



SNDT Women's University

1, N. Thackersey Road, Mumbai 400020

Phone: +91-22-22031879

Fax: +91-22-2201 8226

AQAR 2020-21


Criterion III

Supporting documents

For

3.4.5 - Number of research papers per teacher in the Journals notified on UGC website during the year are available at

<https://sndt.ac.in/pdf/naac/criteria-3/3-4-5-research-papers-per-teacher-in-journals.pdf>


Registrar (Addl. Charge)
SNDT Women's University
Mumbai - 20.

SNDT WOMEN'S UNIVERSITY, MUMBAI
CRITERIA - III
Index of Supporting Documents

METRIC No.3.4.5	Number of research papers in the Journals notified on UGC website during the year 2020-21	
Sr. No.	Content	Page No
1	<p>The HEI should provide the link landing to the paper/article for each journal.</p> <p>The HEI should provide the link to the journal website.</p>	3
2	The HEI should provide screenshots of research articles clearly showing the title of the article, affiliation, name of the journal, year and authors name if the links and DOI number are not available.	6 -411

3.4.5 The HEI should provide the link landing to the paper/article for each journal.

The HEI should provide the link to the journal website.

Title of paper	Name of the author/s	ISSN number	Link to the recognition in UGC enlistment of the Journal	Link to the paper	Link to the journal
Posture-Related Musculoskeletal Problems among Hotel Receptionists in Mumbai: A Cross-Sectional Study	Chauhan MK & Coauthor	0973-2284	Listed in UGC.	https://www.ijoem.com/article.asp?issn=0973-2284;year=2020;volume=24;issue=3;spage=157;epage=162;aulast=Chauhan	https://www.ijoem.com/aboutus.asp
Effect of Covid-19 on features of Speech Signal	Ms. Arundhati Mehendale & Coauthor	0031-4773	listed in UGC CARE	http://penseeeresearch.com/index.php/vol51issue4-3/	http://penseeeresearch.com/index.php/vol51issue4-3/
Online LIS Education in the New Normal Maharashtra State	Dr. Jyoti Bhabal and Coauthor	9721-975	UGC Listed http://www.wbcla.org.in/publication/journal/	http://www.wbcla.org.in/pdf/journals/WBCLA-J-36-I-Mar,2021.pdf	http://www.wbcla.org.in/publication/journal/
Knowledge, Proficiency and Expertise required by Smart Librarians in the Digital Era	Dr. Sarika Sawant and Coauthor	2456-513X	UGC Listed.	https://www.ilaindia.net/jila/index.php/jila/article/view/357/234	https://www.ilaindia.net/jila/index.php/jila
Use of E-books among the users of the engineering colleges of Mumbai	Dr. Sarika Sawant and Coauthor	9721-975	UGC CARE Listed	http://www.wbcla.org.in/pdf/journals/Vol.-35-No-II-June, 2020.pdf	http://www.wbcla.org.in/publication/journal/
"Sheep to Chic" For Wellbeing & Livelihood of Life & Environment	Sharma Anshu & Coauthor	0447-9483	Listed in UGC	https://www.bhu.ac.in/research_pub/jsr/Volumes/JSR_65_04_2021/29.pdf	https://www.bhu.ac.in/research_pub/jsr/
"Impact of Covid - 19 and Lock -down on Financial and Emotional Health of Indian Women"	Dr. Meera shanker and Dr. Anita Chaware	2278-621X	http://dx.doi.org/10.21172/1.171.18	https://www.ijltet.org/journal_details.php?id=961&j_id=4945	https://www.ijltet.org/about_us.php?msclkid=3ec19a31bd6a11ecbdf5ce838bea4b58
A Study of Web 2.0 Tools for Learners at the Higher Education	Dr. Anita Chaware	0974-648X	Listed in UGC CARE	https://www.sxcejournal.com/spe-issue-2020/spe-dec-2020.pdf	https://www.sxcejournal.com/
A Review of Neural Network Hyper-parameters and	Rupa Patel and Anita Chaware	2321-984X	UGC CARE Listed	https://academic-accelerator.com/Research-Hotspot/Journal-Of-	

Approaches to Hyper-parameter optimization				Modern-Thamizh-Research	
Changes in body composition parameters with duration in type II diabetics: an observational study	Dr. Pallavi Mhaskar and Coauthor	2394-6040	UGC CARE Listed	http://dx.doi.org/10.18203/2394-6040.ijcmph20201452	https://www.ijcmph.com/index.php/ijcmph
Impact of a behaviourally focused nutrition education intervention on attitudes and practices related to eating habits and activity levels in Indian adolescents	Dr. Verma and Coauthor	1368-9800	UGC CARE Listed	https://www.cambridge.org/core/journals/public-health-nutrition/article/impact-of-a-behaviourally-focused-nutrition-education-intervention-on-attitudes-and-practices-related-to-eating-habits-and-activity-levels-in-indian-adolescents/6A7BCA51FEB2F07836529678E179A6B3?msclkid=47ae1c2cbd6311ec8b60ba04362e462f	https://www.cambridge.org/core/journals/public-health-nutrition
Development and validation of a questionnaire measuring knowledge, attitudes, and practices (KAP) to healthy eating and activity patterns in school children (HEAPS)	Dr. Verma and Coauthor	0260-1060	UGC CARE Listed	https://pubmed.ncbi.nlm.nih.gov/33522877/	https://www.frontiersin.org/journals/nutrition
Using the intervention mapping framework to develop, implement and evaluate effectiveness of school based nutrition education program	Dr. Verma and Coauthor	0029-6651	UGC CARE Listed	https://www.cambridge.org/core/journals/proceedings-of-the-nutrition-society/article/using-the-intervention-mapping-framework-to-develop-implement-and-evaluate-effectiveness-of-a-school-based-nutrition-education-program/86E743BA0B460FEADC16D104C9355588	https://www.cambridge.org/core/journals/proceedings-of-the-nutrition-society
Effect of Almond Consumption on Metabolic Risk Factors—Glucose Metabolism, Hyperinsulinemia, Selected Markers of Inflammation: A Randomized Controlled Trial in	Shobha Udipi and Coauthor	2296-861X	UGC CARE Listed	https://pubmed.ncbi.nlm.nih.gov/34249987/	https://www.frontiersin.org/journals/nutrition

Adolescents and Young Adults					
---------------------------------	--	--	--	--	--

**A CONCEPTUAL RESEARCH STUDY ON IMPACT OF
TRADITIONAL V/S BRAIN BASED LEARNING APPROACH
ON KNOWLEDGE, CLINICAL PERFORMANCE,
MOTIVATION AND SELF-ESTEEM**

MRS. KIRTI MANGESH JAMDAR

Ph.D. Scholar

MGM Institute of Health Sciences,

Kamothe, Navi Mumbai, India 410209

DR. MRS. PRABHA DASILA

Professor & Director, MGM New Bombay College of Nursing,

MGM Institute of Health Sciences, Kamothe, Navi Mumbai, India 410209

ABSTRACT

Brain Based learning is an emerging field in the teaching learning process. It has been studied by many people at large. It has various aspects which are covered taking into mind the learner's brain into consideration rather than just thinking them as the students sitting physically in the class. This aspect of teaching learning tackles with creating the positive attitude towards learning among the students. As a teacher we understand the mentality of the students in bringing this change of creating affinity towards learning process. We as teachers play a major role in attracting the students towards this process.

Key Words: *Brain Based Learning, Clinical Performance, Motivation*

INTRODUCTION:

Being in teaching profession, we can't be stagnant in our knowledge and the skills. It's mandatory that we keep on updating ourselves continuously so that we are smart enough to deal with smart students. The generation of students is changing day by day where we will have to deal with generation Z students.

We follow Traditional teaching methods since ages. It has been the backbone of the teaching field. With the advancement in the teaching field and various methods used for teaching learning we can be the change agents in the teaching.

When we think of student's mind into consideration, we have to understand their basic needs which are supposed to be met during the teaching learning process. We need to examine the effect of Brain Based learning towards the changes which are desirable in the students. Their attention span, their motivation level, changes in the self-esteem may be affected.

Studying the various studies done by the researchers will help to focus on the effect of Brain Based Learning on the students overall development.

REVIEW OF LITERATURE

STUDIES RELATED TO CHANGE IN ACADEMIC ACHIEVEMENT USING BRAIN BASED LEARNING AND TRADITIONAL TEACHING:

(Tufekçi & Demirel, 2009) conducted a study titled the effect of Brain Based Learning on Achievement, Retention, Attitude and Learning Process. Two group pretest posttest Mixed method design was used in this study. The learning process was analyzed using qualitative data analysis by conducting an interview. The study samples consisted of third year students at Gazi University, from the department of Educational Science. The students were selected as samples based on their equivalence score acquired in the "Student Selection Examination". The achievement score was collected using an open ended test and attitude was checked using a developed achievement scale (35 statements = 17 negative and 18 positive), also Semi structured interview forms were used for qualitative data collection. The data collection continued for 14 weeks. The control group was taught the topics using Traditional Teaching method whereas the study group was taught using Brain Based Learning method. Results showed that as per the Analysis of Variance of the Post Test Basic Level Learning, there was no significant difference in the post test scores of the study and the control group at 0.05 level of significance for $F(1,77) = 0.35$. With regard to the Basic level Total Retention Score Averages, there was a significant difference between retention scores for ($t = 1.96$, $p > 0.05$). In order to determine the change in the post test attitude scores of the study and control group, the data was analyzed using Result of Covariance ($F(1,77) = 7.08$, $p < 0.01$). This showed that there was change in the attitude of the students of the study group in which Brain Based Learning was used.

A Research Study on Traditional Versus Brain based Learning: Opinion of Nursing Students

Mrs. Kirti Mangesh Jamdar¹, Dr. Mrs. Prabha Dasila²

¹ Ph.D. Scholar
MGM Institute of Health Sciences,
Sector -1, Kamothe, Navi Mumbai,
India 410209
kirti.tosalkar@gmail.com

² Professor & Director, MGM New Bombay College of Nursing
MGM Institute of Health Sciences
Sector -1, Kamothe, Navi Mumbai,
India 410209

ABSTRACT

To improve, change or delete any practice or any methodology feedback is very important. Feedback shows us the mirror of what is exactly done and what need to be actually done. Feedback can be taken in various forms. Nursing field is based on both theory and practical. The nursing teacher teaches a particular topic and then also implements the demonstration related to that topic so that the students can implement the same in the clinical area in the actual patient setting. Feedback imposes either positive or negative impact on the learning or achievement¹. In this research researcher used quantitative approach and exploratory survey design.

Key Words: Opinionnaire, Traditional teaching, Brain Based Learning.

INTRODUCTION

In this research, the researcher wants to get the feedback in the form of Opinionnaire related to the topic which was taught using two different methodologies, i.e. traditional method and Brain Based Learning. The researcher intends to help in improving the quality of teaching by getting the student's opinion regarding both the teaching methodologies and compare it within the study and control group for both theory and the clinical teaching.

OBJECTIVES

To compare the opinion of the Nursing students related to Traditional Versus Brain Based Learning

ASSUMPTIONS

1. Opinion of the students may vary from individual to individual.
2. Opinionnaire is an accepted tool to get the feedback.

RESEARCH METHODOLOGY

Research Approach: Quantitative approach.

Research Design: Exploratory Survey design.

Setting: Selected colleges of Nursing in Mumbai.

Population: Students from selected nursing colleges in Mumbai.

Sample: Students who had participated as the samples for the study related to the implementation of Traditional and Brain Based Learning.

Sample Size: 143

Sampling Technique: Non-Probability Convenience Sampling.

Criteria for sample selection:

Inclusion criteria:

1. Willing to participate in the study.
2. Samples for the study related to the implementation of Traditional and Brain Based Learning.
3. Able to access the survey form via internet.

Tool: 3-point Likert Scale

Technique: Self-reporting

DATA COLLECTION

The instrument in this study was an online survey that was used to gather data from 143 participants, from within the different nursing institutions from Mumbai under Maharashtra University of Health Sciences. Participants consent was approved through email and what's app and accordingly the link of the tool was forwarded to them. The participants completed this 15



**International Journal of Research
in
Pharmaceutical and Nano Sciences**

Journal homepage: www.ijrpns.com

<https://doi.org/10.36673/IJRPNS.2020.v09.i03.A15>



**A STUDY ON PERCEPTION OF TEACHERS ON USE OF ONLINE TEACHING-
LEARNING APPROACH DURING COVID-19 AND POST COVID-19 IN
MAHARASHTRA**

Jyoti Thakur*¹

¹*Department of Commerce, S. N. D. T Women's University, 7th Floor, Patkar Hall Building, Mumbai-20, Maharashtra, India.

ABSTRACT

During the pandemic COVID-19, all over India the Government of India has declared lockdown and since then all higher education institutions are closed down. All stakeholders from education industry such as students, teachers, management and parents were in dilemma about completion of syllabus, conducting internal evaluation exams as well as semester End College and university examinations. Students and parents are worried about their exams, declaration of results and even about new academic year. However the management of the colleges and university authorities have issued circulars following the guidelines of the UGC to complete the academic activities. In period of Lockdown colleges and universities have instructed their teachers to conduct classes and assignments, research guidance, class test online. Even guidance and counselling cells are established and sent it to the students and parents. Committees are established to provide guidance on examination related matters. The teachers are engaged in conducting online classes and even attending webinars, e-workshops and training using various video conferencing apps and learning management system tools. The online teaching learning approach has gained importance and plays an important role in the education field during this pandemic as well as it will be used post COVID-19 period. In this context, the researcher has made an attempt to study Perception of teachers on online teaching- Learning Approach during COVID-19 and Post COVID-19 in Mumbai.

KEYWORDS

Online teaching learning approach, COVID-19, Lockdown, Google classroom, Google forms, Online exams, Online classes, Zoom app, Skype, Web ex, Google meet and Kahoot.com.

Author for Correspondence:

Jyoti Thakur,
Department of Commerce,
S. N. D. T Women's University, Patkar Hall Building
Mumbai-20, Maharashtra, India.

Email: jyotitt1@gmail.com

INTRODUCTION¹⁻⁸

Since almost 17th March 2020, all colleges, and universities all over India and Mumbai has closed due to lockdown due to COVID-19 by the Government of India and respective State Government. All stakeholders from education industry such students, teachers management and parents are in dilemma about completion of

May – June

127

syllabus, conducting internal evaluation exams as well as semester End college and university examinations. Students and parents are worried about their exams, declaration of results and even about new academic year. Teachers are concerned about completion of syllabus, conducting of exams and even about evaluation and declaration of results. Management is concerned about conducting exams, evaluation and admission and starting of courses in new academic year.

In period of Lockdown colleges and universities have instructed their teachers to conduct classes and assignments, research guidance, class test online. Even guidance and counselling cells are established and sent it to the students and parents. Committees are established to provide guidance on examination related matters. Various circulars are issued by the colleges and universities providing time to time information to the education stakeholders online during this pandemic.

In this context, the researcher has made an attempt to study Perception of teachers on online teaching-Learning Approach during COVID-19 and Post COVID-19 in Mumbai.

Objectives of the Study

The researcher has framed the following hypotheses:

1. To study and analyse the various video conferencing apps to conduct online classes and Webinars.
2. To study and analyse the various tools available to complete internal evaluation assignments and test.
3. To study the awareness of and use of Learning Managing System (LMS) and e-content development tools by the teachers.
4. To study the perception of the teachers towards online teaching learning approach during and post COVID-19.
5. To give suggestions for effective use on online teaching learning with offline teaching.

Hypotheses of the study

On the basis of the objectives framed, the following hypothesis are framed,

1. Commerce teacher faculty make the wide use of online teaching learning tools as compared to Arts teaching faculty during the lock down of COVID-19.
2. Zoom is widely used app to conduct classes and webinars online.
3. Google Forms is widely used tool to make quizzes by teachers during COVID-19.
4. Teachers perceived that post COVID-19 they prefer Blended teaching learning over offline teaching.

Research Methodology

Both primary and secondary sources of data have been utilized for the research study. Data analysis has been by using statistical tools to draw suitable conclusion and suggestion.

Sources of Data

Primary Data

Survey method is used to collect primary data for the study. Survey is conducted through a structured questionnaire.

Secondary Data

The study is also based on the secondary data. The secondary data is collected from websites of the various online teaching learning apps such Talentmanagement.com

Sample Size

The researcher has used convenience sampling technique for the selection of the respondents for the study questionnaire. The Sample size is fixed to 50 teacher from 50 higher education institutions from various parts of Maharashtra.

Tools for online teaching-learning

The various online apps and tools available for online teaching learning are studied in three categories which are as:

Video conferencing apps used for online meeting of teachers and students

Conferencing apps give the benefits to chat with video with anyone in the world for free of cost to students to deliver lectures for language teachers. During the lockdown period these apps are widely used by the educators, some of which are discussed herewith are:

Skype

Skype is an effective and easy to use app as virtual class room. The Teacher can conduct classes from any place and students can learn from any place.

Zoom

Like a Skype, another free video conferencing tool is Zoom has recently come on the scene for online teaching learning. The Zoom has advantages over Skype: we can record conversations to use for later assessment and feedback. It is a good tool for helping our students to use Videos PPTs I can be presented while conducting lectures using zoom app. It is available in free version and paid version also. Free version have limited services. But during lock down period almost all educators use Zoom app to conduct online classes or webinars.

Cisco Webex

It is also mostly used videoconferencing app to conduct meeting and online classes and webinars with use of videos, audios and screen sharing. It is also have free version with limited features and paid version with special features.

Microsoft team

Like Zoom this app is also widely used by the educator to conduct meetings, workshops seminars and online lectures. This app also provides the features of screen sharing, Interaction with chat, audio videos and recordings of the session. It is a paid app.

Learning Management System tools: The following widely used LMS Are

Talent LMS

Talent LMS is a good tool for Blended teaching learning. It is used for discussion forum. Courses can be build by re-using Presentations or Videos. Talent LMS is also used to conduct the survey even during lectures. It also support to multiple types of questions and a variety of types of test. It is available for free for month with limited use with 5 users and 10 courses.

Socrative

It is tool which can be used in blended teaching learning. The teacher can create quiz while delivering the lecture in the classroom to interact and engage the student in the lecture. In this tool teacher allows room numbers to the students to

enter into the room and complete the quiz test. The teacher receives result spread sheet after completion of Quiz or test

Edmodo

Edmodo is free educational tool connecting teachers and students. In this tool, teachers can create online groups, and can provide educational materials to the student. The teacher can measure the performance of the students and same can communicate with parents and students.

Kahoot.com

It is an educational platform that is based on games and questions. Through this tool, teachers can create questionnaires, discussions, or surveys that complement academic lessons. The material is projected in the classroom and questions are answered by students while playing and learning at the same time. Kahoot promotes game-based learning, which increases student engagement and creates a dynamic, social, and fun educational environment. Free and Paid plans are available. Paid plans start with minimum charges from \$5 per month per teachers for higher education

Google Classroom

It is a free web service developed by Google for schools and higher education that can be used to create, distribute, and grade the assignments. The Google Classroom is used to share the files between teachers and students.

Google Classroom can use documents, Google sheets, slides, Gmail, and calendar to manage student and teacher communication. Students can be invited to join a class through class room code provided by the teachers, or automatically imported from a school domain. Teachers can create, distribute and mark assignments all within the Google ecosystem. The teacher can create for each class a separate folder where the student can submit work given to them by teachers as assignments or projects.

Google Drive

The Google documents and worksheets can be edited with the help of Google drive and can be shared with students who has Google account for

collaborative classroom activities and projects. It is used with Google classroom.

Google Hangouts

The alternative to Skype for bringing remote groups of people together to communicate and collaborate is Google Hangouts. Online classes with Hangout can be conducted with recordings

Tools to conduct online Tests and Quizzes: The following tools are studied

Classmarker.com

Class Marker is a Quiz maker can be easily used to conduct online quizzes, tests and long answer and short answers tests. It is used to conduct online exams without paper work.

It is available with free plan as well as paid plan. Free plan is available with 100 Credits per month that means 1,200 Tests per year can be conducted with limited features.

Paid plan 1 is available 400 Credits per month. 4,800 Tests can be conducted per year with all features included. Paid Plan 2 is available with 1,000 Credits per month. S 12,000 Tests can be conducted with grading per year including all features.

Kahoot.com

It is also very good tool for online teaching learning with offline teaching. It is used to conduct online lecture with presentation, creating tests, quizzes polls during the lecture. Kahoot is used with Microsoft teams, Google Hangouts, Zoom. Kahoot can be used in classroom to create Quiz and open-ended questions for engagement, Polls and word clouds for audience interaction can be created.

Testmoz

Testmoz is a tool that allows you to create automatic grading tests and quizzes. Each test create has a unique URL which can be used to edit tests later stage and to share with others. Testmoz also provides detailed reports which can be analysed by the teachers.

Google forms

Google Forms is also an app of goggle used to create forms for data collection purposes. Students and teachers can use Google Forms to make surveys, quizzes, or event registration sheets. It can

be shared with respondents by sending a link, emailing a message. Data collected using the form is stored in a excel sheet. Google Forms is an excellent free option which can be used for various academic purposes free of cost with feature of availability of result can be used for conducting research survey, student's survey, customers survey to conduct online tests, even to take feedback of the students on courses, programme, teachers and workshops and seminars with varied options.

DATA Analysis and findings of the study

The responses on Perception of teachers on online teaching learning have been collected from 50 teachers from 50 colleges and university departments from arts and commerce faculty. The result of the responses has been presented as under:

The findings of the Study

76 percent female teachers and 24 percent male teachers participated in survey out of which 74% teachers were from commerce faculty and 26% were from arts faculty. 70% teachers were permanent and 30% teachers were temporary teachers. 72% teachers were teaching at UG level, 16% were PG teachers and 12% teachers were teaching at UG and PG level also.

As during lockdown period, all teachers were doing work from home such taking online classes for the students, creating tests online for the students attending webinars online on varies topics. Some teachers were conducting webinars, workshops online. Some were engage in developing contents teaching material for the students, creating video lectures to deliver at various seminars and workshops, attending meetings of various academic bodies, giving research guidance to the research students online, checking the work done by the researchers online. Principals head of the department were engaged in establishing career and guidance cell and even guiding and counselling the students and their staff during this COVID-19 period, making technical arrangements for conducting classes, tests, quizzes and even webinars and workshop. They were also engaged in disbursement of salary to the teaching and non teaching staff online, issuing online circulars from

time to time during this COVID-19 period. In taking into consideration this some questions were asked to the respondents on their engagement online to perform various activities.

The findings of this are under

1. 66% teachers conducted online classes and provided research guidance to the students out of which 60% are from commerce faculty and 6% are from Arts faculty and 34% did not conducted classes online out which 28% are from arts faculty.
2. 100% teachers attended or conducted workshops and webinars online organised on varied topics.
3. 100% teachers each either attended or conducted webinars and workshops on Research Methodology and online teaching learning tools. 60% teachers even attended webinar on e-content development, 64% attended webinar on Impact of COVID-19 and 14% attended webinars on the topics other than these.
4. Those teachers who have conducted online classes for the students or used online tools to attend or deliver lecture at webinar, 92% used Zoom app, 58% used Web Ex app, 66% used you tube channel, 60% used Google classroom and 40% used Google meet.
5. 44% teachers conducted online test for the students as part of internal evaluation and 56% did not conduct any online test.
6. 76% teachers are aware about various online tools to conduct online exams and 24% not aware about online tools to conduct the exams.
7. Those who are aware on online tools to be used to conduct online exams out of which 76% aware about Google classroom, 54% aware on Google sheets, 22% aware about Kahoot.com, 14% aware about class marker.com, 8% aware on vetvox, com and 6.67% about Testmoz.
8. The teachers who have conducted online tests or assignments for the students have used various tools to create and conduct tests online. 46% teachers use google forms to conduct online test, 28% used Google classroom, 16% used Google sheets, 6% used Kahoot.com and class marker.com. No one used Vetvox.com and Testmoz.
9. E-content development is an integral part of the education system. UGC is very keen on implementation of SWAYAM online Mooc courses in the curriculum of the UG and PG courses of the colleges and Universities. As per the guidelines of the UGC universities has introduced transfer of 20% credit through SWAYAM MOOC courses. In this context, it is essential for the teachers to develop their online SWAYAM MOOC courses and E-content development is necessary step towards it. So questions were asked to the respondent teachers on their awareness on E-content development tools. It is come to know that 74% teachers from various colleges are aware on various tools of E-content development and 26% did not aware.
10. 50% of the teachers did not used any E-content development tool and 50% teachers used tools for E-content development and many of them have used more than one tool. Those who have used tools 92% used Screen Recorder, 20% used Open Camera to create videos for online classes. 12% teachers used Lexis Audio Editor and 8% used Kine Master. No one used Cinema F-5 Lite tool.
11. 58% teachers has used various online apps to give guidance and counselling to the students during COVID-19.
12. The question was asked to the teachers about benefits of Online Teaching Learning approach used during COVID-19 and to be used post COVID-19. 44 % teachers say that Time Saving and Time Management is the benefit off online teaching learning approach, 30 % said that Reach to Large masses the benefit, according to 30% teachers it is Effective way of teaching and learning, 28% opinion that there is.

Scope for Online Interaction, 58% says that Students can access it at any time and at any place, 44% told that it is Permanent Record of Lecture and 52% teachers recorded all the above benefits of online teaching Learning approach.

The question was asked to the teachers to record limitations of Online Teaching Learning approach used during COVID-19 and to be used postCOVID-19. As per the responses given by the teachers, 52% says that there are Technology issue to conduct online classes. 50% teachers recorded that there is issue Lack of Control over the students while conducting online classes, 40% opinion that there is lack of Engagement from the students side, 24% said that there is lack of personal touch while conducting online lectures. 44% teachers' opinion that online teaching is not useful for Practical courses, 16% teacher old that they have no knowledge of ICT, 18 % told that there will be resistance from teachers' side for online teaching learning and 42 % recoded all the above limitations of online teaching learning approach.

The respondent teachers were asked their perception on impact of online teaching learning approach during COVID-19 and Post COVID-19, the finding of the responses are

1. 62% of the teachers post COVID-19 online teaching learning will get more importance over offline teaching, however 38% teachers says that offline teaching is more important.
2. 52% teachers says that online teaching learning will affect classroom teaching and 48% says that it won't affect classroom learning.
3. 18% teachers opinion that online teaching will reduce the burden of teachers, however 52% teacher thank that it will not reduce any burden of teachers and 30% teachers says that it may reduce the burden of teachers.
4. 34% teachers think that online teaching will reduce the requirement of additional teachers, 30% teachers said that it will not reduce the requirement of additional teachers and 36% teachers opinion that it

may reduce the requirement of additional teachers.

5. 40% teachers believed that online teaching will create unemployment to the temporary teachers, 26% teachers says that it will not create any unemployment to the temporary teachers while 34% think it may create unemployment to the temporary teachers.
6. 68% teachers prefer Blended Teaching learning post COVID-19, 22% teachers still prefer offline teaching post COVID-19 and 10% prefer online teaching post COVID-19.

Testing of Hypotheses

The hypotheses are tested on the basis of the results of the responses of the respondents which is converted percentage to analyse the result.

Commerce teacher faculty make the wide use of online teaching learning tools as compared to Arts teaching faculty during the lock down of COVID-19. The stated hypothesis is tested on the basis of the result of the responses presented in Table No.1.

The result of the responses states that 66% teachers conducted online classes and provided research guidance to the students out of which 60 % are from commerce faculty and 6% are from Arts faculty and 34% did not conducted classes online out which 28% are from arts faculty(Reference: Fining No.II(1). Therefore the hypothesis "Commerce teacher faculty make the wide use of online teaching learning tools as compared to Arts teaching faculty during the lock down of COVID-19" is accepted.

Zoom is widely used app to conduct classes and webinars online

The stated hypothesis is tested on the basis of the result of the responses presented in Table No.2.

Those teachers who have conducted online classes for the students or used online tools to attend or deliver lecture at webinar, 92% of them used Zoom app. Some of the teachers have used more than one app. The stated hypothesis "Zoom is widely used app to conduct classes and webinars online" is accepted on the basis of results of the respondents.

Google Forms is widely used tool to make quizzes by teachers during COVID-19

The stated hypothesis is tested on the basis of the result of the responses presented in Table No.3.

The teachers who have conducted online tests or assignments for the students have used various tools to create and conduct tests online. 46% teachers use Google forms to conduct online test, 28% used Google classroom, 14% used Google sheets, 6% used Kahoot.com and class marker.com. No one used Vetvox.com and Testmoz. The stated hypothesis "Google Forms is widely used tool to make quizzes during COVID-19 by teachers" is accepted.

Teachers perceived that post COVID-19 they prefer Blended teaching learning over offline teaching

The stated hypothesis is tested on the basis of the result of the responses presented in Table No.4.

68% teachers prefer Blended Teaching learning post COVID-19, 22% teachers still prefer offline teaching post COVID-19 and 10% prefer online teaching post COVID-19. The stated hypothesis "Teachers perceived that post COVID-19 they prefer Blended teaching learning over offline teaching" is accepted.

Conclusions based on the Findings

On the basis of the findings of the research study, the researcher has put forth the following conclusions.

1. The maximum number of teachers who engage in online teaching learning process during COVID-19 are female from UG level and from commerce faculty whose job is of permanent nature and from Commerce faculty.
2. Very few teachers did not conducted online classes however they communicated students using whatsapp and telephonic talk.
3. All teachers participated in survey were engaged online during COVID-19 o to attend various workshops and webinars.
4. Almost all teachers attended online workshops and webinars on Research Methodology and online teaching learning

tools followed by Impact of COVID-19 on various sectors and then webinars on E-content development. This shows that teachers are engaged in doing work from home either to conduct webinars or to participate in webinars.

5. Zoom app is widely used by the teachers either to conduct online classes or to conduct and attend the webinars followed by you tube, Google Classroom, Web Ex and Google Meet. There is no harm using Zoom app, it is available free to use for limited time, paid service is also available with varied features. Zoom app is very easy to handle with screen sharing option to use PPTs and videos, chat option to ask queries and questions and even to see live to each other. Even recordings are available post session.
6. Majority teachers were used online tools to guide and provide counselling to the students to resolve queries of the students and their parents.
7. Less than 50% teachers used online tools to conduct online tests, quizzes and to complete assignments and projects.
8. Those who have conducted online tests, quizzes and assignments and projects used Google forms and Google classrooms for it. Very few used class marker.Com and Kahoot.Com.
9. The majority of the teachers surveyed are aware about various tools available for e-content development and used various tools for content development. The highly used tool is Screen Recorder. The other tools like Kine Master, open Camera are rarely used. These tools are effective to edit and manage the videos but to some extent need training to use it.
10. The benefits of Online Teaching Learning approach used during COVID-19 and to be used post COVID-19 which listed by the teachers are: Time Saving and Time Management, Reach to Large masses the

benefit, Effective way of teaching and learning,

11. Scope for Online Interaction, 58% says that Students can access it at any time and at any place, Permanent Record of Lecture.
12. The limitations of Online Teaching Learning approach used during COVID-19 and to be used post COVID-19 recorded by the teachers are Technology issue to conduct online classes, Lack of Control over the students, lack of Engagement from the students side, lack of personal touch online teaching is not useful for Practical courses, Lack of knowledge of use of ICT to teachers, resistance from teachers' side for online teaching learning and 42 % recoded all the above limitations of online teaching learning approach.
13. Teachers are opinion that online teaching will get more importance over offline teaching post COVID-19, some of them think that online teaching will reduce the burden of teachers at the same time they think that online teaching will reduce the requirement of additional teachers so temporary teachers may lose their jobs.
14. A large group of teachers opinion that blended teacher learning will be effectual post COVID-19 where teacher may use classroom teaching blended with online teaching learning even to be used in delivering lecture in class to engage and interact student attention in the class.

Suggestions on the basis of the Study

On the basis of the survey on perception of 50 teachers in higher education institutions on use of online teaching-Learning Approach during COVID-19 and Post COVID-19 in Mumbai, the researcher has put forth the following suggestions:

1. As blended teaching learning is good approach for higher education institutions to cater the needs of various stakeholders, all Colleges and Universities now have to make compulsory use of online teaching learning tools in their curriculum.

2. The teachers from Faculty of arts have negative approach towards online teaching learning the approach of these teachers is needed to be changed from traditional teaching to blended teaching learning. For this purpose college and universities should assign API score for use of online teaching learning tools with classroom teaching. Even for promotions under CAS, condition to attend minimum one workshop and training program for virtual class teaching and E-content development is to make compulsory.
3. To use online teaching and online class test tools training to the teachers is must so colleges and universities should organise workshops and training programs in their own places free of cost so that teachers are not to make arrangements to attend the such workshops and training programs at other Colleges or Universities in the working hours of the teachers apart from their regular teaching workload.
4. Training to teachers is to be continues process. Instead of organizing one workshop or one training program. Training is to be given to the teachers on regular basis in their computer Lab. Paid Services of the instructor.
5. If the teachers are willing to attend such programs outside the institutions then need to be taken care of that these teachers can easily get duty leave and financial grant to attend such programs.
6. The colleges should keep some budget provision for amount to spend on acquisition of various online teaching learning tools so that teachers can teach and students can learn online. Universities should give permission to the university department to keep some budget provision for acquiring such tools and instruments.
7. It is fact that in classrooms of the university departments basic provision to use such tools is lacking. LCD projectors are not installed and where they are installed not working. No maintenance of such projectors. There is no

wifi facility available in the classrooms. In some colleges, wifi facility is available only for staff and not to the students. To use online teaching tools in the class availability of basic requirements to use such tools need to be provided.

8. In remote areas network is the measure issue so to use such tools in the colleges of remote areas, such issues need to be taken care of by the college management.

Table No.1: Data of the Teacher conduct online classes

S.No	Data of the Teacher conduct online classes						
1	Conduct of Online Classes	Yes	33	66 %	Commerce Faculty	30	60%
					Arts Faculty	03	6%
		No	17	34%	Commerce Faculty	03	6%
					Arts Faculty	14	28%
2	Total		50	100		50	100

Source: Primary data collected from respondents

Table No.2: Use of App in Online Teaching

S.No	APP	Frequency	%
1	Zoom	46	92
2	WebEx	29	58
3	Google Classroom	33	66
4	You tube	30	60
5	Google Meet	20	40
6	Total	50	100

Source: Primary data collected from respondents

Table No.3: APP to conduct online test

S.No	APP to conduct online test	Frequency	%
1	Google Forms	23	46
2	Google Classroom	14	28
3	Google Sheet	07	14
4	Classmarker.com	03	6
5	Kahoot.com	03	6
6	Testmoz	0	0
7	Vetvox	0	0
8	Total	50	100

Source: Primary data collected from respondents

Table No.4: Preference of Teacher for type of Teaching

S.No	Type of Teaching Learning	Frequency	%
1	Offline Teaching Learning	11	22
2	Online Teaching Learning	05	10
3	Blended Teaching Learning	34	68

Source: Primary data collected from respondents

CONCLUSION

In the epidemic of COVID-19, the education industry has shifted from traditional mode of teaching to online mode of teaching. The teachers in higher education institutions has accepted the online teaching mode to conduct the classes, exams, and to attend webinars related to development of research activities and e-contents during the period of COVID-19. The teachers are taken and some are ready to take training to develop e-content to conduct online teaching and other academic activities. They have accepted the change occurred in education industry during COVID-19 period. They have completed their responsibility of completing the curriculum and other academic activities. They are capable to use online teaching tools and to develop e-contents. However they are of the opinion that post COVID-19, they will focus on blended teaching learning approach as the online teaching learning should be the support to the offline teaching. The online teaching learning has many benefits at the same time it has many challenges and difficulties also. So online teaching learning is not the only approach to be used but it is to be used as a support to offline teaching learning even post COVID-19.

ACKNOWLEDGEMENT

The author wish to express their sincere gratitude to Department of Commerce, S. N. D. T Women's University, 7th Floor, Patkar Hall Building, Mumbai-20, Maharashtra, India for providing necessary facilities to carry out this review work.

CONFLICT OF INTEREST

We declare that we have no conflict of interest.

REFERENCES

1. Carrie Thornthwaite. Not a Toy But a tool: A Educator Guide and Using ipad, *Roman and Littlefield, U.K*, 2014.
2. Budhair S S and Skipwith K. best practices in engaging online learners through active and experiential learning strategies, *London: Routledge*, 1st Edition, 2016, 112.
3. Green T D, Brown A H. The educators guide to developing new media and open education resources, *Taylor and Francis Group an Informa Business, London: Routledge*, 1st Edition, 2017, 144.
4. Kahoot.com.
5. Zoom app.com.
6. Socrative.com.
7. Class Marker.com.
8. Google.com.

Please cite this article in press as: Jyoti Thakur. A study on perception of teachers on use of online teaching-learning approach during COVID-19 and post COVID-19 in Maharashtra, *International Journal of Research in Pharmaceutical and Nano Sciences*, 9(3), 2020, 127-136.

A Study of Challenges Confronts by the Students in Online Teaching- Learning Activities in the Emergence of Pandemic Covid-19

Dr. Jyoti Thakur

Head, University Department of Commerce,
SNDT Women's University, Mumbai

Abstract

The outbreak of Covid-19 has drastically affected the every aspects of human life and the economy of the country as a whole. The education is also drastically disrupted by the spread of Covid-19 in all over the world. According to the UNESCO report, Covid-19 has affected nearly 68% of total world's student population as per the data taken during 1st week of June 2020. In the emergence of pandemic Covid-19, the schools and colleges/ universities were closed, has brought many challenges and drawbacks in the Education sector. The Covid-19 pandemic taught the entire society on how the necessity is the mother of invention by allowing educational institutions to adopt online learning but this has brought different challenges associated with it to the teacher and the students.

Keywords: Online Teaching- Learning, Pandemic Covid-19, Higher Education, Challenges

1.1 Introduction:

"There are 34 crore students in the country, more than America's population. They are our biggest treasure. Safety of students and teachers is of utmost importance to the

government (during this Covid-19 pandemic)" – Ramesh Pokhriyal, Union HRD Minister.

India is facing the Novel Corona Virus (Covid-19) pandemic, as the world. Since the lockdown was announced on 25th March by the Prime Minister of India in view of safety of the Indians, the teaching-learning activities have also temporarily suspended. During this pandemic hour, education institutes are shut and students are quarantine at home, with limited contact with friends and no physical activity, with almost all recognized boards having postponed or cancelled examinations. Thus the student community is facing serious uncertainty as to their future because their further education and careers. Higher education plays an important role in the building of a nation and paving the way for overall development of a nation. Ensuring learning continuity during the time of schools/ colleges/ institutions closures, the government has asked the teachers/ professors to move to online delivery of the classes. Before the Covid-19 pandemic, the Indian education has never implemented the online learning on this massive scale. The Teachers and students were largely unprepared to support continuity of learning and adapt to new teaching and learning methodologies. The paper is an attempt to study the various barriers confronted by the students as they tried to adapt to online learning in this emergence of Covid-19 pandemic. Barriers like technological barriers, individual barriers, domestic barriers, Institutional barriers, community barriers, etc.

1.2 Objectives of the Study

The following objectives are framed for research study.

1. To study the challenges faced by the students in online teaching-learning activities during the Covid-19 spread in the country.
2. To study the perception of the students on Online teaching learning Process.
3. To suggest some suitable measures for effective online teaching and learning activities.

1.3 Research Methodology

For the purpose of research, both primary and secondary sources of data are used. Data analysis is done by using statistical tools to draw suitable conclusions and suggestions.

a) Sources of Data

Primary Data

Survey method is used to collect primary data for the study. Survey is conducted through a structured questionnaire. Survey is a systematic collection of the data from the beneficiaries through the questionnaire. Survey is the most widely accepted method for the research.

Secondary Data

The study is also based on the secondary data. The secondary data is collected from the guidelines of the Government of India, MHRD, etc

b) Sample Size

The researcher has used convenience sampling technique for the selection of the respondents for the study. The Sample size is 126 students for the data collection.

1.4 Review of literature:

Some of the review of Literature is presented below

JhaPravat Kumar, (2020), the author has outlined various impact of Covid-19 on Higher education in India. Virtual education is the most preferred mode of education at this time of crisis due to the outbreak of Covid-19. He says that the post covid-19 education seems to be an education with widely accepted online/virtual education which may perhaps be a parallel system of education.

GohiyaPoorva, Ashish Gohiya, highlights about the Teaching learning in the times of Covid-19 pandemic needs to be revamped in order to follow the norms of social distancing. The main hindrance in online learning was internet connection.

Prof. Arup Barman Mr. Das Karan, they make an attempt to study the re- casting of the e-learning and E- education during covid-19 Pandemic. The paper throws light on the e-learning initiatives at the global level.

1.5 Data Analysis and Interpretation:

The research study is based on the primary data collected through survey questionnaire and the secondary data collected through different sources. Below, the primary data collected from 126 students Arts, Science and commerce faculties of UG and PG program all over from Mumbai, Thane, Navi Mumbai is analyzed for deriving the conclusion and suggestions.

I) General Profile and Perception of the Students on Online Teaching Learning Process:

Table 1

Sr. No.	Particulars	Frequency	%
1	Male	35	27.0
	Female	91	73.0
2	Commerce	94	75.0
	Arts & Social Science	15	12.0
	Science & medicines	17	13.0
3	Online Classes started by the institutions after lockdown:	108	86.0
	Yes	18	14.0
4	Prior Experience of students of online learning mode before covid-19		
	Fresher	65	52.0
	Good Experience	22	17.0
	Some experience	39	31.0
5	Basic orientation raining to the teachers required:		
	Strongly Agree	28	22
	Agree	59	47
	Neutral	28	22
6	Study Plans in light of Covid-19:		
	Continue Studies	82	65.0
	Postpone studies	15	12.0
	Can't say	24	19.0
	Cancel studies	05	04.0
7	Availability of Materials/Equipments with the students for online Teaching Learning:		
	Available	64	51.0
	Not Available	62	49.0
8	Quality of online lectures delivered		
	Very Good	32	25.0
	Acceptable	55	44.0
	Need Improvement	39	31.0

Analysis:

1. Out of total student respondents, 73% are female students and 27% are male students.
2. 75% students are commerce students, 12% are arts and social science students and 13% are science and medical students.

3. 86% of the students have attended online classes after lockdown.
4. 52% of the students are nil knowledge of online mode of teaching learning before covid-19, 31% have some experience and only 17% have good experience.
5. 69% of the students agree that basic orientation to be provided to the teacher on online teaching learning, only 9% disagree on this.
6. 65% of the students have continued their studies in the covid-19 pandemic situation, 12% postpone their studies and 4% discontinued their studies.
7. 51% of the students said that Materials/ Equipments for online Teaching Learning are not available with them.
8. 44% of the students says that quality of the online lectures delivered is acceptable and 31% says it need improvement and only 25% are satisfied with the quality the online lectures delivered.

II) Problems and Challenges faced by the students in Online teaching Learning Process:

Table 2

Sr. No.	Particulars	Frequency	%
1	Higher Studies affected due to fund availability:		
	Badly	66	52.0
	No Effect	24	19.0
	Neutral	36	29.0
2	Online Classes has increased the expenses in terms of equipments and Broadband connections:		
	Yes	84	67.0
	No	21	16.0
	Not Sure	21	16.0
3	Emotional and psychological Stress due to transmission:		
	Yes	76	60.0
	No	50	40.0
4	Experience of Barriers on online learning mode by Students:		
	Difficulty in adjusting learning style	65	52.0
	Lack of technical skill	75	60.0
	Unreliable or no internet access	90	71.0
	Poor communications with educators	56	44.0
	Limited space conducive for studying	98	78.0
	Power Interruptions	42	33.0
	Job commitments	36	29.0
	No device/ Gadget sharing	90	71.0
	Economic and financial Distress	56	44.0
	Time Constrains and Heavy assignments	45	36.0
	Inadequate skill of educators	40	32.0
	Physical and mental health difficulties	76	60.0
	Gap in knowledge and skills from current teaching methods	80	63.0
	Large class size	85	67.0
5	Migrations/returning home town has affected the active participations of the students in online teaching learning		
	Agree	62	49.0
	Disagree	21	17.0
	May be	43	34.0

Analysis:

1. 52% of the students expressed that their studies has been affected due non availability of funds in covid-19.
2. 67% of the students told that Online Classes has increased the expenses in terms of equipments and Broadband connections:
3. 60% of the students are facing Emotional and psychological Stress due to transmission.
4. Experience of Barriers on online learning mode by Students:
 - a. 52% students experience difficulty in adjusting learning style.
 - b. 60% students experience lack of technical skill
 - c. 71% students experience unreliable or no internet access
 - d. 44% students experience poor communications with educators
 - e. 78% students experience limited space conducive for studying
 - f. 33% students experience power Interruptions
 - g. 29% students experience job commitments during online teaching learning
 - h. 71% students experience no device/ Gadget sharing
 - i. 44% students experience Economic and financial Distress
 - j. 36% students experience time constraints and Heavy assignments
 - k. 32% students experience inadequate skill of educators
 - l. 60% students experience physical and mental health difficulties
 - m. 63% students experience gap in knowledge and skills from current teaching methods
 - n. 67% students experience large class size in online classes due which disturbance come in the teaching and learning.

5. 49% of the students said that the migrations/returning home town has affected the active participations of the students in online teaching learning.

III. Satisfaction Level of the students on Online Teaching Learning Process:

Table 3

Sr. No.	Particulars	Frequency	%
1	Possibility of encouraging active learning interaction, participation and collaboration among students in online Teaching Process:		
	Always	51	40.0
	Sometimes	56	45.0
	No	19	15.0
2	Need of Physical space (traditional teaching) where queries can be resolved and practice with real tools.		
	Yes	108	86.0
	No	18	14.0
3	Overall satisfaction on with online teaching learning during covid-19 outbreak:		
	Highly satisfied	17	13.0
	Satisfied	36	29.0
	Neutral	44	35.0
	Dissatisfied	16	13.0
	Highly Dissatisfied.	13	10.0

Analysis:

- 40% students says that there is Possibility of encouraging active learning, interaction, participation and collaboration among students in online Teaching Process, 15% students says that there is no possibility.
- 86% students say that there is need of Physical space (traditional teaching) where queries can be resolved and practice with real tools.
- 42% of the students are overall satisfied with online teaching learning during covid-19 outbreak, 35% are neutral and 23% students are dissatisfied.

1.6 Suggestions

The researcher has made an attempt to provide certain suggestions which will help in improvements in Online learning in this emergence of pandemic COVID-19 areas below:

- Educators and the students should be provided with basic training before switching to online learning classes and effective utilisation of the technology in teaching learning process.

- The severe challenge to online learning is the financial crises therefore the government under RUSA should adopt a policy/ scheme which provide free internet and free digital gadgets through institutions to all learners in order to encourage online learning and remain safe during pandemic.
- Extend leniency to students who bear additional responsibilities at home.
- As students have undergone a mental stress and anxiety during this pandemic period, the Educational institutions should organise or develop online mental wellness programs and provide psychosocial support for the students.
- Avoid cognitive overload. As with classroom teaching ensure that assessment measures are aligned with desired learning outcomes.
- Online learning courses should be carefully designed and developed so that it can be effectively communicated to the students.

1.7 Conclusions:

- It is studied that most of the Institution/ University had converted their classes/ activities into online Teaching-Learning mode after lockdown announcements.
- It is studied that most of the respondents agree that basic training is required before switching to online learning mode, as many of the respondents are fresher in this regard.
- It can be said that most of the respondents are in favour of continuing their studies
- It is studied that most of the students attend the online learning daily and followed by 2 or days weekly.
- Most of the students say that Covid-19 pandemic has affected badly their ability to fund their higher studies.
- It is studied that most of the students agree that attending the Online Class has

increased the expenses in terms of internet connectivity, buying technical equipment, etc.

7. Most of the students says that online learning have brought emotional and psychological stress (pressure) due to sudden transition to new learning environment.
8. It is studied that most of the students encounter challenges in online teaching-learning activities during the pandemic Covid-19
9. Most of the students face technological difficulties, less of technical skills, non-availability of adequate resources, financial distress, power interruptions, etc.
10. It is studied that most of the students face Physical or mental health difficulties.
11. It is studied that migration/ returning home towns of the students has impact on the active students participation in Online learning.
12. It is studied that most of the students say that it is sometime not possible in Online Teaching-learning process to encourage active learning, interaction, participation & collaboration among student
13. Most of students says that there is a need of a physical space where queries can be resolved and practice with real tools.
14. It is studied that most of the students are overall satisfied with the online Teaching-learning during the Covid-19 pandemic lockdown.
15. Thus the effective digitalisation of the education systems possible only after removal of the barrier like internet coverage, low technical skills, limited resources, etc. faced by the students in online learning during the pandemic Covid-19. And it can be concluded that the effective and efficient use of ICT (Information Communication Technology) in the teaching-learning process is a very

important part of an education in this lockdown period.

References:

1. JhaPravat Kumar, "Impact of Covid-19 on Higher Education in India", International Journal of Advanced Education and Research, ISSN 2455-5746, Volume 5, Issue 3, 2020, Page no.77-81.
2. Pravatku Jena, "Challenges and Opportunities created by Covid-19 for ODL: A case study of IGNOU", International Journal for Innovative Research in Multidisciplinary Field, 6(5), 2020, 217-222.
3. MHRD notice (20 March 2020). COVID-19 Stay safe: Digital Initiatives. <https://www.mohfw.gov.in/pdf/Covid19.pdf>
4. United nations, Policy Brief: Education during COVID-19 and beyond, August 2020
5. Dr. Singh Garima, "Challenges for Teachers in the Era of E- learning in India", International Journal of Multidisciplinary & Allied studies, ISSN 2394-336X, Volume 03, Issue 02 (2016) page no. 14-18.

□□□

12

Impact of COVID-19 on Tourism Industry: Perception from India

Dr. Jyoti Thakur

Head, University Department of Commerce,
SNDT Women's University, Mumbai

Deepali Tone (Hamand)

Research Scholar
"Department of Commerce",
SNDT Women's University, Mumbai-20

Abstract

COVID -19 is one new disease found in 2019. This new pandemic spread very fast though the contact with an infected person when they have cough or sneeze. First time COVID-19 starting in China then it spreading to worldwide that contributes large number of death. The aim of the study is, to discuss impact of the COVID -19 on tourism industry in India and finding the solution to recovery of tourism industry. The study utilized journals, historical records, newspaper articles, webinars, world health organization publication, government data, World Tourism Organization publication, Indian Chamber of Commerce publication, online websites on COVID -19 impact on tourism. India has also experienced an adverse impact outbound tourism activates have also been banned. Airlines have cancelled flights, while hotels are almost completely vacant and result is tourism agencies are facing large economic losses and employment cutoff in India. The expansion of COVID-19 is predicted to cause a long term adverse effect on the tourism in India. This also guide future studies in addressing challenges for the tourism Industry.

Keywords

COVID-19, Pandemic, Novel Corona,
Impact, Tourism, India, Employment

1.1 Introduction

Tourism industry is a fastest growing industry of the 20th century. In the service industry tourism plays highest role, tourism industry gets more affected due to any external or internal shocks or stresses.

A corona virus originated from the Wuhan province in China during December 2019 which pose an international public health emergence and had acquired the position of an awfully high risk infection virus. The result of COVID-19, the disease caused by the novel corona virus, has expand its roots to 195 countries with more than 10 million cases across the world recorded as corona virus positive as of this writing. The below table showing Indian COVID-19 cases increased rapidly by May to June 2020.

Table 1: COVID-19 cases in the world and India
Source: Worldometers(2020); Corona Tracker(2020)

Date (2020)	World		India	
	Total Cases	Total Death	Total Cases	Total Death
February 15	69,479	1,669	3	0
March 10	137,649	4,299	62	0
April 10	1,723,304	109,369	7,600	249
May 10	4,128,625	288,712	67,161	2,212
June 10	7,440,575	426,412	287,155	8,107
July 10	12,372,402	567,923	822,603	22,144

As per COVID-19 reports, came to know from across the world the Indian government took preemptive steps to screen the passengers at the airports. Indian people returning from different countries were being evaluated for clinical symptom tasted for COVID-19 and quarantine for two weeks. Till the 16 March the government started imposing the flight bans and visa restriction by which time it was obvious that the aviation and tourism industries were going to be heavily impacted. The March 24th the Indian government had announced a complete lockdown in country to control the situation to prevent the further spread of the virus. This lockdown continued till the end of May, in some form of Covid-19 to considerable extend even though it came at the cost of economic output. Most impact on the migrant and daily wage

workers of all classes due to pandemic Covid-19, the recreation, the travel and tourism might be the most impacted in the Indian economy, while some industries have been 'unlocked' early June the restriction on travel and tourism might be continue for quite some time to mitigate the risk of infection in cities, towns and villages. The objectives of the search into gather the status of impact of virus on national international tourism that is inflow, policies, outflow and tourism sector as a whole.

i) **Tourism Industry in India:**

India is huge market for travel and tourism and integrated business. Tourism industry offers a heterogeneous portfolio of niche tourism products, adventure, medical, cruises, wellness, sports, eco-tourism, and film, rural and religious tourism for domestic and international tourists. Past few decades it has seen India had experienced exponential growth in travel and tourism aided by different kinds of tour and travel. India has significance potential for becoming a major source of tourist place. Before the onset of the pandemic the sector was growing very rapidly as it supports a large employment base and rakes in huge profit. Today India has large number of destination for both domestic and international travels. The world travel and tourism council (WTTC) reported that tourism in India generated Rs. 16.91 lakh crores or 9.2% of India's GDP in 2018 and supported 42.673 million jobs which is 8.1% of its total employment (source by wtcc.org). As per WTTC report, India has ranked 3rd among 87 countries in terms of travel and tourism total contribution to GDP in 2018.

1.2 **Objectives of the Study:**

The objectives of the search into gather the status of impact of virus on national, international tourism that is inflow, policies, outflow and tourism sector as a whole.

1) To study Covid-19 pandemic impact on tourism industry in India.

2) To study tourism unemployment during pandemic in India

1.3 **Research Methodology:**

The research paper is based on secondary data. In this study accomplished the analysis by reviewing different article, news paper, webinars, world tourism organization(WTO) published data, World Health Organisation (WHO) published data, Indian Chamber of Commerce (ICC) reports, world travel and tourism council (WTTC) reports, literature of tourism books, and websites etc.

1.4 **Findings and Discussion:**

i) **Impact of Covid-19 on Tourism Industry in India:**

Covid-19 is impacted on Tourism industry to incur Rs.1.25 transaction revenue loss in 2020. As per the Indian Chamber of Commerce (ICC) report travel and tourism alone for 9.2% of India's GDP (2018). The tourism industry generated 267 lakhs jobs in 2018. The measure effect of the corona virus has been found to cripple the India tourism and hospitality industry at large form. According to ministry of civil aviation report, inbound visitors to India drop by 25% to 30% due to novel corona. As per the ministry of tourism government of India Foreign Tourist Arrivals (FTA) has been found to be down by about 67% annually in January to March quarter in occupancy levels as compared to same period in 2019 (Indian Chamber of Commerce); while domestic tourist notched a much lower figure by about 40% FTA, while against 10.87 lakh in February 2019 and 11.18 lakh in January 2020. As per the report of industrial body branded hotel groups are faced loss as much as 1.10 lakh crore, online Travel agencies Rs 4,312 cr., Inbound and domestic tour travel operators Rs, 25000 cr., adventure tour operator Rs. 19000 cr. and as new cruise in coastal area have faced loss of Rs 419 cr.

Table 2: Forecasted Effect of COVID-19 on the Tourism Industry in India

Source: www.financialexpress.com

Tourism Sector	Numbers of Loss (In Crores)
Branded Hotels Groups	1,10,000
Online Travel Agencies	4,312
Tour operators (Inbound & Domestic)	25,000
Adventure Tour operators	19,000
Cruise Tourism	419

Mode of transportation: at least of year people will travel inside their own country. They will have a fear of stepping in some other country for wandering people will also fear travelling in flights, cruises, public transport, eventually they will have to reduce the packages to attract customers. Airline industry will have to tie up with tourism sector to bug up their losses.

i) Tourism unemployment during Covid-19 in India:

The tourism industry growth approximately to 10% on GDP and provides more than 50% million jobs till January 2020. There will be reduction of 12% to 14% in the industry.

All the people these associated in tourism industry will get affected. Impact of pandemic would be felt on both white and blue collar jobs. It will take around 1 year to recover from this situation. Tourism value chain across, hotel, travel companies, tour operators, destination, restaurant, family entertainment venues and air, land and sea transportation will get into slump.

Total tourism business activities of India upwards of Rs.2 lakh croe in the domestic tourism activity and estimated at USD 28 billion plus in forecast which will be at economic risk though the year. Thus, in excess of Rs. 5 lakh crore of direct tourism industry almost at high risk of total economic activity

1.5 Suggestion

Expert suggested public should start at a gradual or in fact slow recovery scenario of the tourism industry in India. However the important thing to focus on is there is hope of recovery after post COVID-19. Within the industry, mutual collaboration, sharing of information and linking up efforts towards common goals, have perhaps never been as important as they are today. "The only things

we can currently does is to stay united and remain safe and stand strong because we are all in this together", said by Riaz Munshi, President, Outbound Tour Operators Association of India (source by www.otoai.org). We believe that problems such as the current situation are not stop signs. In pandemic situation we need to stay positive and be ready with new ideas to bounce back. Now our required priority has to be safe guarding everyone against Covid-19, and to care for each other. Some key factor can be help to overall travel time:

- Safety: personal safety about perception and reality will matter in pandemic
- Health: Government is started Covid-19 centre most affected area in India its helps to increase recovery cases.
- Hygiene: Hygiene should be high priority.
- Brand: Tourism business should provide high quality because quality will win.
- Value: If give good value will return good money. There is no substitute on quality best quality best return this is new mantra.

As per the center for monitoring report of Indian Economy, India overall unemployment rate for the month of July stood at 7.43% down from nearly 24% during the month of April. The As per the CMIE report, its overall unemployment rate by conducting a survey that includes more that 174,000 households over a four-month period. As per the report of Federation of Associations in India Tourism & Hospitality (FAITH) tour, travel agencies and hotels should be a support fund direct transfer to the affected tourism employees.

1.6 Conclusion:

This study showing background of the pandemic Covid-19 outbreak and evaluate the impact of this pandemic in Indian travel and tourism industry. Covid-19 is heavily effect on the domestic as well as international tourist inbound and outbound. Many domestic and international bookings were cancelled; however travel restriction in different countries has (UNWTO- International Tourist Numbers could

fall 60-80% in 2020, UNWTO report) huge loss. Hence, for reason, core business and integrated business are losing their revenue, and employment. In the post pandemic government should manage the dynamic behavior of economic sector in tourism industry, simultaneously government policy need to address a proper solution in preventing the spreading of Covid-19 and elevating the status of economy activity in tourism industry and employment.

References:

- Das, S. K. (January 2020). Impact of COVID-19 Pandemic on Tourism: Perceptions from Bangladesh. SSRN Electronic Journal , 11.
- Bakar, N. A. (April 2020). Effect of Coronavirus disease (Covid-19) to tourism industry. Research Gate , 5.
- <https://www.worldometers.info/coronavirus/worldwide-graphs/>
- Business Standard E-Paper. (n.d.). Retrieved from wap.business-standard.com: https://www.business-standard.com/article/economy-policy/covid-19-impact-tourism-industry-to-incur-rs-1-25-trn-revenue-loss-in-2020-120042801287_1.html
- Indian Chamber of Commerce. (n.d.). Retrieved from www.indianchamber.org: PRESS-NOTE-COVIDE-19-IMPACTS-INIDAN-TOURISM-HOSPITALITY-SECTOR-ICC.pdf
- Indianfolk. (2020, June 30). Retrieved from www.indianfolk.com: <https://www.indianfolk.com/impact-covid-19-indian-tourism-industry/>
- Mohanty, P. (March 2020). Impact of Corona (COVID-19) on tourism. Research Gate .
- OECD -Tourism policy Responses to the coronavirus. (2020, June 2). Retrieved from www.oecd.org: <https://www.oecd.org/coronavirus/policy-responses/tourism-policy-responses-to-the-coronavirus-covid-19-6466aa20/>
- Outlook traveller. (n.d.). Retrieved from www.outlookindia.com: <https://www.outlookindia.com/outlooktraveller/explore/amp/70362/experts-share-insights-on-the-effects-of-coronavirus-on-the-tourism-industry>

www.outlookindia.com/outlooktraveller/explore/amp/70362/experts-share-insights-on-the-effects-of-coronavirus-on-the-tourism-industry

- PTI. (2020, April 3). Financial Express. Retrieved from www.financialexpress.com: <https://www.financialexpress.com/lifestyle/travel-tourism/covid-19-impact-indias-tourism-sector-may-lose-rs-5-lakh-crore-4-5-crore-jobs-could-be-cut/1918324/>
- Sharma, N. (n.d.). Inida City Blog. Retrieved from www.indiacityblog.com: <https://indiacityblog.com/travel/how-will-covid-19-impact-travel-tourism-industry-1395/>
- The Economic Time. (2020, March 19). Retrieved from m.economictimes.com: <https://indiacityblog.com/travel/how-will-covid-19-impact-travel-tourism-industry-1395/>
- UNWTO- International Tourist Numbers could fall 60-80% in 2020, UNWTO report. (n.d.). Retrieved from www.unwto.org: <https://www.unwto.org/news/covid-19-international-tourist-numbers-could-fall-60-80-in-2020>



Impact of Covid-19 on CSR Activities of Micro, Small, Medium Enterprises

Dr. Jyoti Thakur

Head, University Department of Commerce,
SNDT Women's University, Mumbai

Sharada Gaitonde

Research Scholar, Department of Commerce,
SNDT Women's University

Abstract

Coronavirus(Covid-19)or SARS-2, an infectious viral disease has devastated the lives of millions of people all over the world in a period of nine months since the first case is believed to have been traced in November last year .Corporate Social Responsibility are the different activities a company may undertake towards all its stakeholders since it uses resources belonging to society.Micro, small and medium enterprises find it difficult to contribute to CSR even in normal circumstances. This paper attempts to study the impact of Covid-19 on MSMEs worldwide ,the measures by Governments to help them cope up with the challenges and CSR contributions of individuals and corporate in general to cope with the economic, social and emotional effects which are unprecedented and there is uncertainty as to when this crisis will end.Researchers have suggested some mechanisms both for individuals as well as businesses for survival,though the process would be slow and painful.Some relief will be possible only when a vaccine is created successfully for this disease. Key words-Covid-19,Corporate Social Responsibility ,Micro Small and Medium Enterprises.

1.1 Introduction:

Corona virus(Covid-19)is caused by SARS2 which was traced to a large number of people from the wet animal market in Wuhan city, China.(Rothan.S&Byrareddy.S)It is believed that the first case was traced in November 2019(Bryner.J) It is of zoonotic origin-caused by an infectious disease that has jumped from an animal to a human being. It is transmitted from one person to another through droplets when people talk, sing or cough. Some preventive measures suggested for slowing down the spread of the disease are use of face masks, social distancing hand washing with soap. The disease primarily affects the lungs. United Nations Industrial Development Organisation (UNIDO)- "Corporate social responsibility is a management concept whereby companies integrate social and economic concerns in their business operations and interactions with stakeholders."

There is no well accepted definition of Corporate Social responsibility (CSR) but since the 1990's corporate have accepted albeit reluctantly that social and environmental concerns have to be integrated into their business activities as it affects their corporate image. Regulations are also being made more stringent and Government asks for report on Environmental Impact Assessment in accounting terms. The Government of India has made CSR mandatory for companies fulfilling certain conditions as per the Companies Act 2013 which became operational from 1st April 2014. CSR is not mandatory for Micro, Small and Medium Enterprises as per this Act.

1.2 Objectives of the study:

1. To study the concept of Micro, Small and Medium Enterprises (MSMEs).
2. To study Corporate Social Responsibility according to Companies Act 2013.
3. To study the review on impact of Covid-19 on CSR activities

4. To study the impact of Covid-19 on the CSR activities of MSMEs.

1.3 Research Methodology:

The information has been collected from secondary sources -research journals, website of MSME, newspaper reports and internet.

1.4 Review of Literature

This study has been conducted by six academicians from the Universities of Harvard and Chicago (Barkit.A.et al2020) in April to determine how small businesses in USA were coping with the pandemic of Covid-19, how the CARES ACT would impact their decision and their future prospects. Small firms employ 50% of American workers. An online survey was conducted with a business network called Alignable which concentrates on small business after obtaining consent from respondents that they were participating voluntarily in the survey. 5800 small businesses were surveyed in ten states. Industries surveyed included retail, arts, entertainment food services and hospitality, financial services, real estate and professional services. The definition of a small business for the purpose of the survey was a business with less than 500 employees as this is the base considered in the Census data. The expenses of firms as on as on 31st January, 2020 was considered as the base of the study along with the amount paid towards their salaries. Financially businesses are in a delicate situation where a median firm with expenses of ten thousand dollars a month had enough cash for two weeks only. 43% of businesses had temporarily closed down, most of them due to Covid. 64% of business had less than five employees and 18% had between 5-9 employees. The number of full time and part time employees had come down by 36% and 56% respectively compared to January end. Problems were rated numerically as well as by descriptive text. Change in demand was rated as the most important problem with a rating of 78%, employee health concerns at 57% and supply

chain challenges at 35%. Impact has not been uniform across all industries. Entertainment, retail, art, food, hospitality and personal services reported decline in employment by more than 50% whereas professional services, finance and real estate were less affected. Less than 25% of the firms had funds to meet a month's expense, ½ had enough to cover expense of 1-2 months. Firms with more cash on hand were more confident about survival. Restaurants, tourism and personal services will find it more difficult if the crisis lasts for more than four months. Estimates suggest that if 72% of firms take up loans 410 Bn would be needed -90 Bn more than what has been allocated by the Government. Employment levels were lower by 40% than in Jan.2020 before availability of benefits provided by the Government. Limited cash levels led to shutdowns and lay-offs. When respondents were asked whether they would avail of a grant /loan a number of reasons were given by firms for not applying for such loans- such as the associated bureaucratic hassles and doubts about being eligible for such a loan, doubts about the loan being forgiven-repayment of loan would be waived. Respondents were asked when the crisis would end but since there was no precedent the answers initially were the beginning of May and the end of July. Firms would have to cut expenses, borrow more or file for bankruptcy if the crisis did not end soon. The following were the recommendations made by the researchers-Streamlining the application process for applying for the loan, clarity about eligibility for the loan and information about loan waiver /forgiveness would help small businesses to decide about availing of loan/ grant to tide over the present situation.

Robinson.J .and Kengatharan N(2020) from Jaffna University conducted a study about the impact of Covid-19 on SMEs in Sri Lanka since this subject was unexplored earlier. Sri Lanka has a population of 21.7 million people and an estimated GDP of US \$4030. A business with less

than 300 employees and having an annual turnover not exceeding 750 Mn are termed as SMEs. They account for 75% of all business, employ 45% of the population and contribute 52% to the GDP. A qualitative analysis was conducted by using N. Vivo software.

Fourteen telephone interviews were conducted with SME operators engaged in production of apparel, food, operating restaurants. Purposive sampling was done because of the pandemic and a semi-structured questionnaire with open and closed end questions was used for collecting information. All businesses were not affected to the same extent-most businesses had cash to pay less than one month of expenses but gave masks and PPEs to health workers. 70% of the raw material used by these units is imported from India and China. Two months salaries were paid to employees who remained at home during this period. The apparel industry did not dismiss its permanent staff though some had stopped coming for work. 70% of employees are vulnerable. SMEs cannot work from home. Restaurants, hospitality, tourism and theatres were affected the most. Employees were provided with masks, gloves and handwashing with soap was followed. If the lockdown continues for two more months, they will be unable to pay salaries. The Government took a number of preventive measures such as stoppage of all flights to their country from 22nd March 2020-Therefore the number of Covid 19 cases from 2nd March to till 3rd May were 708 only. The Government has postponed repayment of loans by SMEs and payment of utility bills. It also provided financial assistance of 5000 KL to vulnerable sections of the population like senior citizens, kidney patients and food supplies. All these firms need Government help to pay employees' salaries, utility bills and finance for repayment of loans.

230 SMEs surveyed by Lightcastle Partners & Sheba. XYZ in late April a month after

lockdown was initiated on "Covid-19's impact on SMEs in Bangladesh" 48.4% of respondents were involved in provision of grains, dairy, poultry, fisheries and retail trade and 51.6% were from services like restaurants, catering, laundry, beauty salons and electrician services SMEs contribute 25% to the GDP and employ 31.2 million and a day's closure leads to a loss of Tk23,000 crores. If the lockdown lasts for four more months 68% of SMEs will close down permanently. Only 6% of SMEs related to staple foods and emergency medicines reported that they would be able to survive for 8-12 months. 52% had halted operation. due to unavailability of raw materials and had no avenues for their output. The following leeway has been given to SMEs 52% will be soft loan, some banks will not charge interest for the next three months (May to July). Digitalisation is suggested for SMEs for survival but may not materialise immediately

Scaling -up Business Network(SBN) is a dedicated network of Nigerian SMEs which commenced on 21st April, 2016, with 114 members and is a part of the World Food Programme. It reported that they were facing difficulties in accessing raw materials and agricultural produce required for producing and processing nutritious food and were finding it difficult to repay loans. The interest rate had been reduced to 5% by the Bank of Industry. Impact funds have been made available without collateral for loans below 10 Mn Naira.

Hongwei He and Lloyd Harris have described the impact of Covid-19 which is unprecedented since the Spanish flu of 1918 and the depression of 1930's. The UN has called for a more inclusive and sustainable post Covid economies which can face challenges like climate change. Some firms may not be willing to spend on CSR due to shortage of funds-funds being used for survival. On the other hand, prevailing circumstances may force them to spend on CSR to fulfil social/economic

obligations. Some firms engaged in profiteering but others have proactively shifted to produce sanitisers, PPE kits, have donated these products. They also observed changes in behaviour of consumers such as panic buying and stockpiling of necessities and hoped that more responsible consumption patterns would be followed in developed countries. A shift has been observed towards consumption of health and wellness products. Another important decision countries would have to make would be regarding purchase of goods from China and also shifting to use of domestic goods. Semi collapse of globalisation has taken place due to supply chain disruptions.

Prof Fernandes. N.(2020) has studied the economic impact of Covid-19 across industries worldwide and attempted to forecast potential global costs under different scenarios. The IMF declared new estimated rates of growth in February 2020. He has forecast that service-oriented economies will be affected more and that health and economic risks are not correlated. The following are the observations-the pandemic is global, interest rates are at an all-time low, since the global economy is integrated all countries are affected economically. International sporting events like the Tokyo Olympics has been postponed, airlines are operating at skeletal levels, borders are being re-instated in the European Union. Comparison with any other pandemic is not possible due to lack of adequate knowledge. The first case of Covid-19 was reported by China in early January of this year. China's share amounts to 16% of global economy and is a major player in global trade. There have been lockdowns worldwide, quarantine hospitals have been constructed and enhanced public health measures undertaken in most countries. Effects in the second quarter would be worse than the first. People are working from home/not working depending on the nature of their work. Supply chains are affected due to lack of transport and stock markets are affected too. Duration of crisis is unknown. The first forecast is of a mild scenario of 1.5-month

shutdown country-wise forecast with estimated GDP growth containment measures are removed economy returns to normal. Recession depends on policies taken by each Government. Young less educated workers will lose jobs. 2.5-3.5% of global GDP will be affected for each month of lockdown.

Discussion on Literature Review-

A common observation from all the above information is that the corona virus has had an adverse impact on millions of people in different countries worldwide in a period of nine months since November last year. The impact has been felt on every aspect of human life health, employment, economy, agriculture, sport, tourism. Since there is no precedent countries are learning to cope on the basis of knowledge acquired on a day to day basis. The impact has not been uniform on all countries, industries. Developing countries have had a more difficult time due to inadequate health services except Taiwan, Korea and Sri Lanka were quick steps by the government restricted the transmission of the disease. The second aspect is when the crisis will get over is unknown till a vaccine becomes available. Therefore, decisive action regarding containment measures cannot be taken. Even if a vaccine becomes available-the practical difficulty of vaccinating population worldwide has to be considered-the actual production, transportation, who will be vaccinated on a priority basis eg The Indian Government has declared that preference will be given to the Armed Forces and health workers. Experts have forecast that the curve may be U shaped or V shaped depending on the economy of each country.(Fernandes.N.2020.)The third aspect is that all the countries worldwide do not have a common definition of SMEs. Most definitions consider the number of persons employed whereas India and Sri Lanka consider the turnover of units. Also researchers have found that service sector will be affected more adversely than the manufacturing sector.(Fernandes.N.2020)(Hwong He & Lloyd.

H.2020)(Barkit.A.et al 2020) SMEs will have to adapt to digitalisation to survive in the present circumstances though it may not be feasible for all SMEs depending on their geographical location and nature of product/service

1.5 MSMEs are defined as follows under the MSME Act of 2006-

Manufacturing units	Investment in Plant&Machinery	Service units	Investment in Plant&Machinery
Micro units	25 lakhs	Micro units	10 lakhs
Small units	5.0 crores	Small units	2.0 crores
Medium units	10.0 crores	Small units	5.0 crores

The definition of MSMEs have been revised with effect from 1st July 2020.

Manufacturing units	&Service units	Investment in Plant&Machinery	Turnover of the unit
Micro unit		1.0crore	5.0 crores
Small unit		10.0crores	50.0 crores
Medium unit		50.0 crores	250.0 crores

The definitions in operation prior to 1st July are applicable to this study. There are 6.33 crore MSMEs in India which form 95% of all businesses, provide employment to 120 Mn person and account for 50% of exports. The manufacturing units manufactured 33.4% of total output and contributed 6.1% of GDP. Service units contributed 24.63% of GDP in 2019(CII).

The following were the welfare measures made available to MSMEs:

1) Banks and NBFCs will offer 20% Of outstanding credit on 29/2/2020 to Units with 25 crores outstanding and a turnover of 100 crores are eligible for a four-year loan having a moratorium of 12 months on principal and can be availed of till 31/10/2020.

2). 20,00crores declared as subordinate debt will be given to MSMEs declared as NPAs and will be eligible for equity support.

3.)50,000 crores for equity infusion in MSMEs-through Fund of funds with a corpus of 10,000 crores to MSMEs having growth potential and urge them to be listed on Stock exchanges.

4)Global tenders less than 200 crores will be disallowed to avoid competition from foreign firms.

5)Government and Public Sector units will release outstanding dues within 45 days .e-Market will help MSMEs develop linkages to replace Trade fairs and exhibitions.

1.6 Special efforts to fight against Covid-19

On 22/3/2020 the Government declared that contribution made by corporates to Prime Minister's Citizen Assistance And Relief in Emergency Services Fund (PMCARES)for Covid-19 will be treated as CSR vide circular No.10/2020 and be eligible for 100% tax exemption under Sec. 80g

The different Technical Centres (TCs) of MSME are actively engaged in production of sanitisers, face masks, ventilators, gowns, hospital furniture and equipment besides hardware for Corona kits and some Technical centres are also designated as shelter homes and isolation centres. All the TCs have jointly contributed 22 lakh rupees to the PM CARES Fund. Contribution of Rs. 100 lakhs made by National Small Industries Corporation to PM CARES Fund from its CSR fund. Its employees also contributed Rs. 15 lakhs.

Coir Board employees raised Rs. 4.00 lakhs approximately for donating to PM CARES Relief Fund contributed Rs. 15 lakhs. COCOMANS: Rs 3.00 lakhs approximately collected from Coir Industries towards contribution to PM CARES Relief Fund.

1.7 Corporate Social Responsibility under the Companies Act 2013

The Companies Act was amended in 2013 and came into force from 12th Sept.,2013. A special aspect of the Sec 135 of Companies Act 2013 is that CSR spending was made mandatory for specific companies. The European Union had made it mandatory for certain companies to make public disclosures of certain information whereas India is the first country in the world to make CSR spending compulsory for certain companies.

Further Sec 467(1) mentions the different areas and activities which are considered in the CSR list.

G.S.R. 130(E).-In exercise of the powers conferred by sub-section (1) of section 467 of the Companies Act, 2013 (18 of 2013), the Central Government hereby makes the following amendments to Schedule VII of the said Act, namely :

(I) In Schedule The Companies Act 2013 has made it mandatory for a select category of companies to undertake up CSR projects. Sec 135 species:

Companies having a net worth of 500 crores or more or a turnover of 1000 crores or more or a net profit of 5 crores or more during a financial year shall spend 2% of the average net profits made during the three immediately preceding financial years

for items (i) to (x) and the entries relating thereto, the following items and entries shall be substituted, namely:

(i) eradicating hunger, poverty and malnutrition, promoting preventive health care sanitation and making available safe drinking water

(ii) promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly, and the differently abled and livelihood enhancement projects

(iii) promoting gender equality, empowering women, setting up homes and hostels for women and orphans; setting up old age homes, day care centres and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups

(iv) ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, conservation of natural resources and maintaining quality of soil, air and water

(v) protection of national heritage, art and culture including restoration of buildings and sites of historical importance and works of art; setting up public libraries; promotion and development of traditional arts and handicrafts

(vi) measures for the benefit of armed forces veterans, war widows and their dependents;

(vii) training to promote rural sports, nationally recognised sports, Paralympic sports and Olympic sports;

(viii) contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government for socio-economic development and relief and welfare of the Scheduled Castes, the Scheduled Tribes and other backward classes, minorities

(ix) contributions or funds provided to technology incubators located within academic institutions which are approved by the Central Government

x) rural development projects."

2. This notification shall come into force with effect from 1st April, 2014.

The profit will be calculated as per Sec. 198 of the Companies Act and for this purpose the Profit before tax is to be considered(PBT)

A CSR committee has to be formed for the purpose ,which will decide the activities to be carried out .It has specifically mentioned that CSR can to be carried out in areas directly related to the company's core business. The Act also mentions that if a company has not spent the requisite amount in a particular year the reason/s for not spending it has to be mentioned the unspent amount need not be carried forward in the next year.

The areas in which CSR can be implemented is only a broad guideline and does not restrict companies from undertaking participation in other areas.

The activities can be carried out by the company itself, in association with a NGO or registered trust having at least three years

experience of such activities, or by a company formed as per Sec 8 of the Act or can collaborate with another company for doing this activity.

The activity has to be carried on only in India and preference has to be given to the local area of operation of the company. Activity carried on to benefit only its employees or their families will not be considered as CSR donation. Donation to any political party will not qualify as CSR spend. No exemption/benefits are provided for undertaking such activity.

The information about CSR activity has to be displayed on the company's website. The annual report on CSR should be a part of the Board's report in the Annual report of the company.

Prior to 1st April 2014, CSR was not mandatory but the Companies Act 2013 has made it mandatory for companies fulfilling certain conditions. Prior to this companies were voluntarily spending on CSR -eg the Tata Group, Mahindra

& Mahindra, the Birla group whereas now companies have to spend at least 2% of average profits. The Government has also suggested the areas in which CSR can be undertaken. Initially there were adverse reactions from the corporate sector that the 2% CSR spend would be an additional burden but unlike tax, the advantage in case of CSR is that companies have control over the funds being spent. An observation of the total amount spent by companies since 2014 shows that the level of compliance as well as the total amount spent on CSR is increasing. All the areas are not receiving funds but education, health and poverty alleviation programmes received more funds. Some companies have motivated their employees to volunteer for CSR activity -ie employees of Tata group, Infosys and IT companies. Employees of Tata companies have also contributed a day's

salary voluntarily as CSR contribution and a matching amount was contributed by the company in. Stricter reporting and monitoring has led to a more structured approach to allocating funds for social development. Also, the Act is being amended with inputs from experts.

The CRISIL report shows that more companies are complying and fulfilling their CSR obligations in 2015-2016 amount spent was 950 crores which rose to 1688 crores in 2017-2018. The amount of unspent funds which was 57.66% in 2015-'16 came down to 30% in 2017-'18. 37% of the funds were spent on education, vocational skill development, health and sustainability. Due diligence by companies is necessary before funds are allocated for CSR activity. Most companies are not spending on CSR as a business strategy.

The following amendments were made to the Act in 2019

The Companies Amendment Act 2019 became operational from 31/7/2019 and replaced the Companies (Amendment) Second Ordinance 2019 with certain additional amendments. Turnover limit is now Rs 100 crores instead of 500 crores earlier. **Corporate Social Responsibility (CSR):** Under the Act, if companies which have to provide for CSR, do not fully spend the funds, they must disclose the reasons for non-spending in their annual report. Under the Bill, any unspent annual CSR funds must be transferred to one of the funds under Schedule 7 of the Act (e.g., PM Relief Fund) within six months of the financial year.

However, if the CSR funds are committed to certain ongoing projects, then the unspent funds will have to be transferred to an Unspent CSR Account within 30 days of the end of the financial year, and spent within three years. Any funds remaining unspent after three years will have to be transferred to one of the funds under Schedule 7 of the Act. Any violation may attract a fine between Rs 50,000 and Rs 25,00,000 and every defaulting officer may be punished with imprisonment of up to three years or fine between Rs 50,000 and Rs 25,00,000, or both.

2. Recategorisation of offences from offences from criminal to civil list. (ET 27/9/201).

-Conclusion

All businesses will have to adapt to the changed circumstances created by Covid-19. Businesses will have to be more agile-MSMEs

started producing sanitisers, face masks, PPE, ventilators, hospital furniture -products which were vital both for the country as well as for the MSMEs to survive. All firms will have to consider a change in their mission statement as there is no knowledge of when the pandemic will end. Companies have to contribute to employee welfare as a strategy towards survival and cross training of employees has become a necessity with enhanced use of digitalisation. Supply chains will have to shift from global to regional to reduce the dependence e.g. Indian automobile companies and pharma companies faced problems of obtaining components and raw material from China. The Government has suggested changes in policy for MSMEs.

References:

1. Bartik .A. et al- How are Small Businesses Adjusting to COVID-19? Early Evidence from a Survey (April 12, 2020). HKS Working Paper No. RWP20-012, University of Chicago, Becker Friedman Institute for Economics Working Paper No. 2020-42.
2. Fernandes, N. Economic Effects of Coronavirus Outbreak (COVID-19) on the World Economy (March 22, 2020). Available at SSRN: <https://ssrn.com/abstract=3557504>
3. Kengatharan .N and Robinson .J. Journal of Applied Economics and Business Research Volume 10(2): pp 115-125 (2020).
4. <https://doi.org/10.1016/j.jbusres.2020.05>.
5. <https://msme.gov.in/initiatives-ministry-msme-covid-19-relief>
6. <https://sunbusinessnetwork.org/covid-19-and-our-food-systems-how-nutritious-food-smes-in-nigeria-can-adapt-and-respond/>
7. <https://thewire.in/business/five-years-after-csr-became-mandatory-what-has-it-really-achieved>.
8. http://164.100.47.4/billtexts/lbilltexts/PassedLokSabha/187-C_2018_Eng.pdf

□□□

8

COVID-19: Impact on Indian Economy with special reference to Government Revenue – GST

Dr. Nilendra Lokhande,

Head-Department of Commerce,

S.N.D.T. College of Arts &

S.C.B. College of Commerce

& Science for Woman, Mumbai - 20

Ms. Pournima Nivrutti Relekar

Research Scholar, Department of Commerce,

SNDT Women's University, Mumbai.

Abstract

COVID-19 Pandemic created havoc in every country. It disseminated in such a way that within two months it closed down the whole world almost for a period of six months. Each and every country, its economy, its industries and its people & their lives got severely affected. Pandemic left its dire effects on a developed, developing as well as under-developed economies. India is a developing country. India also faced severe impact on the whole country and economy. The Government of India declared complete lockdown in country which ceased each and every sector's working. Due to complete lockdown the whole economy was shut and all sectors were closed. As a result, people lost their jobs, labour migrated to their homeland, Production stopped, income stopped and it all impacted on Government's revenue collection. Taxes are the major source of revenue for the government. Government faced severe deficit and couldn't collect taxes from public. In the first quarter of Financial Year 2020-21, Government couldn't collect GST. As a result, government faced huge deficit. The GDP for Q1 of

Posture-related musculoskeletal problems among hotel receptionists in Mumbai: A cross-sectional study

Manjit Kaur Chauhan, Ankita Sondhi

Department of Resource Management, SNDT Women's University, Mumbai, Maharashtra, India

Date of Submission	29-Sep-2019
Date of Decision	29-Mar-2020
Date of Acceptance	29-Apr-2020
Date of Web Publication	14-Dec-2020

Correspondence Address:

Dr. Manjit Kaur Chauhan

Department of Resource Management, SNDT Women's University, Juhu, Santacruz (W), Mumbai - 400 049, Maharashtra
India

 Login to access the email ID

Source of Support: None, **Conflict of Interest:** None

Introduction



The hotel business is one of the major services in the hospitality industry.^[1] A hotel lobby conjures up exciting images of international dignitaries, celebrities, community leaders, attendees of conventions and large receptions, business persons, and family vacationers. The front office is the most visible and essential focal point of all hotels.^[2] The receptionists are responsible right from greeting and assisting guests to helping people make reservations, managing room status, issuing room keys and handling guest requests/complaints, or solving any problems that may arise during the course of a stay. The work at the hotel front desk often involves repetitive work, awkward postures, and standing for prolonged periods of time.^[3] The average hotel front desk employee spends the majority of his/her 8-h shift standing in front of a chest-level counter, looking down at a computer, or over at a guest. With shift work, fatigue becomes more prevalent, as the employee is forced to work against his/her natural circadian rhythms.^[4] Physiological and psychological health effects of shift work can include disturbed sleep patterns, stomach trouble, and stress.^[5] Work in hotels is often demanding and hectic; hotel staff is required to provide service to guests efficiently, courteously, and accurately while maintaining a pleasant demeanor.^[6]

Prolonged standing jobs may lead to discomfort and occupational injuries to workers.^{[7],[8]} In a study,^[9] approximately 50% of healthy workers complained of lower back discomfort after continuously standing for 2 h. Another study asserted that prolonged standing contributes to foot pain at the end of the day.^[10] Workers exposed to standing for more than 50% of working hours showed higher frequency of chronic venous insufficiency than the workers spending less time in standing position.^[11]

Jobs and tasks requiring prolonged constrained standing postures frequently cause fatigue, body-part discomfort, and lower extremity impairments.^[12] Fatigue and discomfort, though not leading to compensable disability, may lower the resistance of these employees to certain illnesses, or even lead to some occupational symptoms and diseases which may reduce productivity.^[13] According to Seo *et al.*,^[14] continuous standing or sitting work style, commonly observed in various workplaces, causes leg swelling, pain, varicose veins, and skin ulcers as a result of insufficient blood and lymph flow. It is reported that pregnant women who are standing for more than 8 h in a working day have high chance of spontaneous abortion.^[15]

Therefore, this study aimed to demarcate the work activities, posture, and shift timing of the receptionists and find its association with work-related musculoskeletal disorders and health.

Participants

The study was carried out in three-star and five-star hotels mainly near the airport in Urban Mumbai. Only 11 hotels gave permission and agreed to participate in the cross-sectional survey. Non-probability sampling method was used for study as only those who gave consent were studied. A total of 50 Subjects, 28 males and 22 females, who voluntarily agreed to be part of the study and the subjects less than 1 year of experience, were excluded in the study. The subjects were mostly involved in attending phone calls, greeting guests, assisting guests for check-in and check-out procedures, reservations, managing room status, issuing room keys, and handling guest requests/complaints. All these activities were performed in 8-h shifts mostly in standing position behind the front desk. The subjects wore black formal footwear having at least 2-inch heels during their entire shift work. They worked continuously for 15 days in one shift and thereafter a change in shift took place.

Data Collection Tools

Questionnaire

A well-structured self-administered closed-ended questionnaire was developed and each receptionist was requested to answer all the questions with full sincerity. The questionnaire was designed to get information on activities performed, shift work, work-related musculo-skeletal disorder (MSD) problems, frequency of pain/discomfort, severity of pain and other general health problems. A validated Nordic Musculoskeletal questionnaire^[16] was adapted to enquire about the MSD symptoms experienced, and for intensity of pain 5-point VAS Rating scale indicating 1 as least painful and 5 as most painful condition was used.

Observation

Each hotel was visited three to four times to observe the receptionist's involvement in varied activities and postures adopted while performing different activities. The observation method was used to study various postures adopted and no questions were asked during this period.

Posture assessment

Posture was observed and validated OWAS (Ovako Work Analysis System) posture assessment method^[17] was used to analyze the risky postures. The information on back, arms, legs, and load/use of force was collected using this method. The most common activity of the front desk employees was attending and receiving phone calls; hence, this method was used for posture analysis.

Statistical analysis

The statistical analysis was done by using Statistical Package for the Social Sciences (SPSS) software program, version 16.0. Frequency and percentages were calculated. The cross-Phi test table and Cramer's V test was used to find out the association between pain lasting for 7 days and 1 year. Ranking by median was used to find severity and frequency of pain.

Results

General characteristics of the subjects

A total of 50 subjects, 56% males and 44% females, were studied. [Table 1] shows the age groups of the subjects studied. The mean age \pm standard deviation (SD) of the subjects was 29.5 ± 6.66 years. The educational qualifications showed that the majority (68%) were graduates. The largest proportion (48%) of subjects had work experience of 2–5 years. 38% of subjects reported sleeplessness and 20% reported headache due to change in shift.

General characteristics	Total (n=50)	
	n	Percentage
Gender		
Male	28	(56.0)
Female	22	(44.0)
Age (years)		
21–30	32	(64.0)
31–40	12	(24.0)
41–50	6	(12.0)
Educational qualifications		
Diploma	12	(24.0)
Graduate	34	(68.0)
Post graduate	4	(8.0)
Work duration (years)		
1–2	11	(22.0)
2–5	24	(48.0)
3–10	14	(28.0)
>10	1	(2.0)
Health-related symptoms due to shift change		
Sleeplessness	19	(38.0)
Indigestion problems	4	(8.0)
Headache	10	(20.0)
Frustration	4	(8.0)
Fatigue	4	(8.0)

Table 1: General characteristics of the subjects studied

[Click here to view](#)

Work-related musculoskeletal disorders (WRMSDs) experienced by the subjects at the end of the day

[Table 2] shows that 68% of the subjects experienced severe to maximal discomfort in their lower back, followed by 32% in their ankle/feet and 24% subjects having discomfort in their neck and calf by the end of the day's work. For upper extremity, moderate discomfort was reported in upper back (58%) followed by neck (50%) and right shoulder pain (44%), whereas for lower extremity discomfort, majority of the subjects reported moderate pain in the calf (50%–54%); followed by knee pain (36%). The severe discomfort was considered for further analysis.

Part of the body	No discomfort n (%)	Mild discomfort n (%)	Moderate discomfort n (%)	Severe discomfort ^a n (%)	Maximal discomfort n (%)
Upper extremity					
Neck	1 (2)	10 (20)	20 (40)	17 (34)	2 (4)
Right shoulder	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Left shoulder	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Upper back	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Forearm	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Hand	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Lower extremity					
Right hip	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Left hip	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Right knee	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Left knee	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Right calf	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Left calf	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Right ankle/feet	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)
Left ankle/feet	0 (0)	10 (20)	20 (40)	17 (34)	3 (6)

Table 2: Discomfort experienced by the subjects in upper and lower extremities by the end of the day's work

[Click here to view](#)

Pain in different body parts in last seven days and 12 months (NMQ)

The data of pain experienced in the last 7 days revealed that 90% suffered pain in low back, 74% in calf muscle, 66% in upper back, 58% in ankles/feet, 52% in neck, and 50% in knees, whereas 94% reported low back and neck pain, 88% had upper back pain, 84% in calf, 64% in ankles/feet, and 60% in knees in the last 12 months [Table 3].

Body parts	Pain in last 7 days		Pain in last 12 months		Phi value ^a
	n	Percentage	n	Percentage	
Neck	26	(52)	47	(94)	0.263**
Upper back	33	(66)	44	(88)	0.514***
Low back	45	(90)	47	(94)	0.758***
Hips/thighs	10	(20)	20	(40)	0.612***
Knees	25	(50)	30	(60)	0.816***
Calf	37	(74)	42	(84)	0.736***
Ankles/feet	29	(58)	52	(104)	0.881***

^a**Not significant values ($P=0.063 > 0.05$). ***Significant values ($P \leq 0.05$). * $P =$ significance tested by Cross Phi test at 0.05

Table 3: Pain experienced by the subjects in last seven days and 12 months using Phi value (statistical test)

[Click here to view](#)

[Table 3] shows the results of Cross-Phi test and Cramer's V test to find out the association between pain in the last seven days and pain in the last 12 months in different body parts.

The significant results were found in ankles/feet (Phi value: 0.881; $P \leq 0.05$), knees (Phi value: 0.816; $P \leq 0.05$), calf (Value: 0.736; $P \leq 0.05$), low back (Phi value: 0.758; $P \leq 0.05$), hips/thighs/buttocks (Phi value: 0.612; $P \leq 0.05$), and upper back (Phi value: 0.514; $P \leq 0.05$), respectively.

Severity and frequency of pain in different body parts as experienced by the subjects

The analysis of the severity and frequency of pain in different body parts was done by ranking method

Body parts	Locality of pain			Frequency of pain			Valid responses (%)
	Anterior/medial	Posterior/lateral	Pain	Anterior/medial	Posterior/lateral	Pain	
Neck	25	1	Neck	55	5	Neck	90
Shoulder	22	1	Shoulder	23	0	Shoulder	90
Upper limb	11	2	Shoulder	20	0	Shoulder	90
Forearm	10	2	Forearm	15	0	Forearm	90
Wrist	10	2	Wrist	15	0	Wrist	90
Hand	10	2	Hand	15	0	Hand	90
Lower limb	18	3	Lower limb	23	13	Lower limb and foot	90
Thigh	12	2	Thigh	20	0	Thigh	90
Shin	10	2	Shin	15	0	Shin	90
Foot	10	2	Foot	15	0	Foot	90
Back	22	2	Back	25	0	Back	90
Trunk	22	2	Trunk	25	0	Trunk	90

[Click here to view](#)

Patient subgroup at risk	Risk in 12 months				P-value
	Cut				
	No. patients	P (95% CI)	Percentage	Total	
Female	7	2.0 (0.1-12)	13	19 (9)	0.10
Male	7	3.0 (0.1-10)	13	17 (9)	
Total	14	2.5 (0.6-10)	26	36 (18)	
		End-stage			
Female	8	1.0 (0.1-6)	9	18 (9)	0.001
Male	10	7.0 (0.6-40)	14	24 (10)	
Total	18	4.0 (0.6-24)	23	42 (20)	

[Click here to view](#)

[top](#)

This study revealed that the prevalence and severity of pain was highest in low back region with weekly frequency of occurrence, whereas neck, upper back, and calf had pain of moderate severity

with weekly occurrence. Knee and ankle/feet pain was daily experienced but was of mild severity. The findings of the study are comparable with the study among hotel workers where the top three highest pain intensity scores were found for the lower back/waist, upper back and finger/wrist, respectively.^[18]

Further, the association between standing posture with calf pain (Phi value: 0.736; $P \leq 0.05$) and ankle/feet pain (Phi value: 0.881; $P \leq 0.05$) was found, indicating that standing posture leads to musculoskeletal disorder in the lower extremity. In a similar study, on hotel employees, they were exposed to the static postures of standing up without moving for a prolonged time at the front desk.^[21] Another study stated that hotel workers adopt unnatural postures as they become constrained by the height of the front desk while receiving customers or performing VDT tasks leading to MSD's.^[11]

High risk in neck and shoulder region among receptionists was found as they cradle their phone in-between neck and shoulder that leads to awkward posture. Similarly, hotel workers in the USA were found to be exposed to ergonomic risk factors such as repeatability, unnatural and static postures that are known to cause work-related musculoskeletal disorders.^[22]

Further, subjects reported problems of sleeplessness and headache due to change in the shift timings and a few reported indigestion, frustration and fatigue. The higher reliance of hotels on shift work is also likely to cause sleep deprivation.^[23] Many researchers have found the relationship between shift work and musculoskeletal symptoms.^{[24],[25]} Further research is required to establish the relationship between sleep satisfaction and work-related musculoskeletal symptoms.

Limitations of the study

There were a few limitations to this study. The WRMSD problems of males and females were not studied separately. Since the footwear worn by the receptionists (male/female) and body weight were not studied in detail as permission was not given by authorities, its impact on calf and feet/ankle pain could not be studied.

Conclusion



This study has identified MSD and other health problems among front desk employees in hotels, which need to be addressed quickly. The suggestions were given to the management and employees primarily to use sit-stand combination at the front desk, place the telephones as close as possible, reduce the depth of the front desk by giving shelf type arrangement on inner side of the desk so that they are closer to the desk and the guests. This design of the front desk will make the employee stand erect, with no leaning forward and no stretching. Second, using soft shoes with insoles and small heels is recommended, with floor under feet carpeted. Third, to solve the problem of sleep and headache 30 days shift change was recommended as this will help employees to get acclimatized. Finally, most importantly, regular physical exercise before start of the shift is a must, which will loosen up the muscles and help in delaying of muscle pain. Regular medical checkups should be done for the welfare and wellbeing of the employees.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References



- [1.](#) Lee JW, Lee JJ, Mun HJ, Lee KJ, Kim JJ. The relationship between musculoskeletal symptoms and work-related risk factors in hotel workers. *Ann Occup Environ Med* 2013;25:20. [↑](#)
- [2.](#) Bardi JA. *Hotel Front Office Management*. 4th ed. USA: John Wiley; 2007. [↑](#)
- [3.](#) Guidelines for the Hotel Industry. Singapore: Ministry of Manpower, Occupational Safety and Health; 2003. [↑](#)
- [4.](#) Blachowicz E, Letizia M. The challenges of shiftwork. *Medsurg Nurs* 2006;15:274-80. [↑](#)
- [5.](#) Encyclopedia of Occupational Health and Safety. Edited by Stellman JM., ILO Publication, 4th edition Vol.3, ILO Geneva 1998. p. 985-986. [↑](#)
- [6.](#) U.S. Bureau of Labour Statistics. Occupational Employment Statistics. Occupational Employment and Wages, May 2018. 43-4081 Hotel, Motel, and Resort Desk Clerks. [↑](#)
- [7.](#) Halim I, Omar AR, Saman AM, Othman I. Assessment of muscle fatigue associated with prolonged standing in the workplace. *Safety Health Work* 2012;3:31-42. [↑](#)
- [8.](#) Halim I, Omar AR. A review on health effects associated with prolonged standing in the industrial workplaces. *Int J Res Rev Appl Sci* 2011;8:14-21. [↑](#)
- [9.](#) Gregory DE, Callaghan JP. Prolonged standing as a precursor for the development of low back discomfort: An investigation of possible mechanisms. *Gait Posture* 2008;28:86-92. [↑](#)
- [10.](#) Messing K, Kilbom A. Standing and very slow walking: Foot pain-pressure threshold, subjective pain experience and work activity. *Appl Ergon* 2001;32:81-90. [↑](#)
- [11.](#) Tomei F, Baccolo TP, Tomao E, Palmi S, Rosati MV. Chronic venous disorders and occupation. *Am J Ind Med* 1999;36:653-65. [↑](#)
- [12.](#) Gorecki GA. Preliminary investigation of lower extremity impairments among men in heavy industry. *J Am Podiatry Assoc* 1973;63:47-65. [↑](#)
- [13.](#) Zhang L, Drury CG, Woolley SM. Constrained standing: Evaluating the foot/floor interface. *J Ergon* 1991;34:175-92. [↑](#)
- [14.](#) Seo A, Kakehashi M, Tsuru S, Yoshinaga F. Leg swelling during continuous standing and sitting work without restricting leg movement. *J Occup Health* 1996;38:186-9. [↑](#)
- [15.](#) Eskenazi B, Fenster L, Wight S, English P, Windham GC, Swan SH. Physical exertion as a risk factor for spontaneous abortion. *Epidemiology* 1994;5:6-13. [↑](#)
- [16.](#) Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, *et al.* Standardised nordic questionnaire for the analysis of musculoskeletal symptoms. *Appl Ergon* 1987;18:233-7. [↑](#)
- [17.](#) Karhu O, Kansil P, Kuorinka I. Correcting working postures in industry: A practical method for analysis. *Appl Ergon* 1977;8:199-201. [↑](#)

18. Chyuan JY, Du CL, Yeh WY, Li CY. Musculoskeletal disorders in hotel restaurant workers. *Occup Med* 2004;54:55-7. [↑](#)
19. Shankar S, Shanmugam M, Srinivasan J. Prevalence of Upper Limb Disorders and Investigation of Risk Factors Among Commercial Kitchen Male Workers in South India. In: Ray G, Iqbal R, Ganguli A, Khanzode V, editors. *Ergonomics in Caring for People*. Springer, Singapore: Springer Nature Singapore Pte Ltd.; 2018. doi: 10.1007/978-981-10-4980-4_4. [↑](#)
20. Scherzer T, Rugulies R, Krause N. Work-related pain and injury and barriers to workers' compensation among Las Vegas Hotel room cleaners. *Am J Public Health* 2005;95:483-8. [↑](#)
21. Choi WI, Kim DS, Kim JH, Choi DS, Kim YW, Kim JH, *et al.* A survey for status of the work-related musculoskeletal disorders in the food and accommodation industry. *Proceeding of Ergonomics Society of Korea.*, 2007. p. 279-285



War Field Robot with Night Vision Camera

Kavita Mhatre, Nikita Jha, Sonali Dhurway, Jugnum Parimal

Abstract: *Considering the current scenario of warfare between India and China, we got inspired by the thought of various ways technology can help our hardworking soldiers by reducing the human loss by using an application that can spy on the enemy, and also for security purpose. This project's main purpose is to deal with difficult situations like where humans cannot go through scenarios like darkness, entering narrow areas and detecting hidden bombs etc. The robot serves as a perfect machine for the defense sector in order to reduce the human life loss and will also help in prevention of illegal activities. The robot is self-powered, with a backtracking facility, in case a situation arises where there is connection loss from the base station. Wireless cameras send back real-time video and audio inputs that can be seen on a monitor in the base station and action can be taken accordingly.*

Keywords: Robot, Arduino, Night Vision Wireless Camera, Bluetooth

I. INTRODUCTION

As we might have seen in the news or read in the newspaper about the ongoing tension among India and China at LAC in Galvan valley and also with Pakistan in J&K lands. As a youth, we thought of helping our soldiers who are fighting for our safety and well-being by staying on guard for 24hrs not only by risking their lives but also by staying away from their families for months. So, we came up with an idea to help our soldiers by building a war-based spying robot to help them, spy, not only on enemy's movements but also their armours by providing the intel to our soldiers on war field by gaining not only some time to work on counter strategies but also to know the condition of the territory before entering. As you might have seen in movies like Raazi where the protagonist acts as a spy and provide intel about the enemy which involves risking her life in order to reduce the human loss this robot can be used which not only can reduce the human loss by its ability to go in narrower areas which are

inaccessible to humans without getting spotted but also its ability to see in the night without getting much attention by using its night vision camera installed on the robot. This technology is used for serial communication with the robot. It is used to share data between 2 devices considering the range between devices. The Bluetooth module HC-05 will be connected with the robot and the commands are given to the robot by the android application.

II. LITERATURE SURVEY

Beginning with the most basic and important term regarding the project, i.e., the word 'ROBOT'. Literally, this word originates from a salvic word ROBOTA that means labour. Simply saying, a robot is generally a machine that is able to perform certain tasks either automatically or manually or in both ways simultaneously.

Generally, the robots that are used in those battlefields are machines that helps in removing mines and such obstacles in war fields all by itself and sometimes they are also used to spy on enemies. Nowadays, as the domain of technology is getting improvised, robots can be seen being used in military operations as well which are not completely automatic instead, they are controlled remotely. Generally, [4] & [5] there are three kinds of machines used in military operations namely UGV(Unmanned Ground Vehicle), UAV(Unmanned Ground Vehicle), UUV(Unmanned Underwater Vehicle)

UGV: These are used for land surface purposes and can carry heavy load, move on a rough surfaces and have various sensors and cameras attached to them.

UAV: These are used to carry aerial weapons and flying machines.

UUV: These are actually regarded as submarines or more specifically, machines that can survey underwater.

Next another important machine to be discussed is TISON[1]. This is a heavy EOD(Explosive Ordnance Disposal) robot which is a north American military robot that is capable of lifting up to 100 pounds.

Even though it has a strong gripping mechanism, it has one limitation which is that it cannot function properly at night time. And lastly, S.Naskar[3] tried to explore the field on how a RF controlled robot that can be used in defense and battlefield.

III. HARDWARE COMPONENTS

Below are the hardware components used in designing this robot.

Manuscript received on May 05, 2021.

Revised Manuscript received on May 15, 2021.

Manuscript published on June 30, 2021.

* Corresponding Author

Dr. Kavita Mhatre, Department of Electronics and Communication, Usha Mittal Institute of Technology, Mumbai (M.H), India.

Nikita Jha*, Department of Electronics and Communication, Usha Mittal Institute of Technology, Mumbai (M.H), India. Email: nikita.jha01@gmail.com

Sonali Dhurway, Department of Electronics and Communication, Usha Mittal Institute of Technology, Mumbai (M.H), India. Email: dhurway0603@gmail.com

Jugnum Parimal, Department of Electronics and Communication, Usha Mittal Institute of Technology, Mumbai (M.H), India. Email: pjugnum@gmail.com

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](https://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)



Fig1. All the components used

A. Bluetooth Module HC-05

This module is capable of adding two-way wireless functionality to the project and also communicates with the two microcontrollers.

This is a simple wireless communication device which is based on Bluetooth protocol. It consists of six pins 1)Key 2)5V3)GND 4)TX 5)RX 6)status. Basically, it uses serial port protocol (SPP). It is designed for wireless serial connection and this can also be used in master or slave configuration. One device is connected to the slave and another is connected to master.

The connection between the devices follows as -

➤ Rx pin of Arduino is connected to Tx pin of the Bluetooth module while Tx pin of Arduino is connected to the Rx pin of Bluetooth module. So, in this way, a cross-connection setup is required for the operation of the Bluetooth module and the GND pin of the Bluetooth module is connected to that of the Arduino.

➤ The master device must be connected to the slave in order to have a proper communication. When the pairing is done between two devices, then the device will ask to enter the password. The password will be 0000 or 1234.

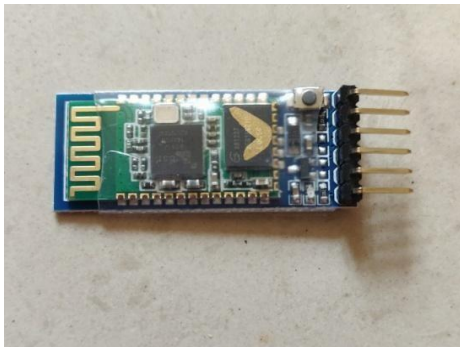


Fig2.HC-05 module

B. Arduino

As it is an open-source platform which is mostly used in building electronics projects consisting of both a physical programmable circuit board (often referred to as a microcontroller) and a software IDE (Integrated Development Environment) which runs on a computer and is used to write and upload code to the physical board. Unlike its predecessors PCB's, this one doesn't require a separate piece of hardware, i.e., a programmer. In order to load a new code onto the board - one can simply use a USB cable. Also, its IDE uses a

simplified version of C++, making it much easier to learn to program. Arduino Uno is also known as a microcontroller board which is based on the ATmega328P processor consisting 14 digital input/output pins (out of which 6 can be used as PWM (to simulate analog outputs, pins marked with (~) symbol is used, available on the board), 6 analog inputs(A0-A5), a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and lastly a reset button. Also, it comprises everything that is needed to support microcontrollers. In order to get connected to a computer, one has to simply connect the USB cable. It is a blue circuit board, the size of a credit card (also available in other sizes). It's divided into two rows of connectors (the 'headers'), a power connector and a USB connector. An Atmel microcontroller is the brain of the board. It's similar to a really small, very low power 'computer'.

Below are some of its features:

- Photoresistors (sensing light levels)
- On/Off lights, LED's
- Sensors (to sense the environment)
- Ultrasound (proximity range finder)
- Push buttons, touch pads
- Motion detection
- Displays (LCD)
- Thermistors (measuring temperature)
- Actuators (to perform action)
- Motors
- Speakers

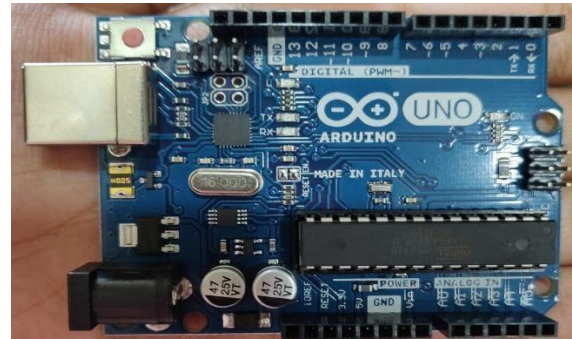


Fig 3. Arduino UNO

C. L293D IC

It is a popular 16-pin Motor Driver IC. It is mainly used to drive motors and also it is capable of running two DC motors at the same time.

Motor driver IC is an integrated circuit which is usually used to control motors. L293D has two H-bridge.

L293D Motor Driver IC can control both speed & spinning direction of two motors. It consists of 16 pins, with 8 pins on each side, for the purpose of controlling the motors. There are 2 I/P pins, 2 O/P pins & 1 Enable pin for each motor. It provides bidirectional drive currents of up to 600-mA at voltage from 4.5V to 36V.



Fig 4. L293 IC

D. Night Vision Camera

Human eyes cannot see in the dark light. Hence night vision cameras are used for many purposes specifically in the field of security and surveillance. These devices offer a bit more security than the normal standard cameras. They have the ability to capture objects that are invisible to human eyes either in an image format or recording a video. The specific type used in this project is the night vision wireless camera. It being a wireless device would help us in allowing the device to travel a particular distance without any bound and complete the mission allotted. Below are the features of the night vision wireless camera used:-

- It can automatically detect a movement around that particular area.
- It can allow the transmission of data over 100 meters of range without any obstacles in between.
- A CMOS imaging sensor of size 1/3 inch is installed that detects and converts the information that is used to make an image.
- Next are the video standards along with the resolutions namely PAL(Phase Alternate Line) 628*582/NTSC(National Television Standards Committee) 510*492.
- Illumination is needed to obtain images of a specified desired quality. It provides about min. illumination of 1.5 lux.
- View angle required is 62 Degree
- Camera head used is of 15 gm weightage.



Fig 5. Night Vision Camera

IV. INTERFACING

A. Interfacing of Bluetooth Module with Arduino

Bluetooth is a one of the great examples for wireless connectivity. It's applications are in various fields. It consumes almost negligible amount of power. Commonly used Wireless technology are :-

- Wi-Fi
- Bluetooth

This Bluetooth module can communicate in 2 ways, meaning it is full duplex, which can be applied along with

microcontrollers. Because it operates Serial Port Protocol (SPP). Using SPP, each connected device is able to send and receive whole data as if there is Rx and Tx lines connected between them. 2 Arduino modules, for instance can communicate with each other from across rooms, instead from across the desk. The communication is acted upon with the help of USART (Universal Synchronous/Asynchronous Receiver/Transmitter). The HC-05 is capable of operating in 2 modes. One is Data mode and other is AT command (Attention Command used to change default settings of Bluetooth Module). In order to operate in Data Mode of HC-05 the enable pin is set to "low", if that pin set as "High" the module operates in AT command mode. For this project we will operate this module in Data Mode.

Table 1

Arduino UNO	HC-05
Rx	Tx
Tx	Rx
5V	+5V
GND	GND

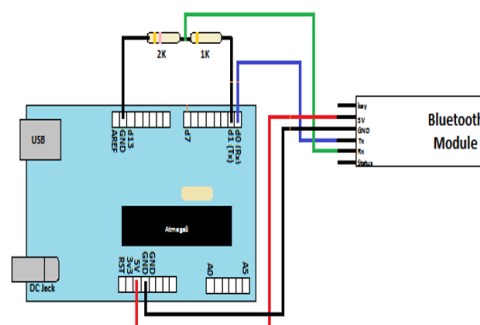


Fig 6. HC-05 Interfacing with Arduino

B, DC Motor interfacing with Arduino

The IC LM293D comprises 4-i/p pins , pin 2 and 7 on the left side and Pin 10 and 15 present on the right side of IC respectively. Left input pins of the IC control the rotation of the motor. In accordance with the i/ps that are provided across the

input pins that are Logic 0 and Logic 1, the motor rotates. Assuming, the motor is connected to the o/p pins 3 and 6 respectively on the left side of the IC. For motors to rotate in clockwise direction, the i/p pins are to be provided with Logic 0 and Logic 1 that is if Pin-2= logic 1 and pin-7 = logic 0, resulting in the rotation in clockwise direction and vice-versa. Similarly, when Pin-2= Pin-7=logic 0, then no rotation is observed and if Pin-2= Pin-7=logic 1, then also no rotation. In similar way the motor can also be operate across input pins namely pin-15 and pin-10 on the right-hand side.

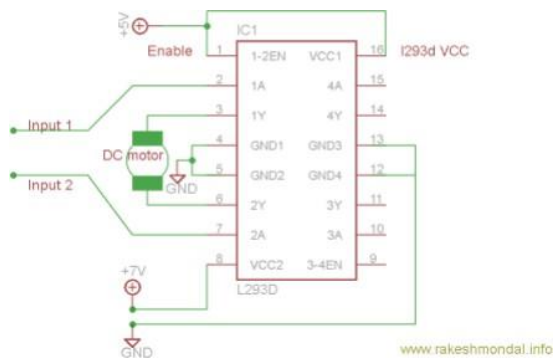


Figure 3.2: DC motors-Arduino interfacing

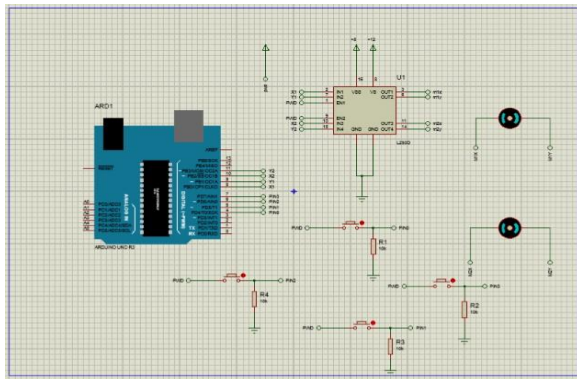


Fig 7. Overall Architecture

V. FUTURE ENHANCEMENT

This robot has one limitation which is the range of communication. It cannot be operated over large distances. To increase the range, modules such as Wi-Fi and Zigbee can be used. Zigbee has low power consumption and also has a very long battery life. These modules can also be used to connect this system directly to internet through which we can control the system via any remote areas.

Also, by using DTMF technology we can easily control the robotic machine by using our own mobile phones.

VI. CONCLUSION

In this paper, a robot is described that uses night vision wireless camera which is operated by an android application. This robot can be further modified using gas sensors as well as bomb diffuse kit. This model of a robot has various applications that include military missions, wireless security and surveillance and search and rescue operation.

REFERENCES

1. M. Tison, QinetiQ North America, Heavy-lift EOD robot, International Conference, art. 125.
2. K. O. Arras, R. Siegwart, G. Caprari, The autonomous miniature robot Alice: from prototypes to applications, IEEE/RSJ International Conference on Intelligent Robots and Systems, vol.1, 2000, pp. 793-798., 2000.
3. S. Das, A. K. Seth, A. Nath., S. Naskar, 2011. Application of Radio Frequency Controlled Intelligent Military Robot in Defense. Communication Systems and Network Technologies (CSNT), International Conference, art. 7-50, 2011.
4. Haard Mehta, Jignesh Patoliya, Hitesh Patel, Arduino Controlled War Field Spy Robot using Night Vision Wireless Camera and Android Application, 2015.
5. Md. Baijid Hasan Shorif, Shekh Nuruzzaman, Ahsanul Hoque, Md. Eftekhari Alam, Arduino based Battlefield Assistive Robot 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), 2017.

AUTHORS PROFILE



Nikita Jha, Address 1: Flat no-502 Payal Heights plot no-93, sec-19 kharghar, Navi Mumbai – 410210 Education: B.Tech in Electronics and Communication Designation: Student Date of Birth 1: 31/03/1999



Sonali Dhurway, Address 2: Kunal-2, D/106, Bhau Nagar, Near New Viva College, Bolinj, Virar(W) Education: B.Tech in Electronics and Communication
Designation: Student Date of Birth 2: 06/03/2000



Jugnum Parimal, Address 3: D-13, central Railway Officers Quarter, Sant gadge baba Marge, Off Dadasaheb Phalke Road, Dadar(E), Mumbai-400014 Education: B.Tech in Electronics and Communication Designation: Student Date of birth 3: 22/11/1998



Dr. Kavita Mhatre, Education: Ph.D in Wireless Networks Designation: Associate Professor Experience: 25 years(Teaching + Industry)



Credit Card Fraud Detection using Deep Learning based on Neural Network and Auto-encoder

Priyanka Sharma, Santoshi Pote

Abstract: Credit card fraud is an event problem and fraud detecting techniques getting more sophisticated each day. Mainly internet is becoming more common in almost every domain. Online transactions, shopping, and e-commerce are expanding step by step. Due to which in the online payment system, fraudulent activities have also increased. It has cost banks and their customers a loss of billions of rupees. The techniques used now a day detects the anomaly only after the fraud transaction takes place. The intruders have found ways to crack the system loopholes and defeat the security. These frauds are not consistent in their actions, they constantly alter. Thus, Artificial Intelligent (AI) algorithms are used to detect the behavior of such activity by learning the past behavior of the transaction of the users. An unsupervised algorithm is used to detect online transactions, as fraudsters commit fraud once by online media and then move on to other techniques. This paper discusses the performance analysis and the comparative study of the two Deep Learning algorithms which include auto-encoder and the neural network. In this paper accuracy, precision, recall, and AUC curve are considered as a model evaluation factor.

Keywords: Credit card, fraud detection, Artificial Intelligent (AI), Unsupervised Learning, Deep Learning, Neural Network, auto-encoder.

I. INTRODUCTION

Nowadays, numbers of people prefer to buy services and goods with credit cards [1]. Both online shopping and online payment of bills and taxes are very useful with credit cards. It's not just convenient, but also time-saving. Many find payment by credit card much more convenient in shops than cash. As a consequence of which there has been a dramatic increase in the number of bank transactions through credit cards and the amount of fraud and card fraud. In the era of digitalization, the need to identify credit card frauds is mandatory. Based on historical information, credit card screening aims to decide whether a transaction is fraudulent or

not. The decision is not easy because, when there is any kind of emergency happens, we can see changes in customer expenditure. Fraudsters utilize various methods to conquer extortion assurance.

Machine learning has achieved significant results in several areas of data processing and classification over the last decades. There are two main types of tasks in the field of machine learning: supervised and unsupervised. Supervised learning uses defined data sets to train and make correct learning by adjusting the learning rate parameters. The main drawback of supervised learning is that if new misrepresentation transactions happen that don't match with the records of the database, then these transactions will be seen as genuine. Although, unsupervised learning acquires new transaction knowledge and discovers anomalous trends from new transactions. This unsupervised learning is tougher than supervised learning, as we need effective methods for identifying irregular behaviors.

Now, let us focus on deep learning, which is a part of machine learning (ML). As online transactions are exponentially growing, the amount of data simultaneously increases, leading to unbalanced data sets. This increase in data generation is one explanation for the fact that in recent years, deep learning has evolved since deep-learning algorithms need a lot of data to understand. Deep learning makes it possible for a machine to tackle complex issues even with an extremely differing, unstructured, and interconnected informational collection. Besides, various deep learning algorithms are used for detection of fraud, but in this paper, Neural Network and Auto-encoder is used to detect whether the usual data set transaction is eligible as new fraud. We assume that certain regular transactions in data sets classified as fraud also have suspicious transaction behavior.

The remaining paper as per the following, section 2 explains all the current system use in fraud detection. Followed by section 3 portrayed the proposed technique, section 4 shows the performance analysis and results and last section 5 shows the conclusion.

II. RELATED WORK

Yusuf Sahin and Ekrem Duman [2] demonstrate the benefits of using credit card fraud detection techniques, like ANN and LR, to reduce the bank's risk. The results show that the proposed ANN classifiers surpass LR graders to solve the investigated problem.

Revised Manuscript Received on June 25, 2020.

* Correspondence Author

Priyanka Sharma*, Department of Electronic and Communication, Usha Mittal Institute of Technology, SNDT University, Mumbai, India. E-mail: sharmasc06@gmail.com

Santoshi Pote, Department of Electronic and Communication, Usha Mittal Institute of Technology, SNDT University, Mumbai, India. E-mail: santoshpote@yahoo.co.in.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

However, with the distribution of the information sets being more partial, the efficiency of the models in fraudulent transactions decreases.

According to [3], they have proposed the utilization of HMM in credit card extortion discovery.

It has likewise been clarified how the HMM can identify whether an approaching exchange is fake or not. Trial results show the presentation and adequacy of the framework and show the convenience of learning the spending profile of the cardholders. Relative examinations uncover that the Accuracy of the framework is near 80% over a wide variety in the information. The framework is moreover adaptable for taking care of huge volumes of exchanges.

M.Suresh Kumar, V.Soundarya and others [4] proposed the Random Forest Algorithm (RFA) for finding the false transactions and the precision of those transactions. This algorithm relies upon a supervised learning algorithm where it uses decision trees for classification of the dataset. After the classification of the dataset, a confusion matrix is acquired. The presentation of the Random Forest Algorithm is assessed depending on the confusion matrix. The outcome got from handling the dataset gives a precision of around 90-95%.

Ayahiko Niimi [5], led tests that affirm that deep learning has a similar precision as the Gaussian kernel SVM. Likewise, the 10-fold cross-validation analysis demonstrates that it is deep learning offers higher exactness. In this experiment, they had utilized the H2O library for deep learning, with the deep learning modules are written in Java were actuated each time. Thusly, they can't evaluate the execution time. Deep learning parameter alteration is troublesome. By upgrading the parameters, it is conceivable to build the learning exactness.

Pooja Chougule, A.D. Thakare and others [6] work mirror an endeavor to distinguish false card transactions by utilizing k-means alongside a genetic algorithm. Genetic Algorithm is an incredible optimization method. The k-means algorithm bunches the MasterCard transaction dependent on autonomous quality qualities. Be that as it may, with the expansion in the information size, it brings about anomalies. Consequently, to give enhanced recognition of cheats, they had utilized a hereditary calculation. The huge outcomes by the proposed model are seen over straightforward K-means and Simple Genetic Algorithm.

III. PROPOSED TECHNIQUE

This paper uses the methods suggested to identify credit card fraud. Comparisons are made with various deep learning, including auto-encoders or neural networks, which algorithm is better suited to classify fraud transactions by credit card dealers.

A. Deep Learning

In today's world, deep learning is modern technology. The principle of deep learning is an ANN with many layers that are known as hidden layers. Now, AI, Machine Learning, and Deep Learning (DL) are well known. Those three terms would be equivalent if metaphorically equated with the human body: artificial intelligence is like the body that includes the characteristics of comprehension, reasoning, communication, emotion, and sentiment. ML resembles one system that

demonstrations in the body, particularly the visual system. Lastly, deep learning is practically identical to the visual signalling component. It comprises of various cells, for example, retina that goes about as a receptor and makes an interpretation of light signals into nerve signals. Presently, we will contrast all the three classes and the human body. Currently, each of the three kinds is to be applied to the human body.

Deep learning is a typical term for a neural network with numerous layers. Deep learning allows for the implementation of other algorithms, such as AE, deep convolutional network, neural network, SVM, and many more. Unsupervised learning immediately extracts the relevant features of your data, makes unlabeled data more available, and offers daily training for data-dependent training.

B. Auto-Encoder

In this examination, we use AE for credit card fraud detection. Auto-encoder is designed to remake high-dimensional information utilizing a neural system model with a narrow bottleneck layer at the center. AE has the input equivalent to the output in the output layer that has pretty much the sort of input units.

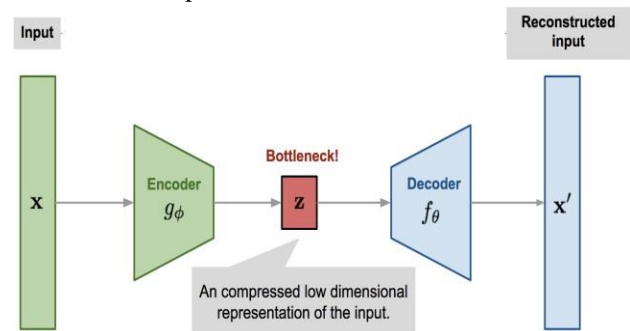


Figure 1: Auto-Encoder [7]

In this experiment to execute AE, we utilize the hyperbolic tangent function or "tanh" function to encode and decode the contribution to the yield. Fig.1. shows the structure of auto-encoder which comprise of input, encoder, bottleneck, decoder, and reconstructed input layers. Encoder figures out how to decrease the input dimension and compress the input data into an encoded portrayal. Bottleneck contains the compress representation of input data. This is the least conceivable dimension of input data. Then again, the decoder figures out how to recreate the information from the encoded representation to be as near as could be expected under the circumstances. Ultimately reconstructed input gauges how well the decoder is performing and how close the output is to the original input. However, the main drawback of auto-encoder is that, while compressing the information they may miss significant parameters that prompt a decline in the accuracy of the model.

C. Neural Network

Another algorithm is the neural network. Neural networks are a set of algorithms; demonstrate after the human brain, which is intended to perceive designs. The systems are worked from singular parts of approximating

neurons, normally called units or just "neurons." Each unit has some number of weighted sources of input. These weighted information sources are added together at that point went through an activation function to get the unit's output.

There are fundamentally three sorts of nodes in the neural network:

- Input unit: Input unit provide network information from outside world. These nodes do not compute they simply pass the information on to hidden node.
- Hidden unit: It calculates and transfers the information from input node to output node. A hidden node forms a set of "Hidden Layer". Although there may be one input layer and only one output layer in a feed-forward, it may have no or several Hidden Layers.
- Output unit: The output node is known as "Output Layer". Output unit calculates and transmit the data from the system to the outside world.

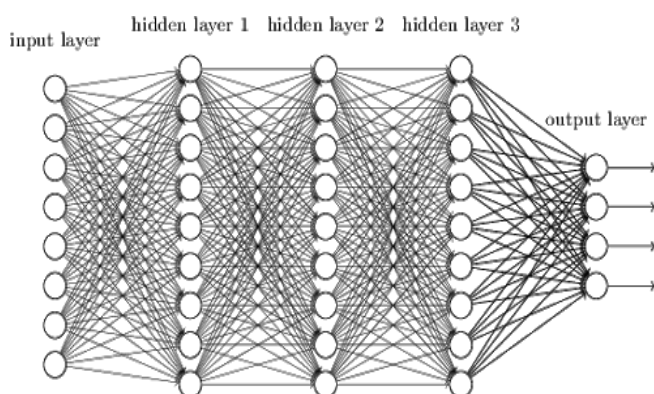


Figure 2: Neural Network [8]

PyTorch [9] is a Python AI package dependent on Torch, which is an open-source machine learning package. PyTorch utilizes the style and intensity of python which is straightforward and useful. Its core gives two essential parts, for instance, an n-dimensional Tensor, like NumPy, yet can run on GPUs and customized partition for building and planning neural systems.

In this experiment, NN consisted of 4 hidden layers, and each layer is backed with a non-linear activation function – The Rectified Linear Unit (ReLU). The input features of each hidden layer are set to 30, 50, 32, and 16 respectively. After this experiment, we started slowly by increasing a smaller number of layers to obtain appropriate results. Therefore, based on extensive analysis, the best hyper-parameters were chosen. Adaptive Moment Estimation (Adam) is a stochastic gradient descent (SGD) and RMSprop-based optimizer, accomplished weight optimization.

D. Dataset

The European dataset of 284, 807 transactions will be utilized for two days in 2013 this incorporates 492 misrepresentation transactions which are named 1 and others are marked as 0 the extent of fraud to no fraud transactions is 0.17%, which indicates that the dataset is extremely imbalanced. Due to customer privacy, the original features of this dataset are not presented and it includes 28 features resulting from the PCA mapping function plus two unmapped features called time and transaction number.

IV. PERFORMANCE METRICS AND EXPERIMENTAL RESULTS

The result of auto-encoder algorithms appeared in fig 3 and 4. The dataset was isolated for training and testing in a proportion of 80:20. The basic performance measures derived from the AUC and confusion matrix. The confusion matrix is a 2 by 2 matrix table contains four results delivered by the paired classifier. The area under an ROC curve is a measure of the usefulness of a test in general, where a greater area means a more useful test, the areas under ROC curves are used to compare the usefulness of tests.

Different estimates, for example, accuracy, precision, recall and F1 score are gotten from the confusion matrix.

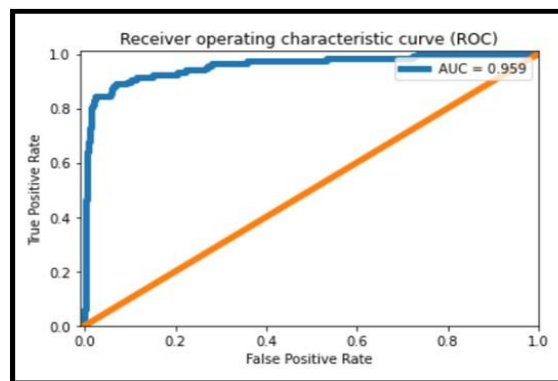


Figure 3: AUC of Auto-encoder

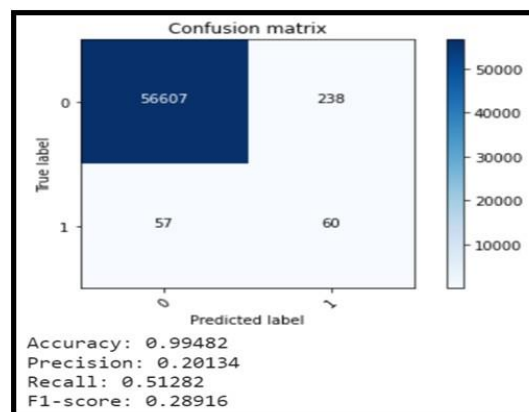


Figure 4: Confusion Matrix of Auto-encoder

Here, we move on to another deep learning algorithm which is a neural network. The results are shown in Fig. 5 and Fig.6.

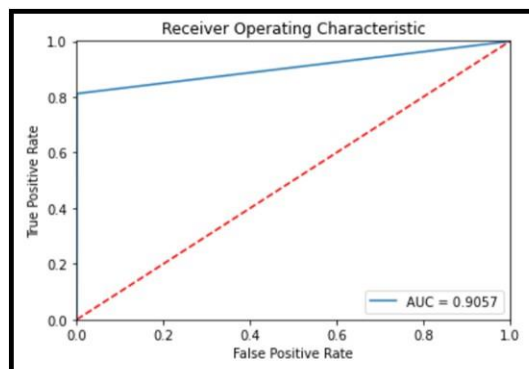


Figure 5: AUC of Neural Network

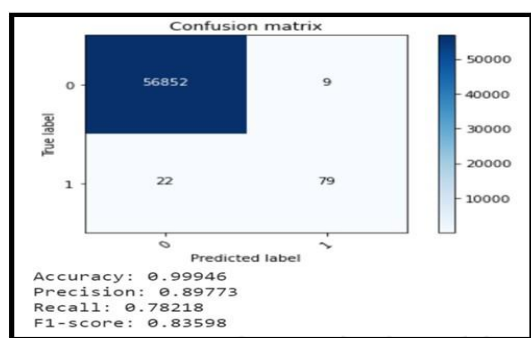


Figure 6: Confusion Matrix of Neural Network

Accuracy, precision, recall, and F1-score are utilized to report the presence of the framework to identify the fraud in

Table- I: Performance analysis of auto-encoder and Neural Network algorithms

Algorithms	Accuracy	Precision	Recall	F1-score
Auto-encoder	99.48%	20.13%	51.28%	28.91%
Neural Network	99.94%	89.77%	78.21%	83.59%

V. CONCLUSION

To make the final comparison of the above algorithms concerning their classification accuracy, the best results have been taking from Table 1.

As shown in the confusion matrix above, a fine-tuned Neural Network-based system has detected fewer false positives compared to Auto-encoders hence giving the highest precision. So in such a case while dealing with sensitive data, it becomes important to consider the precision of the system than accuracy. Adding more layers will make Auto-encoders more complex to train to result in delayed output. The comparative results show that the neural network performs better than auto-encoder algorithms.

In the future, one can further fine-tuning hyperparameters the neural network, perform boosting techniques on different Machine Learning algorithms. One can also compare the results of different deep learning libraries like fast.ai.conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

REFERENCES

1. F. Carcillo, Y. A. Le Borgne, O. Caelen, Y. Kessaci, F. Oblé, and G. Bontempi, "Combining unsupervised and supervised learning in credit card fraud detection," *Inf. Sci. (Ny)*, no. xxxx, 2019, doi: 10.1016/j.ins.2019.05.042.
2. Y. Sahin and E. Duman, "Detecting credit card fraud by ANN and logistic regression," *INISTA 2011 - 2011 Int. Symp. Innov. Intell. Syst. Appl.*, no. June 2011, pp. 315–319, 2011, doi: 10.1109/INISTA.2011.5946108.
3. A. Srivastava, A. Kundu, S. Sural, and A. K. Majumdar, "Credit card fraud detection using Hidden Markov Model," *IEEE Trans. Dependable Secur. Comput.*, vol. 5, no. 1, pp. 37–48, 2008, doi: 10.1109/TDSC.2007.70228.
4. M. S. Kumar, V. Soundarya, S. Kavitha, E. S. Keerthika, and E. Aswini, "Credit Card Fraud Detection Using Random Forest Algorithm," 2019 Proc. 3rd Int. Conf. Comput. Commun. Technol.

the credit card. In this paper, two deep learning algorithms are utilized to identify fraud in the credit card system. To evaluate the algorithms, 80% of the data set is utilized for training and 20% is utilized for testing and validation.

Accuracy, precision, recall, F1-score are used to evaluate for different variables for three algorithms as shown in Table I. The accuracy result appears for Auto-encoder and Neural Network is 99.48%, and 99.94% respectively. In such a case where data is critical, the system cannot rely only on accuracy. The system has to be more precise than being accurate. It should recognize less number of false-negative and false-positive cases.

ICCCT 2019, pp. 149–153, 2019, doi: 10.1109/ICCCT2.2019.8824930.

5. A. Niimi, "Deep learning for credit card data analysis," 2015 World Congr. Internet Secur. WorldCIS 2015, pp. 73–77, 2015, doi: 10.1109/WorldCIS.2015.7359417.
6. P. Chougule, A. D. Thakare, P. Kale, M. Gole, P. Nanekar, and A. K. Algorithm, "Genetic Kmeans Algorithm for Credit Card Fraud Detection," *Int. J. Comput. Sci. Inf. Technol.*, vol. 6, no. 2, pp. 1724–1727, 2015.
7. Available: <https://lilianweng.github.io/lil-log/2018/08/12/from-autoencoder-to-beta-vae.html>
8. Available: <http://neuralnetworksanddeeplearning.com/chap5.html>.
9. Available: <https://pytorch.org/>.

AUTHORS PROFILE



Priyanka Sharma, M.Tech. Scholar (Electronic and Communication Engineering) from Usha Mittal Institute of Technology (Mumbai), Maharashtra. I completed my B Tech in Electronic Engineering in 2018 from Usha Mittal Institute of Technology.



Santoshi Pote, pursuing Ph.D. (Electronics Engineering) from Ramrao Adik Institute of Technology (Navi Mumbai). Working as Associate Professor in Electronic and Communication Engineering department in Usha Mittal Institute of Technology (Mumbai).



Credit Card Fraud Detection using Different Machine Learning Models

Priyanka Sharma^{1*} and Santoshi Pote²

¹Department of Electronic and Communication, Usha Mittal Institute of Technology, SNDT University, Mumbai, India.

²Department of Electronic and Communication, Usha Mittal Institute of Technology, SNDT University, Mumbai, India

Abstract: Credit card fraud is an event problem and fraud detecting techniques getting more sophisticated each day. It has cost banks and their customers a loss of billions of rupees. The techniques used now a day detects the anomaly only after the fraud transaction takes place. The intruders have found ways to crack the system loopholes and defeat the security. Thus, Artificial Intelligent (AI) algorithms are used to detect the behaviour of such activity by learning the past behaviour of the transaction of the user not only this, but data is also unbalanced so SMOTE is used. Various concepts and types have been introduced in this paper related to credit card anomaly detection systems like decision tree, random forest, Neural Networks, and Auto-encoder. A comparative study is done in this paper on the bases of accuracy, precision, recall and AUC curve.

Keywords: Credit card fraud, Artificial Intelligent, SMOTE, decision tree, random forest, Neural Network and Auto-encoder.

1. INTRODUCTION:

These days, a credit card is a well-known method of transactions used in many scenarios like online shopping, bill payments, bank-to-bank money transfer, etc. Due to a rise in demands for online transactions, credit card users have increased leading to credit card frauds. A credit card is a payment card provided to clients as an arrangement of payment. There are heaps of advantages in utilizing Visas, for example:

- **Purchasing convenience:** The credit card allows customers to buy anything at any time, place or amount without conveying the money.
- **Hold the records of custom credit:** Great financial record is regularly significant in identifying steadfast clients. This history is important for a credit card, yet additionally for other budgetary administrations like credits, rental applications, or even a few employments.
- **Purchase security:** A credit card may likewise offer clients, extra assurance if the bought stock gets lost, harmed, or taken. Furthermore, some charge card organizations give protection to enormous buys.

Despite all referenced advantages, the issue of misrepresentation is difficult in e-banking administrations that undermine charge card exchanges particularly. In the era of digitalization, the need to identify credit card frauds is mandatory. Further, the individual utilizing the card has no association with the cardholder or backer and has no aim of either reaching the proprietor of the card or making reimbursements for the buys made[1].

For fraud, a credit card is a basic objective in light of the fact that with no hazard, an immense measure of cash can be picked up inside a brief time frame. To commit fraud, fraudsters endeavour to take delicate information like card number, financial balance information, and CVV number. These fraudulent transactions are so legitimate that it makes fraud

detection a difficult issue. In this manner, a great misrepresentation recognition framework ought to have the option to distinguish the extortion exchange precisely and should make the discovery conceivable progressively exchanges.

In the detection of credit card fraud, both unsupervised and supervised learning is investigated. Supervised learning uses defined data sets to train and make correct learning by adjusting the learning rate parameters. The disadvantage of supervised learning is that if new fraud transactions happen that don't coordinate with the records of the database, at that point this transaction will be viewed as real. Although, unsupervised learning acquires new transaction knowledge and discovers anomalous trends from new transactions. This uncontrolled learning is tougher than supervised learning, as we need effective methods for identifying irregular behaviours.

Deep learning is another innovation that as of late pulled in a lot of consideration in the field of AI. By reconstructing deep structures such as the neural networks on the human brain, it greatly increases the accuracy of abstract representations. In this paper, we had compared deep learning algorithms Auto-encoder and Neural Network with machine learning algorithms such as decision tree, random forest using SMOTE (Synthetic Minority Oversampling Technique) to overcome the problem of the imbalanced dataset. The finding of these algorithms will also help us to find the best algorithm for detecting credit card fraud. The remaining paper as per the following section 2 explains all the current system use in fraud detection. Followed by section 3 portrayed the proposed technique, section 4 shows the performance analysis and results and last section 5 shows the conclusion.

2. RELATED WORK:

According to [2], they have proposed the utilization of HMM in credit card extortion discovery. The proposed technique for finding the spending profile of cardholders, just as the utilization of this information in choosing the estimation of perception images and an underlying appraisal of the model parameters. It has likewise been clarified how the HMM can identify whether an approaching exchange is fake or not. Trial results show the presentation and adequacy of our framework and show the convenience of learning the spending profile of the cardholders. Relative examinations uncover that the Accuracy of the framework is near 80% over a wide variety in the information. The framework is moreover adaptable for taking care of huge volumes of exchanges.

Ayahiko Niimi [3], led tests that affirm that deep learning has a similar precision as the Gaussian kernel SVM. Likewise, the 10-fold cross-validation analysis demonstrates that it is deep learning offers higher exactness. In this experiment, they had utilized the H2O library for deep learning, with the deep learning modules are written in Java were actuated each time. Thusly, they can't evaluate the execution time. Deep learning parameter alteration is troublesome. By upgrading the parameters, it is conceivable to build the learning exactness.

According to [4], examination uncovers a relative execution of CFLANN, MLP, and Decision Tree more than two unique informational collections for credit card fraud detection. The outcome shows that in both the informational collection MLP outflanked CFLANN and Decision Tree in misrepresentation recognition. Even though FLANN with other info development has been effectively utilized in different regions like an expectation in which FLANN performed better than MLP however in MasterCard extortion location MLP has marginally an edge over CFLANN.

Pooja Chougule, A.D. Thakare and others [5], work mirrors an endeavor to distinguish false card transactions by utilizing k-means alongside a genetic algorithm. Genetic Algorithm is an incredible optimization method. The k-means algorithm bunches the MasterCard transaction dependent on autonomous quality qualities. Be that as it may, with the expansion in the information size, it brings about anomalies. Consequently, to give enhanced recognition of cheats, they had utilized a hereditary calculation. The huge outcomes by the proposed model are seen over straightforward K-means and Simple Genetic Algorithm.

M.Suresh Kumar, V.Soundarya and others [6] proposed the Random Forest Algorithm (RFA) for finding the false transactions and the precision of those transactions. This algorithm depends on a supervised learning algorithm where it utilizes choice trees for classification of the dataset. After the classification of the dataset, a confusion matrix is acquired. The presentation of the Random Forest Algorithm is assessed depending on the confusion matrix. The outcome got from handling the dataset gives a precision of around 90-95%.

3. PROPOSED TECHNIQUE:

This paper uses the methods suggested identifying credit card fraud. Comparisons are made with various machine learning algorithms, such as decision tree, random forest and deep learning, including auto-encoders or neural networks, which algorithm is better suited to classify fraud transactions by credit card dealers.

3.1. Dataset

In 2013, 284,807 European data sets were used for two days. It includes 492 fraud transactions listed as 1 and 0 for other transactions. The fraud-to-non-fraud transaction ratio is 0.17%, which reveals a very imbalanced data collection. The original features are not seen on this data set due to customer confidentiality and include 28 PCA mapping features plus two unmapped features known as the time and transaction number. As the data is very imbalanced, SMOTE is used to align the data collection for machine learning algorithms.

3.2. Machine Learning Algorithms

For Machine learning algorithms SMOTE is used to overcome highly imbalance data. The over-sampling technique by the synthesized minority reduces the non-fraud transaction. The parameters of SMOTE() function synthesizes the confluence. The result of this technique will be compared with other algorithm is used for comparison

Decision Tree

A decision tree is a kind of supervised learning algorithm that is primarily used in problem classification. It operates both for the category and continuous variables of input and output. In this technique, the population test is separated into at least two homogenous sets depending on the most appropriate input divider/differentiator. Decision trees appear to have a significant variation when separate training and testing sets with the same data are used because they are over fitting with the training data. This contributes to poor data output. Unfortunately, this restricts the use of predictive modelling decision trees[7].

Random Forest

Random forests are tree-based algorithms that require the formation and combination of many trees with outputs to improve the model's generalization. It is known as an ensemble approach for the combination of trees. Combining is simply a mixture of weak students (individual trees) generating a strong student [8]. Random forests can be used to solve problems with regression and classification. The dependent variable is constant in cases of regression problems.

3.3. Deep Learning Algorithm

Auto-encoder

Auto-encoders are unsupervised learning techniques that affect the neural network of portrait learning assignments. It is designed with the ultimate purpose of forcing a device bottleneck that provides a packed information portrait of the first information. This strain and subsequent rework would be a very difficult job if the knowledge highlights were each separate from one another. In any case, if there is an information structure, this structure can be used by scientists and the machine bottleneck to drive contribution.

Neural Network

Neural networks are a set of algorithms, demonstrated freely after the human mind, that are intended to perceive designs. The systems are worked from singular parts approximating neurons, normally called units or just "neurons." Each unit has some number of weighted sources of info. These weighted information sources are added together at that point went through an activation function to get the unit's yield.

There are fundamentally three sorts of nodes in neural network:

- Input unit: Provides network information from outside world. These nodes do not compute they simply pass the information on to the hidden nodes.

- Hidden unit: It calculations and transfers the information from input nodes to output nodes. A hidden nodes forms a set of "Hidden Layer". Although there may be one input layer and only one output layer in a feed-forward network, it may have no or several Hidden Layers.
- Output unit: The output nodes are called the "Output layer" collectively and are responsible for computations and transmission of information from the network to the outside world.

In this study to implement Neural Network, we had used the PyTorch. It generally utilizes the style and intensity of python which is understand easy and used. It core give two primary component, for example, a n-dimensional Tensor, like numpy yet can run on GPUs and programmed separation for building and preparing neural systems.

The experimental NN consisted of 4 hidden layers and each layer is backed with a non-linear activation function – Rectified Linear Unit (ReLU). The input features of each hidden layer are set to 30, 50, 32 and 16 respectively. Deeper networks have been shown to produce better performance than those with fewer layers. After this experiment, we started slowly by increasing a smaller number of layers to obtain appropriate results. Therefore, based on extensive analysis, the best hyper-parameters were chosen. More network improvement resulted in more machine time and the results were not so different from the design chosen. Adaptive Moment Estimation (Adam) is a stochastic gradient descent (SGD) and RMSprop-based optimizer, accomplished weight optimization.

4. PERFORMANCE METRICS AND EXPERIMENTAL RESULTS:

These are the result of machine learning algorithms decision tree and random forest appeared fig 1, 2, 3 and 4 respectively as we referenced above that the dataset was isolated for training and testing in a proportion of 80:20. The basic performance measures derived from the AUC and confusion matrix. The confusion matrix is a 2 by 2 matrix table contains four results delivered by the paired classifier. Different estimates, for example, accuracy, precision, recall and F1 score are gotten from the confusion matrix.

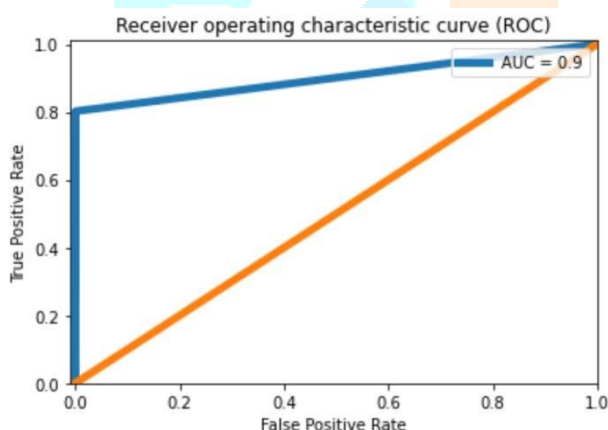


Figure 1: AUC of Decision Tree using SMOTE

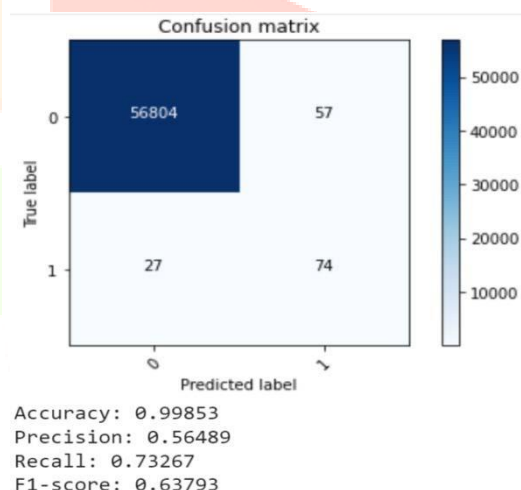


Figure 2: Confusion Matrix of Decision Tree using SMOTE

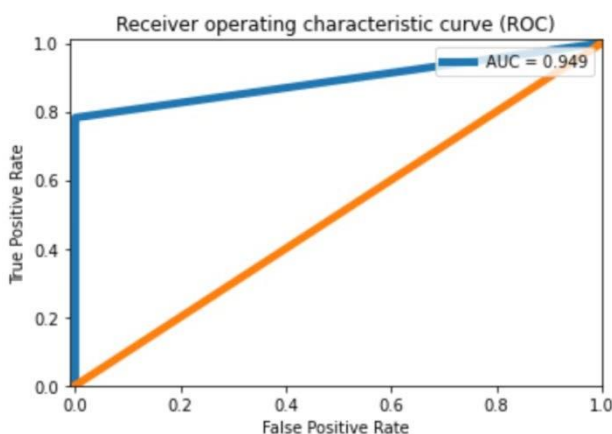


Figure 3: AUC of Random Forest using SMOTE

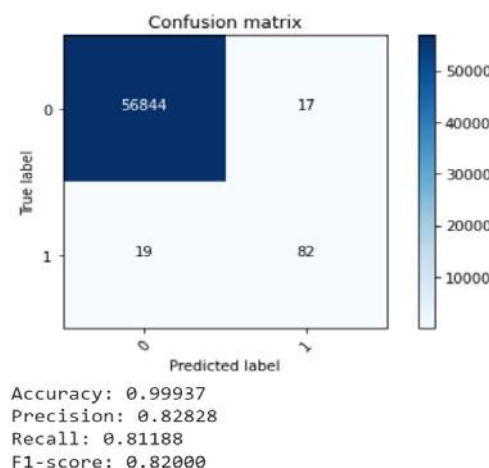


Figure 4: Confusion Matrix of Random Forest using SMOTE

Here, we move on to the deep learning algorithm which are Auto-encoder and Neural network. The results are shown in Fig. 5,6,7,8.

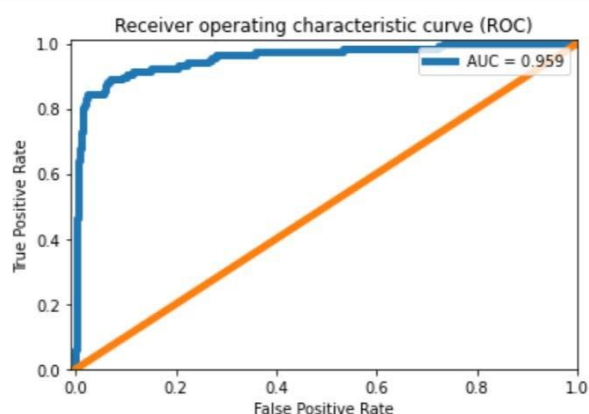


Figure 5: AUC of Auto-encoder

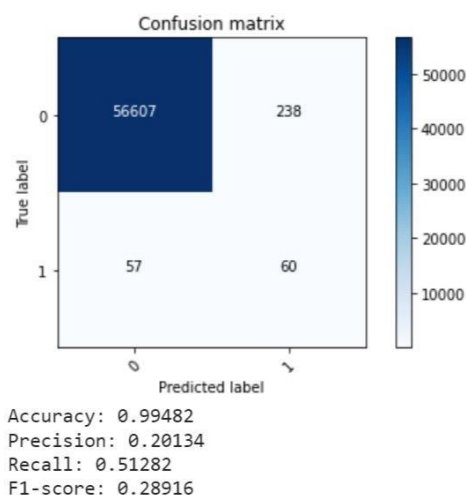


Figure 6: Confusion Matrix of Auto-encoder

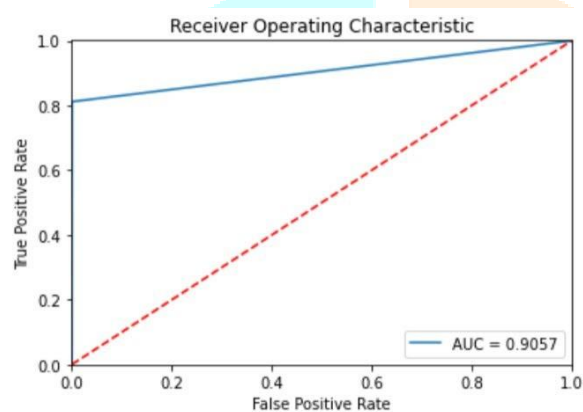


Figure 7: AUC of Neural Network

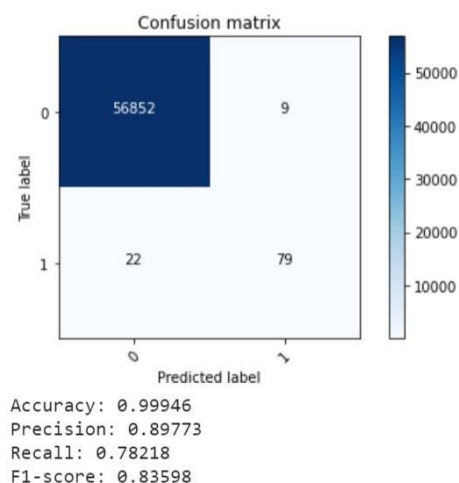


Figure 8: Confusion Matrix of Neural Network

Accuracy, precision, recall and F1-score are utilized to report the presentation of the framework to identify the fraud in the credit card. In this paper, two machine learning algorithms and two deep learning algorithms are developed to detect the fraud in credit card system. To evaluate the algorithms, 80% of the dataset is used for training and 20% is used for testing and validation. Accuracy, precision, recall, F1-score are used to evaluate for different variables for three algorithms as shown in Table 1.

Table 1: Performance analysis for different algorithms

Algorithms	Decision Tree	Random Forest	Auto-encoder	Neural Network
Accuracy	99.85%	99.93%	99.48%	99.94%
Precision	56.48%	82.82%	20.13%	89.77%
Recall	73.26%	81.18%	51.28%	78.21%
F1-score	63.79%	82.00%	28.91%	83.59%

The accuracy result is shown for decision tree; random forest, auto-encoder and neural network are 99.85%, 99.93%, 99.48%, and 99.94% respectively. In such a case where data is critical, system cannot rely only on accuracy. System has to be more precise than being accurate. It should detect less number of false positive and false negative cases.

5. CONCLUSION

In order to make final comparison of all the above algorithms with respect to their classification accuracy, best result have been take from Table 1.

As shown in the confusion matrix above, a fine-tuned Neural Network based system has detected less number of false positives compared to other counterparts hence giving highest precision. Random forest gives almost the same results but has ~7% difference in its precision which is a lot while handling such a sensitive data. While NN can be fine-tuned further for better results whereas more number of trees in RF will create lot of confusion. Adding more layers will make Auto-encoders more complex to train resulting in delayed output. The comparative results show that the neural network performs better than other three algorithms.

In future one can further fine-tuning hyper-parameters the neural network, perform boosting techniques on different Machine Learning algorithms. One can also compare the results of different deep learning libraries like fast.ai.

REFERENCES

- [1] T. P. Bhatla, V. Prabhu, and A. Dua, "Understanding Credit Card Frauds," *Cards Bus. Rev.*, vol. 1, no. 6, pp. 1–15, 2003, doi: 10.1.1.431.7770.
- [2] A. Srivastava, A. Kundu, S. Sural, and A. K. Majumdar, "Credit card fraud detection using Hidden Markov Model," *IEEE Trans. Dependable Secur. Comput.*, vol. 5, no. 1, pp. 37–48, 2008, doi: 10.1109/TDSC.2007.70228.
- [3] A. Niimi, "Deep learning for credit card data analysis," *2015 World Congr. Internet Secur. WorldCIS 2015*, pp. 73–77, 2015, doi: 10.1109/WorldCIS.2015.7359417.
- [4] M. K. Mishra and R. Dash, "A comparative study of chebyshev functional link artificial neural network, multi-layer perceptron and decision tree for credit card fraud detection," *Proc. - 2014 13th Int. Conf. Inf. Technol. ICIT 2014*, vol. 228, no. August 2013, pp. 228–233, 2014, doi: 10.1109/ICIT.2014.25.
- [5] P. Chougule, A. D. Thakare, P. Kale, M. Gole, P. Nanekar, and A. K. Algorithm, "Genetic K-means Algorithm for Credit Card Fraud Detection," *Int. J. Comput. Sci. Inf. Technol.*, vol. 6, no. 2, pp. 1724–1727, 2015.
- [6] M. S. Kumar, V. Soundarya, S. Kavitha, E. S. Keerthika, and E. Aswini, "Credit Card Fraud Detection Using Random Forest Algorithm," *2019 Proc. 3rd Int. Conf. Comput. Commun. Technol. ICCCT 2019*, pp. 149–153, 2019, doi: 10.1109/ICCCT2.2019.8824930.
- [7] X. Niu, L. Wang, and X. Yang, "A Comparison Study of Credit Card Fraud Detection: Supervised versus Unsupervised," 2019, [Online]. Available: <http://arxiv.org/abs/1904.10604>.
- [8] S. Venkata Suryanarayana, G. N. Balaji, and G. Venkateswara Rao, "Machine learning approaches for credit card fraud detection," *Int. J. Eng. Technol.*, vol. 7, no. 2, pp. 917–920, 2018, doi: 10.14419/ijet.v7i2.9356.
- [9] SamanehSorournejad, Z. Zojaji, R. E. Atani, and A. H. Monadjemi, "A Survey of Credit Card Fraud Detection Techniques: Data and Technique Oriented Perspective," no. November, 2016, [Online]. Available: <http://arxiv.org/abs/1611.06439>.
- [10] S. Ghosh and D. L. Reilly, "Credit card fraud detection with a neural-network," *Proc. Hawaii Int. Conf. Syst. Sci.*, vol. 3, pp. 621–630, 1994, doi: 10.1109/hicss.1994.323314.

Sensor Based Water Pollution Monitoring System

Gazanfar Gaffar , Arpita Goja, Seema Hanchate

Electronics and Communication Department

Usha Mittal Institute of Technology,

SNDT Women's University,

Mumbai.

Email: gazanfargaffar880@gmail.com

arpitagoja8@gmail.com

Abstract—Water Pollution affects the health of both humans and inhabitants of the water. Water is an important natural resource that needs constant quality monitoring for ensuring its safe use. Therefore it is important to monitor the quality of water. There are various parameters like the temperature of the water, pH value of water, and turbidity, which help detect whether water is polluted. So, we have proposed a real-time monitoring system to observe the harmful hazards which may cause pollution. The proposed monitoring system is a real-time sensor-based monitoring system that holds the temperature sensor, pH sensor, and turbidity sensor, sensing the water quality parameters continuously. The proposed system collects data from various sensors then transmits the sensed data from the microcontroller to the Wi-Fi module. Data is fetched from the Wi-Fi module and then the data is received by the end-user or monitoring station via SMS. Thus, water pollution is monitored in an intelligent manner continuously.

I. INTRODUCTION

Water is an important and crucial resource. We can't live without water but polluted water becomes unsafe to drink. Not only for human beings but polluted water is a great threat to the water habitats also. It occurs when harmful substances, chemicals, or microorganisms contaminate water bodies, degrading water quality. With the development of industries and its waste being discharged into the rivers, which may be toxic and also in rural areas, lakes, rivers get contaminated due to agricultural chemicals.

To overcome such major problems, we have put forward a Sensor-based Water monitoring system which will measure several water quality measurement parameters like pH, temperature, and turbidity values of water. A sensor-based Water Pollution Monitoring System is a real-time monitoring system. The sensor nodes will measure the parameters and using Wireless-Sensor Network (WSN) technology, it will send the data to the base station where data is monitored and the end-user will get to know that water is polluted, it will analyze, process, and record the data. This system will help in detecting whether the water is polluted or not [1].

II. LITERATURE SURVEY

In the paper [2], in India, a river water quality monitoring system is developed on a wireless sensor network that helps in monitoring water quality data in India. In the system, a wireless sensor node is designed for monitoring the pH of water. The pH value measured is transmitted to the base station

the power requirement of the system and is cost-effective platform for monitoring water quality, but the main drawback is that only one parameter can be measured using this system [2]. Monitoring of pool water quality of trout farms is measured using fuzzy logic with a graphical user interface (GUI). For this water from four trout farms was tested for 24 days of study. By using graphical user interface (GUI) status of parameters could be monitored easily and the situation can be explained to those people with inadequate knowledge but this system lacks real-time data monitoring as discussed in the paper [3].

In the Paper [4] uses wireless microprocessor CC2430 and a remote data center following Zigbee and send the data to the Internet with the help of the General Packet Radio Service (GPRS) Data Terminal Unit (DTU). By using this, the average current consumption will be less and it will be long term stable. Since it uses a real-time clock (RTC), whenever it loses all power (including the backup battery) it will reset to an earlier date and report.

III. SYSTEM MODEL

The proposed system consists of sensors, Arduino, ESP8266 Node MCU Wi-Fi module. This system collects the data from various sensors then the sensed data is communicated to a sensor-based monitoring system. The sensor-based monitoring classifies the data based on the reference values fed to the processing unit for performing the necessary computations. The result from the Arduino unit is then wirelessly transmitted using Wi-Fi module. Sensors will sense parameters like temperature, pH, and turbidity. To transmit these values, data pins of sensors are connected to analog pins of Arduino. To transmit data from Arduino to Wi-Fi, so that end-user can get it, transmission pin of Arduino is connected to receiver pin of Wi-Fi module. To display these values on Liquid Crystal Display (LCD). We connect it to the I2C module which will convert serial data to parallel data by connecting analog pins of Arduino to Serial Clock (SCL) and SD pins and will convert 2 pin data to 8 pin data [1, 3, 5].

Monitoring of water pollution using sensing techniques works by detecting the following parameters:

- 1) Temperature
- 2) pH value
- 3) Turbidity

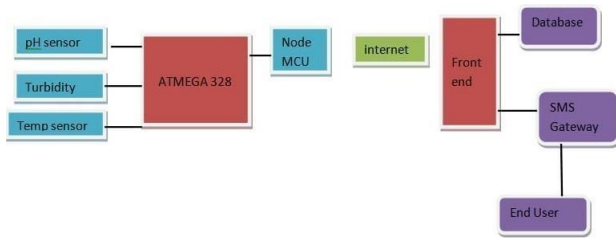


Fig. 1. Block Diagram of Sensor-based Water Pollution Monitoring System

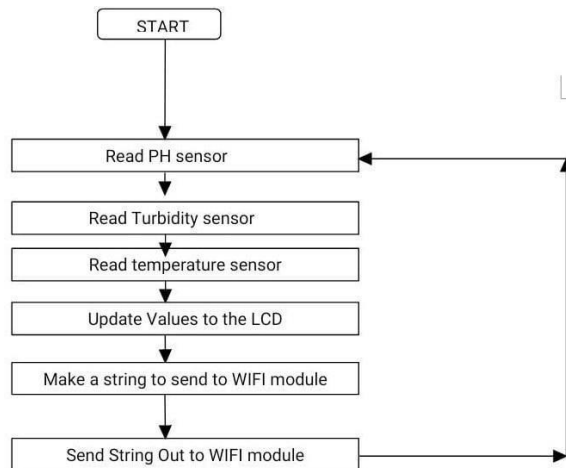


Fig. 2. Flowchart of Sensor-based Water Pollution Monitoring System

If the water is polluted it will change one of the above mentioned parameters.

1) *Temperature Sensor*: The temperature sensing device senses the temperature and converts the analog temperature value into a digital value. Here we are using a DS18B20 temperature sensor having an operating voltage of 3.3v-5v. The temperature value measured by the sensor will be stored in a 2-byte register inside the sensor. This data will be read using one wire communication method by sending in a sequence of data. We are interfacing it with Arduino therefore we will use a built-in function to access the data

2) *pH sensor*: pH solution indicates how acidic or basic the water is. If the pH value is low between 0-6 then it is acidic, if it is 7 then neutral and from 7-14 basic. [4] The sensor consists of a measuring electrode as a positive terminal which is sensitive to the H ion, it develops voltage which is directly related to H ion concentration, and a reference electrode as a negative terminal which provides a stable potential against the measuring electrode. These two electrodes generate a voltage directly proportional to the pH of the solution

3) *Turbidity Sensor*: The purpose of measuring turbidity is to get an indication for the concentration of scattering particles in a medium. Based on the amount of light scattered and

absorbed by suspended particles we can detect whether it is polluted or not.[6, 7]

4) *At mega 328*: The high-performance Microchip 8-bit (Automatic voltage regulator) AVR RISC (Reduced Instruction Set Computing)-based microcontroller combines 32KB Internet service provider (ISP) flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general-purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART (Universal Synchronous Asynchronous Receiver Transmitter), a byte-oriented 2-wire serial interface, SPI (Serial Peripheral Interface) serial port, 6-channel 10-bit A/D converter (8-channels in Thin Quad Flat Pack(TQFP) and QFN/MLF), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts[8]

5) *ESP8266 Node MCU Wi-Fi module*: It has an integrated IP protocol stack that can give any microcontroller access to a Wi-Fi network. We can simply hook this up to an Arduino device and get about as much of its ability. It is cost-effective. The operating frequency is 2.4GHz and the transfer rate is 9600 bps.[9]

6) *LCD Display*: The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits and devices like mobile phones, calculators. The operating voltage of this LCD is 4.7V-5.3V It includes two rows where each row can produce 16-characters[10]



Fig. 3. Hardware Implementation of Sensor-based Water Pollution Monitoring System

IV. RESULTS

It was tested for different conditions of pH, temperature, and turbidity. Different conditions of pH like drinking water, lemon juice, and soap solution. Tested for turbidity values for clean water and muddy water. To check different values for the temperature sensor we checked for normal water and warm water. The resulting information was displayed on the web page for each of the different cases. From the experimental results, the pH value for drinking water was 7 which was found to be within the range, for lemon juice and soap solution it was found to be 3 and 12 respectively.

```

COM3
[Temperature] 46
[pH] 11
[Water] 17
[Temp] 40
[Time] 05/19/21 21:02:05
[Temperature] 50
[pH] 10
[Water] 8
[Temp] 41
[Time] 05/19/21 21:02:27
[Temperature] 60
[pH] 7
[Water] 54
[Temp] 29
[Time] 05/19/21 21:02:39
[Temperature] 42
[pH] 7
[Water] 60
[Temp] 27
[Time] 05/19/21 21:02:51
[Temperature] 40
[pH] 7
[Water] 45
[Temp] 26
[Time] 05/19/21 21:03:03
[Temperature] 75
[pH] 4
[Water] 65
[Temp] 25
[Time] 05/19/21 21:03:15
[Temperature] 74
[pH] 4
[Water] 56
[Temp] 25
[Time] 05/19/21 21:03:27

```

Fig. 4. Output of Sensor-based Water Pollution Monitoring System

The turbidity was normal for clean water and in the range of 25-28 and for muddy water turbidity was bad and the value was 87. Values for the temperature of normal and warm water were 27 and 40 degrees respectively. When the values were above the threshold values an SMS was received by the end-user indicating that the water pollution is increased.

Sr No.	Temperature	PH	Turbidity	Time
1	025	07	Bad	05-19-21 20:34:07
1	025	06	Normal	05-19-21 20:34:14
1	025	07	Normal	05-19-21 20:34:37
1	025	07	Bad	05-19-21 20:34:49
1	025	07	Bad	05-19-21 20:35:01
1	025	07	Bad	05-19-21 20:35:12
1	025	07	Bad	05-19-21 20:35:24
1	025	06	Normal	05-19-21 20:35:36
1	025	06	Bad	05-19-21 20:35:47
1	026	06	Good	05-19-21 20:35:59

Fig. 5. Measured Parameters of Sensor-based Water Pollution Monitoring System on Webpage

Sr No.	Temperature	PH	Turbidity	Time
1	040	12	Normal	05-19-21 21:02:05
1	040	11	Bad	05-19-21 21:02:27
1	040	11	Bad	05-19-21 21:02:39
1	039	09	Bad	05-19-21 21:03:28
1	023	00	Normal	05-19-21 21:03:37

Fig. 6. Measured Parameters of Sensor-based Water Pollution Monitoring System on Webpage

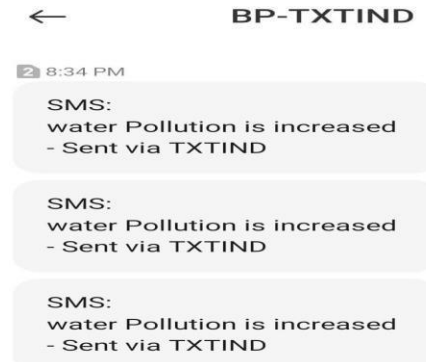


Fig. 7. SMS Received when Pollutants increase in Water

V. CONCLUSION

The proposed system extends to a new type of water quality monitoring system based on wireless sensor networks. At the same time using a Wi-Fi network and Remote Data center simplify the design. This system is a long term stable and real-time monitoring system. By using Wi-Fi Module, the result from the Arduino unit is then wirelessly transmitted. Sensors will sense parameters like temperature, pH and Turbidity. Hence, this system detects water pollution and prevents the hazards caused by it.

REFERENCES

- [1] S. Premkumardeepak and M. B. M. Krishnan, "Intelligent sensor based monitoring system for underwater pollution," 2017 International Conference on IoT and Application (ICIOT), Nagapattinam, 2017, pp. 1-4, doi: 10.1109/ICIOTA.2017.8073626., 2017.
- [2] K. A. U. Menon, D. P and M. V. Ramesh, "Wireless sensor network for river water quality monitoring in India," 2012 Third International Conference on Computing, Communication and Networking Technologies (ICCCNT'12), 2012, pp. 1-7, doi: 10.1109/ICCCNT.2012.6512437., 2012.
- [3] Yalcuk, A., Postalcioglu, S. Evaluation of pool water quality of trout farms by fuzzy logic: monitoring of pool water quality for trout farms. *Int. J. Environ. Sci. Technol.* 12, 1503–1514 (2015). <https://doi.org/10.1007/s13762-014-0536-9>, 2015.
- [4] D. He and L. Zhang, "The water quality monitoring system based on WSN," 2012 2nd International Conference on Consumer Electronics, Communications and Networks (CECNet), Yichang, 2012, pp. 3661-3664, doi: 10.1109/CECNet.2012.6201666., 2012.
- [5] Abel, T., Ungerböck, B., Klimant, I. et al. Fast responsive, optical trace level ammonia sensor for environmental monitoring. *Chemistry Central Journal* 6, 124 (2012). <https://doi.org/10.1186/1752-153X-6-124>., 2012.
- [6] P. N. Budiarti, A. Tjahjono, M. Hariadi and M. H. Purnomo, "Development of IoT for Automated Water Quality Monitoring System," 2019 International Conference on Computer Science, Information Technology, and Electrical Engineering (ICOMITEE), Jember, Indonesia, 2019, pp. 211-216, doi: 10.1109/ICOMITEE.2019.8920900., 2019.
- [7] S. Zhang and L. Zhang, "Water pollution monitoring system based on Zigbee wireless sensor network," 2011 International Conference on Electronics, Communications and Control (ICECC), Ningbo, China, 2011, pp. 1775-1779, doi: 10.1109/ICECC.2011.6067965., 2011.
- [8] Marco Zennaro, Athanasios Floros, Gokhan Dogan, Antoine Bagula, "On the design of aWater Quality Wireless Sensor Network (WQWSN): an Application toWater Quality Monitoring in Malawi,"2009 International Conference on Parallel Processing Workshops, pp.330 – 336., 2009.
- [9] Frederick J. Kohlmann, "What is pH, and how is it measured?-Technical Handbook", Hach Company, 2003., 2003.
- [10] Walteneus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks-Theory and Practice" published 2010,John Wiley Sons Ltd., 2010.

Tracking and Tracing of Fake Data

Svarna Kothari¹, Niyati More², Anita Morey³

^{1,2,3}Information Technology, Usha Mittal Institute of Technology, Mumbai, India

ABSTRACT

When image tampering mechanisms become more sophisticated as a result of technological advancements, fraud detection approaches must evolve to keep up. Since the original image compression and the fake image compression are different, forensic the image using Error Level Analysis to determine the compression ratio between the original image and the fake image. In this case, we use Error Level Analysis on each image and supporting parameters for error rate analysis to identify images of manipulations using Deep Learning on a dataset of a fake image and original images. In addition to this we also proposed a unified deep neural architecture called Manipulation Tracing Network (ManTraNet). The Manipulation Tracing Network is an end-to-end network that performs both detection and localization without the need for any additional pre-processing and post-processing. The Manipulation Tracing Network is a completely convolutional network that can handle images of any size and a variety of forgery types, including splicing, copy-move, elimination, enhancement, and even unknown forgery types. We also use scale-invariant feature transformation (SIFT) algorithm and this application works by accepting an image uploaded by the user, then passing the input image into the program which utilizes the SIFT algorithm to detect if a given image has been tampered with through copy-move forgery. We have developed a graphical user interface (GUI) which will show us the result indicating whether our given input is forged or not.

Index Terms- convolutional network, deep learning, error level analysis, image forgery, manipulation tracing network, scale-invariant feature transformation

INTRODUCTION

With As the rapid climb of technology makes it easier for somebody to unfold the word, moreover as spreading false pictures. With such a big amount of computer code which will be accustomed manipulate the image thus on facilitate the general public in manipulating the image. With the unfold of false pictures on social media which will reap the tilt in order that the image rhetorical to check the reality of the image. Generally, image rhetorical could be a field of the study characteristic the origin and verifactory the believability of the image. With such a big number of false pictures that unfold across the net and social media, therefore the necessity for a tool to assist folks confirm whether or not the image unfold is real or pretend photos. several strategies area unit accustomed confirm the extent of believability of the image, one with decisive the standard of the compression level results. during this analysis, the strategies accustomed live the extent of compression is using Error Level Analysis.

- Error Level Analysis (ELA) is a forensic technique on the image to analyse images through different levels of compression. [4]
- Manipulation tracing network detects forged pixels by identifying local anomalous features, and thus is not limited to a specific forgery or manipulation type. It is an end-to-end solution, and thus no need to apply pre-and/or post-processing. [5]
- The SIFT algorithm is used because it helps extract robust features from the image to detect if a part of an image was copy-moved. [6]

Research Examples

Hites C Patel et al. in their research Forgery Frame Detection From, The Video Using Error Level Analysis. By analysing the number of frames and comparing the original video frames with the fake ones. [1]

Meera Mary Isaac et al. doing image forgery detection using Gabor Wavelets dan Local Phase Quantization. By using CASIA TIDE v.1 Dataset [2].

Birajfar et al. using a passive technique method in analysing false images. In his research summarizes some research that does image forgery. [3]



Figure 1.1: ELA Image Detection

Objective of study

As an increasing amount of our lives is spent interacting online through social media platforms, more and more people tend to seek out and consume news from digital media. Online communication has changed the nature of human beings because of the following reasons:

- (i) it is often more timely and less expensive to consume news on digital media
- (ii) it is easier to further share, comment on, and discuss the news with friends or other viewers.

However fake news on digital media has been occurring for several years now. More spread of false data can have a serious negative impact on an individual and our community. The false data can harm the authentication of the original content. The basic objective of the project is to build an efficient and accurate system which can detect image forgery. There are various ways to detect image forgery. They are classified into active and passive approaches.

DETECTION OF FAKE IMAGE

Active Approach

In the advanced form, the digital image must undergo some kind of pre-processing, such as embedding a watermark or generating signatures at the time of creation. Watermarking is a form of active tampering detection in which a security structure is embedded in the image, but most current imaging devices lack a watermarking or signature module. Message authentication code, image hash, image checksum, and image watermarking are some of the recent schemes proposed for providing image protection, which are similar to the principle of watermarking shielding as a counterpart to it

Passive Approach

In image processing techniques, passive image forensics is typically a difficult task. The passive tampering detection stream examines the raw image using different statistics and semantics of image content in order to pinpoint image tampering. As opposed to active approaches, neither construct is embedded in the image nor is it associated with it for protection, so this method is also known as raw image analysis. The only way to detect tampering is to use image function statistics. As a result, the algorithms and methods for detecting and localising image tampering differ depending on the type of protection construct used.

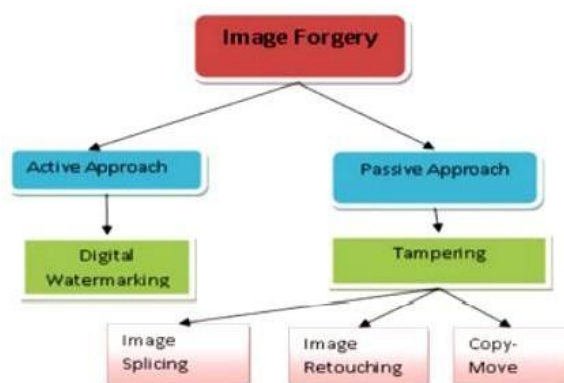


Figure 3.1: Image Forgery Detection [12]

Copy-move Forgery- One of the most difficult and widely used forms of image tampering techniques is copy-move forgery. To extract information, a part of the image must be covered. In the Copy-Move image, manipulation

technique a part of the same image is copied and pasted into another part of that image itself to shroud some important data. As the copied part originated from the same image, its essential properties such as noise, colour and texture do not change and make the recognition process troublesome.



Figure 3.2: Example of copy-move

Splicing- A region from an authentic image is copied into a different image. Image splicing is a direct method that involves cropping and pasting regions from the same or different sources. This approach refers to a paste-up created by sewing images together using digital tools like Photoshop. Picture splicing is a technique in which two or more images are combined to produce a fictitious image. Several well-known news stories are examples. Cases involving the use of forged images should be recorded. It entails combining two or more separate images into a single-image.



Figure 3.3: Example of splicing

Image Retouching- In order to create a stunning forged image, some selected regions must go through geometric transformations such as rotation, scaling, stretching, skewing, and flipping. The process of changing an image in order to prepare it for final display is known as image retouching. Retouching is a technique for making tiny, localized changes to an image. Retouching is the smoothing of an image that is usually done after global changes (such as colour correction) [14]. Image retouching is a form of digital image forgery that is considered to be less harmful than other forms. This technique is common among magazine photo editors, who use it to enhance certain features of an image in order to make it more attractive. Actually, the fact is that such enhancement is ethically wrong [13].

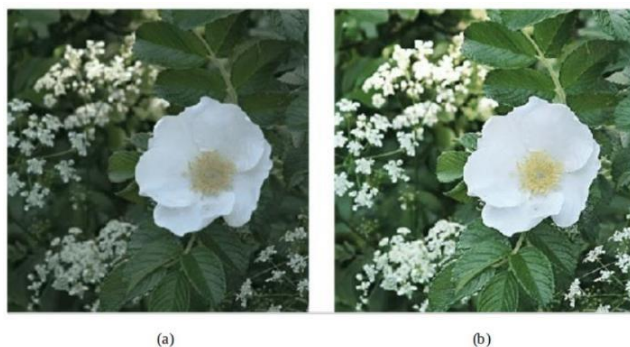


Figure 3.3: Example of image retouching

LITERATURE SURVEY

Image Forgery Detection techniques

The image splicing forgery technique involves the composition or combination of two or more images, which greatly alters the original image to create a forged image. As photos of different backgrounds are combined, making the borders and boundaries indistinguishable becomes extremely difficult. Splicing detection is a difficult problem in which the composite regions are examined using a number of techniques that, when combined with their backgrounds,

provide useful traces for detecting splicing in the image in question. This section reviews some of the existing techniques to detect image splicing forgery:

Key Techniques and Methods	Advantages	Disadvantages	Forger Type
LBP, DWT, SVM, YCbCr and PCA	Evaluated on Two Different Datasets and having good efficiency	Processing Time is not evaluate0d	Splicing
Adaptive over segmentation, SIFT, Block based.	Working on both Splicing and CopyMove Forgery Images.	Processing time is not evaluated.	Copy-Move
Multiscale BKS, Random Forest, SVM.	Probably it is first method of considering the Blur Type irregularity.	No complementarily of the underlying classifiers.	Copy-Move
Maximum a posteriori (MAP), LDA, binary classifier	Having good Accuracy	Processing time is not calculated and conflicts resulted sometimes while	Splicing
Discrete Cosine Transform, LBP, SVM	Robust and simple method	Processing time is not calculated and very complex method	Splicing and Copy-Move

Figure 4.1: Comparison of various Image forgery detection techniques [12]

METHODOLOGY

Error level analysis

Error level analysis is one powerful open-source algorithm. Error level analysis is a forensic method to identify portions of an image that has different levels of compression. It will authorize us to see areas of the photo that has been changed or altered. This technique can be used to determined that the picture is modified digitally or not. ELA can detect the added fake content(layers) on top of the image is different from the original image or not. In case the image is not been modify, the remaining part of the image should be in higher error potential in respect to altered grid. ELA works by re-saving the image at 90 percent - 95 percent compression and compares the difference between the original and the compressed. Through ELA representation of the image we can easily view the modified image. [8]

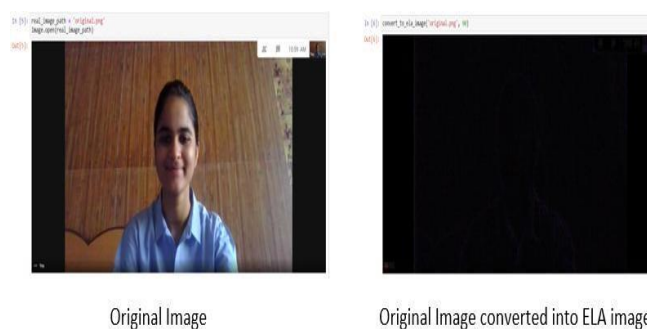


Figure 5.1: ELA test on original image

In figure 5.1 we have taken an original image and converted that image using ELA, since that was an original image hence there was no compression levels change after conversion.

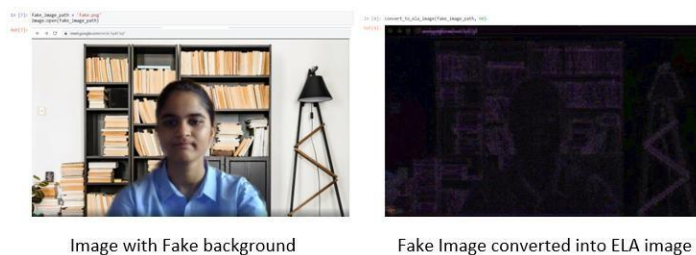


Figure 5.2: ELA test on tampered image

Similarly, a tampered image was taken in figure 5.2 and converted using ELA which gives higher compression level change after conversion in the tampered region.

Feature extraction on the train set

On splitting the data and training and testing them, following is the output we received using ELA model.

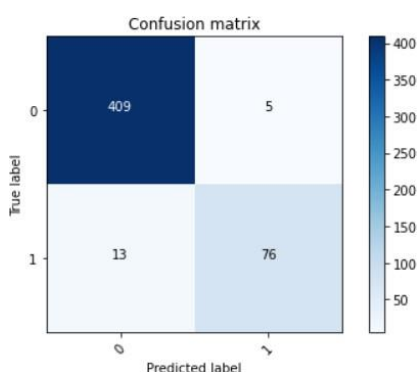


Figure 5.3: Confusion Matrix

Figure 5.3 demonstrates the confusion matrix where we have taken CASIA database and conducted test and train split of the data. Confusion matrix helps us in understand following error types - False positive (5), True positive (409), False negative (76), False positive (13)

Manipulation Tracing Network

Manipulation Tracing Network is a complete forgery detection in any image, which means it takes input as a test image and provides pixel-level forgery likelihood map as output. Comparing to existing methods, the proposed

It has the following advantages:

1. Less complex: Manipulation Tracing Network needs no extra pre- and/or post-processing
2. Rapid: Manipulation Tracing Network puts all computations in a single network, and accepts an image of arbitrary size.
3. Reliable: Manipulation Tracing Network does not rely on working assumptions other than the local manipulation assumption, i.e., some region in a testing image is modified differently from the rest.

Its solution is composed of two sub-networks, i.e., the image manipulation-trace feature extractor that creates a unified feature representation, and the local anomaly detection network (LADN) for directly localizing forgery regions without postprocessing.[9]

Manipulated Image Feature Extraction Network: the feature extraction network for the image manipulation classification task, that is sensitive to completely different manipulation varieties, and encodes the image manipulation in a very patch into a set dimension feature vector.

Localized Anomaly Detection Network: the anomaly detection network to match an area feature against the dominant feature averaged from an area region, whose activation depends on however so much an area feature completely different from the reference feature and not absolutely the price of an area feature.

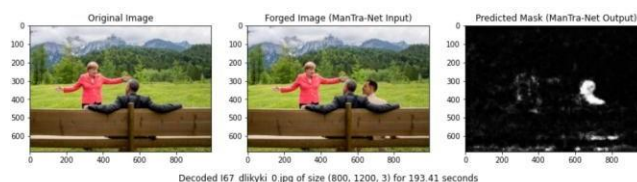


Figure 5.4: Manipulation Tracing Network test on sample data

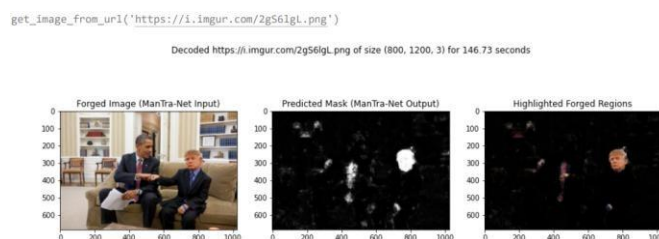


Figure 5.5: Manipulation Tracing Network test on internet data

Scale-invariant feature transformation

Robust features help to detect whether the part of the image was copy-moved or not using SIFT algorithm. Generally, the region which is copied of the original image has almost identical appearance to the copied region from any scaling or rotational transformation if it is applied on it. Hence, the descriptor of the key points extracted from the forged region is quite similar to the descriptor of key-points extracted from the original region regardless of any transformations applied due to the use of SIFT algorithm. Thus, In this concept, if an image has been forged by applying copy-move attack is the general idea to detect, this is to match each of the SIFT features extracted from the image by finding key-points that share almost similar characteristics which can be assessed based on its respective descriptor. [11]

Given an input image $I(x, y)$, then the scale space of image I is defined as follows:

$$L(x, y, \sigma) = G(x, y, \sigma) * I(x, y) \quad (1)$$

where $*$ is the convolution operation in x and y directions, and the Gaussian function

$$G(x, y, \sigma) = \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}} \quad (2)$$

where σ is the factor of scale space. [6]



Figure 5.6: SIFT Model test on original image



Figure 5.7: SIFT Model test on tampered image

Accuracy of the models for the following datasets

Models	CASIA ●●●	COVERAGE ●
ELA	87.06	80.30
ManTraNet	89.09	90.70
SIFT	60.80	78.00

Table 5.8: Result of the models, where copy-move, splicing, enhancement

Above table represents accuracy of the models used in our project. We used CASIA-v2 database [10]. It consists of 7437 authentic and 5123 tampered images of various sizes from 240x160 to 900x600 with JPEG, BMP, and TIFF formats. For training and testing purpose, we kept 80% of data for training and rest for testing. [7][15]

We used COVERAGE database. It consists of 580 samples of 256x256 size of copy-move images only.

According to our dataset, Manipulation Tracing Network gives us the highest accuracy of 90.70 percent in COVERAGE dataset and 89.09 percent in CASIA dataset.

CONCLUSION AND FUTURE SCOPE

This paper shows the overview of different image forgery detection techniques using Manipulation tracing network which detects all kind of image forgery like splicing, copy-move and image retouching with best accuracy of 89.89, Error level analysis identifies portions of an image that has different levels of compression and SIFT model is specifically to identify copy move forgery in an image.

Work on localization of tampered region is to be improved. Work on all kind of forgery detection that also includes different filtering mechanism of images. Include all formats of image. More efficient accuracy. It can be extended to finding the source of those fake images and reporting the fraud.

ACKNOWLEDGMENT

We have a great pleasure to express my gratitude to all those who have contributed and motivated during my project work.

REFERENCES

- [1] Patel HC, Patel MM. Forgery Frame Detection From The Video Using Error Level Analysis. IJAERD. 2015; (6): 242–247.
- [2] Isaac MM, Wilscy M. Image Forgery Detection Based on Gabor Wavelets and Local Phase Quantization. Procedia Computer Science. 2015; 58: 76–83.
- [3] Birajdar GK, Mankar VH. Digital image forgery detection using passive techniques: A survey. Digital Investigation. 2013; 10(3): 226–45.
- [4] Sudiatmika, Ida Bagus Kresna, and Fathur Rahman. "Image forgery detection using error level analysis and deep learning." Telkomnika 17.2 (2019): 653-659.
- [5] Wu, Yue, Wael AbdAlmageed, and Premkumar Natarajan. "Mantra-net: Manipulation tracing network for detection and localization of image forgeries with anomalous features." Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2019.

- [6] Hashmi, Mohammad Farukh, Aaditya R. Hambarde, and Avinash G. Keskar. "Copy move forgery detection using DWT and SIFT features." 2013 13th International conference on intelligent systems design and applications. IEEE, 2013.
- [7] Dong, Jing, Wei Wang, and Tieniu Tan. "Casia image tampering detection evaluation database." 2013 IEEE China Summit and International Conference on Signal and Information Processing. IEEE, 2013.
- [8] Luo, Weiqi, Jiwu Huang, and Guoping Qiu. "JPEG error analysis and its applications to digital image forensics." IEEE Transactions on Information Forensics and Security 5.3 (2010): 480-491..
- [9] Hu, Xuefeng, et al. "SPAN: Spatial Pyramid Attention Network for Image Manipulation Localization." arXiv preprint arXiv:2009.00726 (2020).
- [10] Zhang, Ying, et al. "Image Region Forgery Detection: A Deep Learning Approach." SG-CRC 2016 (2016): 1-11.
- [11] Pandey, R. C., Singh, S. K., Shukla, K. K., & Agrawal, R. (2014, December). Fast and robust passive copy-move forgery detection using SURF and SIFT image features. In 2014 9th International conference on industrial and information systems (ICIIS) (pp. 1-6). IEEE.
- [12] Gill, Navpreet Kaur, Ruhi Garg, and Er Amit Doegar. "A review paper on digital image forgery detection techniques." 2017 8th International Conference on Computing, Communication and Networking Technologies (ICCCNT). IEEE, 2017.
- [13] Mahalakshmi, S. Devi, K. Vijayalakshmi, and S. Priyadharsini. "Digital image forgery detection and estimation by exploring basic image manipulations." Digital Investigation 8.3-4 (2012): 215-225.
- [14] Guo, Yuanfang, et al. "Fake colorized image detection." IEEE Transactions on Information Forensics and Security 13.8 (2018): 1932-1944.
- [15] Kuznetsov, A. "Digital image forgery detection using deep learning approach." Journal of Physics: Conference Series. Vol. 1368. No. 3. IOP Publishing, 2019.

ONLINE VOTING SYSTEM BASED ON VISUAL CRYPTOGRAPHY AND BIOMETRIC

Anjali Dwivedi¹

Information Technology, Usha Mittal Institute of Technology Mumbai, India

Gayatri Khandare²

Information Technology

Usha Mittal Institute of Technology Mumbai, India

Mariha Shaikh³

Information Technology, Usha Mittal Institute of Technology Mumbai, India

Mrs. Anita Morey⁴

Usha Mittal Institute of Technology Mumbai, India

Abstract—With growing internet usage, exploitation activity has also increased over the years' diverse online attacks have been extended and among them the most notable attack is phishing. Phishing is being undertaken by an individual or a social event to get singular restricted information like passwords, Master card information from confusing setbacks for discount fraud, monetary advantage, and other phony activities. But not only phishing is an activity we're trying to resolve but also the violation that is been observed is that the person who is authorized to vote lays hold of and instead other rambles the votes. In this paper, we have proposed the right that a voter gets without violating his/her rights and the candidates. Another procedure named "A Novel Anti-phishing structure reliant on visual cryptography" deals with the issue of phishing. Here an image-based confirmation using Visual Cryptography and another way of providing security is through Bio-metric finger sensor. The use of visual cryptography is researched to shield the security of an image manual human test by rotting the first picture manual human test into two successful images which can also be referred to as sheets that are taken care of in secluded information collection laborers (one with voter furthermore, one with laborer) which are covered until the two images are combined to get the real images(password) which are referred to as CAPTCHA. The mystery is permits access. And the final aim of implementing Bio-metric technology is achieving duplication and phishing of the voting register thus preventing multiple voter voting.

IndexTerms- Voting System, Cryptography, AES Algorithm, Finger print sensor.

I. INTRODUCTION

Earlier casting votes through internet ballot was impractical, before due to security reasons yet with the idea of two- layer authentication measure for ID of electors and voters. Projecting their cast vote by ballot recognizing their right to vote stalls will satisfy all the requests forced by the political decision commission of India. There was a various explanation by which this framework was sought after like on the final voting day

people groups couldn't visit ballot stalls because of their medical condition, mature age people couldn't stroll to project their votes by remaining in line for an extensive stretch, working proficient who were out of their city on Election day and some more. To project their valuable votes which can bring the change, people need to enlist by giving their essential data and their citizen ids cards like the Aadhar card and voter ID card number. Its exceptional distinguishing proof strategy will straightforwardly divert to a specific corner for which that individual is permitted to cast a ballot vote and the Admin will be ready to see the rundown of applicants who have been enlisted from their area or ward or territory.

- The framework will produce just a one-time secret phrase on the date of political Election day through which individual can make their choice and when they cast, such individuals won't be permitted to project their vote once again. [1]

- Online Political Election Framework is the framework that empowers the client to cast a ballot on the web.[2]

- Explicitly, the Democratic framework comprised of worker administrations which are each connected with a data set for putting away industrious information. [3]

- Administrator will keep up all data with regard to citizen and tallies consequently they're deciding in favor of their chosen parties. [4]

II. LITERATURE REVIEW

This paper deals with the design and development of an "online -Based Voting System Using Visual Cryptography and Fingerprint Design and Implementation", to provide high performance with high security to the voting system have also used the web to make the voting system more practical. The proposed AES (Advanced Encryption Standards) algorithm security ensures just if it is adequately done an incredible key to the organization. The methodologies for phishing identification framework are email-based methodology,

visual piece of information-based approach data stream based methodology, and design closeness based methodology. In the existing arrangement of phishing locations, there is likewise a methodology where visual cryptography is utilized. [1] In this methodology when the client first registers as the Voter, at that point at the hour of enlistment itself a picture is chosen which is isolated into two consecutive parts. One portion of the picture is put away at the bank worker, what's more, the client gets another offer which he keeps with him. When the client needs to start the exchange with the Admin he sends his UID code to the voter. Vendor a worker at that point sends his sys ID secret phrase alongside the client's UID to the Administration [2]. Till now, projecting votes was finished utilizing electronic ballot performances what's more, by visiting their Ballot election area. If such individual was not accessible, they couldn't make their valuable choice, what's more, checking the number of decisions in favor of each assigned applicant was a period taking cycle in any event, when utilizing electronic ballots. Multiple layers of safety systems were unrealistic to carry out immense speculation. There was no system to accessibility and unwavering quality of the Internet casting a ballot framework and ID of the right individual who will project their vote. This system has provided a coherent way to cast votes, free of fraud, swindle free, and make the system more trustable, and fast. [3]

III. ALGORITHM

1. AES (Advanced Encryption Standards) AES plays out all its computations on bytes rather than pieces. In this way, These 16 bytes are coordinated in four segments and four lines for taking care of as a structure. [1]
2. AES uses 10 rounds for 128-digit keys, 12 adapts to 192- piece keys and 14 rounds for 256-digit keys. Each of these rounds uses other 128-cycle round key, which is resolved from the main AES key. [2]

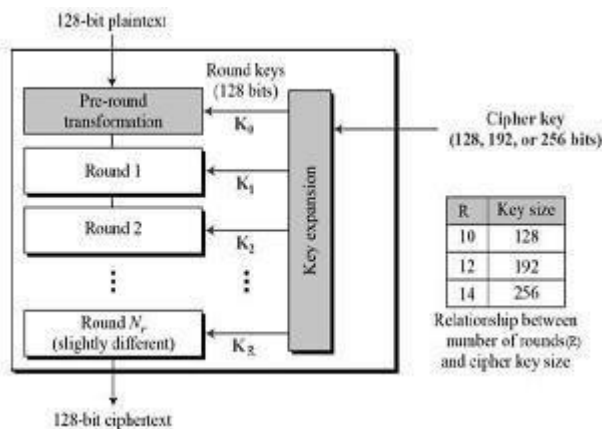


Fig.1. schematic of AES structure

3. AES is extensively gotten and maintained in both gear

and programming. Till date, no practical cryptanalytic attacks against AES has been found. In addition, AES has inborn versatility of key length, which allows a degree of 'future proofing' against progress in the ability to perform careful key requests. [3]

4. Similarly concerning DES, the AES security is ensured just in the event that it is adequately done and incredible key organization is used. [4]

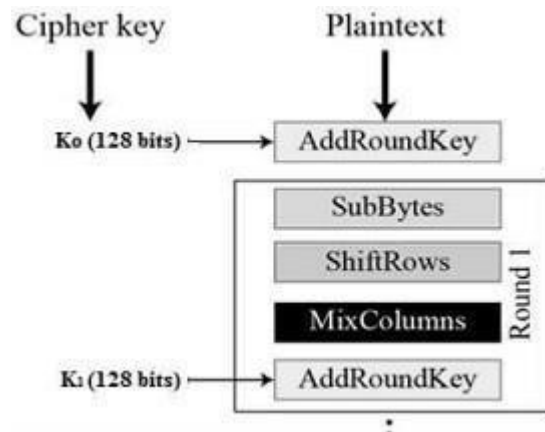


Fig.2. Encryption Process

IV. VISUAL CRYPTOGRAPHY

Extraordinary compared to other realized strategies to secure

information is cryptography. It is the craft of sending and accepting encoded messages that can be decoded simply by the sender or the collector. Encryption and unscrambling are cultivated by utilizing numerical calculations so that nobody however the expected beneficiary can decode and peruse the message. Naor furthermore, Shamir presented the visual crypt- tography plot (VCS) as a basic and secure approach to permit the mysterious sharing of pictures with no cryptographic calculations.

V. BIOMETRIC FINGER SENSOR

Biometrics is robotized technique used for perceiving an in- dividual dependent on physiological or conduct characteristics. A unique finger impression scanner is a gadget that is used to distinguish an individual by examining their fingerprints. We have a few edges on our fingers. Moreover, every individual has an exceptional example. Thus, a unique mark scanner checks them to recognize.

VI. METHODOLOGY

This record is the Product Prerequisites Determination for the "Online Political race Framework" which is being created as part of a scholarly course. [1]

This record is expected to give a point by point determination of the prerequisites for the designers and fill in as a methods to unmistakably layout the venture highlights [2]

The overall necessities give an outline of the client's attributes, item viewpoint, and outline of useful also, information prerequisites. [3]

The particular necessities give a more refined adaptation of the general necessities. [4]

VII. FLOWCHART DIAGRAM

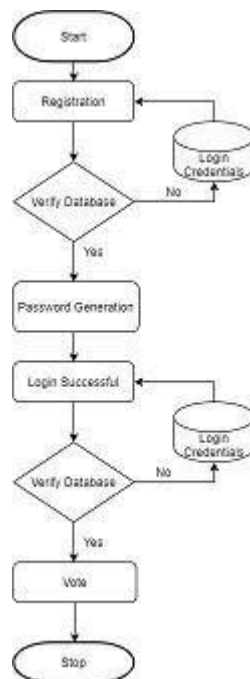


Fig. 3. Voting Flow

VIII. IMPLEMENTATION

I. Administrator Meeting:

- Login: Administrator need to enter substantial login certifications all together to login into the framework. [1]
- Add Political decision: Administrator can add political decision detail by entering name, choosing competitors and setting political decision end date. [2]
- View Political decision: By choosing the political race id, administrator can see political decision subtleties and the competitors with their photograph.
- Administrator can produce result from here itself. [3]
- Add Competitors: Administrator can enroll every single new up-and-comer detail with their photo. [4]
- View Applicants: Every one of the enrolled competitors will be shown. [5]
- View Result: Administrator can see result by choosing the political decision id from the view political decision module. [6]

- View Client: Every one of the enlisted clients will be shown here with their subtleties. [7]

ii. Citizen Meeting:

- Register: Client need to enroll first by topping off fundamental enrollment subtleties. While enrollment, secret key is put away into picture record and 2 picture documents are produced. One picture record is sent over mail and another is downloaded in neighborhood framework. [1]
- Login: Here, the genuine validation is performed where client need to enter their login id and select the two pictures which were sent and downloaded separately. Subsequent to blending the picture, the encoded secret phrase is appeared and client need the enter the encoded secret phrase to continue with login. [2]
- Vote: After fruitful login, client would now be able to choose political decision id and cast their decision in favor of the ideal competitor. [3]
- View Result: Client can see the political decision results here. At present surveying are occurring by manual democratic framework. Our proposed framework is internet casting a ballot framework with security measures. With the goal that client can capable survey at any spot in this world through Web. [4]

iii. Task Execution

The Task is stacked in Visual Studio 2010. We utilized Visual Studio for Plan and coding of task. Made and kept up all information bases into SQL Worker 2008, in that we make tables, put down inquiry for store information or account of venture.[1]

Equipment Prerequisite:

- i3 Processor Based PC or higher
- Memory: 1 GB Slam
- Hard Drive: 50 GB
- Screen
- Web Association

Programming

Prerequisite:

- Windows 7 or higher
- Visual studio 2010.
- SQL Worker 2008.

IX. MODULES

X. USER MODULE REGISTRATION

This is the registration page, where the voter can register themselves. The users have to enter their details which are required by admin through registration page. All the details registered on the portal are saved in the respective database. The Admin has authority to accept eligible user, otherwise he has right to reject their registration by providing reason of rejection.



Fig.4. REGISTRATION

XI. USER MODULE DASHBOARD

From here client can login to his record furthermore, can oversee entire democratic interaction by login, producing secret key, see competitor and vote. He has the option to cast a ballot.



Fig. 5. USER-DASHBOARD

XII. USER MODULE AUTHENTICATION

It is utilized to create secret key with the assistance of visual cryptography two way verification.



Fig.6. AUTHENTICATION

XIII. ADMIN MODULE DASHBOARD

From here administrator can login to his record furthermore, can oversee entire democratic interaction by adding new political race, creating id for client, confirming the clients, creating result and some more. He has the privilege to create id for client by confirming the clients.



Fig. 7. DASHBOARD

XIV. ADMIN MODULE ADD CANDIDATE

This is a module which gives a rundown of all continuous political decision, this module is open just to those clients who have been checked by administrator. By this module client can project their vote by choosing an up-and-comer of a specific political race.



Fig.8. ADD CANDIDATE

XV. ADMIN MODULE ADD ELECTION DIAGRAM This a module which add when election is going to be held along with election name and candidate which all are participating.



Fig.9. ADDELECTION

XVI. RESULT

This module provides the results of all the completed elections; user has the right to see the result of elections. All the results are being generated by admin after the successful completion of the election.



Fig. 10. VIEW RESULT

XVII. CONCLUSION

In this paper we have attempted to utilize Visual Cryptography to forestall Phishing. This paper has endeavored to investigate the significance, need and simplicity of casting a ballot. Future work remembers the working and testing the outcome for huge measure of information. This task can likewise be utilized in reality situation. Since Visual Cryptography Method is utilized, client can ready to see if he is in phishing site or unique site without any problem. Proposed internet casting a ballot framework is successful and it will valuable for citizens.

REFERENCES

- 1) Himanshu Agarwal and G.N. Pandey "Online Voting System for India Based on AADHAAR ID" 2013 Eleventh International Conference on ICT and Knowledge Engineering
- 2) Smita B. Khaimar, P. Sanyasi Naidu, Reena Kharat

- 3) Shivendra Katiyar, Kullai Reddy Meka, Ferdous A. Barbhuiya, Sukumar Nandi "Online Voting System Powered By Biometric Security" 2011 Second International Conference on Emerging Applications of Information Technology.
- 4) Al-Ameen, A.; Talab, S.A., "E-voting systems vulnerabilities," Information Science and Digital Content Technology (ICIDT), 2012 8th International Conference on , vol.1, no., pp.67,73, 26-28 June 2012 URL:
<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=arnumber=6269229&isnumber=6269212>
- 5) Cui Zhe; Dai Xiang, "A practical distributed electronic voting system," Electric Information and Control Engineering (ICEICE), 2011 International Conference on , vol., no., pp.1095,1099, 15-17 April 2011 doi: 10.1109/ICEICE.2011.5777548 URL:
<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=arnumber=5777548&isnumber=5776798>
- 7) Gritzalis, D. (2002). Secure Electronic voting. Seventh Computer Security Incident Response Team Workshop Syros, Greece.
- 8) Krejcie, R. Morgan D. (1970). Determining Sample Size for Research Activities Educational and Psychological Measurement.
- 9) Melanie Volkamer (2010), —Electronic Voting in Germany|, Data Protection in a Profiled World, DOI 10.1007/978-90-481-8865-9_10, SpringerScience + BusinessMediaB.V.2010

IMAGE ENHANCEMENT FRAMEWORK FOR ARMY APPLICATIONS

A. Akshata Shenai, B. Shreya Telavane

Usha Mittal Institute of Technology
SNDT Women's Univeristy, Mumbai
Department of Information Technology

C. Anita Morey

Usha Mittal Institute of Technology
SNDT Women's Univeristy, Mumbai,
Department of Information
Technology.

ABSTRACT

Image processing is widely known field of study gaining momentum with the daily requirement to enhance and improve the quality of images. Image processing is a core technology used in numerous fields. Its used in Defense and Military applications to improve image and video quality. Mostly images face problems like turbulence, noise, distortion, haziness due to which army people are unable to read the image. The army people also find difficulty in identifying objects in image to find intruders. Various techniques have been stated over the years in order to improve the quality of these images and video. In order to improve image quality we have implemented and assessed certain algorithms along with image quality assessment metrics. Several trails will be made using different techniques and the results for the same will be presented.

Keywords: Image Enhancement, Super Resolution, Turbulence, Noise Reduction, Contrast

1. INTRODUCTION

Image processing is a domain where we apply certain algorithms on an image to get some useful information for the image. Different hardware technologies have evolved to reduce the destortion in images but due to turbulence the need for software image processing techniques is prevelant. The image enhancement techniques can help to mitigate the problems caused by sensors or environment providing better task performance for operators. The military environment affects the quality of the image highly. For military purpose several techniques are being studied for the improvement of situational awareness. In military applications due to turbulence and moving stations distortion and haziness is high in images. Also the terrain and atmospheric turbulence play a vital role in this[1]. To give the observer a comfortable view various image processing techniques like contrast adjustment, super resolution, turbulence mitigation, artifact reduction, stabilization, automation can be used. These im-

age enhancement techniques will also give us faster observations and long range vision which will reduce the stress for long range images. These techniques improves the visibility of the images making it comfortable for the army operator to read. These techniques will also help the army operator to identify suspicious objects or the movements of the intruders. The cost of sensors is also a major concern for most applications, high cost of sensors gives sensors with more precision this is where the super resolution comes into picture. The requirement is for these techniques to process data in short span to give enhanced results in real time. These techniques have been utilized on audio and video processing. Also various image quality assessment parameters have been tested to asses the quality of the algorithms. GNU Octave is highly used in image processing and for applying various numerical operations on images. The image data matrix will be processed using image processing algorithms and octave coding.

The main focus for army applications is high resolution of image and situational awareness. The main component for situational awareness is the camera as it captures every movement of the intruder. The resolution of the image is an important factor when it comes to situational awareness. Resolution of the image is mostly improved by combining the low resolution and high resolution images. Evaluating a high resolution image is hard due to some problems. The first problem is due to noise, it is difficult to make out difference between noise. Frequency plays important role when it comes to noise, therefore frequency should be evaluated properly. Super resolution involves various image enhancement techniques such as noise reduction and edge enhancement. The problem is that this image enhancement techniques noise reduction, edge enhancement, super resolution are dependent on each other therefore, they cannot be evaluated separately but it gives us some visible results[2]. Turbulence is mostly created due to atmospheric conditions. The Atmospheric conditions near the army base camps can be extreme sometimes which automatically leads to increase

the turbulence range in images. Therefore, turbulence mitigation becomes important factor to be resolved for army applications.

Human eye have visibly long range of vision as compared to camera. The human eye has higher dynamic range than camera which automatically decreases the visibility of objects seen in pictures compared to naked human vision. Human eye is capable to make out the details of the objects in both light and dark part of the landscape, but when the same landscape is captured in an image it fails to capture every detail of the image in landscape due to irregular lighting. Therefore, lighting is the major factor when it comes to images. So, it becomes important to improve the contrast of the image so that we can get visible amount of light in every part of the image making it easier to read. To make the objects more visible in the image various image enhancement techniques are used in which contrast is one of the technique. There are various contrast enhancement techniques used. The first technique to improve the contrast of an image is by using global contrast stretching where the image is adjusted to available range. This is the most easiest method but fails when the ranges are extended, it is beneficial only in available range. Global gamma correction can be carried out to enhance contrast in parts with available contrast range. Another technique for contrast enhancement is through histogram equalization where the luminance values are altered to get a flat histogram but, the main disadvantage of this technique is that it doesn't give a natural look to our output image[3].

2. PROPOSED FRAMEWORK

To obtain deployment and implementation of various image enhancement techniques, an overall design is provided with different block diagrams and different techniques used.

2.1. Super Resolution

Super resolution algorithm is used to increase the ppi/dpi of an image thus attaining a superior quality image. It also provides a cost effective zoom.

In single super resolution the recordings of the same scene are combined to get a high resolution image. The difference between the recordings is calculated and depending on this difference we get a new and improved high resolution image. The visibility which lags in army field images is recovered by applying super resolution on that image. The details which are hardly visible in the original image are cleared after getting the resolved image which helps in faster object identification[4]. We consider a low-resolution image as two parts: one is the smooth image and the error image between the low-resolution image and the smoothing image. We get an intermediate high resolution image

by performing bicubic interpolation on low resolution image. We then generate high resolution smoothing image using smoothing method. The high resolution image is the combination of high resolution smoothing image and high resolution error image[5].

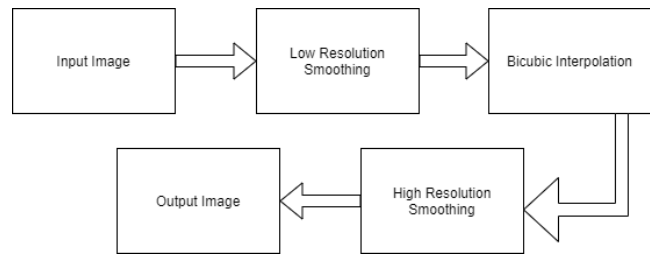


Figure 1: Block diagram for Single super resolution using bicubic interpolation.

2.2. Contrast Adjustment using LACE algorithm

LACE stands for Local Adaptive Contrast Enhancement. The dynamic range of a landscape imagery can lead to loss of information due to low lighting effects which reduces the contrast. Therefore, the visualization capacity of a particular display device decreases. To improve the visualization of the image and gather all the information present in the image we use Local Adaptive Contrast Enhancement technique. Local Adaptive Contrast Enhancement evaluates the overall dynamic range of an image and tries to maintain and give a natural look of a particular image. LACE allows us to get the details of darker as well as parts of an image. There are two versions of LACE mostly used: mild and medium. The mild version of LACE is used for situational awareness where we broadly focus on large scale details rather than small scale. The medium version of LACE is mostly used for detection where we broadly focus on small scale details rather than large scale[1].

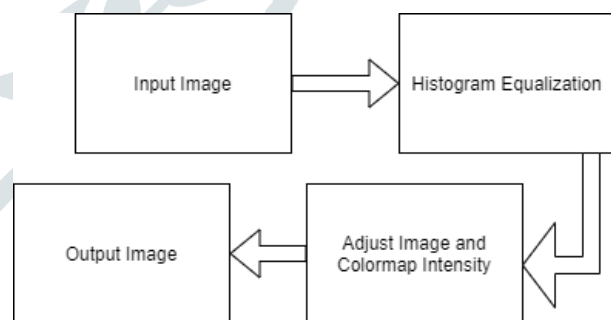


Figure 2: Block diagram for LACE.

2.3. Noise Reduction using Median Filtering

The median filter is a salt and pepper noise remover filter which is a non-linear digital filtering technique. It is greatly useful in pre-processing for reduction of the salt and pepper noise. The median filter increases the peak signal to noise ratio value and mean square value thus increasing the quality of the degraded image. By applying the median filter to the input image constantly the image quality is enhanced considerably[7].

2.4. Image stitching

Camera gives us only limited field of view but for the army applications we require overall field of view just like a panorama where small parts of fields or images are stitch together to give more prominent view of the field. For stitching we take various images of the field as input images then we find the key points of every image. After finding the key points we try to match the key points of various images. The images are stitched together once the key points are matched. The results of the stitched images will immediately show us some interesting objects in the surrounding enhancing the awareness of the task operator[6].

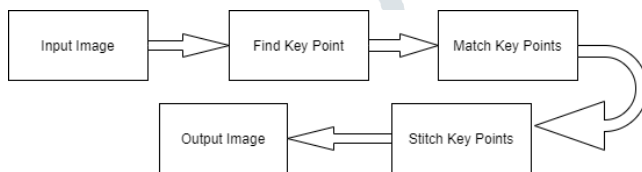


Figure 3: Block diagram for Stitching.

2.5. Turbulence Mitigation

Turbulence usually takes place due to extreme atmospheric conditions. This deteriorates the imagery which is captured in cameras over long range. As the visualization of cameras is weak as compared to human eye, we have to perform certain operations to increase the visualization capacity. Army people work mostly in extreme weather conditions therefore, turbulence mitigation is important for army applications.

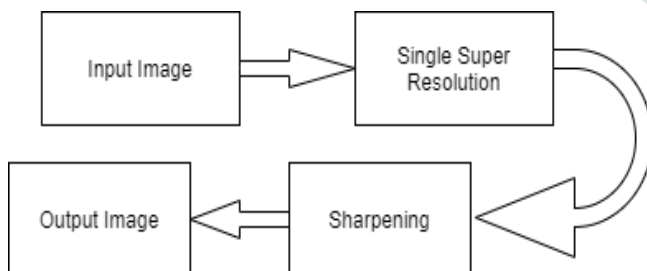


Figure 4: Block diagram for Turbulence Mitigation.

For turbulence mitigation we take the input of the image and then apply the algorithm of single super resolution on the image. After getting the high resolution image we sharpen the image using image sharpening technique. After sharpening the image we get the output result which deteriorates the turbulence effect from the image and gives it a clear vision.

2.6. Filtering

2.6.1. Median Filter

Median filters are basically used to reduce the noise present in an image, which is achieved by sliding a window over an image. It helps in preserving useful information of the image. The filtered image is obtained by determining the median value from the sorted neighbouring pixels. Median filters are said to be more robust in nature compared to average. As an edge is crossed, one side or the other dominates the window, and the output switches sharply between the values. Thus, the edge is not blurred. These filters are particularly easy to implement, by performing successive operation over the rows and columns of the image.

2.6.2. Average Filter

The Average filter is also called as mean filter. Average filter is also required to reduce the noise in the image. Average filter is a linear filter. The mean is determined by calculating the sum of all pixels in the kernel and then dividing by the number of pixels in the kernel. Edge pixels which are located near the edge of an image are replicated. This method smooths the appearance of the image.

2.7. Target Acquisition

Target Acquisition is acquired by performing object recognition, object detection and image segmentation. All of these methods helps us to identify and detect the objects, people present in the image. All these methods helps the army soldiers to check the presence of an intruder or to detect suspicious object present in the image as well as video.

2.7.1. Object recognition

An object recognition system recognizes the objects that are present in the image using object models, datasets which are created previously. Object recognition is performed easily and instantaneously by human eye and brain but, for a electronic machine we have to apply some computational algorithms to recognize objects. Giving intelligence to a computational device is a difficult task. Also, the algorithmic descriptions for implementing intelligence is difficult. Features are the main attributes in object recognition. Features help in describing and recognizing an image.

2.7.2. Object detection

Object detection is a computer technique which locates instances of objects in an image or video. Object detection is performed easily and instantaneously by human eye and brain but, for a electronic machine we have to apply some computational algorithms to detect objects. Object detection is a crucial part for army applications, our soldiers require object detection to detect if any intruder is present. so, if the intruder is present it alarm the army soldiers.



(a) color original image

2.7.3. Image segmentation

Image segmentation is also an important and commonly used technique in image processing, where the objects are getting highlighted. Image segmentation helps us to separate objects in an image into set of regions, often based on the characteristics of the pixels in the image. Group of pixels in an image having border and a particular shape are called regions. When an intruder or any suspicious object do not cover the whole image, we can the apply image segmentation.



(b) intermediate image



(c) high resolution image

3. EXPERIMENTAL RESULTS

For Analysing our outputs we have made use of histogram. Histogram analysis in image processing normally refers to the number of pixel intensity values and how these values are spread on the graph.

3.1. Super Resolution

In Super Resolution we have studied two different algorithms i.e. SSR and ISR. We have compared these two algorithms using PSNR values of the output image of both the algorithms. PSNR value is directly proportional to the quality of image. Therefore, the output image with highest PSNR value gives better results. The PSNR value we have got for SSR is 21.424 and for ISR is 22.754. Therefore, we can say that Image Super resolution algorithm provides better results and quality.

3.1.1. Single Super Resolution

The mechanism behind resolution enhancement is that temporal resolution of image sequences is exchanged for spatial resolution while improving signal to noise ratio. Here, recordings of the same scenes are combined to get high resolution image. Also, the edges of the image are shown more appropriately. The PSNR value we get for the output image of SSR is 21.424.

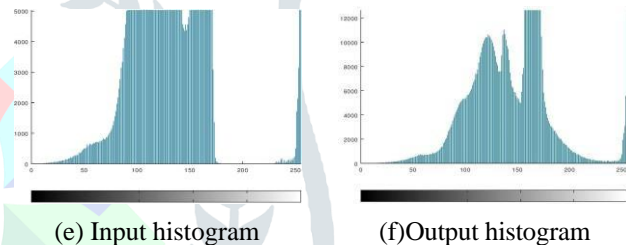


Figure 5: Single Super resolution results.

We can see that input histogram goes beyond range for some interval where as output histogram is scattered all over the scale and gives us almost proper curve, which indicates that we have got correct output.

3.1.2. Image Super Resolution

In super resolution the recordings of the same scene are combined to get a high resolution image. The difference between the recordings are calculated and depending on its difference we get a new and improved high resolution image. Interpolation works by using known data to estimate values at unknown points. Here, we have used bicubic interpolation. The PSNR value we get for the output image of SSR is 22.754.

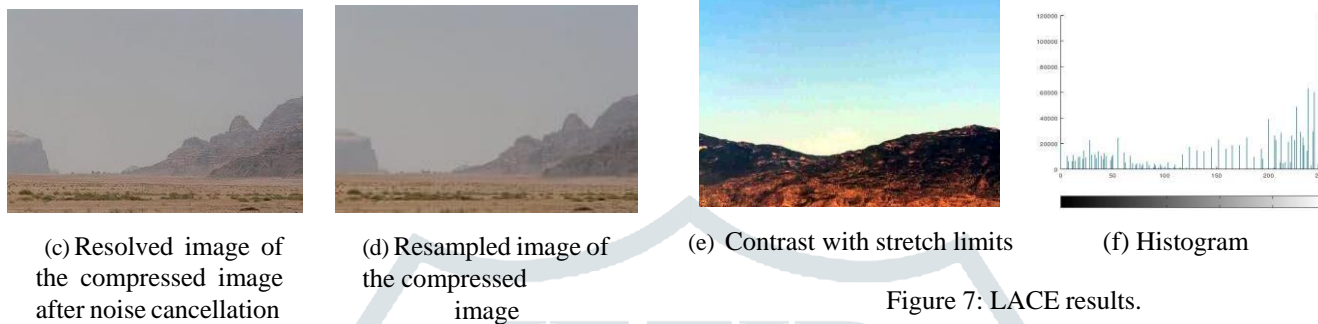
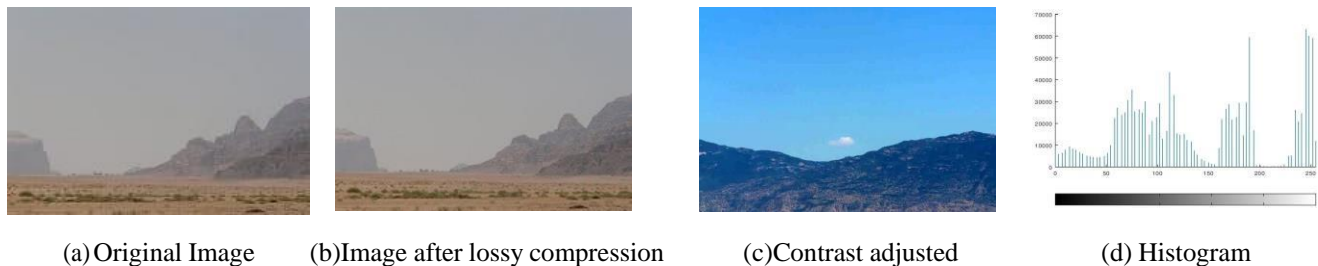


Figure 7: LACE results.

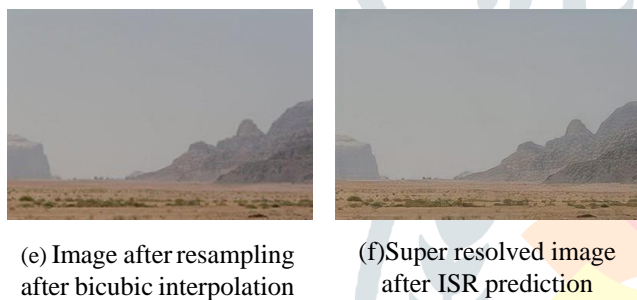
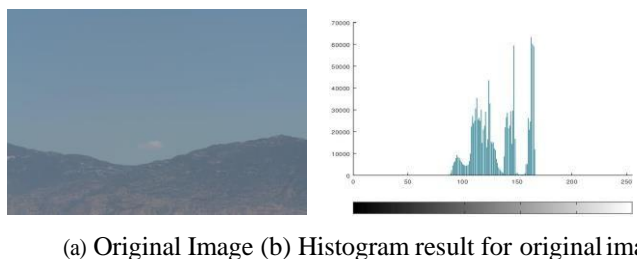


Figure 6: Image Super resolution results.

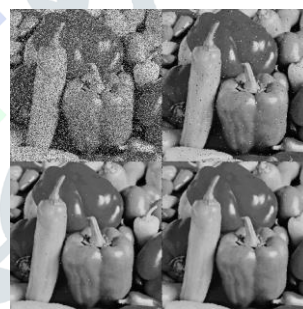
3.2. Contrast Adjustment using LACE algorithm

LACE retains small amplitude details while compressing the overall dynamic range of image and tries to maintain overall natural look. We have calculated histograms for original image as well as contrast adjusted images. The points in histogram increases as contrast levels are increased giving more appropriate output.



3.3. Noise Reduction using Median Filtering

The noise that is the pepper salt texture in the image is removed and clear output image is obtained. The histogram shows the difference between the input image and the output image. More points are precisely plotted in the output of the histogram for output image.



(a) Noise reduction

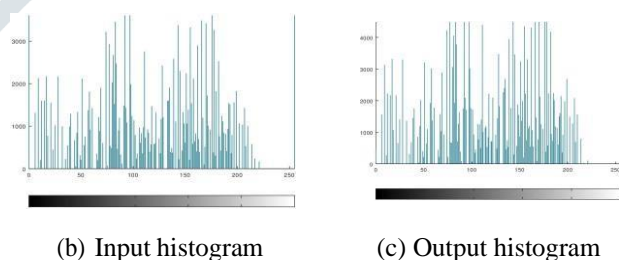
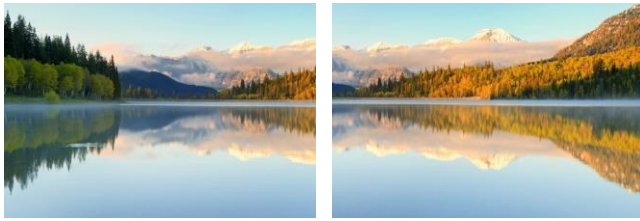


Figure 8: Noise Reduction using Median Filtering results.

3.4. Image stitching

Image Stitching is combining multiple images or we can also say as overlapping the field of view to produce a panorama. Image stitching requires nearly exact overlaps or the exact key points to produce correct results.



(a) Left input

(b) Right input



(c) Stitched image

Figure 9: Image stitching results.

3.5. Turbulence Mitigation



(a) Input Image



(b) Intermediate



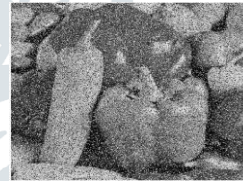
(c) Output Image

Figure 10: Turbulence Mitigation results.

The main of Turbulence mitigation is to stabilize and sharpen the recorded images sequence based on the image data. The results reduce the turbulence and provide more seamless results.

3.6. Filtering

Applying median filter which is a non linear filter we see that the output which we get in figure 10(c) shows slight dotted lines after concatenating the original image which is firstly broken into four. Whereas, in case of average filtering which is a linear filter the dotted lines disappear and we get a proper image just by using 25 concatenating operation. Figure 5.10(d) gives the output for average filter. This also shows that the output we get by applying local average filtering is better than local median filtering. We can also say that, in this case linear filters give a better output than non linear filter.



(a) Input Image



(b) Global median filtering



(c) Local median filtering



(d) Global Average filtering (e) Local Average

filtering Figure 11: Filtering results.

3.7. Target Acquisition

Object recognition refers to a collection of related tasks for identifying objects in digital photographs. From figure 11(a) we can see that the program predicts the image of a dog as German shepherd with a probability of 0.99 which is nearly equal to 1 which says we got correct output. From Figure 11(b) we can see that the program detects the objects present in the image such as dog and people along with the probability of that object being dog or a human.



(a) Object recognition



(b) Object detection/Image

segmentation Figure 12: Target

Acquisition results.

4. CONCLUSION

We have implemented different image enhancement techniques like components of LACE, single image super resolution, noise reduction, stitching and turbulence mitigation algorithm that are required in the army context. The histogram analysis shows the difference between the input and output images, where the histogram for output images become more appropriate after applying image enhancement techniques. These image enhancement

techniques provide better observation over long range, better observation in foggy and rainy conditions and also cost effective. We have also seen that linear filters give better results than non-linear filter for local filtering. We have also performed several algorithms required to acquire target i.e. intruder or suspicious objects at army fields. Above tasks helps make army task operator easier so that they can perform better on field.

5. ACKNOWLEDGMENT

We would like to express our sincere gratitude to Dr. Sanjay Shitole, Head of IT Department for his valuable guidance and constant support to our project. His direction and mentoring has helped us to work successfully on our project. Also we would like to express our gratitude to UMIT teaching and non-teaching staff for their support.

6. REFERENCES

- [1] Schwering P.B.W., van den Broek S.P., van Iersel M., 2007, in 'Infrared Technology and Applications XXXIII', eds. B.F. Andresen, SPIE Vol. 6542-100, 654230, Orlando Florida (USA), April 9-13, 2007: "EO System Concepts in the Littoral".
- [2] Schutte, K., de Lange, D.J.J., van den Broek, S.P., "Signal conditioning algorithms for enhanced tactical sensor imagery," SPIE Proc. Vol. 5076, 92-100, (2003).
- [3] J. Dijk, R. J. M. den Hollander, J. G. M. Schavemaker, K. Schutte, J. Dijk, R. J. M. den Hollander, J. G. M. Schavemaker, K. Schutte, S. E. Reichenbach, and M. A. Neifeld, "Local adaptive contrast enhancement for color images: (2007): Dijk: Publications," Spie. [Online].
- [4] Kemp, R.A.W., de Groot, J.F., van den Broek, S.P., de Lange, D-J.J., Dijk, J., Schwering P.B.W., in SPIE Vol 6943- 0Y, Orlando-FL (USA), April 2008, "Results of Optical Detection Trials in Harbour Environment".
- [5] Rob J. Dekker, Piet B.W. Schwering, Koen W. Benoist, Stefano Pignatti, Federico Santini, Ola Friman, SPIE [8743- 14] 2013, LWIR Hyperspectral Change Detection for Target Acquisition and Situation Awareness in Urban Areas.
- [6] Laxmi Nidhi, Pratyusha Roy, Srishty Nayak, Rajine swetha R, "Unmanned gun control mechanism", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 2, Issue 5, May 2013.
- [7] "imlabfilt," Noise Removal - MATLAB Simulink. [Online]. Available: <https://www.mathworks.com/help/noise-removal.htm>. [Accessed: 17-Feb-2020].
- [8] "Intensity Histogram," Image Analysis - Intensity Histogram. [Online]. [Accessed: 27-Apr-2020].
- [9] "Median Filter," Spatial Filters - Median Filter. [Online]. Available: <https://homepagesuk/rbf/HIPR2/median.htm>. [Accessed: 27-Apr-2020].
- [10] "Mean Filter," Spatial Filters - Mean Filter. [Online]. Available: <http://homepages/rbf/HIPR2/mean.htm>. [Accessed: 27-Apr-2020].

Traffic Light Classification Using YOLO Detection

Nadar Rajeshwari¹, Harshitha Aditham², Prof. Anita Morey³

^{1, 2, 3} Dept of Information Technology

^{1, 2, 3} Usha Mittal Institute of Technology

Abstract- The aim of this research paper is to classify the traffic lights on the road to guide the self driving car. Using Yolo (You Only Look Once) object detection which has higher speed and relatively accurate. Analyzing objects and figuring out the lane lines on a given roadway to follow the traffic rules. Considering all these competencies with the self driving car obstacles coming in the road are also need to be taken care of, for which the yolo object detection with sliding window techniques are considered. These methods are solved along with deep leaning models (CNN) for autonomous vehicles.

Keywords- YOLO object detection, Annotations, Self driving car, Traffic light, classification.

I. INTRODUCTION

Object detection may sound like a pinnacle in Artificial Intelligence but it co-exists with us in our lives hiding in plain sides. We often fail to notice the simple applications of object detection around us. Object detection is a technology that includes computer vision and image processing used to detect objects, images or videos. Self driving cars make use of the moving object detection technology along with computer vision to determine the distance between the car and the moving object also to create alerts and guide the car. The object detection and recognition are considered to be one of the most important tasks as this is what helps the vehicle detect the obstacles in-front of the car. Deep learning and computer vision both are now helping self driving cars to figure out the competencies faced by the autonomous cars. The competencies can be to predict the other cars on the road and the pedestrians around the road so that to avoid them and have a safe drive. Deep learning is able to make face recognition work much better than ever before so that now we are able to unlock our computer screens and phone screens just by using our face. Deep learning is moving so advance that companies are able to build applications on our phones with most attractive, interactive and most beautiful pictures and features to attract the customers. Therefore, it is necessary for the object detection algorithms to be highly accurate. Since machines cannot detect the objects in an image instantly like humans, it is really necessary for the algorithms to be fast and accurate and to detect the objects in real-time, so that the vehicle controllers solve optimization problems at

least at a frequency of one per second. In this research paper traffic light prediction for autonomous vehicles and the object detection on the roads is done with the help of Yolo object detection.

II. LITERATURE REVIEW

Computer vision research community has been so inventive is coming up with new neural network architectures, new algorithms. Image classification sometimes also called image recognition where you might take as input image 64 X 64 image and try to figure out if static. The another problem for a computer vision problem is object detection, suppose in self-driving car we need to figure out if there are other cars in this image but instead the position of the other cars need to be figured out so that the car can avoid other cars. By drawing bounding boxes it will be able to find out the position where the object is present in the image.

Computer vision is the area of study in which computers are empowered to visualize, recognize and process what they see in a similar way as that of humans. The main aim of computer vision is to generate relevant information from image and video data in order to deduce something about the world. It can be classified as a sub-field of artificial intelligence and machine learning. This is quite different from image processing, which involves manipulating or enhancing visual information and is not concerned about the contents of the image. Applications of computer vision include image classification, visual detection, 3D scene reconstruction from 2D images, image retrieval, augmented reality, machine vision and traffic automation. Today, machine learning is a necessary component of many computer vision algorithms. These algorithms are typically a combination of image processing and machine learning techniques. The major requirement of these algorithms is to handle large amounts of image/video data and to be able to perform computation in real-time for wide range of applications.

For example, real-time detection and tracking. There are various types of artificial neural networks that are considered to be very important such as Radial basis function neural network, Feed-forward neural network, Convolutional neural network, Recurrent neural network, Modular neural network etc. Among these types of networks, the

convolutional neural networks (CNNs) are effective in applications such as image/video recognition, semantic parsing, natural language processing and paraphrase detection. A convolutional neural network comprises of 3 layers – Convolutional neural layer, Pooling layer and Fully-connected layer. A convolutional layer generally executes tasks that require heavy computation. It comprises of a set of filters that have the ability to learn. Though the filters are small in size, they reach to the entire depth of the input.

III. YOLO OBJECT DETECTION

Yolo object detection is one of the best algorithms used for object detection. It is an improvement over other region based algorithms because of the speed, accuracy and the ability to deal with multiple objects in the same frame. YOLO is also referred as YOU ONLY LOOK ONCE. It requires only one forward propagation on the image to make the predictions. The features used by these algorithms passed on the entire image and make bounding boxes for objects. The features help to predict all the bounding boxes across the image and make classes of similar objects. It simultaneously predicts the output after recognizing the object with a process called non-max suppression.

The basic idea in yolo object prediction is to take any input image and divide the image into blocks also called as “grids” with equal sizes. Then these grids are used to make a bounding box along with the label. The co-ordinates of the image are also processed and stored. The co-ordinates are the exact location of the objects in the image. Predict a class and bounding box of the objects present in grid of original image. Working of YOLO:

- In YOLO we provide input as an image to a Convolutional neural network which outputs a particular vector which consists of the class probabilities for that object. The class to which that particular object belongs to and the coordinates of the bounding box for the object.
- In sliding window approach take a particular dimension of window and slide it over the input image stride by stride. Stride allows to decide what is the overlap of each sliding window. In YOLO instead of using stride of finite number, stride with 0 is used. Stride with 0 is basically to show no overlap on each sliding window. These results in the image divided into grids. There are no overlaps in the whole image and it is divided simply into grids.

We split the image into an $S \times S$ grid. Each cell predicts B number of bounding boxes with a confidence score

for each of the boxes. Confidence score means how confident the model is that the box contains an object and how accurately the box has predicted the object boundaries means how accurately these (x, y, h, w) are estimated.

A) YOLO OBJECT DETECTION INPUT AND OUTPUT:

- Suppose a grid in YOLO CNN is of size 16×16 .
- In the output, each bounding box is represented by 6 numbers (pc, x, y, h, w, c)
- Here class probability c is a 1-hot vector of size 20.
- Every bounding box that is predicted called as anchor box.
- Thus each anchor box will be represented by a vector of size 25.
- If we get $b = 4$, then YOLO produces 3 anchor boxes for each grid cell.

Then the YOLO architecture has the following input/ output for each batch and the flowchart is shown in figure 1.

IMAGE ($M, 304, 304, 3$) \rightarrow YOLO CNN \rightarrow ENCODING ($m, 19, 19, 2, 25$).

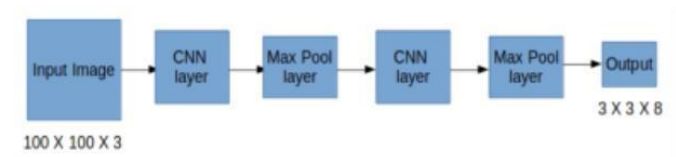


Figure 1: Flow chart for YOLO

YOLO's PREDICTION:

- In each of the 19×19 grids, the grids that have maximum probability score are chosen.
- The maximum probability score is predicted by taking any 2 anchor boxes and finding max between them which are across different class.
- Color that grid cell according to what object that grid cell considers the most likely.

DEALING WITH ANCHOR BOXES:

- Two stage filtering out of anchor boxes.
- Set a threshold on confidence of a box detecting a class.
- Ignore boxes with a low score, that is, what the box is not very confident about detecting a class

BOX CONFIDENCE:

- Anchor box confidence depends upon two factors:
- How confident the model is that the box contains an object and
- How accurate it thinks the box is that it predicts.
- Intersection Over Union-It is a measure of overlap between the actual (ground truth) bounding box and the predicted bounding box.

First Level of Filtering Out (Boxes):

Remove all those boxes whose scores are less than threshold.

Second Level of Filtering Out (Non Max Suppression)

1. Select any bounding box from the image that has the highest score.
2. Compute its overlap with all other boxes, and remove boxes that overlap it more than the threshold set for IOU (Intersection Over Union)

YOLO CNN Specification:

- The features from the input image are extracted initially by the Convolutional layers and the probabilities are predicted by the fully connected layers of the CNN
- The CNN network architecture is inspired by the GoogleNet model for image classification.
- The 24 Convolutional layers are followed by two fully connected layers of CNN.

Yolo is better than region-based algorithm, because it was much slower and error was more as compared to YOLO algorithm. Yolo prioritize the speed; this is particular are used in application like self-driving car.

The self-driving car is an expected to detect the objects on its path with much more speed and accuracy, then the current system allows. A self-driving car can look at an object and recognize the object whether, the image or a video are able to identify whether the object is present in that and detect what kind of object is present.

B. Yolo object detection implementation for self driving car

In yolo input image is provided to a convolutional neural network, which outputs a particular vector which consist of class probability of that object, the class to which

the particular object belongs to and coordinates of the bounding box.

a) Sliding window approach

In a sliding window approach, particular dimension of a window and slide it over an image stride by stride. Stride allows us to decide, what is the overlap of each sliding window. In Yolo instead of using stride of finite number, stride of 0 is been used, which basically gives no overlap between each sliding window and it result into image been divide into grids, so imagine that there are no overlap between sliding window and the whole image is divided into grids of particular dimensions as shown in figure 2.



Figure 2: Sliding window approach

b) Anchor box

If two or more object are present in same grid or if a single object is present in two or more grids, then angular box is used. Two anchor boxes are used, one vertically and one horizontally, ideally, we can choose as many as anchor box .which are required; hence it is particular aspect ratio. When anchor boxes are used then, the output vectors are also changed according to the output of two anchor boxes for a particular grid cell. It is shown in figure 3.



Figure 3: Anchor Box approach

C. Equations

1. p_c be the probability of class present.
2. c_1, c_2, \dots, c_n be the probability of each class present.
3. (b_h, b_w) - it detects height and width of the bounding box
4. (b_x, b_y) -co-ordinates of the bounding box.

p_c, b_h, b_w, b_x, b_y are the five fixed parameters.

Let n number of class is present, m number of anchor box we are using and for above example there are 3 x 3 grids. So, $y = (5 + n) \times m \times 3 \times 3$

The grid object detection is shown in figure 4.

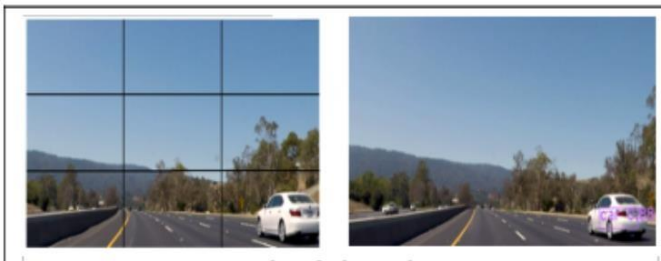


Figure 4: Grid and object detection

D. Network

The network structure of CNN model in yolo, with convolutional and max pooling layers, for 2 fully convoluted layers are, Calculate the x-coordinate, y-coordinate, height and width of the object detected. After analyzing for many frames of the video, it is found the x-coordinate and the height of the object changes instantly, so while analyzing the for these specific image, it was found that, giving value x-coordinate < 900 and height > 300 will be the static value for getting the object in same lane where the actual car mounted camera is placed. The result of CNN model is shown in following figure 5.

Name	Filters	Output Dimension
Conv 1	7 x 7 x 64, stride=2	224 x 224 x 64
Max Pool 1	2 x 2, stride=2	112 x 112 x 64
Conv 2	3 x 3 x 192	112 x 112 x 192
Max Pool 2	2 x 2, stride=2	56 x 56 x 192
Conv 3	1 x 1 x 128	56 x 56 x 128
Conv 4	3 x 3 x 256	56 x 56 x 256
Conv 5	1 x 1 x 256	56 x 56 x 256
Conv 6	1 x 1 x 512	56 x 56 x 512
Max Pool 3	2 x 2, stride=2	28 x 28 x 512
Conv 7	1 x 1 x 256	28 x 28 x 256
Conv 8	3 x 3 x 512	28 x 28 x 512
Conv 9	1 x 1 x 256	28 x 28 x 256
Conv 10	3 x 3 x 512	28 x 28 x 512
Conv 11	1 x 1 x 256	28 x 28 x 256
Conv 12	3 x 3 x 512	28 x 28 x 512
Conv 13	1 x 1 x 256	28 x 28 x 256
Conv 14	3 x 3 x 512	28 x 28 x 512
Conv 15	1 x 1 x 512	28 x 28 x 512
Conv 16	3 x 3 x 1024	28 x 28 x 1024

Figure 5: CNN Output

- Computationally Very Fast, can be used on real time environment.
- Globally processing the entire image once only with a single CNN.
- Learn generalized representations
- Maintains a high accuracy range.
- The object detection with YOLO is possible with all kinds of input files such as images, video files and webcam real-time capturing.

Yolo Algorithm Limitations:

- YOLO inflicts strong spatial constraints on the bounding box predictions as each grid cell predicts two boxes at a time and it can only have one class.
- Due to this spatial constraint the number of near by objects is also limited that the given model can predict.
- This object detection model struggles with small objects that appear in groups within the same grid.

It also struggles to generalize to objects in new or unusual aspect ratios.

IV. TRAFFIC LIGHT DETECTION

Traffic light is one the most important traffic rule which everyone should maintain, so in self driving car also the processor should automatically detect the traffic light signals. Each frame which is captured by the camera should be send to a specific algorithm to detect whether that frame contains the traffic light or any traffic symbol, the yolo object which was discussed, used coco model. This model can detect car, person, animals etc., so if the frame contains any object present in coco.names, it can be detect otherwise it cannot detect it, in coco model there is also object know as traffic light, but it can only detect the traffic light, but cannot classify whether the traffic light is green or red, to make decision whether the processor should stop the car or else keep moving. So, in order to consider that condition, lots of dataset of red and green images are needed, so that, a separate model can be created.

YOLO Features:

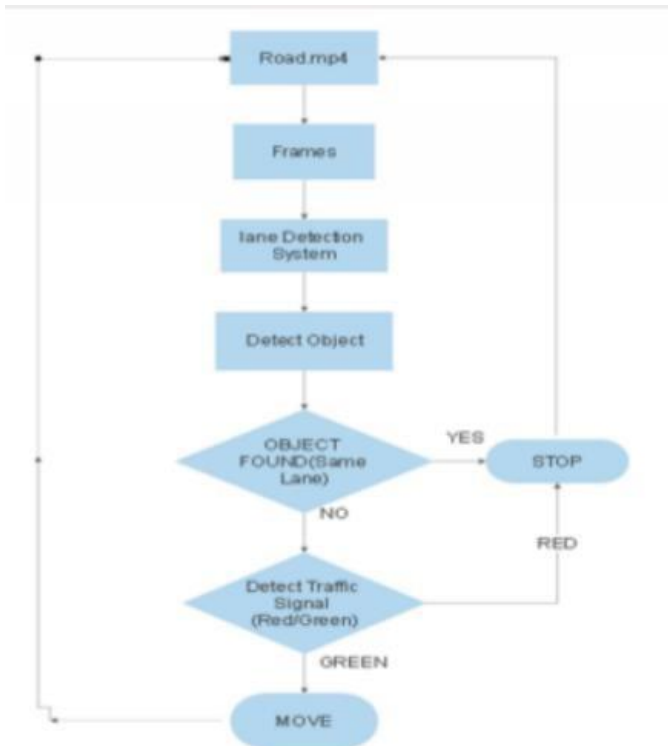


Figure 6: Flow chart for Traffic light Detection

The flowchart shown in figure 6 gives a glimpse about how the traffic light is detected, if traffic light detected is “GREEN” then keeps moving and if it is “RED”, stop the car and wait for the next frame to be processed. So, to make the model to classify “RED” and “GREEN” signal, following steps are present: -

A. COLLECT IMAGES OF RED AND GREEN LIGHT:

Collect 500 to 1000 images from Google or any online site, in order to train the model using the images, more the number of images more the accuracy of classifying the traffic signal.

B. ANNOTATE THE IMAGE:

Use a software know as “LabelImg”, this will help to label the image, to give “RED” or “GREEN”. The annotation of image for traffic light detection is shown in figure 7.



Figure 7: Annotate the image

C. CREATE XML FILE

After giving naming using annotation, each annotated image will have a separate xml, which says about the folder name, image name, image width, height and the label image

```

000001.xml - Notepad
File Edit Format View Help

<annotation>
  <folder>images</folder>
  <filename>000001.png</filename>
  <segmented>0</segmented>
  <size>
    <width>192</width>
    <height>263</height>
    <depth>3</depth>
  </size>
  <object>
    <name>green</name>
    <pose>Unspecified</pose>
    <truncated>0</truncated>
    <difficult>0</difficult>
    <bndbox>
      <xmin>46</xmin>
      <ymin>166</ymin>
      <xmax>164</xmax>
      <ymax>252</ymax>
    </bndbox>
  </object>
</annotation>
  
```

Figure 8: XML File

D. TRAIN MODEL

This xml will be sending for training using “Yolo method”, and there will be separate name file to train the model, which consist of only “RED and GREEN”. After this procedure, a yolo.h5 model file is created and this file will be used to

classify the traffic light. To train the model we used steps which are represented by a flowchart as given in figure 9.

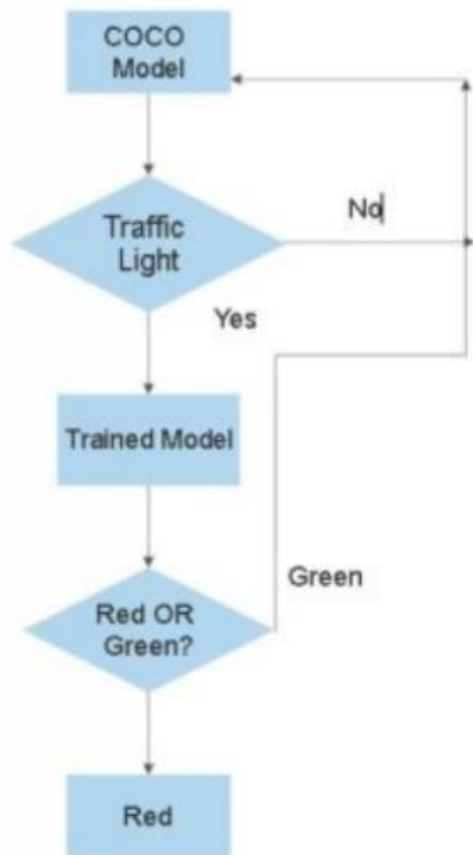


Figure 9: Flow chart for traffic light training model

E. FINAL OUTPUT:

Above flowchart (figure 9), gives idea about classifying the traffic light using the new trained model, whenever the traffic light is detected using the coco model then it is sent to new trained model “yolo.h5” because if single frame is sent to two model at a time, then unnecessary time complexity in classifying the traffic light in a frame which doesn’t contain the traffic light will be reduced. So, after the frame enter the coco model to detect the traffic light, if it detects the traffic light then only it enter then it moves trained model, which is used to classify “RED” forward else it will stop. “signal, so if frame detects “GREEN” as shown in figure 10.



Figure 10: Traffic Light Prediction

V. CONCLUSION

Above flowchart gives idea about classifying the traffic light using the new trained model, whenever the traffic light is detected using the coco model then it is sent to new trained model “yolo.h5” because if single frame is sent to two model at a time, then unnecessary time complexity in classifying the traffic light in a frame which doesn’t contain the traffic light will be reduced. So, after the frame enter the coco model to detect the traffic light, if it detects the traffic light then only it enter the trained model, which is used to classify “RED” and “GREEN” signal, so if frame detects “GREEN” then it moves forward else it will stop.

REFERENCES

- [1] Liu, C., Tao, Y., Liang, J., Li, K., & Chen, Y. (2018). *Object Detection Based on YOLO Network*. 2018 IEEE 4th Information Technology and Mechatronics Engineering Conference (ITOEC).
- [2] Adarsh, P., Rath, P., & Kumar, M. (2020). *YOLO v3-Tiny: Object Detection and Recognition using one stage improved model*. 2020 6th International Conference on Advanced Computing
- [3] Redmon, J., Divvala, S., Girshick, R., & Farhadi, A. (2016). *You Only Look Once: Unified, Real-Time Object Detection*. 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR).
- [4] Ahmad, T., Ma, Y., Yahya, M., Ahmad, B., Nazir, S., & Haq, A. ul. (2020). *Object Detection through Modified YOLO Neural Network*. Scientific Programming, 2020, 1–10.
- [5] Protschky, V., Feit, S., & Linnhoff-Popien, C. (2014). *Extensive Traffic Light Prediction under Real-*

World Conditions. 2014 IEEE 80th Vehicular Technology Conference (VTC2014-Fall).

- [6] Protschky, V., Wiesner, K., &Feit, S. (2014). *Adaptive traffic light prediction via Kalman filtering. 2014 IEEE Intelligent Vehicles Symposium*

REAL TIME FACE MASK DETECTION USING MACHINE LEARNING

¹Seeju Singh, ¹Ritu Swami, ³Mohan V Bonde

¹B. Tech Student, ²Asst. Professor,

¹Usha Mittal Institute Of Technology, ²Usha Mittal Institute Of Technology,
SNDT Women's University, Mumbai, India.

Abstract: The outbreak of Coronavirus disease has thus far killed over 2.85M people and infected over 131M all over the world, causing global health crisis. Due to this the government was forced to impose lockdown all over the world. As made mandatory by World Health Organization (WHO), the only effective protection method is to wear face mask every time we are out in public and maintain social distancing. Wearing face masks will automatically reduce the risk of spreading of the deadly virus. An efficient approach used for building Deep learning model for face detection will be presented. Here, we will have dataset that consists images that are with mask and without mask and later use OpenCV real-time face mask detection from our webcam. We will use the dataset to build a COVID-19 face mask detector with computer vision using Python, OpenCV, and Tensor Flow and Keras. Our aim to identify if the person in the image/video is masked or unmasked. The model achieves 98.7% accuracy on distinguishing people with or without face mask. We hope that our study would be useful to reduce the rapid spread of virus.

Keywords— Machine learning, Deep learning, computer vision, face mask, OpenCV, TensorFlow, Keras, CNN, MobileNetV2, YOLO.

I. INTRODUCTION

The World Health Organization (WHO) reports suggest that the two main routes of transmission of the COVID-19 virus are respiratory droplets and physical contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person in close contact (within 1 meter) with someone who has respiratory symptoms (coughing, sneezing) is at risk of being exposed to potentially infective respiratory droplets. As soon as the first patient was detected in December, COVID-19 has become pandemic all over the world which led us all to challenging situations. Everyday large number of people are infected and died. At the time of writing this paper, almost 131M infected cases have been confirmed and 2.85M are death[1]. The number keeps increasing day by day. Fever, dry cough, tiredness, diarrhea, loss of taste, and smell are the major symptoms of coronavirus which is declared by the World Health Organization (WHO). Many precautions have been taken to fight this virus such as washing hands, maintaining social distancing in public areas, wearing masks, avoiding touching eyes, nose and mouth area, where wearing mask is the simplest one. By ensuring proper use of face mask, we can stop the spread of COVID-19. As we can see, the second wave of the virus has hit our country with mutation the virus. Therefore, we can still limit the spread if people strictly maintain social distancing and wear facial mask. But sadly, people are not obeying the protocols which is speeding the number of cases around the globe. Hence, detecting these people who are not following the rules and informing the authorities can be a solution in reducing the spread of coronavirus.

Artificial Intelligence (AI) based on Machine learning and Deep Learning can help to fight Covid-19 in many ways. A face mask detection is a technique to find out whether someone is wearing a mask or not. Object detection plays major role in this. Deep learning techniques are highly used in medical applications. These techniques can be incorporated in detecting the mask on face. This project can be applicable anywhere but specially in cities that are highly populated which have IoT sensors to collect data. In section II, illustration of related work has been mentioned followed by section III in which, detailed information about technologies used in this project is explained. In section IV overall design of the project has been explained. In section

V the implementation of the model is illustrated. In section VI the result of the model is shown with comparisons and graphs.

II. RELATED WORK

In the meantime, many systems have been developed for COVID-19. Deep learning has progressed quite fast over the past few years and implemented in almost every field today. Likewise, Convolutional neural network or CNN which is type of feed forward artificial neural network in which connectivity pattern between its neurons is inspired by human eye is found to be used in many applications of almost every domain. A study on using facemask to restrict the growth of COVID-19 has been introduced in many papers. This study is the evidence of how wearing mask can reduce the transmissibility. Public mask wearing is most effective at reducing spread of virus when compliance is high. This studies also show that even the cloth mask can be as effective as wearing N-95 or surgical masks. "Mask classifier" has been introduced, where web scrapped data has been used with classes people wearing mask and no mask and trained it. Different algorithms were used such as Haar cascade classifier and CNN. Haar cascade classifier is used in object detection. It is machine learning based approach where many positive and negative images are used to train the classifier. Positive images focus on what our classifier wants to identify whereas negative images are everything else which do not contain the object we want to detect. Another system was built by Mk Gurucharan called "Face-Mask-Detection" in which the model was built using TensorFlow framework and OpenCV library which is highly used of real-time application. It gives accuracy rate of 96% after using algorithms like MoblieNetV2[4]. Another system was built named "Mask Classifier" by Prajna Bhandary in which scrapped data was used with classes "with mask" and "without mask" and trained resent 50[8]. Since mask is an object and our region of interest, we came across various object detection studies. Object detection is inextricably linked to other similar computer vision techniques like image recognition and image segmentation which helps us to understand and analyses scenes in images. An object detection model named "Region-based Convolutional Network for Accurate Object Detection and Segmentation"[15] has been proposed. The

developed model includes two stage frame work i.e., region proposal stage and region classification and refinement stage. Another model was developed by Joseph Redmon, Ali Farhadi named “An Incremental Improvement”[2]. YOLOV3 came in picture after YOLOv2 which resulted in more powerful backbone feature extractor and RetinaNet-like detection. It fully embraced FPN’s multi-scale predictions design.

III. TECHNOLOGY ADOPTED

Convolutional Neural Network

A convolutional neural network, or CNN, is a deep learning neural network which are very easy at identifying on designs in input images, such as lines, gradients, circles, eyes, nose and faces. In neural network there are mainly 3 layers: input layer, hidden layer, output layer. The input layer we give input to our model. The total number of neurons present in this layer is equal to number of features in our data. The input from this layer is then feed to hidden layer. Hidden layer may vary depending on our data size and mode. Each hidden layer has different neurons. The output is calculated by matrix multiplication of output of previous layer with suitable weights and later adding the activation function which makes the layer nonlinear. Finally, the output layer is then fed into logistic functions like SoftMax. Convolution layers has set of filters which has width and height and same depth as that of input. For instance, image with dimension $34 \times 34 \times 3$. Here size of filters can be $a \times a \times 3$, where ‘a’ can be 3,5,7 etc. but small compared to image dimension[6].

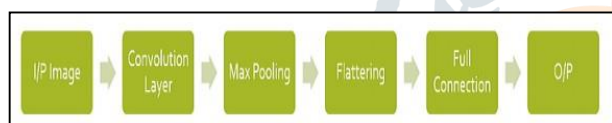


Figure 1. CNN Model

The input layer in Fig 1 holds the raw input of image of width 32, height 32 and depth 3. Convolution layer gives output by calculating dot product between all filters and image patch. Suppose there are 14 filters, then output is of dimension $32 \times 32 \times 14$. Activation function like RELU is used which is given by $1/(1+e^{-x})$. Pool layer reduces the size of volume resulting in fast computation and prevents from overfitting. Lastly fully connected layer takes input from previous layer and converts it into 1-D array of size equal to number of classes.

MobileNetV2

MobileNetV2 is the next generation of mobile vision applications. It is improvement over MobileNetV1. Having 53 layers deep where more than 1 million images can be pretrained, it is an effective feature extractor for object detection and segmentation. MobileNetV2 are faster with same accuracy. Two features are added to the architecture as seen in Fig 2 1) Linear bottlenecks between the layers and 2) shortcut connection between bottlenecks. The architecture of MobileNetV2 contains fully convolutional layer with 32 filters, followed by 19 residual bottleneck layers[11]. It delivers high accuracy results while keeping the parameters and mathematical operations as low as possible.

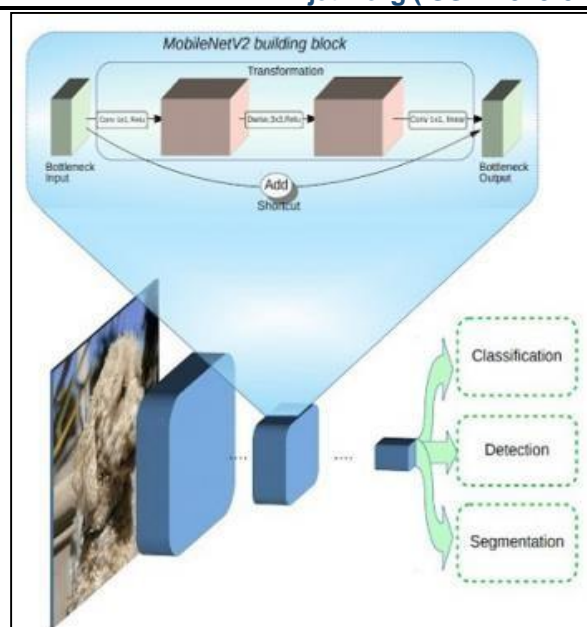


Figure 2. Architecture of MobileNetV2

Yolo

YOLO (You only look once) is convolutional neural network for doing object detection in real-time. A single neural network algorithm is applied to full image which divides the images into regions along with the prediction of bounding boxes. These bounding boxes are weighted by predicted probabilities. It is one of the popular techniques because it can achieve high accuracy in real-time. It requires one forward propagation pass to make predictions. Once it checks that the object detection detects each object only once, then it gives outputs with the bounding boxes. For each bounding box encloses an object and probability of the enclosed object being a particular class. There are many versions YOLO that have been released. Three major version of YOLO are YOLO V4, YOLO V5 and PP-YOLO. It takes image and divides it into grid of $n \times n$. A pixel is responsible for prediction. Out of all detected boxes, only one object is observed and rest other detection are rejected[12]. Figure 4 below shows the flow of how the process is carried out in YOLO.

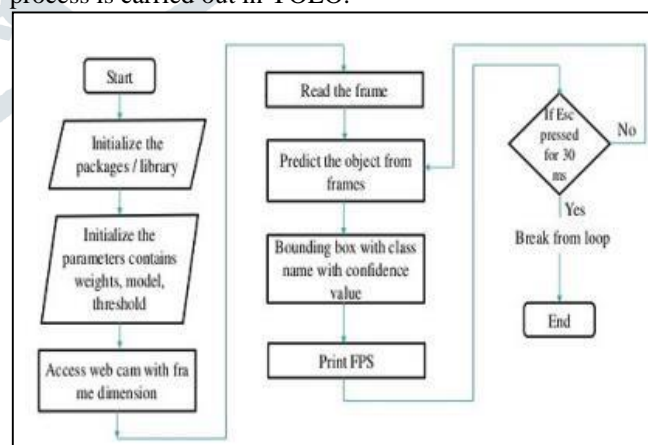


Figure 3. Flowchart of YOLO

IV. DESIGN

i. Face Detection

Face detection has been active area of research in past two decades. Facial tracking is finding more growth of use in security and safety applications to detect various situations. The basic idea of face detection is to construct facial features by down sampling components of face such as eyes, nose, mouth and whole face. In this approach, cascade

function is trained from lot of positive images (images with faces) and negative images (images without faces). Then features are extracted from the images which are just like convolutional kernel[3]. Fig 4 is illustration of face detection model.

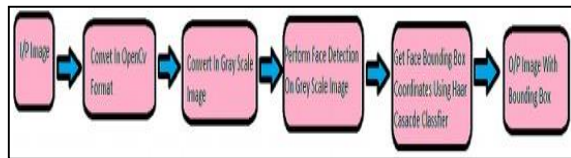


Figure 4. Face Detection Model



Figure 5. Output of Face Detection

ii. Object Detection

An object detection system finds objects of the real-world present either in a digital image or a video, where the object can belong to any class of objects namely humans, cars, etc. The basic input is the image or a video from which an object is to be detected. Once the objects are detected, then the system simply needs to categorise various objects into respective object classes. In our system, there will be two classes which are people with mask and people without mask. Before giving the output, it passes two phases namely: the learning phase and testing phase. After pre-processing is done on image, template matching is done that generates features of object in image. The main aim of testing phase is to see if object is present in an image and if yes, then which object class it belongs to. The Fig 6 shows object detection model.

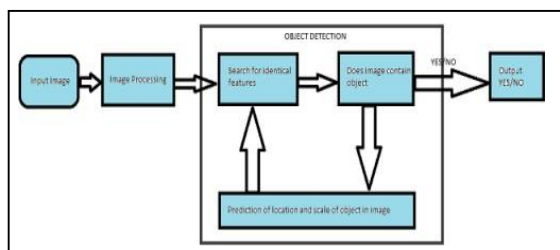


Figure 6. Object Detection Model



Figure 7. Output of object detection

V. IMPLEMENTATION

iii. Face Mask Detection using CNN and MobileNetV2

Due to high rising covid cases, face mask detection applications are highly in demand. This system can be used in real-time applications which require face mask detection for safety purposes. Here we have implemented face mask detection using MobileNetV2 and convolutional neural network. The dataset consists of 4095 images belonging to two classes: with_mask: 2165 images without_mask: 1930 images. For better understanding below is the algorithm:

- Step 1: Start
- Step 2: Initialize the webcam
- Step 3: Extract image from the frame
- Step 4: Load face detection model and detect face
- Step 5: If face is detected apply image processing else return to Step 3.
- Step 6: Load the face mask detection model and detect the masked face.
- Step 7: If mask detected display bounding box and accuracy percentage with title "mask" else display bounding box and accuracy percentage with title "no mask".
- Step 8: Return to Step 3.



Figure 8. Output of face mask detection



Figure 9. Output of face mask detection

Using another algorithm, YOLOV4 we have again detected the face mask. Calculating the accuracy is bit complex but the output is more accurate and speed is fast. It has various layers: - Input: where image is taken. Backbone: object detection in image. Neck: feature maps from different layers are collected. Head: output with bounding boxes and classes for objects. The dataset for this pretrained network is provided by VictorLin000^[18] and contains 678 images of people with and without masks. It has improved the YOLOV3's AP and FPS by 10% and 12% respectively. For better understanding below is the algorithm:

- Step 1: Start
- Step 2: Clone Darknet
- Step 3: Load the helper function
- Step 4: Load YOLO V4 weights
- Step 5: Connect to drive
- Step 6: Load the data sets
- Step 7: Train the model
- Step 8: Test the model on images/videos
- Step 9: If mask detected display bounding box and accuracy percentage with title "mask" else display bounding box and accuracy percentage with title "no mask".
- Step 10: Run the model with real time webcam.
- Step 11: Outcome will be same as Step 9
- Step 12: Return to step 10.

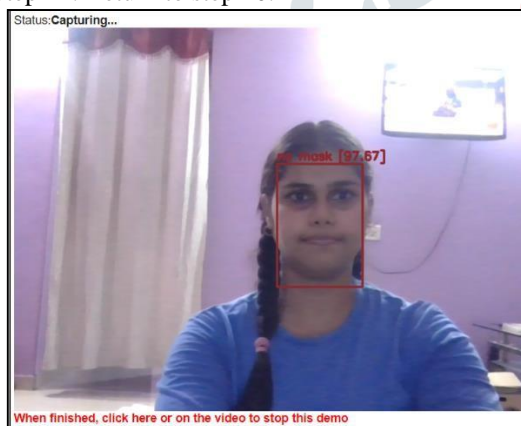


Figure 10. Output of face mask detection



Figure 11. Output of face mask detection



Figure 12. Output of face mask detection

VI. RESULT

a) Result of face mask detection using YOLOV4

With dataset of 687 images which contains images of people with mask and without mask after iterating the model with 5000 iteration. We can successfully detect whether the person is wearing mask or not.

Average loss = 0.3210

Mean average precision = 85%

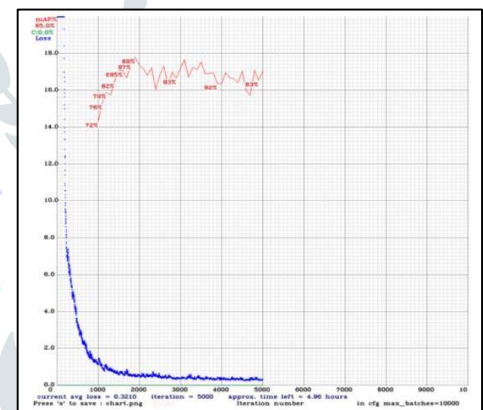


Figure 13. Graph of iteration number Vs loss

b) Result of face mask detection using CNN and MobileNetV2

With dataset of total 4095 images in which, with_mask: 2165 images without_mask: 1930 images, we trained the model and it can successfully detect if a person is wearing mask or not.

Average loss = 0.0827

Mean average precision with mask = 98%

Mean average precision without mask = 99%

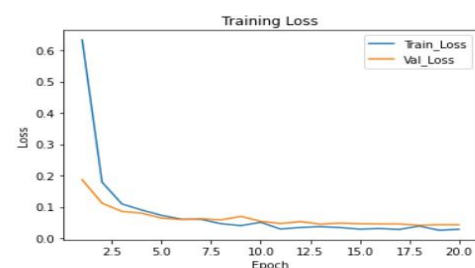


Figure 14. Loss curve of CNN & MobileNetV2 model

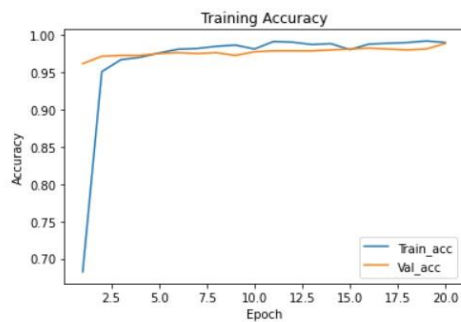


Figure 15. Accuracy curve of CNN & MobileNetV2 model

CONCLUSION

With the rapid rise of Covid-19 cases, government was forced to impose lockdown all over the world. And wearing mask has become necessary part of our lives as suggested by WHO. Hence, in this project we have implemented two Real Time Face Mask Detection Model one with MobileNetV2 and CNN. Another with YOLOV4. In comparison to both, the model with CNN and MobileNetV2 is much better than YOLOV4 as its accuracy is 98% where as YOLOV4 accuracy is 88.92. Since we used the MobileNetV2 architecture, it's also computationally efficient and thus making it easier to deploy the model to embedded systems (Raspberry Pi, Google Coral, etc.).

REFERENCES

- [1] Worldometers.info. 2021. *India COVID: 26,930,220 Cases and 306,865 Deaths - Worldometer*
- [2] J. and Farhadi, A., 2021. YOLOv3: An Incremental Improvement | Request PDF
- [3] GreatLearning. 2020. Real-Time Face Detection | Face Mask Detection Using Opencv.
- [4] GitHub. 2020. Mk-Gurucharan/Face-Mask-Detection.
- [5] Kumar, S., Balyan, A. and Chawla, M., 2021.
- [6] Medium. 2020. A Comprehensive Guide To Convolutional Neural Networks—The ELI5 Way.
- [7] The Times of India. 2020. Coronavirus: People Who Don't Wear A Mask Have Antisocial Traits, Finds Brazilian Study | The Times Of India.
- [8] GitHub. 2020. Prajnash/Observations.
- [9] GeeksforGeeks. 2020. Python | Haar Cascades For Object Detection – Geeksforgeeks.
- [10] Rosebrock, A., 2020. COVID-19: Face Mask Detector With Opencv, Keras/Tensorflow, And Deep Learning – Pyimagesearch.
- [11] Sinha, S., Sinha, S. and Sinha, S., 2021. Why Google's Mobilenetv2 Is A Revolutionary Next Gen On-Device Computer Vision Network.
- [12] Started, G., Tensorflow, K., Guide, R., Courses, O., (Old), C. and Consulting, A., 2021. Deep Learning Based Object Detection Using Yolov3 With Opencv (Python / C++) | Learn Opencv. [online] Learn OpenCV | OpenCV, PyTorch, Keras, Tensorflow examples and tutorials.
- [13] Medium. 2021. Face Detection Using OpenCV With Haar Cascade Classifiers.
- [14] Opencv-python-tutroals.readthedocs.io. 2021. Face Detection using Haar Cascades — OpenCV-Python Tutorials 1 documentation.
- [15] R. Girshick, J. Donahue, T. Darrell and J. Malik, "Region-Based Convolutional Networks for Accurate Object Detection and Segmentation," in IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 38, no. 1, pp. 142-158, 1 Jan. 2016, doi: 10.1109/TPAMI.2015.2437384.
- [16] Ahmad, F., Najam, A. and Ahmed, Z., 2021
- [17] Ideas2it. 2021. Face Mask Detector using Deep Learning (PyTorch) and Computer Vision (OpenCV) - Ideas2it.
- [18] GitHub. 2021. VictorLin000/YOLOv3_mask_detect.
- [19] Google.com. 2021. face mask detection model using mobilenetV2 - Google Search.



Using Machine Learning and Artificial Intelligence Principles to Implement a Wealth Management System

Prarthana Mukherjee, Prit Palan, Mohan V Bonde

Abstract: *Studies have shown that new generation of millennials have limited to no knowledge about managing their finances. This lack of awareness has created a need for financial literacy which is not only an essential employ-ability skill but also, a paramount life skill. Not only the younger generation but many individuals already in the corporate field are at their wit's end when it comes to planning their finances and making correct financial decisions. This is where awareness in wealth management comes in. Wealth management is an investment advisory service. It also combines financial services to address the needs of individuals. It is more than just investment advice; it encompasses all parts of a person's financial life. The users can find all the information of different investments rather than integrating all the information from different places. They can generate a plan themselves or with the help of artificial intelligence and machine learning principles, manage their own and their family's current and future needs.*

Keywords: *Artificial Intelligence, Investment Advisory, Machine Learning, Wealth Management System*

I. INTRODUCTION

Wealth management is an investment advisory service. It combines many financial services to cater to the needs of the clients. In this process the advisor understands and anticipates the client's wants and creates a bespoke strategy using appropriate financial products and services. For such financial advice mostly, people pay a certain sum to a wealth management advisor or a wealth manager. Depending upon client's financial status the advisor suggests how much should the client invest and in which investments. Wealth management is more than just investment advice. It also can encompass all parts of an individual's financial life.

A user of this system can find all the information of different investments, instead of piecing it together from a number of places. They can generate a plan themselves manually or with the help of artificial intelligence and machine learning techniques and manage their own and their family's current and future needs. However, it is a common misnomer that wealth management is a service required and available only to wealthy individuals. In fact, with new world of working millennial generation, there is a growing need appropriate guidance and understanding into the finance world before they can truly delve into it. In this website, we have created a user-friendly platform such that individuals aren't intimidated by financial world and the surplus of information around.

We have built a website where any individual, as a user will be able to understand the various investment options and opportunities available. They will be able to make accurate financial decisions with the help of various features like returns calculators, financial plan creators, stock market predictors, and stock market simulators.

A. Objectives of the Study

In today's world technology plays a very important role. The main objective of the wealth management system is to ease managing an individual's finances and to create a platform where users can make well informed and best suited financial decisions. The system is based on the user's input information regarding the necessary parameters which are important to accurately calculate and provide best suited options for investing.

We have used various machine learning and artificial intelligence principles to accurately allot an individual into the categories of high risk, medium risk and low risk. Based on their category of risk, the user will be provided with various financial plans and calculators to understand the approximate returns on those investments, should they decide to go for them. Above all, we aim to provide a comfortable user experience along with gained expertise in the financial literacy field.

B. Organization of the Paper

- **Related Work:** We looked into the various existing systems similar to the proposed system to ascertain the important features that are to be worked on.
- **Proposed Methodology:** The proposed system design and module division are discussed to understand the system better.

Manuscript received on May 21, 2021.

Revised Manuscript received on May 27, 2021.

Manuscript published on May 30, 2021.

* Correspondence Author

Prarthana Mukherjee*, Pursuing Bachelor of Engineering, Department Information Technology, Usha Mittal Institute of Technology, SNDT Women's University, Mumbai, Maharashtra, India.

Prit Palan, Pursuing Bachelor of Engineering, Department Information Technology, Usha Mittal Institute of Technology, SNDT Women's University, Mumbai, Maharashtra, India.

M. V. Bonde, Assistant Professor, Department Information Technology, Usha Mittal Institute of Technology, SNDT Women's University, Mumbai, Maharashtra, India

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)



- Results and Discussion: Along with installation and testing of the software that are used for development of the system. As well as the various observations during the implementation.
- Conclusion and Future scope of the system.

II. RELATED WORK

There are a number of existing works which are based on similar aspects of wealth management. These works are listed and reviewed for ascertaining the main features which must be included in the system. Also to determine the advantages that could be added into the proposed system to further benefit the user and in all improve the system. A few works are as followed:

A. Stock Market Analysis and Prediction Co- Authored by Eric Alexander, Emily Kawaler

Through this paper we learnt that the stock market data is influenced by a large number of factors including foreign and domestic economies, trade agreements, wars, seasons, and even day of the week. Many different approaches towards prediction are attempted in this paper including neural networks and fuzzy reasoning, support vector machines, and even attempting prediction using data-mining techniques over textual data in financial news. In this paper, we were able to ascertain the abilities of linear regression, random forests, and support vector machines (SVM) with SMO to predict future prices and trends in a variety of stocks.

B. Study on Machine Learning Techniques in Financial Markets o-Authored by Prakhar Vats, Krishna Samdani

This Paper helped understand the financial world and its pillars, portfolios, securities, stock market forecasting, risk management, debt management, and these pillars rely on adequate and accurate prediction. These are problems that, on the small scale, affect individuals and their financial conditions and, on the larger scale, can be detrimental to a country's or an organization's financial well-being. This paper, implements various algorithms and platforms involving Machine Learning in Financial Markets and reaching informed conclusions on parameters like accuracy, efficiency, speed and usability. This paper, helped us decide upon the algorithms to use in the proposed system based on the parameters they have tested.

C. Finbingo

Finbingo is an application which was recently launched in the market as a financial decision helper. It enables the users to ascertain their financial goals in terms of money or objects. It also enables the users to understand and ascertain the financial plan to achieve that goal. It helps the user understand the various investment plans which can enable them to invest accurately. We understood the need for high connectivity with users and the need to be easily accessible by the users.

III. PROPOSED METHODOLOGY

We have split the entire system into four distinct modules based on the risk level of the investment options and the customer's view to the system, they are as followed:

A. Customer Module:

The first module of the system is the customer module, through this module the user will enter in their individual details and other details regarding their earnings, expenses and savings. Based on these details the system create the financial plans for the individuals using artificial intelligence principles.

B. Low-risk and Medium-risk Module

The second module includes low and medium risk investment. In low-risk investment users can invest and can be assured that their money is safe. They include investments like fixed deposits and PPFs. The medium risk investments include mutual funds. It will also include calculators to calculate their returns based on the investment they are interested in.

C. High-risk Module

This module includes high risk investments like the stock market. In this module users will be displayed the various stocks which are on the rise and have a probability of an increased profit. These predictions will be done using machine learning principles. The user may also individually search any stock they are interested in to find their predictions.

D. Integration Module

In this module, all the above mentioned modules are integrated and the website is built. In this module the front end implementation and development of system is done.

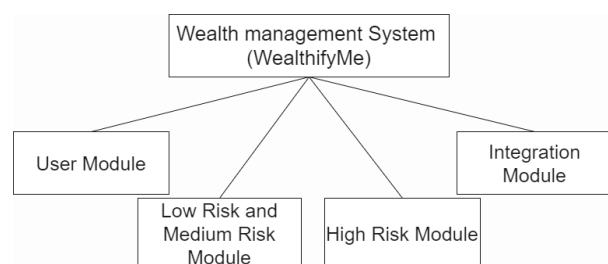


Fig 1: Block view of the System

IV. IMPLEMENTATION

A. Website Implementation

React is a user interface library written in JavaScript. Single-page applications are built with React. ReactJS is a JavaScript library for creating reusable user interface components that is declarative, powerful, and versatile. It's an open-source, component-based front-end library that's only liable for the application's view layer. We can make reusable UI components with React. Developers can use React to build massive web applications that can alter data without reloading the page. React's main goal is to be fast, scalable, and easy to use. It only operates on the application's user interfaces.

This corresponds to the MVC template's view. As a user enters into the website, they will view the home page, if they are not a registered user, they can register themselves in the sign-up section. As a new user, a user needs to fill out a form about the various information that would be necessary to segregate them into the various level of risk.

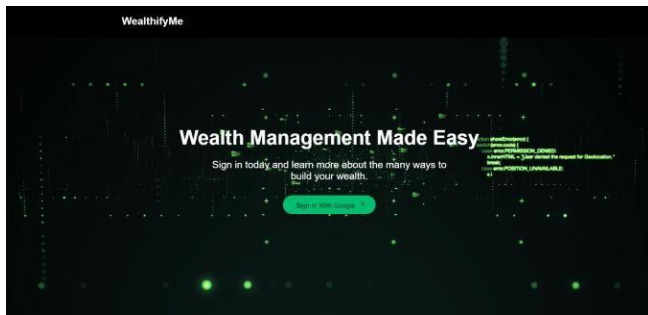


Fig 2: User's First view into the system

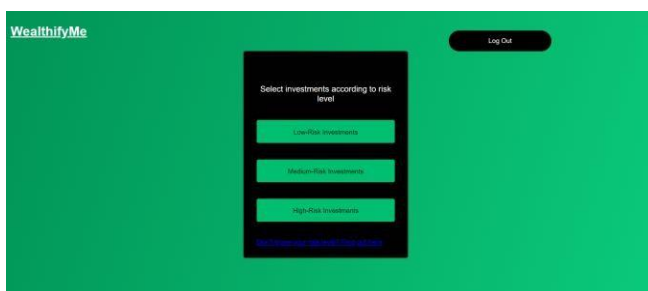


Fig 3: Risk level page of system

B. Customer Segmentation based on Risk Level

Customer segmentation is a method of categorizing the customers into distinct subgroups with distinct needs. When done manually, it lacks precision and accuracy, and it takes a long time. Artificial intelligence (AI) and machine learning principles are being used in the segmentation process to help you get the most out of your resources and data and achieve your business goals. These 'segments' can be as easy as separating the customers by categories like gender and age, which are the most closely linked to their risk level preferences.

The Customer Segmentation Process are as followed:

- Pre-processing

In order for the process to work, the data must first be cleaned and transformed. It will also be necessary to identify a 'gold standard' training collection for future use.

- Modeling

Algorithms will be run to determine the variables are crucial to segmentation. These are then prioritized and added to the 'gold standard' training set so that the model can learn which properties are shared by the segments.

- Evaluation

A matrix can be used to distinguish previously incorrectly defined contacts and also be used to determine the model's accuracy. A statistical coefficient can be used to account for class imbalance when the data set includes unbalanced data across segments.

- Output

The data has now been transformed. The customers will now be segmented based on the "gold standard" training set.

The users have an option where they can find out the risk appetite, they would fall into by simply filling up a form which includes information about their age, gender and certain personality-based questions.

Fig 4: The form to calculate risk

Fig 5: This is the result of a user with high risk appetite

Fig 6: This is the result of a user with medium risk appetite

Fig 7: This is the result of a user with low risk appetite

C. Low-risk and Medium-risk investments (Return calculator)

We've built a Returns Calculator that can be used to figure out how much money the user will make with the investment that they are looking into. There will be different parts, much like any calculator, where the user can enter the various parameters depending on which the returns on investment will be determined.

D. High-risk investments (Stock Price Prediction)

Prediction problems are around for an extended time. They are together considered as the toughest problems to unravel within the data science industry. These include a good range of problems; from predicting sales to finding patterns available markets' data, from understanding movie plots to recognizing your way of speech, from language translations to even predicting the next word on your keyboard. The stock price of today will depend upon:

- **The trend**

The trend that the stock has been following within the previous days, maybe a downtrend or an uptrend.

- **The worth**

The worth of the stock on the previous day, because many traders compare the stock's previous day price before buying it.

- **Factors**

The factors which will affect the worth of the stock for today. This can be a replacement company policy that's being criticized widely, or a drop by the company's profit, or even an unexpected change within the senior leadership of the company.

Prophet is an additive regression model that fits non-linear patterns with annual, weekly, and regular seasonality, as well as the impact of holidays:

- Prophet detects changes in patterns by selecting change points from the data.
- A Fourier series-based yearly seasonal variable
- Dummy variables are used to create a weekly seasonal component.
- A list of important holidays submitted by users.

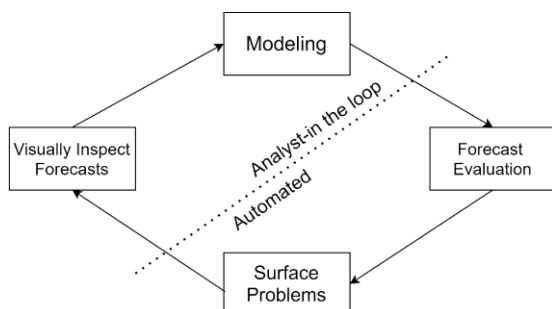


Fig 8: Prediction model of Prophecy used in the Stock Market Prediction

V. RESULTS AND DISCUSSIONS

A. Prophecy Library:

Forecasting is a method of making well-informed forecasts about the path of future developments using historical data as

inputs. In today's organizations, it's a critical and popular data science challenge. Knowing of an event in advance will help a company's goal-setting, policy-making, and planning greatly. Prophet is a method designed to overcome these concerns and offers a realistic approach to forecasting "at scale." Its aim is to provide easy and methods which can be tuned for automating the popular features of business time series.

Prophet allows analysts from a wide range of backgrounds to make more predictions than they could manually.

The Prophet kit includes user-friendly parameters that are simple to adjust. And someone with no prior experience with forecasting models may do this to make accurate forecasts for a number of business problems. They are combined in the following equation:

$$y(t) = g(t) + s(t) + h(t) + \varepsilon_t \quad (1)$$

$g(t)$: piecewise linear or logistic growth curve for modelling non-periodic changes in time series

$s(t)$: periodic changes (e.g: weekly/yearly seasonality)

$h(t)$: effects of holidays with irregular schedules

ε_t : error term accounts for any unusual changes not accommodated by the model

The Prophet uses a decomposable time series model. The Prophet procedure is an additive regression model with five main parts:

Prophet automatically detects changes in trends by selecting

change points from the data.

A yearly seasonal component modeled using Fourier series.

A weekly seasonal component using dummy variables.

A user-provided list of important holidays.

We sampled this model over Reliance stock to ascertain the prediction and the error percentage. It also had a root mean square error of 1.2

Raw data

	Date	Open	High	Low	Close
1569	2021-05-19T00:00:00+0...	1982	2,016.6000	1,972.1000	1,996.3500
1570	2021-05-20T00:00:00+0...	1,996.3500	2,010.8000	1,981.1000	1,985.3000
1571	2021-05-21T00:00:00+0...	1,995.7000	2009	1980	2,000.9000
1572	2021-05-24T00:00:00+0...	2,007.4000	2,009.5000	1,981.6000	1,985.5500
1573	2021-05-25T00:00:00+0...	1,990.0500	1997	1,960.1000	1,964.5000

Time Series Data

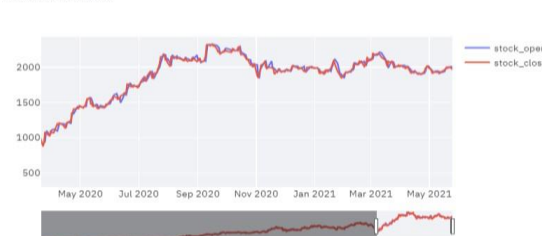


Fig 9: Raw data and graphed Reliance.BO Stock

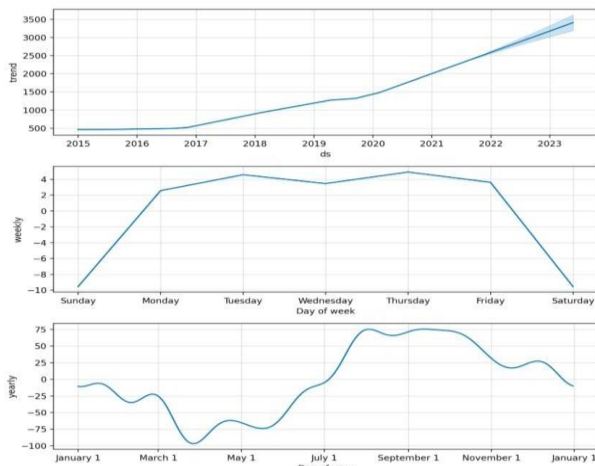


Fig 10: Forecast trends, weekly and yearly for Reliance.BO Stock using Prophecy



Fig 11: Prediction graph of Reliance.BO Stock using Prophecy

B. LSTM:

We had also used LSTM neural network to predict the closing price of Apple and Netflix stock using Yahoo finance information. This model are often wont to predict the stock of any company. Just by replacing the company name in the code.

Prediction problems are around for an extended time. They are considered together of the toughest problems to unravel within the data science industry. These include a good range of problems; from predicting sales to finding patterns available markets' data, from understanding movie plots to recognizing an individual's way of speech, from language translations to predicting the next word. With the recent breakthroughs that are happening in data science, it's found that for nearly all of those sequence prediction problems, long short-Term Memory networks, a.k.a LSTMs are observed because the best solution.

LSTMs have a certain edge over conventional feed-forward neural networks and Recurrent Neural Network (RNN) in many ways. They have the unique feature of selectively remembering patterns for long durations of your time.

LSTMs can selectively remember or forget things. The information at a specific cell state has three different dependencies. We'll visualize this with an example. Let's take the instance of predicting stock prices for a specific stock.

The stock price of today will depend upon:

The trend that the stock has followed in the previous days,

the worth of the stock on the previous day, because many traders compare the stock's previous day price before buying it.

Factors which will affect the price of the stock for today.

This can be a replacement company policy that's being criticized widely, or a drop by the company's profit, or even an unexpected change within the senior leadership of the company.

These dependencies are often generalized to any problem as:

The previous cell states

The previous hidden state

The input at the present time step

We calculated a rmse of 4.7%



Fig 12: Stock price prediction graph of NETFLIX

We have tried the various algorithms and referred to a number of papers who have focused on the particular algorithms to ascertain the aspects that need to be focused on while choosing the algorithm to work with on the Stock price

Algorithm Used	Model Applied	Parameters	Metrics
SVM [3]	Non-Linear Classification	Accuracy	96.15%
NN (Neural Network) [6]		Accuracy	88%
Prophecy	-	RMSE	1.2
LR [2]	Classification	RMSE	1.4 (with PCA)
SVM [4]	Regression	RMSE	12.873

Fig 13: Comparison Table of the various machine learning algorithms

VI. CONCLUSION AND FUTURE SCOPE

Based on the analysis with various machine learning algorithms, we have found Prophecy to be the best suited to the need of this system. We used clustering techniques to work on the customer segregation based on risk level and have used react for the website implementation for a smooth and interactive view of the user.



Through this paper, we have built a wealth management system which uses machine learning and artificial intelligence principles to help the users make financially sound decisions. This will be a highly reliable and efficient system for modern wealth management industry and market requirements, with aspects of growth in the taxation field.

ACKNOWLEDGMENT

We have a great pleasure to express our gratitude to all those who have contributed and motivated us during our project work. For selecting a topic of our choice and studying and understanding it, is a good opportunity to learn and know new technology, understand the way projects are researched and executed on international level. We would like to thank our guide Prof. Mohan Bonde for his support and guidance, our HOD Dr. Sanjay Shitole, our principal Dr. Sanjay Pawar, and to all the teachers whose help made us understand our topic well.

Thank you all!

REFERENCES

1. Ibrahim M. Hamed, Ashraf S. Hussein, Mohamed F. Tolba, An intelligent model for stock market prediction, in the International Journal of Computational Intelligence Systems, 2012
2. P. Guo, M. Waqar, H. Dawood, M. B Shahnawaz and M. A. Ghazanfar, Prediction of Stock Market by Principle Component Analysis in 13th International Conference on Computational Intelligence and Security, 2017
3. Z. Hu, J. Zhu and K. Tse, Stocks Market Prediction Using Support Vector Machine, in 6th International Conference on Information Management, Innovation Management and Industrial Engineering, 2013.
4. S. Kavitha, S. Varuna and R. Ramya, A Comparative Analysis on Linear Regression and Support Vector Regression, in Online International Conference on Green Engineering and Technologies (IC-GET), 2016.
5. Eric Alexander, Emily Kawaler, Dan Szafir, Stock Market Analysis and Prediction, 2011
6. R. Verma, P. Choure and U. Singh, Neural Networks through Stock Market Data Prediction, in International Conference on Electronics, Communication and Aerospace Technology, 2017.
7. Meghna Misra, Ajay Prakash Yadav, Harkiran Kaur, Stock Market Analysis and Prediction, In International Conference on Recent Innovations in Electrical, Electronics and Communication Engineering (ICRIEECE), 2018
8. Prakhar Vats, Krishna Samdani, Study on Machine Learning Techniques in Financial Markets, IEEE International Conference on System, Computation, Automation and Networking (ICSCAN), 2019
9. Hirotaka Mizuno, Michitaka Kosaka, Hiroshi Yajima Application of Neural Network to Technical Analysis of Stock Market Prediction, 2001
10. Ayodele A. Adebisi, Aderemi O. Adewumi, Charles K. Ayo, Stock Price Prediction Using the ARIMA Model, in UKSim-AMSS 16th International Conference on Computer Modelling and Simulation, 2014
11. Samarth Agarwal, Manoj Jindal, G>N Pillai, Momentum Analysis based Stock Market Prediction using Adaptive Neuro-Fuzzy Inference System, in International Multi-Conference of Engineers and Computer Scientists 2010 Vol I, IMECS, 2010
12. Qianwen Bi, Jingpeng Tang, Bradley Van Fleet, Software Architecture for Machine Learning in Personal Financial Planning, In Intermountain Engineering, Technology and Computing (IETC), 2020
13. V. Rajput and S. Bobde, Stock Market Prediction Using Hybrid Approach, in International Conference on Computing, Communication and Automation (ICCCA2016), 2016.
14. R. Verma, P. Choure and U. Singh, Neural Networks through Stock Market Data Prediction, in International Conference on Electronics, Communication and Aerospace Technology, 2017.
15. Brenda Y. Hon, Dickson K.w. Chiu, An Integration of Web Service and Workflow to a Wealth Management Order Placement System: A

Case Study of International Brokerages, In IEEE Asia-Pacific Conference on Services Computing, 2006. (APSCC'06)

16. Finbingo, an online portal, Available at <https://www.finbingo.com/>

AUTHORS PROFILE



Prarthana Mukherjee, is currently pursuing Bachelor of Engineering degree in Information Technology from Usha Mittal Institute of Technology, SNDT Women's University, Mumbai, Maharashtra, India. Her area of interest includes Machine Learning, Artificial Intelligence and Big Data.



Prit Palan, is currently pursuing Bachelor of Engineering degree in Information Technology from Usha Mittal Institute of Technology, SNDT Women's University, Mumbai, Maharashtra, India. Her area of interest includes Machine Learning, Artificial Intelligence and Cloud Computing.



M. V. Bonde, has obtained Bachelor of Engineering degree in Computer Science & Engineering from Dr. B. A. Marathwada University, Aurangabad, Maharashtra, India in 1997. He completed Master of Engineering in Computer Engineering from Mumbai University, Mumbai, Maharashtra, India in 2003. He is currently working as Assistant Professor in Information Technology Department at Usha Mittal Institute of Technology, SNDT Women's University, Mumbai, Maharashtra, India since 2003. He has published 8 research papers in International Journals. His main areas of interest include Digital Signal and Image Processing, Information Security. He has 19 years of teaching experience and 2 years of industry experience.



Food Item Calorie Estimation Using YOLOv4 and Image Processing

Samidha Patil[#], Shivani Patil[#], Vaishnavi Kale[#], Mohan Bonde^{*}

[#]Final Year B.Tech IT Student, ^{*}Assistant Professor, Department of Information Technology, UMIT, SNDT Women's University
Juhu Tara Road, Santacruz(W) Mumbai Maharashtra India

Received Date: 15 April 2021
Revised Date: 29 May 2021
Accepted Date: 31 May 2021

Abstract — In last decade or two, an increase in growth of obesity has been seen all around the world. There has been increasing research to tackle obesity using food logging and food item calorie analysis. An increase in healthy living has led to numerous food management applications, which have image recognition to automatically record meals. To achieve healthy living it's important for someone to observe his/her daily calorie intake. The project aims to incorporate modern technique for object detection together with image analysis techniques to determine a more accurate calorie count from images of food items. The strategy employed involves determining the calorie count of the food item through mathematical calculations of the features extracted from food image by image segmentation. In this paper, we propose a mobile software for food calorie estimation from images of food items. By using YOLO- You Only Look Once for Object detection and Image segmentation for calorie estimation we are able to detect the food and thereby calculate the required food calories from the varied datasets of Indian cuisine.

Keywords — Calorie Estimation, Object Detection, YOLO

I. INTRODUCTION

Food is necessary for human life. Since it is the main source of energy and all the nutrients we get from the food, it is an important source of health and well-being. However, the human's diet is changing from the last one or two decades, as it is becoming high in saturated and trans fats and salt, and low in vegetables and fruits. These changes in diet are causing various diseases such as obesity, diabetes, cardiovascular diseases and cancer. To deal with these issues, most of the people are changing their diet plans by focusing on what type of food they are consuming.

To know what we consume, we regularly create a record of everyday meals. Such recording of the food is manual exercise and it is complex and time consuming task. It's not easy task for consumer to create healthy food selections as the nutritional information available is not easily interpretable. Thus, to make it straightforward for the customers, this project has come into existence. Automatic food classification is beneficial in real-world applications

like waiter-less restaurants and private health. As an example, mobile food classification has been used to tell the users their daily dietary requirements and calorie intake. This work aims to develop a mobile application that may record real time images of meal and analyse it for calorie content, so that people will improve their dietary habits and lead a healthy life.

In this project, we have used YOLO (You Only Look Once) and Image Segmentation for recognition and calorie estimation of food items respectively. YOLO (You Only Look Once) is a real time object detection algorithm. It is the algorithmic rule or strategy behind how the code is going to detect the objects from the image. It looks at the image just once, then goes through the network and detects the object. The image segmentation technique from image processing is used to estimate the amount of calories present in the detected food item.

II. RELATED WORK

Tatsuya Miyazaki, Gamhewage C de Silva and Kiyoharu Aizawa [2] had mentioned an image analysis approach to calorie count estimation for dietary assessment. They had designed a dataset of 6000 images contained in food log calorie count that had been calculated by the nutritionist. The food image was compared with food log dataset from the aspect of multiple options like Correlograms, color Histograms and SURF options.

Parisa Pouladzadeh, Shervin Shirmohammadi, and Rana Al-Maghrabi [3] had presented a food calorie and nutrition measurement system that helped patients and dietitians to manage daily food intake. The paper projected to build a mobile application which will offer the measure of calorie and nutrition contents by clicking the photo before and after the consumption of food.

Joseph Redmon, Santosh Divvala, Ross Girshick, and Ali Farhadi [6], they had introduced YOLO, a unified model for object detection. This model is uncomplicated to construct and can be trained directly on full images. In contrast to classifier-based approaches, YOLO is trained on a loss function that directly corresponds to detection performance and hence the entire model is trained together.

Manal Chokr, Shady Elbassuoni [9] projected the simplest



way to estimate the calorie content of the food item (pointed towards eatables like pizzas, doughnuts, chicken, and sandwiches) by measuring the size of the item by passing the compressed image through a regressor.

Joseph Redmon and Ali Farhadi [8], they had introduced YOLOv2 and YOLO9000, the detection systems that were real time. YOLOv2 is quite faster than other detection systems. YOLO9000 is a real-time framework for detection of more than 9000 various objects categories with both optimizing detection and classification.

Sujata Chaudhari, Nisha Malkan, Ayesha Momin, Mohan Bonde [12] used YOLO for real time object detection. This paper aims to involve YOLO as a modern technique for object detection with the goal of achieving high accuracy. The increment in accuracy throughout training process is explained in this paper. They have explained advancement of CNN in this paper and with the assistance of YOLO and CNN object detection is performed.

Alexey Bochkovskiy, Chien-Yao Wang, Hong-Yuan Mark Liao [13], their main objective of this work is to build a fast operating speed of an object detector in production systems and maximizing for parallel computations. They have developed an efficient and powerful object detection model. The state of art techniques are made more effective for single GPU training. A huge numbers of features are verified for boosting up the accuracy of both classifier and detector.

III. PROPOSED METHODOLOGY

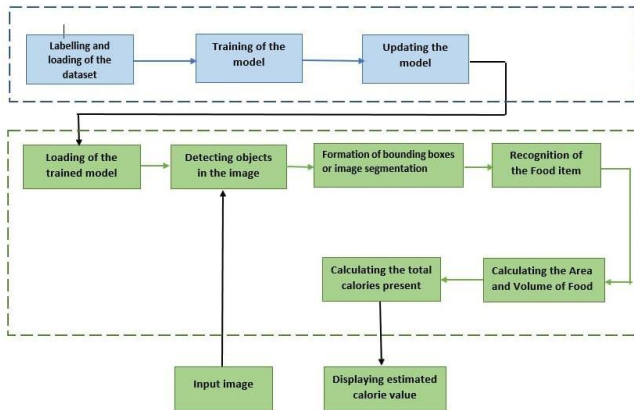


Fig. 1: Block Diagram of Proposed Methodology

A. Data Acquisition

The dataset comprises of food images from Kaggle datasets and also a custom dataset created by the team members. This dataset consists of images belonging to different classes such as Apple, Banana, Orange, Pizza, etc. Since finger is used as a calibration object, all the images are taken in such a way that finger is placed near the food item. [17], [18].

B. Image Preprocessing

- Image Cropping:** Image cropping is performed to crop out any unnecessary part of the image.
- Image Resizing:** After image cropping, image resizing is done to make all the images of equal size.

C. Labelling of the Dataset

The graphical image annotation tool named LabelImg is used for labelling of the images. The images are labeled by creating boundary box or rectangular box around the object in the image. The annotations are saved as txt file or xml file in Pascal voc format.

D. YOLO (You Only Look Once)

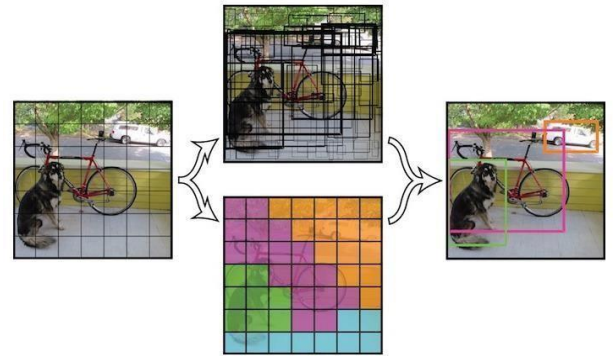


Fig. 2: You Only Look Once

YOLO (You Only Look Once) is an algorithm for object detection in real time. YOLO applies single neural network to the image, then divides the image into regions and predicts bounding box for each possible region. YOLO can be applicable to multiple objects in a single image and able to predict multiple bounding boxes and class probabilities for those boxes.



Fig. 3: Division of input image into grid

YOLO Algorithm works according to the following three techniques -

- a) **Residual Block:** Here the image in Figure 3 is divided into various grids with $S \times S$ dimension for each grid. In the image, there are multiple grids of equal dimensions. Every grid cell will detect objects that appear within the particular grid.

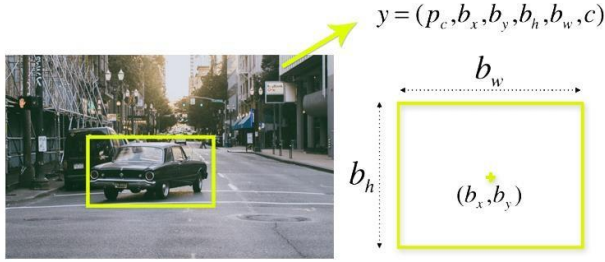


Fig. 4: Bounding Box Representation

- b) **Bounding Box Regression:** The bounding box shown in Figure 4 is used to highlight the object in an image. YOLO uses single bounding box to find the width, height, center and the class of the object. It consists of four attributes; they are Width (b_w), Height (b_h), Class (for example. person, car, traffic light, etc.) This is represented by letter c , and the last attribute is bounding box center (b_x, b_y).

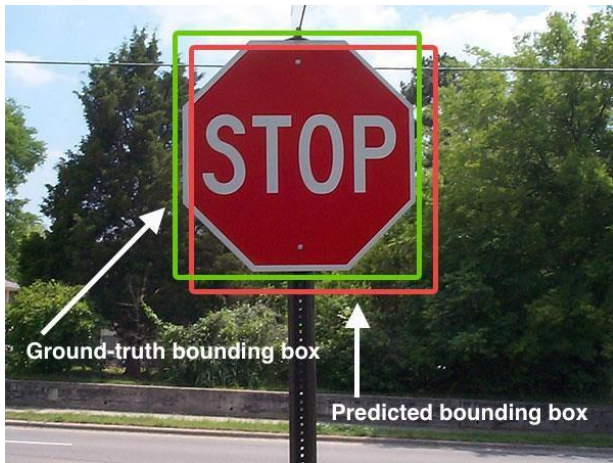


Fig. 5: An example of detecting stop sign in an image

- c) **Intersection Over Union (IOU):** Intersection Over Union describes overlapping of the boxes as shown in Figure 5. It is a measure to calculate accuracy of an object detector. To apply Intersection Over Union (IOU), we need two things; the ground-truth bounding boxes and the predicted bounding boxes from the image.

$$IOU = \text{Area of Overlap} / \text{Area of Union} \quad \text{--- (1)}$$

Using the above formula, IOU can be computed.

If ground-truth bounding box is same as the predicted bounding box then IOU is equal to 1 as shown in Figure 6.



Fig. 6: An example of computing IOU for various bounding boxes

E. The YOLOv4 Network

The YOLOv4 network consists of three parts -

- a) **Backbone:** Backbone refers to the feature extraction architecture. It is a Convolution Neural Network (CNN) that combines and forms image features at different granularities. The different versions of YOLO are differentiated depending on the backbone. In YOLOv4 CSPDarknet53 is used. CSP stands for Cross-Stage-Partial connections. [14]
- b) **Neck:** The neck block is used to add extra layer between the backbone and the head (dense prediction block). The YOLOv4 uses modified Pan Aggregation Network (PAN) [10], modified Spatial Attention Module (SAM) [11] and Spatial Pyramid Pooling (SPP) to add extra information in a layer. It is the series of layers to mix and combine image features to pass them forward for prediction.
- c) **Head:** The head block is used to locate bounding boxes and classify the objects present in the image. It analyzes the features from the neck block, detects bounding box and classifies it into various classes.

F. Convolutional Neural Network

The Convolutional Neural Network (CNN) is a feed-forward neural network that is used to detect and classify objects in an image. It is also known as ConvNet [4]. A convolutional neural network consists of an input and an output layer, and multiple hidden layers. The hidden layers of a CNN consist of convolutional layer, RELU layer which is activation function, pooling layer, fully connected layer and normalization layer. In CNN, every image is represented in the form of array of pixel values. It is a network which can

take input image, assign weights to various objects from the image and differentiate objects from one another. In CNN pre-processing required is much lower than the other classification algorithms. The task of convolutional neural network is to transform the images into a format that is easier to process, without losing the features which are necessary for getting a good prediction.

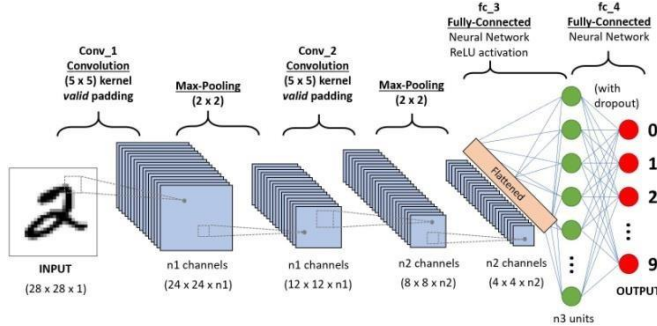


Fig. 7: An example of CNN Architecture representing sequence to classify handwritten digits

CNN is comprised of three types of layers

- Convolutional Layer (The Kernel):** Convolutional layer is used to extract the various features from the input images. In this layer, convolution is performed between the input image and filter of size $M \times M$. The element used for carrying out the convolution operation is termed as the Kernel or filter. The result of the convolution is termed as the feature map. Feature map gives the information about the edges and corners of the image. This feature map is passed to the other layers to get more other features from the input image.
- Pooling Layers:** Convolutional layer is followed by pooling layer. Pooling layer reduces the size of the convolved feature map to reduce the computational cost required to process the data. This is done by decreasing the connection between the layers and independently operating on each feature map. There exists two types of pooling which are max pooling and average pooling.

Max Pooling returns maximum value from the portion of the image covered by the kernel. Max pooling is considered as a noise reducer. It removes the noisy activations and performs de-noising along with dimensionality reduction.

Average Pooling returns the average of all the values that are covered by the kernel. Dimensionality reduction is achieved using average pooling.

Performance wise max pooling is better than the average pooling.

- Fully Connected Layer:** The head block is used to locate bounding boxes and classify the objects present in the image. The Fully Connected (FC) Layer consists of the weights, biases and neurons which are used to connect the neurons of two different layers. These layers are placed before the output layer and form the last few layers of CNN architecture. In this layer, the input images from the previous layers are flattened and fed to the Fully Connected layer. The flattened vector then undergoes some more Fully Connected layers where the mathematical functions operation usually happens. In this step, the process of classification begins to take place.

G. Major Enhancement in YOLOv4

The YOLOv4 is based on Darknet. The difference between previous version of YOLO i.e., YOLOv3 and YOLOv4 is only the backbone. YOLOv3 uses Darknet53 backbone while YOLOv4 uses CSPDarknet53 backbone. CSPDarknet53 backbone is used to enhance the learning capability of CNN. YOLOv4 has acquired an AP value of 43.5 percent on the COCO dataset and a real-time speed of 65 FPS. In YOLOv4, the AP and FPS has been incremented by 10 percent and 12 percent, respectively as compared to YOLOv3.

H. Calorie Estimation

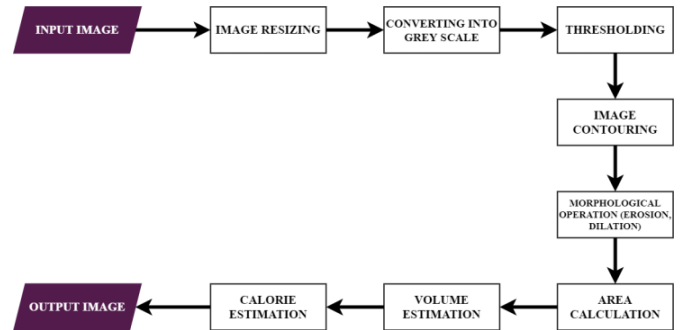


Fig. 8: Method of Calorie Estimation

We use various image processing techniques to calculate the volume of food from images. There are various methods of image segmentation such as canny edge detection, watershed segmentation, morphological operators and Otsu's method which are used to segment the food item to find the contour of the fruit and thumb. Thumb finger is used as a calibration object. The thumb is kept next to the dish while clicking the photo and it helps us to estimate the real-life size of the food item and volume accurately.

After the food item is identified, the volume of food items

by approximating it to a geometric shape like sphere, cylinder, etc is calculated. Once we get the volume, the mass of the food item is calculated using the standard value of density. The amount of calories is calculated using the values of the volume and mass of the food item.

These are the steps for performing Calorie Estimation

- a) **Image Segmentation:** Image segmentation is a technique in digital image processing which is used to partition an image into multiple parts or regions with the help of the pixels of the image. It is mostly used to locate boundaries and objects in images. Following are the image segmentation steps.

Resizing of the original image

Image resizing is required to alter the number of pixels. The image is resized to 400×400.

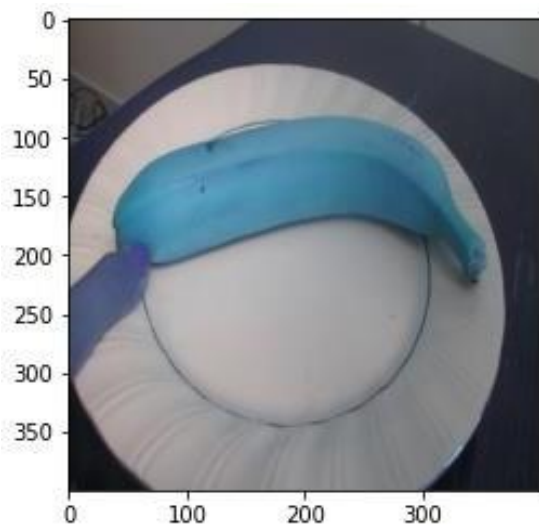


Fig. 9: Image Resizing

Conversion of BGR image to Grey Scale

There are two methods for converting the image from BGR to Gray Scale as follows:

Average Method: In this method, the average value of R, G and B is taken as grayscale value.

$$\text{Grayscale} = (B+G+R) / 3 \quad \text{--- (2)}$$

The Weighted Method: This method weights red, green and blue according to their wavelengths.

$$\text{Grayscale} = 0.299R + 0.587G + 0.114B \quad \text{--- (3)}$$

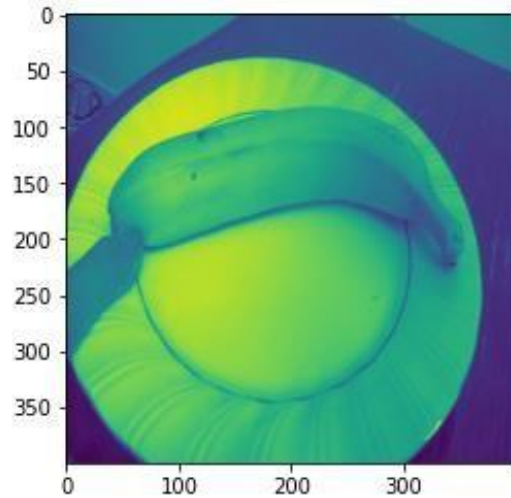


Fig. 10: BGR to Grayscale

Threshold of an entire Image

Thresholding of an image is one of the simple of image segmentation. It is useful for creating binary image from grayscale image. The result of the thresholding separates the object or foreground pixels from the background pixels to perform image processing.

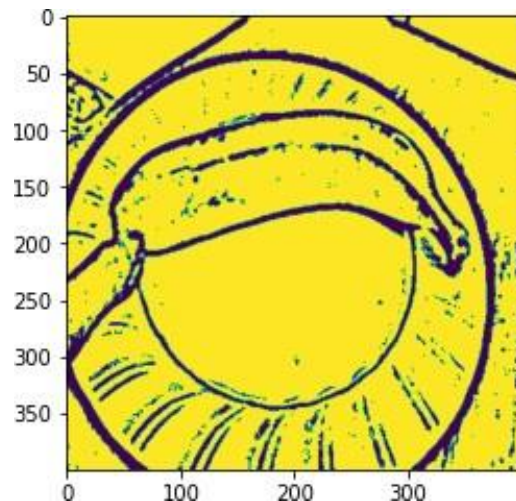


Fig. 11: Thresholding of entire image

Finding Contours

A contour is defined as a curve connecting all the continuous points which are along the boundary and having same color or intensity. Binary images are used to get more accurate contours. It is required to apply threshold or canny edge detection before finding contours.

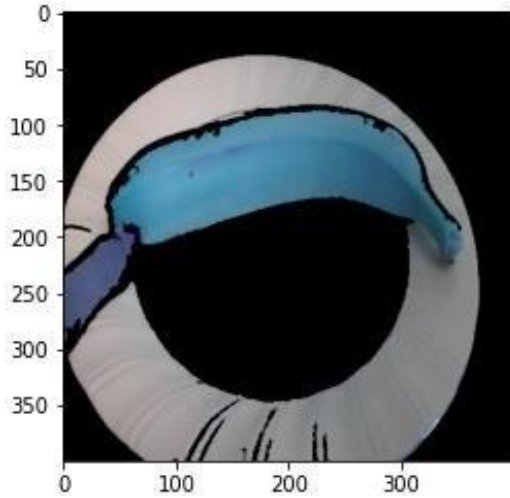


Fig. 12: Finding Contours

HSV Color spaced based segmentation

Thresholding of an image is one of the simple of image segmentation. HSV stands for Hue, Saturation and Value. HSV uses color, saturation and brightness values. HSV color space is closer to the RGB color space. Hue is the dominant color observed by humans. Saturation refers to the white light mixed with hue. Value is the brightness/ Intensity. HSV is used to detect the object in a certain color and to decrease the influence of light intensity. The distance measured from the central axis of HSV cylinder determines Saturation(S).

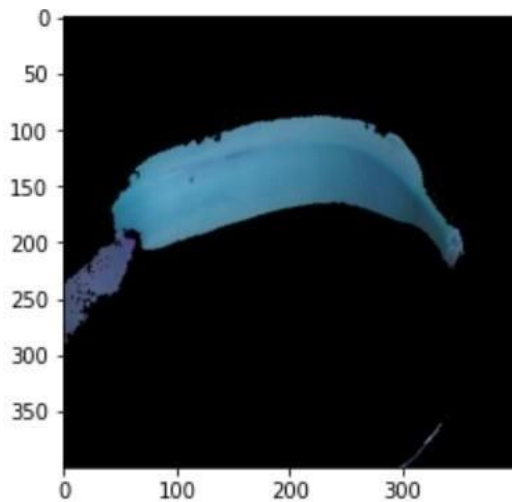


Fig. 13: Conversion to HSV

Erosion and Dilation

Image resizing is required to alter the number of pixels. Erosion and Dilation are two morphological

operations. Dilation adds pixels to the boundaries of the image while erosion removes pixels from the boundaries of the image. The size and shape of structuring element determines the number of pixels added or removed.

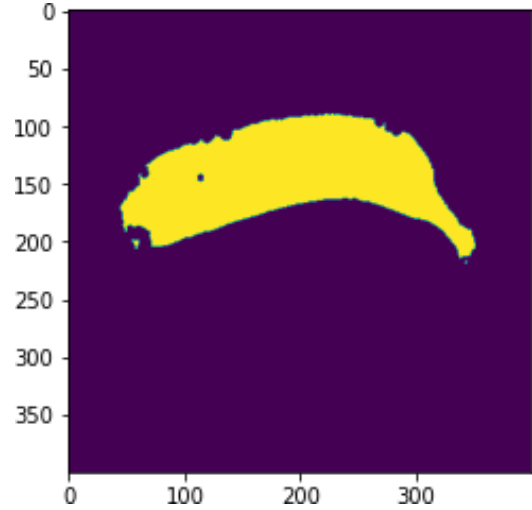


Fig. 14: Erosion

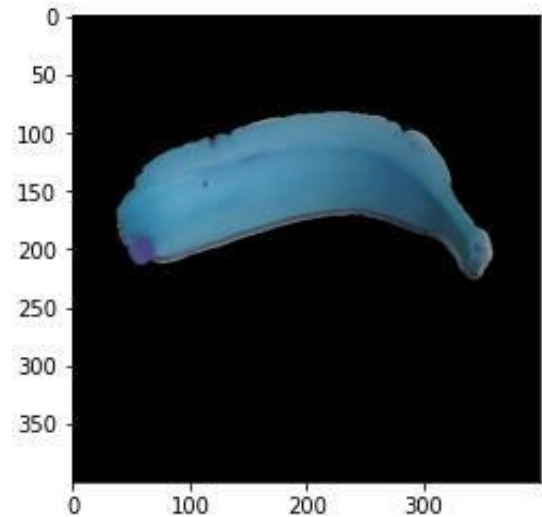


Fig. 15: Dilation

- b) **Area Calculation:** After performing image segmentation steps on image, we get 3 factors namely Food pixel area, skin pixel area and actual skin area. Food pixel area and skin pixel area is calculated by converting an image to HSV. We know that our thumb size is approximately 5cm, so 5*2.3cm is taken as a skin multiplier. To calculate the actual skin area, following formula is used.

$$\text{pix_to_cm_multiplier} = 5.0 / \text{pix_height} \quad \text{--- (4)}$$

With the help of above 3 factors, estimated food area can be calculated.

$$\text{Estimated Food Area} = (\text{Foods Pixel Area} \times \text{Actual Skin Area}) / \text{Skin Pixel Area} \quad \text{--- (5)}$$

- c) **Volume Estimation:** The volume estimation method is used to measure the mass of food portion. Mass is required as all the nutritional tables are based on food mass. Once the value of the mass is calculated, then we can easily calculate the amount of calories present in the food item. Volume of food item is been calculated using the total area of food in the image with respect to finger i.e. the calibration object used. Then by approximating these detected item to a geometric shape like sphere, cylinder, rectangle, etc. the volume of food item is calculated. Once we have the volume of food item, we can use the following formulae to calculate the mass of the food item.

$$M = \rho \times V \quad \text{--- (6)}$$

Where, M = mass of the food item, ρ = density

Food density can be obtained from readily available tables.

- d) **Calorie Estimation:** To estimate the amount of calories present in the food item, we values of the mass and volume. Following equations are used to calculate the amount of calories.

$$\text{Estimated Weight} = \text{Actual Density} \times \text{Estimated Volume} \quad \text{--- (7)}$$

$$\text{Estimated Calories} = (\text{Estimated Weight} \times \text{Calories per 100gm}) / 100 \quad \text{--- (8)}$$

IV. RESULT

The result of the model developed using the YOLOv4 method is represented by the graph obtained during the training process. At iteration 3400, the blue curve indicates the loss during training, which is 0.293 and the red curve indicates the mean Accuracy Precision (mAP) which is around 83%. The sudden drop in mAP curve near iteration 1200 is mostly due to mean precision is lower for that particular mini-batch in our dataset as compared to other mini-batches.

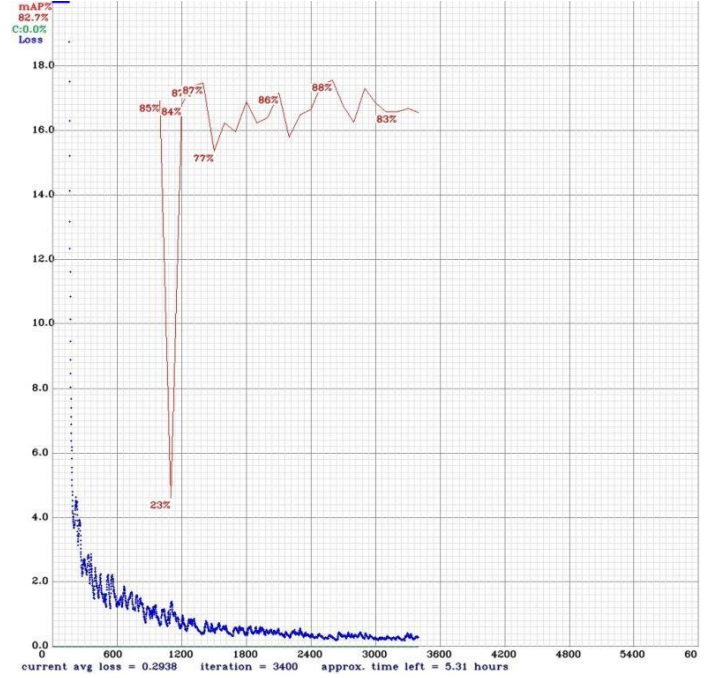


Fig. 17: Graph showing Loss and mean Accuracy Precision (mAP)

Further the values of calorie that are obtained using the model are compared with actual calories referenced from the database. [20]
Depending upon these actual and estimated value of calories, Table I is created.

TABLE I

COMPARISON of ACTUAL and ESTIMATED CALORIE VALUES

Food Item	Actual Calorie value	Estimated Calorie value	Difference (in %)
Apple	44	50	12.76
Banana	65	71	8.82
Orange	30	37	20.58
Carrot	41	45	9.30
Cake	297	260	13.26
Pizza	266	275	3.44
Broccoli	32	36	11.76

V. CONCLUSION AND FUTURE SCOPE

Our model is able to detect and recognize the food item accurately and also predict the calorie value. The prediction is in reference with the volume of a food item and finger calibration that is available in the image provided to the system. The system is able to give an output in the form of a bounding box over the food item with a label stating the name of the food item and calorie value that it holds.

Further work can be done in order to increase the accuracy of the system and more classes can be included so that the system is capable of estimating calories for a variety of food item.

ACKNOWLEDGMENT

We would like to express gratitude to our Guide Mr. Mohan Bonde, for giving us an opportunity to do the project work on 'Food Item Calorie Estimation Using YOLOv4 and Image Processing'. The constant encouragement and support has been a guiding post throughout. We would also like to extend our gratitude to HOD of IT Department Dr. Sanjay Shitole, project coordinators Ms. Anita Morey for guiding us in selecting this topic as well as motivating us to do better.

REFERENCES

- [1] Anil K Jain and Farshid Farrokhnia., Unsupervised texture segmentation using Gabor filters, Pattern recognition. 24(12) (1991) 1167–1186.
- [2] Tatsuya Miyazaki, Gamhewage C de Silva, and Kiyoharu Aizawa, Image-based calorie content estimation for dietary assessment, In2011 IEEE Inter-national Symposium on Multimedia. (2011) 363–368.
- [3] Parisa Pouladzadeh, Shervin Shirmohammadi, and Rana Al-Maghrabi, Measuring Calorie and Nutrition from Food Image, IEEE Transactions on Instrumentation and Measurement, 63(8) (2014) 1947–1956.
- [4] Karen Simonyan & Andrew Zisserman, VERY DEEP CONVOLUTIONAL NETWORKS FOR LARGE-SCALE IMAGE RECOGNITION , ICLR (2015)
- [5] Patrick McAllister, Huiru Zheng, Raymond Bond, and Anne Moorhead, Semi-automated system for predicting calories in photographs of meals. In2015 IEEE International Conference on Engineering, Technology and Innovation/International Technology Management Conference (ICE/ITMC) (2015) 1–6. IEEE.
- [6] Joseph Redmon, Santosh Divvala, Ross Girshick, and Ali Farhadi, You Only Look Once: Unified, Real-Time Object Detection. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (2016) 779–788.
- [7] Koichi Okamoto and Keiji Yanai, An automatic calorie estimation system of food images on a smartphone, In Proceedings of the 2nd International Workshop on Multimedia Assisted Dietary Management (2016) 63–70.
- [8] Joseph Redmon and Ali Farhadi, Yolo9000: Better, Faster, Stronger. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (2017) 7263–7271.
- [9] Manal Chokr, Shady Elbassuoni, Calories Prediction from Food Images, Proceedings of the Twenty-Ninth AAAI Conference on Innovative Applications (IAAI-17)) (2017).
- [10] Shu Liu, Lu Qi, Haifang Qin, Jianping Shi, Jiaya Jia, Path Aggregation Network for Instance Segmentation, Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (2018) 8759–8768.
- [11] Sanghyun Woo, Jongchan Park, Joon-Young Lee and In So Kweon, CBAM: Convolutional Block Attention Module, Proceedings of the European Conference on Computer Vision (ECCV) (2018) 3–19.
- [12] Sujata Chaudhari, Nisha Malkan, Ayesha Momin, Mohan Bonde, Yolo Real Time Object Detection, SSRG International Journal of Computer Trends and Technology 68(6) (2020) 70–76.
- [13] Alexey Bochkovskiy, Chien-Yao Wang, Hong-Yuan Mark Liao, YOLOv4: Optimal Speed and Accuracy of Object Detection, arXiv preprint arXiv:2004.10934 (2020).
- [14] Chien-Yao Wang, Hong-Yuan Mark Liao, Yueh-Hua Wu, Ping-Yang Chen, Jun-Wei Hsieh, and I-Hau Yeh, CSPNet: A New Backbone That Can Enhance Learning Capability of CNN (2020) 390–391.
- [15] Retrieved from <https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1164a53>
- [16] Retrieved from <https://www.upgrad.com/blog/basic-cnn-architecture/>
- [17] Food dataset from <https://www.kaggle.com/moltean/fruits>
- [18] Food dataset from <https://www.kaggle.com/rahulbhalley/food-101>
- [19] Aqua-calc Food Volume to Weight Conversions. [Online]. <http://www.aqua-calc.com/page/density-table>
- [20] Actual calorie database [Online] <https://www.uncledavesenterprise.com/file/health/Food%20Calories%20List.pdf>

UGC - CARE enlisted Journal

ISSN 0972-1975

COLLEGE LIBRARIES

(A Peer Reviewed Quarterly Journal)



**West Bengal College Librarians' Association
(WBCLA)**

Vol. 36 No. I

March, 2021

COLLEGE LIBRARIES

(A Peer Reviewed Quarterly Journal)

ISSN : 0972-1975

Vol. 36 No. 1

March - 2021

Contents

Research Potential and Competitiveness of Indian Institutes of Technology : a Scientometric assessment - Amir Amanullah and Dr. Avijit Chakrabarti	03 - 14
Online LIS Education in the New Normal Maharashtra State - Mrs. Kadambari H Manjekar and Dr. Jyoti Bhabal	15 - 26
Marketing of Library Services and Evaluation of Service Utilization through Classification Method - S. Lakshmi S and Dr. L. Santhi	27 - 38
Content Analysis of Library Websites of State Aided Universities in Kolkata City, West Bengal : an evaluative study - Dr. Santosh Kumar Tunga	39 - 51
A Study on the Role of Indian Library Associations in the Scholarly Communication through Websites - Sonali Saha	52 - 65
Scientometric portrait of Stephen Hawking- the British physicist and cosmologist - Amit Kumar Das and Dr. Nivedita Bhattacharyya Sahu	66 - 82
Measuring Research Trends of Physical Education Department PhD Thesis Titles using Text Mining Technique - Dr. N. Ashok Kumar	83 - 94
Evaluation of Chemical Science Web Resources - Mr. Shreedhar S and Dr. B.S. Biradar	95 - 106



Online LIS Education in the New Normal Maharashtra State

Mrs. Kadambari H Manjrekar

Librarian

VPM's B. N. Bandodkar College of Science, Thane

Dr. Jyoti Bhabal

Asst Professor, SHPT School of Library Science,
SNDT Women's University, Mumbai

Abstract :

The study was conducted to examine the perspectives of LIS teachers regarding their preparedness for the online education learning system in Maharashtra. It focused on the resources, platforms, assessment methods used during online LIS education. Google Meet, Zoom, online quizzes, E-PGPathashala, E-Gyankosh, Shodhaganga, Google Classroom, Whatsapp, and E-mail helped to sustain the teaching during the lockdown. The study identified few gender differences. Few suggestions from the respondents on improvements in online education are also mentioned.

Keywords :

Learning Resources, LIS Education, New Normal, Online Learning, Online Learning Tools

1. Introduction :

Information technology has made a drastic change in every field. The teaching field is no exception to this. The chalk and talk method is the most popular method, but we need to adopt new learning methods in our teaching process with this new technology. Hybrid things have different impacts; thus, if we use multiple methods, it will be helpful for a teacher to interact more with the students.

Intelligent gadgets for different tasks like teaching, designing question papers, assessment of students, feedback, and research methodology are required. Innovative teaching and learning methodologies such as short

lectures, simulation, role-playing, and problem-based learning (PBL) are very useful in addressing the rapid technological advances and developing workplaces required in the foreseeable future (Naga Subramani and Iyappan, 2018). Higher education plays an integral part in every country existence as it provides highly trained experts for future growth and prosperity (Kannadhasan et al., 2020)

2. Literature review :

Mahalakshmi and Rangaswamy (2019) presented the overview of required skills, i.e., communication, technical, and domain skills. They discussed innovativeness in teaching methods such as Problem based teaching, simulation, role-play, project-based teaching (PBT), etc., in education. Farooq and Matteson (2016) pointed out the similarities and differences between traditional and online seminars. While developing the LIS curriculum, the skills of faculty members should also be developed. The Government should also take the initiative in providing funds for creating the infrastructure in LIS schools (Edegbo, 2011). Islam and Karim (2020) conducted a literature review to investigate research studies on the use of e-resources by students in developing countries. Literature found that e-resources are a time-demand material for all education institutions. Slow internet speed reported one of the obstacles to getting their required information.

Aslam et al. (2021) believed the positive side of online learning is an excellent opportunity to enhance skills and importance in self-development. Callo and Yazon (2020) studied Indian higher education during lockdown that found that lack of access to laptops or desktops was the main difficulty amongst a significant ratio of teachers and students to complete the teaching-learning task. They believed that the institution could take some measurement for the fundamental infrastructure problem. Oluonghae et al. (2021) conducted a study on technological development and self-efficacy. They depicted a substantial relationship between e-learning adoption and technological readiness, computer self-efficacy in Library and Information Science students in Nigeria. Most participants suffered from disturbances during online classes because of internet connectivity (Mohanani et al., 2020). Rafique et al. (2021) explored the significant differences in Online Learning Readiness (OLR) of students in Pakistan concerning students' readiness towards their computer, internet, and online communication self-efficacy and learning motivation depending on



the level of their program of study.

Rajkumar and Raju (2016) have explored the educational and pedagogical issues in blended learning to develop a framework for designing and implementing blended learning in the delivery of LIS curricula in South African universities. Islam et al. (2011) explored how EL tools and technologies support the LIS education process and measure the Weights of factors constraining the use of EL in LIS education. Wójcik (2016) observed that AR technology is a helpful teaching tool that enables students to achieve improved learning outcomes in the practical skills needed by librarians and the personal and social competencies relevant to labor market needs.

3. Need and significance of the study :

Due to the COVID-19 pandemic, there were restrictions on everyone in India as well as abroad. No one was prepared for this. After the declaration of lockdown in India, immediately after few days, it was directed by the officials to begin with online education. Many were aware of technology but had not used it 100%; however, all education sectors accepted the challenge happily, and online environment education started.

It was essential to find out How LIS teaching during Online Environment is taking place? Therefore, the present study will explore the preparedness of LIS teachers for online education.

4. Objectives :

1. To study different platforms used by LIS teachers for online education.
2. To find out the type of e-resources used by the LIS teachers.
3. To explore the assessment methods used during online LIS education.
4. To study the opinion of LIS teachers about the readiness at the university level for online teaching.

5. Scope, methodology and population :

Quantitative data was collected through the questionnaire using Google forms. This study covered the 10 Universities in Maharashtra (India) having full-time Library and Information Science Courses. From the University websites and earlier research, the researcher found the number of faculty members. Simple descriptive

Effect of Covid-19 on Features of Speech Signal

Mrs. Arundhati Niwatkar^{1*}, Dr. Y. K. Kanse^{2*}

1 Department of Electronics, Usha Mittal Institute of Technology, SNDTWU, Mumbai*

2 Department of Electronics, Karmaveer Bhaurao Patil, College of Engineering, Satara.*

Abstract: The current speaker acknowledgment framework has numerous issues. i.e., channel confounding, clamors, feelings, expressions, and so forth to fabricate a solid and vigorous speaker acknowledgment framework, it's vital for carry out the exact component extraction strategy. A first significant advance in speaker acknowledgment framework is including extraction from the discourse signal for that speaker. The speaker model can be fabricated utilizing these highlights, So that one can extricate right and helpful highlights. The customary technique for include extraction is MFCC. Covid-19 is an infection, which influences the human body, especially on chest, throat, vocal cords, and so on. The regular manifestations in this sickness are hacking, trouble in breathing, throat expanding and etc. So in this paper, we will examine the impact of Corona virus on MFCC features, to test the unwavering quality of MFCC.

Keywords: MFCC, Covid-19.

1. INTRODUCTION

The assignment of speaker acknowledgment is to decide the personality of a speaker. With the end goal for people to perceive voices, the voices should be natural comparatively for the instrument utilizing for it. For speaker recognizable proof there are two sections, one is training and other is testing. In training step. Preparing of the framework happens with various voices and in testing stage we will test every one of the voices with prepared voices. For that reason information must be made which is additionally called as data set for various voices.

Speaker recognition system has two major stages. First is feature extraction and second is to classify the speaker based upon different characteristics of speech of a speaker. Every speaker recognition system uses these features as the primary input to recognize the correct speaker. Voice of every human is unique and hence each speaker is having different speech features. We can take advantage of the nature's gift and we can use human voice as his unique identity in some applications. Many researches are going on but still some challenge problems are there who are attracting the researchers to do more study about the system. One of the challenges is effect of health on the speech features. In order to make a robust speaker recognition system, it's very important to use such features of speech, which cannot affect by health[1]. So in this paper, we are going to focus on effect of covid-19 on features of a speech signal. The reason to choose this disease is, Corona leads to the infection in lungs, and throat, vocal cords etc. means the organs which are used in sound production. Also we are going to study three features, MFCC, pitch and energy of the speech signal.

2. FEATURE EXTRACTION

A. MFCC processor

Speech contains 5 KHz energy frequency. The temporal characteristics of speech signal are mostly constant over a short period. In other words, they are stationary for short time period.

To convert time domain of speech signal into frequency domain, speech signal has to be divided into short time duration slots[2]. The model of MFCC represents human auditory system. The ear perception for frequencies of speech signal is not linear in scale, but it is compatible with log scale. For this comparative experiment, we have collected voice samples from people for two times. First when they were in healthy state, and secondly when they were suffering from corona. For this purpose, we have used different mediums, like telephone, voice message, some videos from social media, etc. MFCC processor has six main steps. Each step is as mentioned Below[9].

Divide speech signal into small frames

Instead of considering entire signal for the process, we can have some short time duration signals. Because for good results we cannot apply Fourier Transform to entire signal.

Windowing

Different types of windows are available. But here we are using Hanning window.

Discrete FT calculation

Output of this step is the power spectrum

Application of filter banks

Human ear is compatible with log scale and not linear scale, in this step we are going to use 20-40 triangular filters. Output of this step is spectrogram after applying filter.

Application of log scale

Output of this step is log energies from filterbank.

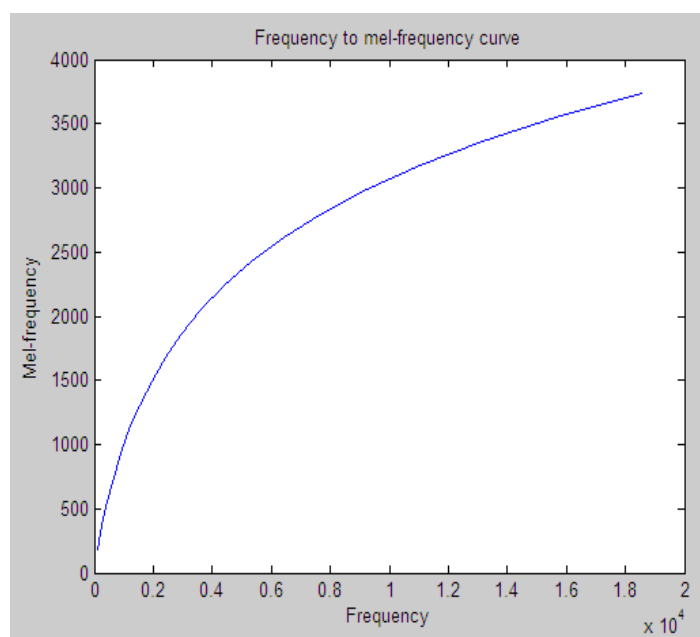


Figure 1. Frequency to Mel-frequency curve

Discrete cosine transform application

The coefficients of filterbank are highly correlated, therefore we are using DCT in this step.

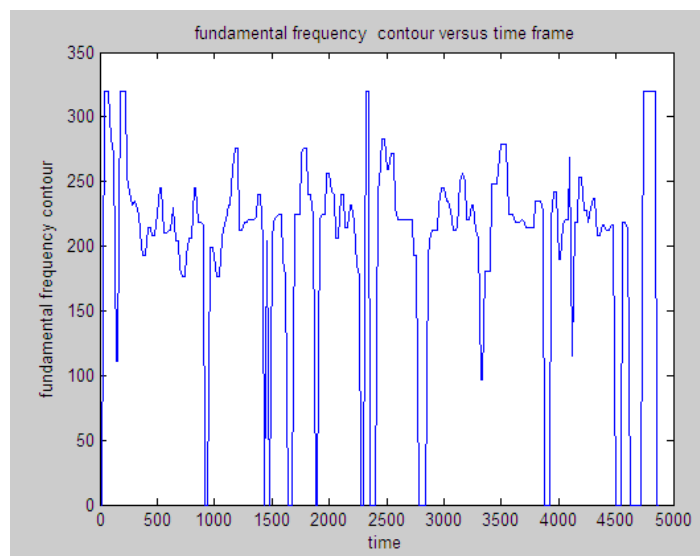
In order to compare MFCC coefficients of same person in two different conditions, healthy and unhealthy we extracted MFCC features in both the cases. We considered only first 13 MFCC coefficients. Then we applied Euclidean distance for comparison purpose. If it is zero, that means in healthy and unhealthy conditions MFCC does not change. Following are the results we got.

Table 1. MFCC comparison results

	Speaker 1 (healthy)	Speaker2 (healthy)	Speaker3 (healthy)	Speaker 4 (healthy)	Speaker 5 (healthy)
Speaker 1 (unhealthy)	E. Distace= 0.6143				
Speaker2 (unhealthy)		E. Distace= 0.7537			
Speaker 3 (unhealthy)			E. Distace= 1.0128		
Speaker 4 (unhealthy)				E. Distace= 0.4729	
Speaker 5 (unhealthy)					E. Distace= 0.6450

3. FUNDAMENTAL FREQUENCY

Fundamental Frequency of a speech is denoted by F_0 . In speech production process vocal cord plays very important role. When air pass through the vocal cord, it vibrates. And this rate of vibration of vocal cord is called as fundamental frequency. Every individual person has different fundamental frequency, depending on biological structure of the vocal cord. Generally its range is 100 to 400 Hz. Female has higher pitch than male. In this paper we are going to study effect of covid-19 on the fundamental frequency. Here we have calculated fundamental frequency using autocorrelation method.

**Figure 2. Fundamental Frequency contour versus time graph**

The comparison table for fundamental frequencies in healthy and unhealthy is given below

Table 1. Fundamental Frequency comparison

	Fundamental frequency in Hz (Healthy)	Fundamental frequency in Hz (unhealthy)
Speaker 1	228.2440	245.638
Speaker 2	164.837 ¹⁹⁰⁷	189.281
Speaker 3	267.826	287.251

Speaker 4	146.204	178.382
Speaker 5	236.718	278.521

4. RESULT ANALYSIS

According to speech production, human speech consists of voiced and unvoiced and silent patches. In this paper we have mainly focused on two features of human speech, MFCC coefficients and fundamental frequency. In first experiment we have compared MFCC coefficients of same speaker in healthy and unhealthy conditions. As covid -19 directly affects the respiratory system of human being, we found its effect on MFCC coefficients also. In second experiment, we have compared fundamental frequency of same speaker in healthy and unhealthy conditions. During corona infection , inflammation in throat has noticed. According to the fundamental frequency production mechanism, many oral organs play very important role, and as there is inflammation in organs during corona infection, hence it is reflecting in the readings. For the same speaker we are getting different readings.

5. CONCLUSION AND FUTURE SCOPE

MFCC coefficients and fundamental frequency are very important parameters of any speakers. MFCC coefficients play very important role in speaker recognition system. They can be used as features for a speaker. Similarly, each speaker has its own unique fundamental frequency. After studying the speech signal in two different conditions, healthy and unhealthy, it is observed that, MFCC coefficients and fundamental frequency of a person differs. In future one can study some other features of a speaker for comparison purpose.

REFERENCES

- [1] Tanu Singhal, "A Review of Coronavirus Disease-2019(COVID19)," *Indian J Pediatr.* 2020; 87(4): 281–286.
- [2] Piotr Staroniewicz, "Influence of Natural Voice Disguise Techniques on Automatic Speaker Recognition," in *2018 Joint Conference - Acoustics*, Sept 2018, IEEE.
- [3] Avots, E., Sapiński, T., Bachmann, M. and Kamińska, D., "Audiovisual emotion recognition in wild. *Machine Vision and Applications*," pp.1-11, 2018
- [4] Sandhya, M. and M.V. Prasad, *Biometric Template Protection: A Systematic Literature Review of Approaches and Modalities*, in *Biometric Security and Privacy*. 2017, Springer. p. 323-370.
- [5] Sreenivas Sremath Tirumala, Seyed Reza Shahamiri , Abhimanyu Singh Garhwal, Ruili Wang "Speaker identification features extraction methods: A systematic review," in *Expert Systems With Applications*, 2017, Elsevier.
- [6] Mahmoud I. Abdalla, Haitham M. Abobakr a Tamer S. Gaafar, "DWT and MFCCs based Feature Extraction Methods for Isolated Word Recognition," in *International Journal of Computer Applications*, vol.69, no.20, pp.21-26, May 2013.
- [7] Drygajlo, A. and R. Haraksim, *Biometric Evidence in Forensic Automatic Speaker Recognition*, in *Handbook of Biometrics for Forensic Science*. 2017, Springer. p. 221- 239.
- [8] Ruhi sarakaya ,bryan pellow and John Hansen, Wavelet packet transform features with application to speaker identification ,IEEE, June, 1998.

[9] Douglas A. Reynolds and Richard C. Rose, *Robust text-independent speaker identification using Gaussian mixture speaker models*. *Member, IEEE*, January, 1995.

[10] Herbert Gish and Michel Schmidt, *text-independent speaker recognition*, *IEEE signal processing magazine*, OCT 1994.

[11] Andras Zolnay, Ralf Schluter and Hermann, *acoustic features combination for robust speech recognition*., *member*

KNOWLEDGE, PROFICIENCY AND EXPERTISE REQUIRED BY SMART LIBRARIANS IN THE DIGITAL ERA

Sarika Sawant

Sarala Yadav

Dr. Sarika Sawant

Assistant Professor

SHPT School of Library Science

SNDT Women's University,

Mumbai - 400 020,

MAHARASHTRA

Email: sarikashpt@gmail.com

Corresponding Author

Ms. Sarala Yadav

Librarian

Oxford International School,

Thakur village, Kandivali East,

Mumbai - 400101,

MAHARASHTRA

Email:

saralayadav8425@gmail.com

Adoption of Information and Communication Technology (ICT), in libraries have helped librarians in administration and in serving the end users. The technology is changing everyday at faster speed which is creating a burden to librarians to adopt new technology and function accordingly. The aim of the present research is to study knowledge, proficiency and expertise required by practicing librarians in the digital era. Survey research method was employed and structured questionnaire as a data collection tool. The sample consisted of library professionals (not semi and non library professionals) of South Mumbai Region only. The study found that along with traditional knowledge, LIS professional need to develop their IT skills too. It was observed that the drastic changes in the field of ICT are creating pressure on library in general and LIS professionals in particular to adopt the latest techniques and practices in digital age. For this purpose academic librarians need to attend the different types of professional training Programmes such as workshops, conferences, demonstrations, online trainings etc. to develop and learn new technologies effectively and efficiently work in the digital library environment. For a successful professional career in the digital library environment, it is utmost important that the upcoming generation of LIS professionals should have high knowledge of ICT technologies such as database development and management systems, networking, cloud computing, file management, discovery services, which are most essential in today's context.

Keywords: Academic libraries, India, Information and Communication Technology, Knowledge, Knowledge and Skills, LIS professionals, Skills

INTRODUCTION

Due to the emergence of Information and Communication Technology (ICT), libraries are the ones who have observed a strong positive effect by implementing in house technologies and as well as adopting technology in serving users. The highly appreciated ICT has a darker side as everyday technology is changing at a faster speed which is creating a burden to librarians to adopt new change and function accordingly. To face these challenges libraries need to focus on to upgrade and enhance LIS professional's knowledge and skills (Wright, 2014). The present study is

an attempt to find out the knowledge and proficiency required by practicing/professional librarians to work with full efficiency in a digital era. As in the fast-moving technology-driven society, librarians need to keep pace with it and the study will uncover the facts about their general perception regarding the need for digital education/training to be incorporated likely in their library routine.

Skills and Knowledge required for LIS professionals in digital era are classified as Personal skills, Generic skills, General IT skills and Technical skills. Personal skills especially personal attributes as being important in Library and Information Science (LIS) work environment, the capacity for continuous learning, flexibility, fostering change and the capacity to work independently, enthusiasm, and self-motivation. Generic skills refer to life skills such as communication and interpersonal skills, critical thinking, problem solving and teamwork which allow individuals to function not only in disciplinary or subject domains but also in employment and social situations (Orme, 2008).

General ICT skills are crucial in operating the computers in the libraries and overall housekeeping activities such as file management, web navigation, software installation, photocopy & printer handling, online searching and retrieval, etc. Technical Skills in the digital environment includes developing digital content, its organisation, preservation by various means such as adopting Metadata schemas, get exposed to web-crawlers so that it is discoverable through the Internet. These IT skills have become the integral or core identity of librarians. Librarians should have strong knowledge of Integrated

Library Systems (ILS), ins and outs of their system, Web technology, Electronic resources management, Web page development and its updation, Discovery services, Institutional repository development, Open accessible learning resources etc. (Raju, 2014). Even librarians need to know learning management software so that it can be utilized by them to provide information literacy Programmess, support reading materials or resources, etc.

REVIEW OF LITERATURE

There were numerous articles that discussed key skills and competencies of a new generation of LIS professionals (Calarco et al. 2016; Choi and Rasmussen, 2009; Howard, 2009; Marcum, 2016; Myburgh, 2005; Nonthacumjane, 2011; Sarasvathy, Nambratha and Giddaiah, 2012; Sreenivasulu, 2000; Tennant, 1999). Canadian Association of Research Libraries (CARL, 2010) prepared a complete guideline in a form of competencies profile intended as a guide to help librarians working in CARL libraries manage their careers, set meaningful professional development goals and align those goals with the missions of their respective organizations. Library professional can do actual SWOT (Strength Weakness Opportunities and Threats) analysis of their own to identify the strengths to enrich and enhance, weaknesses to overcome and opportunities of new learning and surpass threats with knowledge.

In the case of research studies, one of the important studies by Raju (2014) reported a preliminary study that was part of a wider study. The study was about practicing librarians to develop a frame, a guideline covering a varied

set of skills required to work efficiently in today's environment in South Africa. This can be used by freshers as well as those who are established very well in the profession to identify the need and depth of further skills acquisition. Johnston and Williams (2015) investigated and documented the skills and knowledge needs of future library professionals in Qatar and to upgrade course curricula that meet the needs of the local workforce and also guide or improve national or local professional development Programmes. It was reported that participants of the study felt that there was a lack of opportunities for professional development in Qatar and that the most essential area of skills training was information literacy, awareness about copyright laws and training and technical skills including RDA and Arabic cataloging.

Seena and Pillai (2014) investigated the awareness skills and attitude towards ICT among library professionals in Kerala University Library, India. It was revealed that their library professionals possess moderately average level skills in various ICT related activities that are performed in libraries. Pillai (2016) covered the skills required by the librarian in teacher training colleges in Mumbai city of India. The author pointed out that trainee teacher's information needs are high and more accurate as compared to other general academic users. The author claimed that it is of utmost importance for librarian to have essential skills such as web designing, blogging skills, knowledge of open source software, research skills, etc. Sawant and Manchekar (2019) in their study of personal information management highlighted the importance of ICT

skills, Web 2.0 skills, and technical skills for librarians while pursuing Phd. Ezeani (2011) discussed that it is a responsibility of the librarian to acquire Internet skills or web 2.0 skills including social media. Librarians should use the Internet effectively to deliver information or reference services to the users. The author examined that newcomers in the LIS profession are more interested to learn & adopt upcoming IT skills as compared to old-fashioned librarians. Therefore, the author suggested that every staff member of the library no matter what position they are in should take part in learning IT skills. By organizing in-house training, attending conferences/seminars, workshops to learn new skills and achieve higher goals in the profession, etc.

RESEARCH DESIGN

The objectives of the present study are

- To find out knowledge and proficiency and skills required by practicing/professional librarians to work with full efficiency in a digital era.
- To the the general perception regarding the need for digital education/training to be included in the LIS courses.

This study covers only professionals (not semi and non-library professionals) of the western suburb Mumbai part of Mumbai city. The survey research method was employed and structured questionnaire as a data collection tool. It was consisted of 27 questions and developed in Google form. The cluster sample method was used to select the sample considering a western suburb Mumbai part of Mumbai city. There were approximately 70 granted and non granted

colleges chosen from the western suburb Mumbai based on the convenience of the authors. About 51 participants filled up the questionnaire that makes 73 % of the response rate.

ANALYSIS AND FINDINGS OF THE STUDY

Personal Information

About 42 (82%) respondents were holding a permanent position, while 9 (18%) were working on a contract basis but full time (Table 1). It was observed that 20 (39%) of the respondents fall in the age group of 31-40 years and an equal number of respondents fall under the 41-50 age group. Only 6 (12%) respondents were belonging to up to 30 age groups; 5(10%) respondents were falling under the 51-60 age group (Table 2). It was observed that majority of the female respondents, i.e. 36 (72%) responded to the questionnaire (Table 3). It was observed that more than half of the respondents 30 (60%) had M.L.I.Sc. degree. Few of them had PhD degree, i.e. 9 (18%) even 8 (16%) had done MPhil in Library & Information Science (Table 4). Nearly half of the respondents 24 (47%) had the experience of 6-15 years followed by 15 (29%) 16-25 years of experience, 8 (16%) have 1-5 years and lowest i.e. 4 (8%) had the experience of 25 years and above (Table 5).

Table 1: Job status

Sl. No.	Job status	No. of respondents	Percentage (%)
1	Parmanent	42	82
2	Part time on contract basis	0	0
3	Full time on contract basis	9	18

Table 2: Age group

Sl. No.	Age group	No. of respondents	Percentage (%)
1	21-30	6	12
2	31-40	20	39
3	41-50	20	39
4	51-60	5	10

Table 3: Gender

Sl. No.	Gender	No. of respondents	Percentage (%)
1	Male	15	28
2	Female	36	72

Table 4: Qualification

Sl. No	Qualification	No. of respondents	Percentage (%)
1	BLISc	3	6
2	MLISc	30	60
3	MPhil	8	16
4	PhD	9	18

Table 5: Experience

Sl. No.	Experience	No. of respondents	Percentage (%)
1	1-5	8	16
2	6-15	24	47
3	16-25	15	29
4	25 and above	4	8

Knowledge and skills of the respondents

Professional development training Programmes, types of the Programmes attended and its effect on their job performance

The question was asked about the participation of respondents in the professional development training programmes in the last two

Table 6: Professional development Programmes attended by the respondents

Sl. No.	Professional Development Programmes	No. of respondents	Percentage (%)
1	Workshop	30	58.82
2	Training	44	88
3	Seminar	16	31.37
4	Lecture	10	19.16
5	Conference	14	27.45
6	Demonstration	3	5.88
7	Video Presentation	1	1.96
8	Webinar	1	1.96
9	Online course	6	11.76

years. It was examined that 44 (88%) respondents had attended the professional development training Programmess, followed by 30 respondents (58.82%) who attended the workshops. The data is shown in table 6.

Gained Skills and Knowledge

About 20 (39%) of the respondents reported that their performance got improved, whereas 15 (29%) have mentioned that their performance got greatly improved; whereas, 5 (10%) of the respondents mentioned that had little effect of training/seminar/conference Programmes on their performance. About 11 (22%) said that Programmess somewhat improved their performance. Further, the respondents were asked about the other ways of updating their knowledge apart from the seminar /conference, it was observed that most of the LIS professionals gained the skills and knowledge 'On the Job' (43, 84.31%), while the lowest response was received to the 'Professional association activities' (19, 37.25%). The data is given in figure 1.

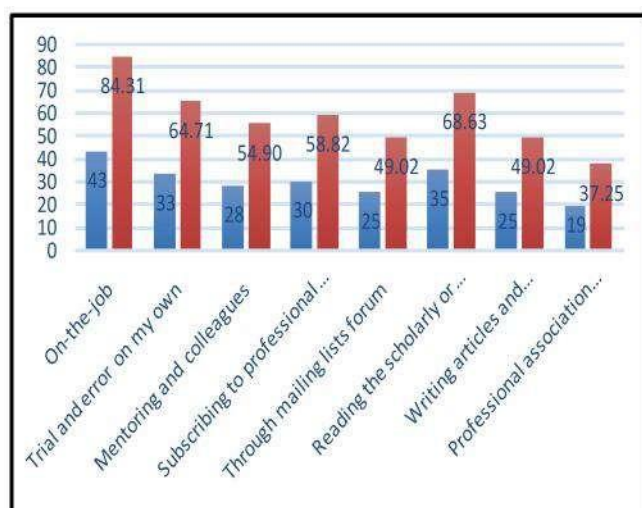


Figure 1: Gained skills and knowledge

It was noted that 29 (57 %) respondents felt that it is very important to attend professional development training for them to develop library skills and knowledge. About 8 % respondents felt that it was somewhat important to them. When respondents were asked about how well their need for knowledge and skills development is being met by attending training, about 31 (61%) felt that there need is met by attending such Programmess whereas 3 (6%) respondents said no, about 17 (33%) of the respondents said sometimes there need is met by attending such Programmess.

Training opportunities available to the professionals

It was important to ask the respondents about how satisfied they are with the training opportunities currently available to them. It was observed that 22 (43.14%) respondents were satisfied whereas more or less the number of respondents i.e. 21 (41.18%) respondents were sometimes satisfied and 8 (15.69%) were not at all satisfied (Table 7). In continuation of this, the respondents were asked about the reasons of non-satisfaction. It was observed that support from parent organization and duration of the Programmess found to be the most reasons for their non-satisfaction with the current opportunities of professional training available to them. The data is presented in table 8.

Table 7: Level of Satisfaction with the training opportunities

Sl. No.	Level of Satisfaction	No. of respondents	Percentage (%)
1	Yes	22	43.14
2	Sometimes	21	41.18
3	No	8	15.69

Table 8: Reasons for non-satisfaction

Sl. No.	Reasons	No	%
1	Very few Programmess related to my areas of concern are available to me	1	1.96
2	Lack of expertise	1	1.96
3	Duration of Programmes	5	9.80
4	Timings of the Programmes	3	5.88
5	Programmess available in other cities	4	7.84
6	Support from parent organization	5	9.80

Level of knowledge and skills: Personal Skills

There were a series of questions asked for the respondents about the skills that they possess. It was observed that on an average half of the participants of the study felt that they possess good personal skills (Table 9) generic skills (Table 10) and IT skills (Table 11). In the case of personal skills, flexibility (65%) is important as librarians are multitasking, they need to adapt themselves to the situation and act accordingly. For example, if there is an error in data entry, data back up

procedure then immediately need to solve by going through manuals or inquiring with respective personnel. Librarians need to be reflective (61%) in nature in cases like delivering reference services, directing users to the right resources, giving opinion in case of reference query raised by research scholars, so their personal skills play an important role in operating library functions smoothly to deliver the best services to the users. Analytical skills (61%) are useful especially in the case of classification of books and creativity (61%) is reflected in case of reference services such as making banners/flyers for the library, book display, signages used in the library which needs a lot of creativity and understanding of library users and their taste, which again can be reflected from choosing the right film screening for students in the library. The data is presented in Table 9.

Table 9: Personal skills

Sl. No.	Personal skills	Poor	%	Average	%	Good	%	Excellent	%
1	Analytical skills	3	5.88	13	25.49	31	60.78	4	7.84
2	Creative (power to create)	0	0.00	11	21.57	31	60.78	9	17.65
3	Flexible	0	0.00	10	19.61	33	64.71	8	15.69
4	Reflective	0	0.00	18	35.29	31	60.78	2	3.92
5	Can handle varied users	0	0.00	6	11.76	26	50.98	19	37.25
6	Adaptable	0	0.00	9	17.65	30	58.82	12	23.53
7	Proactive	0	0.00	12	23.53	23	45.10	16	31.37
8	Responsive to others' such as colleague, users,	0	0.00	5	9.80	26	50.98	20	39.22
9	Keen	0	0.00	9	17.65	26	50.98	16	31.37
10	Self -motivated	0	0.00	9	17.65	22	43.14	20	39.22
11	Marketing skills	3	5.88	15	29.41	29	56.86	4	7.84
12	Professional networking skills	1	1.96	17	33.33	27	52.94	6	11.76

Level of Knowledge and Skills: Generic Skills

In case of generic skills project management and presentation skills are particularly important and rated high (59%) by respondents as the library is service oriented and librarian need to converse with right from higher authorities to wide range of users, their presentation skills are tested in library committee and even with novice users coming to the library. As rightly said that librarian is teacher of teachers, their teaching and training skills are required especially in the library orientation Programmes where, with his / her skills, teaching aids, resources and technology they need to make novice user a life long reader. Personal and online Communication skills (55%) are useful and has become the intergral part of librarianship as the technology is advancing in

automating library to discovery services, asynchronous to real time communication is must. The data is presented in Table 10.

Level of Knowledge and Skills: IT Skills

In the case of IT skills, awareness of database concept was scored more (59%). Bibliographic, citation and full-text databases are subscribed by the libraries, so the general concept of database along with searching skills (51%) is a necessity. This is particularly important in the case of teaching database searching effectively to the users in advanced orientation Programmess. The respondents also agreed that word processing skills which are the utmost required in report writing in the library has become an important skill, the features of word such as tables, review, references widely used by them. In the case of

Table 10: Generic Skills

Sl. No.	Generic skills	Poor	%	Average	%	Good	%	Excellent	%
1	Personal and online Communication skills	0	0.00	10	19.61	28	54.90	13	25.49
2	Ethical standards and social responsibility ("an awareness of the need for and commitment to the maintenance of high professional standards and social justice.")	2	3.92	15	29.41	25	49.02	10	19.61
3	Project management and presentation skills	1	1.96	12	23.53	30	58.82	8	15.69
4	Critical thinking	1	1.96	12	23.53	29	56.86	9	17.65
5	Teamwork	0	0.00	4	7.84	26	50.98	21	41.18
6	Problem solving	1	1.96	7	13.73	29	56.86	14	27.45
7	Leadership	0	0.00	7	13.73	28	54.90	16	31.37
8	Building strategic partnerships/relationships	0	0.00	18	35.29	27	52.94	6	11.76
9	Research skills	0	0.00	15	29.41	26	50.98	6	11.76
10	Teaching and training skills	0	0.00	11	21.57	29	56.86	11	21.57
11	Negotiation skills	2	3.92	12	23.53	26	50.98	11	21.57

electronic presentation skills, making a good presentation, effectively present in front of higher authorities, and the library users using a projector

or via remote desktop has become a routine library culture. The data is presented in Table 11.

Table 11: IT Skills

Sl. No.	IT skills	Poor	%	Average	%	Good	%	Excellent	Percentage %
1	Word Processing Skills	0	0.00	15	29.41	26	50.98	19	37.25
2	Spreadsheets Skills	1	1.96	14	27.45	24	47.06	12	23.53
3	Awareness about Database concept	1	1.96	11	21.57	30	58.82	9	17.65
4	Electronic Presentation Skills	2	3.92	13	25.49	25	49.02	11	21.57
5	Web Navigation Skills	4	7.84	14	27.45	22	43.14	11	21.57
6	Web Site Design Skills/ Web publishing skills	14	27.45	14	27.45	18	35.29	5	9.80
7	E-Mail Management Skills	2	3.92	11	21.57	20	39.22	18	35.29
8	Digital Cameras / CCTV cameras	9	17.65	15	29.41	22	43.14	5	9.80
9	Computer Network Knowledge Applicable	7	13.73	11	21.57	24	47.06	9	17.65
10	File Management & Windows Explorer Skills	3	5.88	13	25.49	20	39.22	15	29.41
11	Downloading Software From the Web	6	11.76	13	25.49	21	41.18	11	21.57
12	Installing Computer Software on to a Computer System	10	19.61	12	23.53	20	39.22	9	17.65
13	Blackboard Teaching Skills	9	17.65	15	29.41	24	47.06	3	5.88
14	Video conferencing skills	13	25.49	19	37.25	18	35.29	1	1.96
15	Computer-Related Storage Devices (Knowledge: CDs, USB drives, DVDs)	5	9.80	7	13.73	26	50.98	13	25.49
16	Scanner Knowledge	4	7.84	11	21.57	23	45.10	13	25.49
17	Knowledge of PDAs	9	17.65	16	31.37	20	39.22	6	11.76
18	Deep Web Knowledge	11	21.57	15	29.41	20	39.22	5	9.80
19	Web 2.0 skills	8	15.69	14	27.45	21	41.18	8	15.69
20	Computer Security Knowledge	9	17.65	16	31.37	19	37.25	7	13.73
21	Photocopying and printer handling skills	5	9.80	12	23.53	24	47.06	10	19.61
22	Online searching & Information retrieval	3	5.88	3	5.88	26	50.98	19	37.25

Level of Knowledge and Skills: Technical skills

It was observed that almost half of the respondents felt that they possess average

technical skills except for few cases they rated as good. The respondents felt that they possess good skills in the area of eBooks acquisition, maintenance and content management system

(53%) which is a good sign that the change in library operation is imbibed by the respondents. This was followed by advanced web technologies (50%) as the World Wide Web and its underlying technologies are increasingly gaining importance for the development of interactive web applications which are becoming crucial for librarians. Even the educational copyright knowledge is utmost important aspect

(48%), while delivering the services, scanning the full-text documents, and uploading documents on the website which may create problem for librarians. Acquisition, licensing, or creation of information using different digital media and formats is gaining momentum and in the present study found that respondents felt that they possess average skills in this context which means they need to be given good training to acquire required

Table 12: Technical Skills

Sl. No.	Technical skills	1 Poor	%	2 Average	%	3 Good	%	4 Excellent	%
1	Advance database management	12	23.53	13	25.49	22	43.14	4	7.84
2	Advance web technology	9	17.65	15	29.41	25	49.02	2	3.92
3	Content management system	8	15.69	14	27.45	27	52.94	2	3.92
4	Data interoperability/ federated search	9	17.65	17	33.33	24	47.06	1	1.96
5	Development of web applications	12	23.53	22	43.14	16	31.37	1	1.96
6	Digital library technology/ software e.g.DSpace	11	21.57	21	41.18	16	31.37	3	5.88
7	Encoded archival description	13	25.49	26	50.98	12	23.53	0	0.00
8	Information architecture for the web to determine the structure, design and flows of information	13	25.49	25	49.02	13	25.49	0	0.00
9	Information visualization	9	17.65	23	45.10	18	35.29	1	1.96
10	Web Programmes	17	33.33	22	43.14	11	21.57	1	1.96
11	Mobile application development	17	33.33	23	45.10	9	17.65	2	3.92
12	Educational Copyright Knowledge	10	19.61	15	29.41	24	47.06	2	3.92
13	Web archiving	12	23.53	19	37.25	19	37.25	1	1.96
14	Digital preservation & access	9	17.65	17	33.33	21	41.18	4	7.84
15	Licensing regarding databases	12	23.53	18	35.29	18	35.29	3	5.88
16	eBooks acquisition and maintenance	6	11.76	14	27.45	27	52.94	4	7.84
17	Acquisition, licensing or creation of information using different digital media and formats	7	13.73	24	47.06	17	33.33	3	5.88
18	Metadata creation and management skills	13	25.49	24	47.06	11	21.57	3	5.88
19	Augmented reality and RFID technology	14	27.45	22	43.14	14	27.45	1	1.96
20	3D printers & maker spaces	20	39.22	24	47.06	7	13.73	0	0.00

skills. It has become a necessity for librarians to create library guides, FAQs, and information literacy /library orientation videos and upload them on the website as it may serve all users which is very common in foreign university libraries. Again evident from the respondents that they possess average skills in case of Metadata creation, Information architecture which need to be addressed by developing special courses/ training Programmess for them by the leading professionals in the LIS field. The data is shown in table 12.

IT Skills needed at the time of employing professional staff

The same questions about Personal, Generic, IT, Technical skills were asked to the respondents that what were their expectations about these skills when they want to employ professional

(entry-level position) staff in their library, which of these qualities should they possess. It was observed that at the time of employing professional (entry level position) staff in the library, almost all personal (Table 3) & generic skills (Table 4) were necessary. In case of IT skills, it was noted that respondents were highly expected from new employees about photocopying and printer handling skills (45, 88.24%), scanner knowledge (42, 82.35), word processing skills (38, 74.51) online searching and information retrieval skills (38, 74.51). Whereas, Deep Web Knowledge (10, 19.61%), Video conferencing skills (15, 21.41%), Blackboard Teaching Skills (19, 3.25%), File Management & Windows Explorer Skills (19, 3.25%) were least expected from the respondents. The data is presented in figure 2.

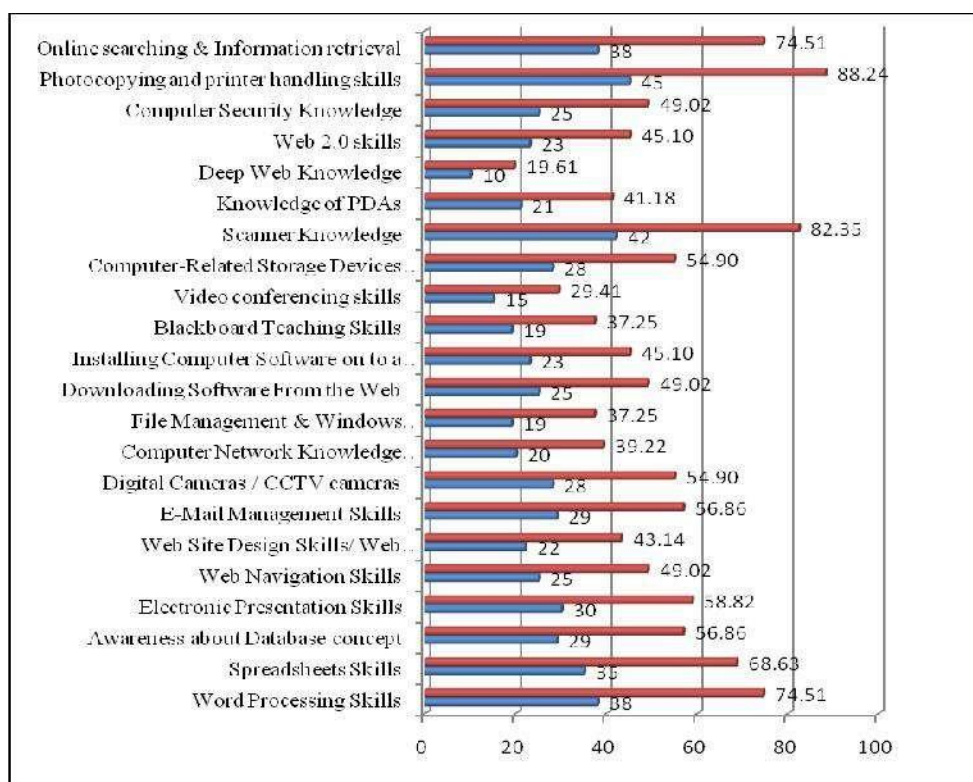


Figure 2: IT Skills needed at the time of employing professional staff

Technical Skills needed at the time of employing professional staff

It was noted that technical skills needed at the time of employing professional staff were i.e. 35 (68.63%) have Educational Copyright Knowledge, 32 (62.75) Digital preservation & access, and 30 (58.52) respondents said that web

archiving, Augmented reality and RFID technology and Licensing regarding databases should be necessary. 10 (19.61%) respondents mentioned that knowledge of Content management system and 3D printers & maker spaces were necessary as it is not common in India till today. The data is presented in figure 3.

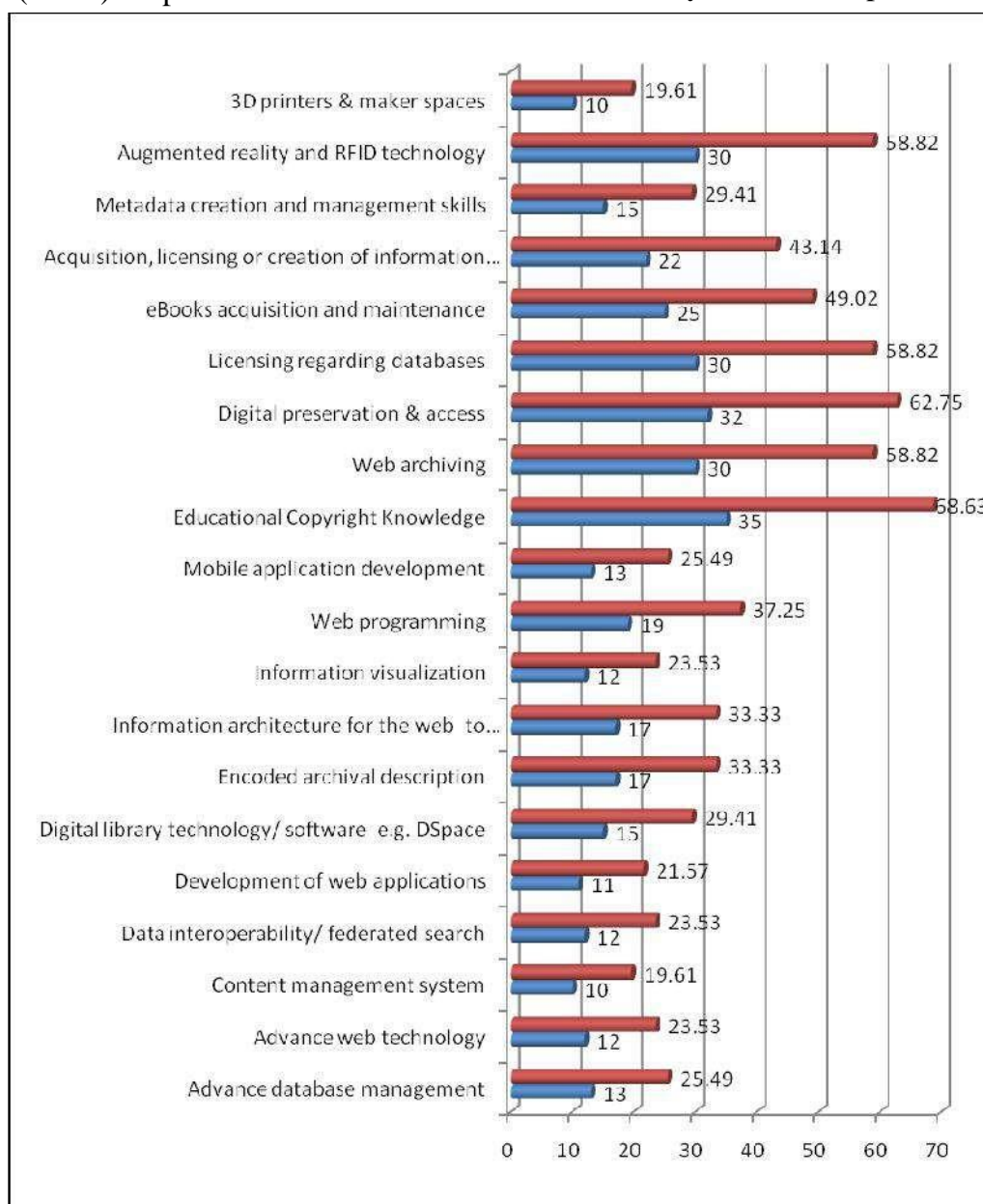


Figure 3: Technical Skills needed at the time of employing professional staff

Essential qualities for Library Administrator

The respondents were asked about the qualities that are required as a library administrator. Out of the listed qualities, most of

the respondents gave importance to the qualities i.e. Communication, vision & creativity, whereas, minimum importance was given to the integrity and supervising staff. The data is presented in figure 4.

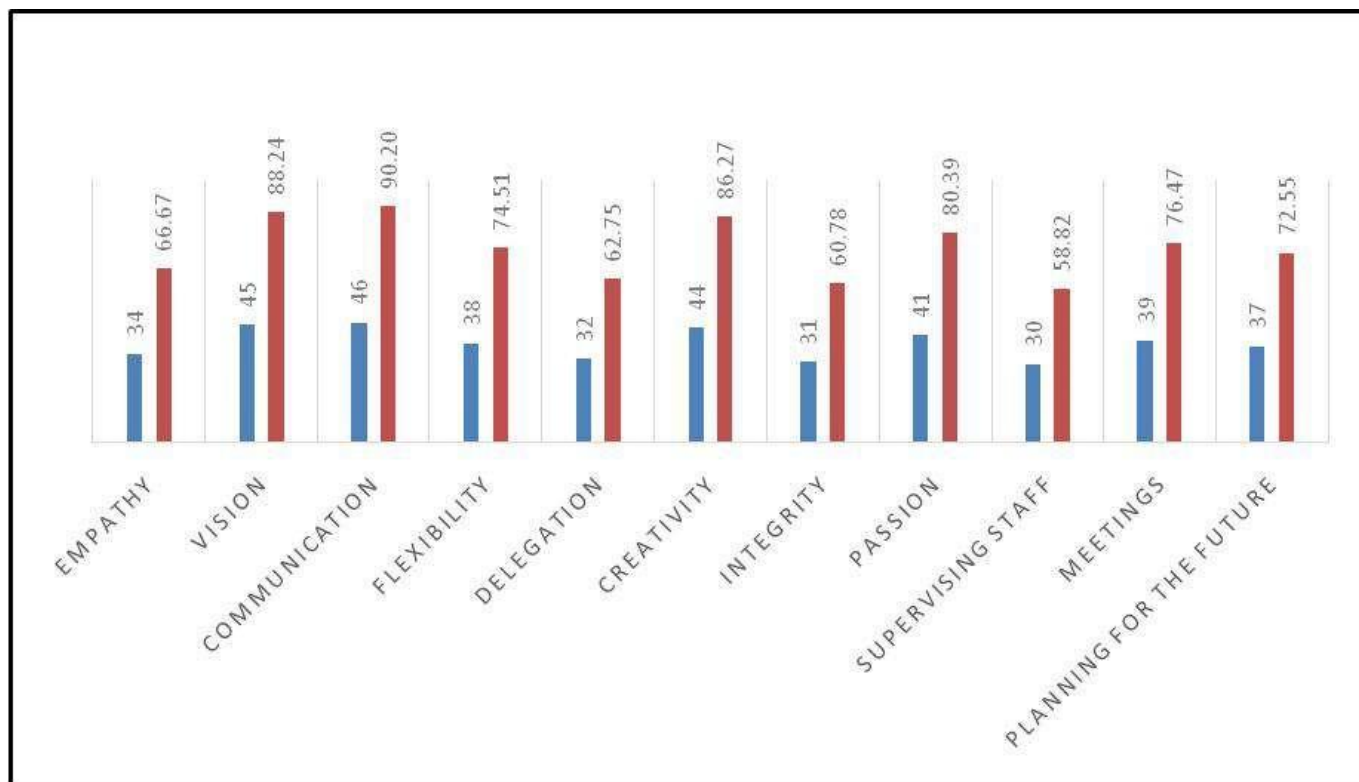


Figure 4: Required Qualities

Revision of LIS curricula as per changing needs in this digital era

All the respondents unanimously agreed that to become a successful librarian in the digital era library schools should revise curricula as per the changing needs and should produce productive and well-skilled students.

Opinion regarding specialized courses, LIS course and its future

The respondents were asked about their opinion regarding the collaboration between library schools with other departments such as computer science to come

out with new degree/discipline so that students will become successful librarian in digital era. It was noted that nearly all respondents felt that library schools should collaborate with other department such as computer science to come out with new collaborative courses to sustain in the future.

The respondents were asked to give their opinion regarding specialized courses offered by LIS schools, such as knowledge or records management / Web archiving in collaboration / partnership with working librarians. It was observed that 35 (69%) respondents

agreed that LIS Schools should offer specialized courses in collaboration with workingskilled librarians. Whereas, 15 (29%) respondents said that LIS Schools should independently offer specialized courses.

When asked about the expectations from LIS schools about the changes that are happening in the profession. The respondents expressed varied expectations concerning decline of enrollment, restricted job opportunities, personality development as part of syllabus, timely syllabus revision with more technical and IT skills based syllabus, rigorous training /practicals, campus recruitments, MOOCs development by LIS schools etc.

DISCUSSION AND CONCLUSION

Overall, it was noticed that academic librarians attend different types of professional development training Programmes. It is recommended that fully focussed training Programmes should be organised considering the level of professionals such as for beginners and mid-career as the beginners level professionals' needs are different than mid-career professionals. It can also be recommended for beginners to take the MOOCs by SWAYAM (Example: Emerging Trends & Technologies in Library & Information Services (ETTLIS)) as they can help LIS professionals to enhance professional competency and skills. There are few courses available on SWAYAM for librarians to update their knowledge and skills. The complete list is available on swayam.gov.in.

It was noted from the present study that apart from the professional development training Programmes, LIS professionals also gained knowledge and skills from 'On the job', subscribing 'Scholarly journal articles', 'Trial and error on their own', etc. It can be recommended for professionals to develop

and capture their own talent in the form of small videos that they can prepare with the help of online video or screen capturing apps and should upload on YouTube to make it available for others. It will certainly help budding professionals to find solutions to their problems or can be served as guidance. Some of the respondents were not satisfied with the training Programmes because of some reasons such as Lack of expertise, Duration of Programmes, Timings of the Programmes, Programmes available in other cities, Support from the parent organization. They think that very few Programmes related to their areas of concern are available to them. In this scenario, a pool of experts should be identified at the national and international level that can guide the professionals struggling to find solutions for their problems. For example, there are plenty of mailing list forums to circulate the query generated but very few give solutions. This particular suggestion should be taken up by library associations to work on developing experts zonal wise and skills-wise.

It was observed that respondents felt that library schools should collaborate with other departments such as computer science to come out with new courses for the future needs of librarians or library schools should offer specialized courses, allied areas to the library science such as knowledge or records management / Web archiving / Personal librarianship / Media librarianship / Library entrepreneurship by collaborating with workingskilled librarians. A very successful attempt is by Prof. Shalini Urs who founded ISiM (International School of Information Management) - the first Information School in India at the University of Mysore with the global funding and collaboration. So such strong initiatives should be taken up by current LIS leaders to start a new branch of library science and evolve further.

It was revealed that the respondents felt that those qualities that they possess i.e personal, generic, IT skills

they expect approximately the same qualities from staff which will likely join. But in case of the IT skills, their expectations from new incoming staff is very basic, for example, they expect new staff should possess scanning and photocopying, online searching and word processing skills. In the case of technical skills copyright and licensing, augmented reality and RFID technology skills were highly expected in case of fresh recruitment. As more e-resources and databases are subscribed by the libraries more knowledge of licensing is required infused with their negotiation skills. Again associated with this, knowledge of digital preservation is expected as day by day libraries will more focus on acquiring e-resources that beneath the long term maintenance and access.

REFERENCES

1. Calarco, P. et al. (2016). Time to Adopt: Librarians' New Skills and Competency Profiles. F. Loizides & B. Schmidt (Eds.). Positioning and Power in Academic Publishing: Players, Agents and Agendas. IOS Press, (2016). Retrieved January 12, 2020, from <https://scholar.uwindsor.ca/leddylibrarypub/42>
2. Canadian Association of Research Libraries (CARL). Core competencies for 21st Century CARL librarians, (2010). Retrieved January 12, 2020, from https://www.carl-abrc.ca/doc/core_comp_profile-e.pdf
3. Choi, Y., & Rasmussen, E. (2009). What Qualifications and Skills are Important for Digital Librarian Positions in Academic Libraries? A Job Advertisement Analysis. *Journal of Academic Librarianship*, 35(5), 457-467. doi:10.1016/j.acalib.2009.06.003
4. Ezeani, C. N. (2011). Network Literacy Skills of Academic Librarians for Effective Services Delivery: The Case of University of Nigeria Library System. *Library Philosophy and Practice (e-journal)*. Paper 648. Retrieved January 12, 2020, from <http://digitalcommons.unl.edu/libphilprac/64>.
5. Howard, K. (2009). (Digital Library) Education or (Digital) Library Education? An Australian Perspective. [Unpublished Master's thesis] Oslo University College, Tallinn University & University of Parma. Retrieved January 12, 2020, from http://e-ait.tlulib.ee/274/1/katherine_howard_mag.pdf
6. Johnston, N., & Williams, R. (2015). Skills and knowledge needs assessment of current and future library professionals in the state of Qatar, *Library Management*, 36(1/2), 86-98. Retrieved January 12, 2020, from <https://doi.org/10.1108/LM-10-2014-0120>
7. Marcum, D. (2016). Library Leadership for the Digital Age. Retrieved January 12, 2020, from <https://doi.org/10.18665/sr.277583>
8. Myburgh, S. (2005). *The New information Professional: How to thrive in the information age doing what you love*. Chandos.
9. Nonthacumjane, P. (2011). Key skills and competencies of a new generation of LIS professionals. *IFLA Journal*, 37(4), 280-288.
10. Orme, V. (2008). A study of job advertisements to determine employers' requirements for LIS professionals in the UK in 2007. *Library Review*, 57 8(), 619-633.
11. Pillai, P. (2016). Overview of the skills sets needed to become a librarian in teacher training college. *Proceedings of National Conference on Libraries in the changing information marketplace*. Bharatratna Maharshi Karve Library & SHPT School of Library Science, SNDT Women's University, 24-26 February 2016, p. 199-201.
12. Raju, J. (2014). Knowledge and skills for the digital era academic library. *The Journal of Academic Librarianship*, 40(2), 163-170. <https://doi.org/10.1016/j.acalib.2014.02.007>

13. Sarasvathy, P., Nambratha G.R., & Giddaiah, D. (2012). Changing Roles of The Librarians in the Virtual/Digital Era. *SRELS Journal of Information Management* 49(5), 495-500.
14. Sawant, S. S., & Manchekar, B. (2019). Personal Information Management by Ph.D. Scholars of Library and Information Science in India. *Library Philosophy and Practice (e-journal)*. 2927. Retrieved January 12, 2020, from <https://digitalcommons.unl.edu/libphilprac/2927>
15. Seena, S. T., & Pillai, K. G. (2014). A study of ICT skills among library professionals in the Kerala University Library System. *Annals of Library and Information Studies* 61, 132-141. Retrieved January 12, 2020, from <http://nopr.niscair.res.in/bitstream/123456789/29034/4/ALIS%2061%282%29%20132-141.pdf>
16. Sreenivasulu, V. (2000). The role of a digital librarian in the management of digital information systems (DIS). *The Electronic Library*, 18(1), 12-20. 10.1108/02640470010320380
17. Tennant, R. (1999). Digital libraries: Skills for the new millennium. *Library Journal*, 124 (1), 39.
18. Wright, J. (2014). Academic Libraries in the Digital Age: Best Practices For Modernizing The Library, *The Online Journal of Distance Education and e-Learning*, 2(2). Retrieved January 12, 2020, from <https://www.tojdel.net/journals/tojdel/articles/v02i02/v02i02-01.pdf>





Use of E-books among the Users of the Engineering Colleges of Mumbai

Ms. Sandhya B. Pagare

Librarian

CCYM's Hashu Advani College of Special Education, Mumbai
and

Dr. Sarika Sawant

Asst. Prof. SHPT School of Library Science, SNDT Women's University, Mumbai

Abstract :

The usage of e-books in the academic environment is escalating with the technological advancements and changing reading habits of users. This study highlights different motivating features and challenges related to access and usage of e-books by the users of engineering college libraries of Mumbai. The survey was conducted by using a questionnaire as a data collection tool. The objectives of the study were to discover the motivating factors and challenges related to access and usage of e-books and purposes of using e-books. Preparing notes, updating knowledge and writing an article or paper, were a few important purposes behind the usage of e-books, as reported by most of the participants. Findings further revealed that online availability and easy to search features motivates the users most to use e-books. The challenging factors reported by maximum participants of the survey were: preference for printed text for prolonged reading, inconvenience with the screen and DRM technologies. The present study is the part of a major research on the same topic.

Keywords :

Academic libraries, Access, Usage, Print books, Electronic books, Engineering colleges of Mumbai, Undergraduate students.

1. Introduction :

E-books are becoming increasingly popular. There is a strong impact and implication for the academic libraries. At the same time, it poses challenges to

academic libraries in terms of finance, viewpoints, and awareness, because nowadays the students rely heavily on e-books for their studies. Adoption of books supports the learning process. However, the preference of the students is to printed book. The user community is very much aware of the e-book as an information source. Some highlighting features attract the user community towards e-books over the printed books. E-books are known as digital books, electronic books etc. The academic user community uses e-books for making notes, for upgrading knowledge and research purposes.

In this age of Information and Communication Technology (ICT) environment, there has been a great development of E-resources. Electronic book technology has brought about a solid impact on academic libraries. Academicians can publish their study material in the e-books format. Increasing digital collections and growing numbers of users show the success of e-resources.

Jianzhong and Xiaoming (2004) reported that at the beginning of 2003 the e-book service was opened in the Shanghai Library, which offers the online registration for the readers and receive the library's remote electronic book borrowing service. Polding, Baptista Nunes and Kingston (2008) said that the concept of an e-book is a useful and relevant area to study when considering the transition from a paper-based book to an electronic format. Whereas, Jantz (2001) concluded his research by saying "we are very early in the evolutionary life of the e-books and it is difficult at this stage to predict how this new technology will transform library services".

Findings of this study will empower librarians to deal with the situations which are still undefined in the electronic environment. The views of the students and academicians about e-books will help the concerned authorities to bring out the change in the current environment of the electronic era.

The students are very confident about the different ICT devices in the cities, especially with Smartphones. Gradually reading e-books for their study is now becoming a practice.

2. Objectives :

The main two objectives of this study are :



1. To explore the purposes of reading e-books by the users of the libraries of Engineering Colleges.
2. To discover the motivating factors to use e-books among the users of the libraries of Engineering Colleges.
3. To identify the challenges faced by the library users in using the e-books.

3. Literature review :

Electronic books have created the transition from the printed collection to electronic collection. It is a growing industry in academia. E-books have become important for both the publishers and authors. Increasing readership and financial return for their work are the advantages for the authors. E-books are cost-saving, have less storage requirements and easier distribution than the printed one. A literature search was carried out on key terms such as E-books, academic libraries, DRM, licensing and access and usage of e-books.

For the current study, the researcher has taken journal articles from 2011 to 2019 for the literature review.

Price and Havergal (2011) asserted that "E-books can be integrated into college strategies which aim to enhance learning through the full use of technologies such as virtual learning environments". The dissemination of internet-enabled mobile devices and study and work, improvements in standardization and usability, combined with an easing of DRM restrictions all these are the important factors are necessary for the future of e-books.

Adeyinka et al., (2018) states that "e-book which served as a medium for delivering information content online has become popular and has entered the mainstream consciousness of the general public".

Mizrachi et al., (2018) highlighted that "the purpose and nature of a reading task, whether academic or otherwise; the length of a reading; characteristics of the environment, such as costs and convenience; and to some extent the characteristics of a reader, such as academic seniority or presence of visual limitations; all interact together to influence a user's preference for reading format". The academic community especially most of the university students prefer print materials as they believe they can learn better from print text.

Martins et al., (2019) stated "despite the growing use of e-books, a substitution of



book technology by digital book technology is not expected. Rather, the complementary use of both technologies is expected, because access to large digital book databases makes it easier to access specific data and materials, and the user has the option of finding the necessary book in digital format and then deciding whether to purchase the printed version, download it in the digital format, or even read it online".

Walton (2013) highlighted the six distinct categories of research on e-books in academia, which include the impact of e-books in academic libraries, desired features and/ or technical issues impacting e-books adoption, impact of e-books on students' learning, purpose for which students were using e-books and student preference for printed books v/s e-books. He also highlighted the restrictions of DRM protocol, which are implemented by e-book publishers which include the restrictions on downloading. The students were willing to read e-books when the amount of text to be read was limited. The amount of quality content available and difficulties with licensing and copyright issues hampers the ability to provide access to some e-books. The use of e-books is a form of forced adoption that compels students to use e-books.

Walters (2013) commented that "e-books cannot be considered a success in the academic context until they have been integrated into the system of scholarly communication and information delivery that is until they have been accepted by authors, publishers and librarians". Many institutional e-books license places major restrictions on the viewing, printing, saving, and copying of files by individual library patrons. The building e-books collection is difficult because academic titles are not available in electronic format. E-book embargoes are barriers to e-books collection development

Vasileiou, Rowley and Hartley (2012) highlighted the position of E-books. E-books have become more popular and their adoption as learning resources can have a major impact on academic libraries. E-books pose an interesting challenge to academic libraries and there are many questions to be answered as to the way to manage the introduction and development of e-books collections and service. The students are now increasingly relying on e-books for many of their educational materials. Bailey, Scott and Best, (2015) concluded "the movement to a predominantly e-only format for information is increasing the pressures upon



academic libraries to be able to provide access to the digital resources, while those resources are in a pricing model reminiscent of the serials pricing models that have bedeviled libraries for decades”.

Some studies show the feelings of reluctance among the students towards the use of e-books. Kahn and Underwood (2013) highlighted the hardware and software compatibility issues. They stated that the relevant hardware and software is required to provide the access to any kind of format of e-books; so that the e-book collection can be utilized. They also highlighted other challenges for e-books usage and access like, the perceptions and attitudes of the librarians and libraries, lack of academic content, different business model, copyright and DRM issues and different formats of e-books.

Aaltonen et al., (2011) pointed out the big issue with the devices was their interoperability with digital rights management (DRM) solutions used by services providers of electronic books. Different services providers use different DRM solutions and currently the e-book readers have problems with most of them. The major technological bottleneck is the lack of network connections. The current situation means that it is very difficult to get any DRM material other than that designed especially for a specific device to work with other devices. As a result, in the majority of the libraries electronic books were not available on the devices.

Iroaganachi and Izuagbe (2018) identified constraints to access the online databases, which are applicable to access the e-books collection. The lack of constant power supply, unavailability of full-text materials and unstable web access; these are the most top rated constraints.

Other studies provide different views about the presence and absence of e-books in academic libraries, and various issues relating to them. However, the Indian studies about the e-books related to academic libraries are less compared to those from other countries.

4. Methodology :

4.1 Research design :

The researcher has taken the users from Mumbai region area to study the Indian scenario. This study is a part of big research. The survey method was used

for the study.

Population of the study :

The populations taken into consideration for the present study were the final year students of the engineering colleges affiliated to University of Mumbai and teaching faculty members with minimum one year of teaching experience.

4.2 Sampling :

The Convenience sampling technique was used. The available library users were taken for sampling purpose.

4.3 Data Collection :

The researcher developed questionnaires which were distributed among the library users by personally as well as through Google form. The period of project work submission was chosen for data collection so that final year students were present in the libraries. Due to this, the 195 completely filled questionnaires were obtained.

5. Validity of the instrument :

Validity of the questionnaire was assessed by taking feedback from three experts from library and information science and the alterations suggested by them were incorporated.

6. Method of data analysis :

The collected data was analyzed using SPSS. The percentage and frequency were drawn to analyze the data.

7. Data analysis and Interpretation :

Among the respondents, 81.5% were final year students, 12.8% were assistant professors, 3.6% were associate professors, and professors and research scholars each framed 1% of the sample.



The demographic information showed the different levels of library users. The user group included the students of the final year of Bachelors degree in engineering, assistant professors, associate professors, research scholars and professors. The users from age range 21-30 were 161 (83%), 31-40 were 15 (7.7%), 41-50 were 14 (7.2%) and 51 onwards were 4(2.1%). (See table 1).

Table No. 1: Demographic profile by age

Age Range	Frequency	Percent
21-30 yrs	161	83
31-40 yrs	15	7.7
41-50 yrs	14	7.2
51 yrs onwards	4	2.1
Total	194	100

Of the users population, 48.7% agreed that they are comfortable with different ICT devices. Data on the frequency of reading e-books showed that only 24.7% of the population read e-books regularly, 50.5% read e-books sometimes, 18.6% read e-books at few times and 6.2 never read e-books.

The researcher has found out the purposes of the reading e-books of the user community. As shown in figure 1, the purposes of reading e-books which are highly important to the user community are preparing notes (30%), to update knowledge (22%), writing an article/paper (15%), for leisure reading (11%), supporting academic research work (11%), preparing lecture (11%).

Figure 1: Purposes to use e-book of academic library users

- Writing an article/paper
- To update knowledge
- Supporting academic research work
- Any other
- Preparing notes
- Preparing lectures
- For leisure reading

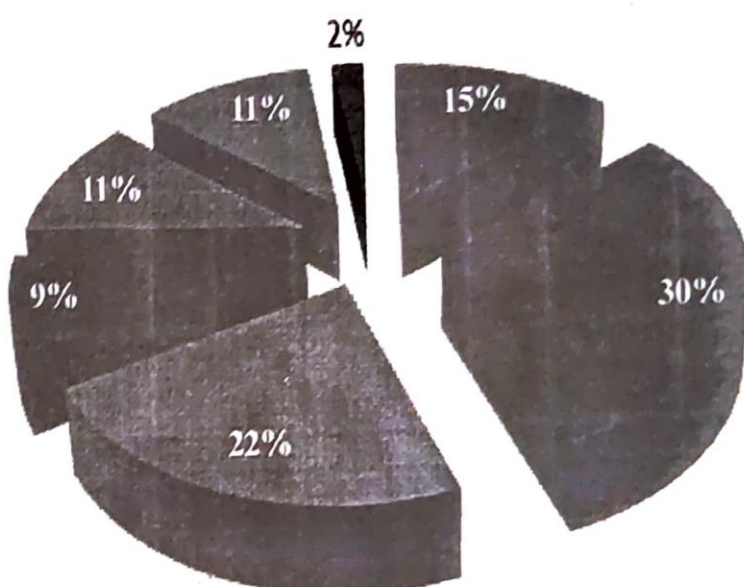


Table 2 reveals that the online availability and ease of searching are the features of e-books that motivate users most to use them. Moreover, 175 (89.9%) users indicated that faster and easy accesses to new titles are a motivating factor to use e-books. Almost 80% of users agreed that 24x7 accesses to e-books are a real motivator to them to use e-books. Total 166 (85%) users found e-books convenient to use. 121 users said they get motivated to use e-books when they were recommended by their faculty members and 116 users get motivated to use e-books when they were recommended by the librarians. Reading e-books is the trend, so the users are using e-books. But very few of the users agreed to this statement.



Table No. 2 Motivating factors to use e-books

MOTIVATING FACTORS	SA (%)		A (%)		NEITHER A OR D (%)		D (%)		SD (%)	
Available online	90	46	94	48.2	6	3.1	2	1	1	0.5
Easy to search	80	41	101	51.4	9	4.6	3	1.5	0	0
Faster and easy access to new titles	76	39	99	50.8	13	6.7	5	2.6	0	0
24X7 access	97	50	72	36.9	18	9.2	4	2.1	1	0.5
Convenient	67	34	99	50.8	19	9.7	6	3.1	2	1
User friendly features	60	31	99	50.8	26	13.3	4	2.1	1	0.5
Recommended by faculty members	37	19	84	4.1	54	27.7	12	6.2	5	2.6
Recommended by librarians	32	16	84	43.1	47	24.1	23	11.8	7	3.6
Reading e-books is the trend	36	19	61	31.3	59	30.3	23	11.8	13	6.7

Table No. 3 reveals the different challenges that were faced by academic users while using and accessing e-books. Like previously published studies, here too the users prefer printed books for their academic activities. Around 116 users prefer printed books. They are comfortable with the printed text, this is the biggest challenge, and 77 users find e-books difficult to read. 94 users are not comfortable with screen and 94 users faced restrictions on copying, pasting and downloading. The users feel that different Digital Rights Management technologies are challenges to access and use the e-books. Furthermore, 89 users agreed that they faced difficulties while using e-books due to the non-availability or low speed of Internet connection. Further limitations create challenges for the users to use e-books, e.g. limitation of access limitation on the period of access and limitation on access to copies and per person. 65 users faced problems of technical issues while using e-books including software and hardware compatibility issues. Further, 65 users faced difficulties in using e-books as they were unable to locate relevant information. Whereas, 65 users agreed that the lack of standardized access and use policies create challenges to use e-books. Very few users indicated that the lack of knowledge about how to use e-books is also a challenge for them.

Table no. 3 Challenges faced while accessing and using e-books

Challenges faced while accessing e-books	SA (%)		A (%)		NEITHER A OR D (%)		D (%)		SD (%)	
Preference to printed books	45	23.1	71	36.4	37	19	31	15.9	9	4.6
Not comfortable with screen	39	20	55	28.2	40	20.5	41	21	17	8.7
Restriction on copying, pasting and downloading	25	12.8	69	35.8	44	22.6	43	22.1	12	6.2



Challenges faced while a using e-books	SA (%)		A (%)		NEITHER A OR D (%)		D (%)		SD (%)	
Non- availability or low speed of internet connection	19	9.7	70	35.9	43	22.1	48	24.6	13	6.7
Difficult to read	24	12.3	53	27.2	40	20.5	60	30.8	17	8.7
Limited on period of access	17	8.7	60	30.8	53	27.2	52	26.7	11	5.6
Limited access to copies or per person	14	7.2	61	31.3	54	27.2	45	23.1	18	9.2
Limitation on access	11	5.6	55	28.2	40	20.5	66	33.8	13	6.7
Software and hardware compatibility issues	15	7.7	50	25.6	57	29.2	55	28.2	17	8.7
Unable to locate relevant information	15	9.2	50	25.6	46	23.6	61	31.3	18	9.2
Lack of standardized access and use policies	12	6.2	53	27.2	69	35.4	50	25.6	8	4.1
Lack of knowledge about how to use	4	2.1	26	13.3	44	22.6	84	43.1	36	18.5



Table 4. Sources of the information about the e-books collection

Sources of the information	No.	Percentage	Percentage of Cases
Through verbal communication by library staff	74	28.60%	38.30%
Through email	116	44.80%	60.10%
Through library website	37	14.30%	19.20%
Through OPAC	7	2.70%	3.60%
Through library orientation programme / information literacy programme	16	6.20%	8.30%
Other factors	9	3.50%	4.70%
Total	259	100.00%	134.20%

Table 4 reveals the different ways, through which the users got the information about the e-books collection. 60% of the users said that they got the information about the e-books through emails and 38% of the users indicated that they got it through verbal communication by the library staff. The library website also provides the information about the e-books collection of the library, 19.20% of the users agreed. 8.70 % users highlighted that the library orientation programmes and information literacy programmes provide the information about e-books collection of the libraries. Very few users got information about the e-books through OPAC. Some users mentioned the other ways of finding information about e-books, which includes the own research, display in the library and causal surfing.



8. Observational findings :

The users of the Engineering colleges of the Mumbai affiliated to the University of Mumbai use e-books for their academic activities. But still, they have a preference for the printed text. The preparation of notes is their main purpose for using e-books. Maximum users have knowledge about how to use e-books. So the users are very well aware of the e-books and how to use them. The users get motivated to use e-books as e-books are available online, are convenient to use, provide faster and easier access to new titles are easy to search and have user-friendly features. The technologies-related difficulties like, uncomfortable with screen, DRM technologies issues, software and hardware compatibility issues need attention by the e-books publishers and aggregators.

9. Conclusion :

E-books are handy to access. All these features lead to the motivation to access and use e-books. Providing more user education programs can help the users to overcome the difficulties. The faculty members and the librarians can play an important role to motivate the users to use e-books. Smooth access and constant availability of internet will enhance the usage of e-books. The technical issues relating to e-books need to be sorted out by the publishers themselves to overcome the hesitation among the users. E-books help academic communities to upgrade their knowledge faster.

References :

- Aaltonen, M., Mannonen, P., Nieminen, S. & Nieminen, M. (2011). Usability and compatibility of e-book readers in an academic environment : A collaborative study. *IFLA Journal*, 37(1), 16-27. doi: 10.1177/0340035210396775
- Adeyinka, T., Dare, O., Oguntayo, S. & Lawal, A. (2018). Perception and Usage Pattern of e-books among Library and Information Science Students in Selected Universities in Nigeria. *DESIDOC Journal of Library and Information Technology*. 38(2) 132-140. .doi: 10.14429/djlit.38.2.11111.
- Bailey, T., Scott, A., & Best, R. (2015). Cost Differentials between E-Books and Print in Academic Libraries. *College & Research Libraries*, 76 (1), 6 -18. doi: 10.5860/crl.76.1.6

- Iroaganachi, M. & Izuagbe, R. (2019). Access to Online Databases: Predicate for Faculty Research Output. *Library Philosophy and Practice*. (e-journal). 2133.
- Jantz, R. (2001). E-books and new library services model: an analysis of the impact of e-book technology on academic libraries. *Information Technology and Libraries* 20(2) ProQuest pg. 104.
- Jianzhong, W., & Xiaoming, J. (2004). A Dynamic Gateway to Information : Electronic Services at the Shanghai Library. *Information Development*, 20 (2), 111-116. doi:10.1177/0266666904045324
- Kahn, M. & Underwood, P. G. (2013). Issues related to the adoption of e-books in academic libraries: A literature review. *South African Journal Libraries and Information Science*, 79(2), 10-16
- Martins, M., Farias, J. S., Albuquerque, P. H. M., & Pereira, D. S. (2018). Adoption of Technology for Reading Purposes : A Study of E-Books Acceptance. *Brazilian Business Review*, 15(6), 568-588. <https://doi.org/10.15728/bbr.2018.15.6.4>
- Mizrachi, D., Salaz, A., Kurbanoglu, S., & Boustany, J. (2018). Academic reading format preferences and behaviors among university students worldwide: A comparative survey analysis. *PLOS ONE*, 13(5), e0197444. doi: 10.1371/journal.pone.0197444 (accessed 05 September 2019).
- Polding, R., Miguel, J., Nunes, B., & Kingston, B. (2008). Assessing e-book model sustainability. *Journal of Librarianship and Information Science*. 40 (4), 255-268 doi 10.1177/0961000608096715
- Price, K., & Havergal, V. (2011). *E-books in libraries*. London: Facet Publishing
- Vasileiou, M., Rowley, J., & Hartley, R. (2012). Perspectives on the future of e-books in libraries in universities. *Journal of Librarianship and Information Science*, 44 (4), 217-226. doi:10.1177/0961000611434759 Available at <http://lis.sagepub.com/content/44/4/12> (accessed 02 September 2019).
- Walters, W. H. (2013). E-books in academic libraries: Challenges for sharing and use. *Journal of Librarianship and Information Science*, 46 (2), 85-95. doi:10.1177/0961000612470279
- Walton, E. W. (2013). Why undergraduate students choose to use e-books. *Journal of Librarianship and Information Science*, 46 (4), 263-270 doi:10.1177/0961000613488124

dmL ‘Mm© d J«Wmb`m‘m’ V ‘mJ©XeZ

Sr. gm[aH m gmdV
d[að ghñ`H àñÜ`ññH, JWñb` d ‘ñ{hVremó {d^ñJ
Eg. EZ. Sr. Qr. ‘{hbn {dÚññR ‘~B
sarika.sawant@libraryinfosc.sndt.ac.in

gname

enñ, ‘hñ{dÚñb`m‘YZ {dÚññ`ññJhññR, àH èñ Ahñb VgM
{d{dY àH ñaMr gnXarH aU H aÊ`ngñRr dñMZgn{hÈ`ññM AnYna ÿ`ñdn
bnJVñ. `ñ gX^ñV dñMZgn{hÈ`ñ‘YZ ÿ`ñd`ññMr ‘ñ{hVr d È`ññH [aVñ
`ñh` V gX{^ñV H v Z Ame`ññMr {Z{‘Vr H aVñ `V. h gd H aVñZñ dñL ‘Mñ`
hñUma Zñhr `ññMr H ññOr {dÚñWu d {ejH ñZr KU JaOM Anh. È`ññH [aVñ
JWñb`ñÀ`ñ ‘ñÜ`‘ñVZ dñL ‘Mñ` VgM dñMZgn{hÈ` H g Cñ`ññJV
AmUñ`M `ñ~ñ~VM ‘ñJXeZ àñVV bññV H bb Anh.

àñVmdZñ

dmL ‘Mñar hr EH ‘ñZ{gH Vñ Anh, Or g‘mOnbn bnJbbr H sS
Anh, È`ñhrññ Ag àhUñ`bn haH V Zñhr H s Vr EH gñ{hÈ`ñbn An{U
Z{VH Vbn bnJbbr H sS Anh. AmB-dSrb Annè`ñ ‘bnZñ Mñar H v
Z` Ag bhñZñUnñgZ {eH dVñV. È`ññMr A‘b~Onður gd ~ñ~VrV
ñar hñD eH V.

‘arA` d~ñQa eāXH ñenZgna "dmL ‘Mñ`Mr ñ`ñ>`ñ Xgè`ñM
eāX qH dñ H èñZñr Mñar H aU qH dñ V AnnbnM Anh Ag ^ñgdU,
Xgè`ññMr ‘ñ{hVr AnnbrM àhUZ {b{hU d È`ññMr nñMñndVr Z XU,
{dÚ`ññZ óñVñMñ AnYna KD Z ZdrZ An{U ‘ñ {Z{‘Vr H è`ññMñ ^ñg
H aU.

gmß`ñ ^ñfV gmJñ`M Va dñL ‘Mñ` àhUO YñH ñ XU, È`ñ‘Ü`
XñZ JññtMñ g‘ñde hñVñ Vñ àhUO Xgè`ñÀ`ñ Hñ‘ñMr / H èñZñr
Mñar H aU An{U ZVa ññQ ~ñbU.

dmL ‘Mñ`ñM àH ña ññbrbà`ñU :

- (1) Xgè`ñM eāX, H èñZñ Annè`ñM àhUZ gnJU
- (2) Xgè`ñMñ eāX, H èñZñ Mñar H v Z {bññU H aU d È`ññMr nñMñndVr
(acknowledgement) Z XU
- (3) AdVaU {MÝhñMñ dñna Z H aU
- (4) óñVñMr AYdQ ‘ñ{hVr XU
- (5) g‘ñZñWu eāX dñvñZ eāXñMr ‘o a’ ña H v Z {b{hU.

dmL ‘Mñ`ñ H Ur ‘Ôñ‘hZñr H aV Zñhr V AZñdYñZñZ hñD eH V.
È`ññMr Anñññ hr {dÚññ`ññZñ hñU JaOM Anh.

dmL ‘Mñ`ññMr H ñaU gnYñaUV... nTrbà`ñU Ag eH VñV

- (1) AkñZ / ‘ñ{hVr ZgU
- (2) dñ Zgè`ñ‘ñ {dÚñWu H UmM Var qH dñ BQaZQdv Z Hññr H aVñV
- (3) AnB d{SbnMñ MñJè`ñ JUñgmRñMñ AnJh
- (4) JW gñ{hÈ` ZgU.
- (5) JUñH [aVñ dJñV ññYñ AgU.

gnYñaUV... ‘bnZñ bnAa H OrñngZM bhñZ bhñZ àH èñ An{U
Aä`ñg {Xbn OnVñ. È`ñngñRr nñbH d ‘b ññVH ññMñ An{U BQaZQMñ
AnYna KVñV. Oa MñJè`ñ enññ‘Ü` ‘b AgVrb Va ‘b JWñb`ññhr
AnYna KVñV. BQaZQdv Z H èñZñ {Mñ An{U BVa JññtMñ Cñ`ññJ qH dñ
gX^ KdZ àH èñ nU H b OnVñV. ‘hñ{dÚñb`ñ‘Ü` Va AVJV JUñM
‘hñd’ ña Anh. AVJV narññZñ NñQ NñQ JhññR, àH èñ {Xb OnVñV
d È`ññM gnXarH aU gJUH s` ‘ñRçñ nSÚñda (projector) H b OnV.
{ejH ñÀ`ñ ‘ñ V ññVH ñÀ`ñ gMr {dÚññ`ññZñ {Xè`ñ OnVñV. È`ññMñ
Cñ`ññJ H v Z {dÚñWu àH èñ gnXa H aVñV.

øñ nU àH ñaVñV dmL ‘Mñar hñD Z` øñH [aVñ JWñnb EH
‘hñdnU ^{‘Hñ {Z^ñd eH Vñ.

JWñnbñbn enññÀ`ñ / ‘hñ{dÚñb`ñÀ`ñ Aä`ñgH ‘ñMr gnU Anñññ
AgU JaOM Anh. JWñnb hñ {ejH ñ~am~a MMñ H v Z àH èñ {H dñ
ànOŠQ H en àH ñaM XVñ `Bb øñda gMd eH VñV An{U È`ññM~am~a

È`n àH ènngRr bñJUar nñVH d È`nMr gMr {dÚmĩ`nZn qH dn {ejH mZn XD eH VmV.

bhñZ d`nVM ‘bñZn Oa CXñhaU XD Z gn{JVb qH dn CXñhaUng{hV H s È`nM ‘Ü` MnJē`n JñitM gH ‘U hnD eH V. CXñhaUñXñ**■**b Oa EH m {dÚmĩ`n**■**gn{JVb H s Oa Vbñ VÂ`n {‘İñZ EH È`nZ {b{hbbñr Jñi Vbñ gn{JVbr An{U Vr Oa V VÂ`n Kar gn{JVbr V {b{hbr àhUZ Va V ~am~a Anh Hñ MH Va V H g MH Anh h g‘Oñdb Va V **■**n n[aUn‘H naH hnD eH V.

AJXr àH ènM`n gv dnVrñgZM JWñnb {dÚmĩ`nZn ‘ñJXeZ Hv eH VmV. nT Qß`nQß`nZ H g ‘ñJXeZ Hand h AYñap**■**V H b Anh.

(01) df Mñb hmÈ`n~am~a JWñnbñZr CX~ñYZ Hñ`H ‘ KoU JaOM Anh. È`n‘Ü` dnL‘` Mñar hm EH ‘hîdnMñ ‘mJ g‘ñđĩ HaU AĖ`V JaOM Anh. È`n‘Ü` àÈ`jñV XñZ~VrZ CXñhaU KoD Z È`nMr gX‘ogMr Her V`na Han`Mr h Xñ**■**db Va {dÚmĩ`nZn g‘OĖ`ng gnñ OnV.

(02) dnL‘`Mñ` àhUO Hñ` d È`nM Xñ[aUn‘ Hñ` AnhV, È`nMr An**■** H v Z {Xbr nñhO. È`nM YñH Hñ` Ag eH VmV, eni‘Ü` / ‘hñ{dÚnb`n‘Ü` òngñRr Hñ` {ejñ Anh, `ñMrhr H ènZñ XU JaOM Anh. {dÚmĩ`nZn dJdJñr CXñhaU {Xbr Va Cîñ‘M. JWñb`n‘Ü` Aem àH naM ‘bH bñdU nU `m` Rv eH V. H naU V {dÚmĩ`nZn AnRdU Hv Z XVñV.

(03) dnL‘`Mñ` hr \ ŠV eāXñMrM Zñhr, Va {Mİ, ñQñBb, H ènZñ, ~ñÖH gH ènZñ, dnŠ`, {MÝh, pñh{SAñ, An{SAñ, gJUH àñJñ‘ BĖ`nXñMr hr AgV.

(04) àH èn HaVñZñ qH dn {b{hVñZñ ZñXr H en Rdn`À`n hgÖñ {eH db Jb nñhO. ZñXr {b{hĖ`ñH [aVñ, Nññrb HñS HaU qH dn ‘ñ`H mgnâQ dS / EŠgbMñ dnna HaU òñM àñĖ`{jH hr Cñ`ñJr nSV.

(05) gX‘O {b{hĖ`ngñRr Hñ` Andí`H Anh, gX‘O àhUO Hñ`, È`n‘Ü` b**■**HñM Zñd, erfH, {Z`VHñ{bHñM Zñd, **■**S H., nđ H. {S{OQb

AnāOŠQ An`S{Q’ n`a H g {bhZ Rdn`M, È`nMñ H ‘ H gn bñdn`Mñ hnU gnJU Andí`H Anh.

(06) Oa gX‘O AnZbñBZ Agb Va gH VñWññMñ nĖñ {bhZ Rdnñ hhr Xñ**■**db nñhO.

(07) BQaZQda {d{dY àH naM knZgn{hĖ` CnbāY AgV, È`nMr VñSAñ**■** H v Z XU JaOM Anh. CXñhaUñW - ābñO, B~Šg, {Z`VHñ{bH, {d{H nñ{S`ñ, AnñZ EĀ`HeZb ‘Q[a`b, [ann{PQar, BĖ`ñXr.

(08) àH èn am~dVñZñ qH dn {b{hVñZñ VĖHñ**■** ‘ñ{hVr Her gnRdZ Rdn`Mr, Vr EHñ ‘ñĖSa‘Ü` àH ènM Zñd XD Z H g {Z`ñOZ H b nñhO hhr gn{JVb nñhO. OUH v Z È`nZñ {Z`ñOZñM ‘hîd H **■**b.

(09) àH ènMr gMZñ {‘iVñM {dÚmĩ`nZr Hñ` gv H b Va È`nZñ ‘ana d**■** {‘i eH Vñ. OUH v Z V dnL‘`MñarMñ ‘ñJ Adb~Una ZñhrV. Va d**■**M ‘hîd An{U {Z`ñOZñr ZH **■**V JWñnbñZ {eH dU JaOM Anh.

(10) dJdJù`n ñQñBb ‘Ý`AbñMrhr VñSAñ**■** H v Z {Xbr nñhO. {d{dY {df`ñH [aVñ {d{dY ñQñBb ‘Ý`AĖg dnñab OnVñV. CXñ. APA, MLA, Chicago ñQñBb h gnU OJ`a dnñab OnVñV. JWñb` enón‘Ü` APA dnñab OnV. È`nMñ WñSñ B{Vhñg hr gnJU JaOM Anh. gÜ`ñ APA Mr gnVdr Andñr dnñabr OnV.

(11) dJdJù`n àH naM gX‘O H g {b{hb nñhOV, CXñhaUñW, nñVH MĀ`ñ ZñXr, ‘ñ{gH ‘Yrb b**■**MĀ`ñ ZñXr, gX‘OJWñĀ`ñ, d~gnBQĀ`ñ ZñXr, BĖ`ñXr. àĖ`HñMñ EH EH Z`Zñ V`na H v Z Vñ {dÚmĩ`nZñ Xñ**■**dbñ Va È`nZñ {bñm`bñ gnñ OnV.

(12) Oar Hñhr gX‘O Cñ`ñJr dnQV AgVrb naV È`nMñ \ ŠV knZñOZñV Cñ`ñJ Pñbñ, nU àĖ`j {b**■**ñUn‘Ü` Zñhr Pñbñ Var È`nMrñU ZñX gMr‘Ü` {Xbr nñhO hhr Z`X H b nñhO. OnñVrMr gX‘ogMr {Xbbñr Hññhr MñJbr AgV.

(13) dnMZ gn{hĖ`n‘YZ E**■**ñÚñ b**■**HñZ {b{hbbñ ‘OH a OgnĀ`ñ Vgn ž`nd`ñMñ Agb Va Oa HñQeÝg‘Ü` H g {bñnd h g‘Oñdb nñhO. HñQeÝg‘Ü` Oa {bñnd bñJb Va È`nññhr eāX‘`ñXñ AgV. Vr È`n È`n ñQñBb ‘Ý`Abā`ñU ~XbV. {dÚmĩ`nZñ ‘i (An[aOZb) H g {b{hb nñhO, gnñ`ñ, ghO Annē`ñ ‘mf‘Ü` {b{hVñ `U An{U È`nMñ

gand H v Z KoU JaOM Anh. ^mfM eāXH me dnrV Z {b■mUmr gd` HadZ KoU h Ê`nÀ`ngRr EH daXnZM Rab. øgRr {ejH An{U JWnb XmKmZrhr à`EZ H b nfhOV.

- (14) {dÚm{H [aVm Aem àH naM gX`O {b{hÊ`nH aVm JmBS ~ZdU qH dn ~Zdbb JmBS d~gmBQda RdU hhr EH `hîdmr ~n~ Anh. Aem JmBS`Ü` gMr {b{hÊ`nM {Z`´, àH na, {d{dY `mfhVrM óV`mMn C,,■ H aU JaOM Anh. Oa H mUE`m `hng{dÚmb`nÀ`m qH dn {dÚmRÀ`n d~gmBQda Aem àH naM JmBS AgVrb Ê`mMn dmnahr JWnb H v eH VmV qH dn {dÚm{`nZm dmnàÊ`ngRr gMd eH VmV. CXn. nS {dÚmnrRmMr citation b~ hr OJà{gÕ Anh. Ê`nda ■n g■nb dJdJiçn nÖVtMr `mfhVr CXmhaUmûna ññi H br Jbr Anh. Ê`n d~gmBQMn nîm <https://owl.purdue.edu/owl/researchsandscitation/resources.html>
- (15) 'Plagiarism Checker' Mr An■ H v Z {Xbr nfhO. O `âV MH a AnhV Ê`mM dnna H gm Ham`Mn ømM ànÊ`{jH nU Xn{db nfhO. CXn. Plagiarism detector, Duplichecker. h Oar _n\ V Agb Var V 2500 eāXM Agb Var {Xdg^amV gYmaUnU MH HaVmV.
- (16) dL`´Mm`Mr ànX{eH An{U AnVaamir` CXmhaUX■rb {Xbr nfhOV OUH v Z øm Jm{rM J^ra ñdv n {dÚm{`nÀ`n bjnV`Bb.
- (17) {dÚmWu O {b■mU HaVmV d Ê`ngRr ~è`mM gX^mMn dnna HaVmV, AnYna KoVmV Ê`mMn dnOdr dnna àhUO `oAa `O Agm hmVm Anh Ag Ê`mZn g`Ob nfhO. ej{UH dnna H embn àhUVmV V g`Omdb nfhO. {dÚmWu ~arM nñVH dmMVmV Ê`mZn dmMbè`n nñVH nÀ`n ZnXr d gname H gm {bhmdn hhr OmUZ KoÊ`ng `XV hmBb d Ê`mMn AnÊ`{dídng dmTZ Ê`nÀ`n hmVZ MmJè`n {b■mUvV `XV hmBb.
- (18) dL`´Mm` `m g~{YV pìh{SAm emYZ {dÚm{`nZn Xm■{db Va Ê`ngRr Ê`mZr Ag pìh{SAm `Qç~ emYb nfhOV An{U {dÚm{`nZn V Xm■{db nfhOV. CXn. ~mH {dÚmnrR, {`{g{gnr {dÚmnrRmM dL`´ Mmar da NnZ à{ejU pìh{SAm AnhV. A{Z`eZ`i {dÚm{`nZn g`OÊ`ng gm OmV An{U aghr dmQVn.

JWnb dL`´Mm`n~ôbm `mJXeZ H v Z MmJb {dÚmWu KSd eH VmV. ànMm`nZn øm gd ~m~tM `hîd nQdZ V Plagiarism Checker gâQdAa {dH Vhr KD eH VmV.

JWnb An{U {ejH `nÀ`ng~V g`Yd` an■Z Ag {d{dYmJr àH èn an~db nfhOV. Sm. aJZmWZ `nZr àhQè`nà`mU JWnb h {ejH mM {ejH AgVmV. h {ejH nZm `mJXeZ H v Z JWnb {gÕ H v eH VmV. Cýhnir, {Xdmir gÅr`Ü` {ejH ngRrhr JWnb H n`enim an~d eH VmV. ZnXr H en {bhni`nV, ñQnBb manual àhUO H n` øn~ôb {ejH nZn g■nb `mJXeZ H aU AÊ`ndí`H Anh. {ejH nZn dL`´Mm` H m` AgV, Ê`mM àH na, H mnrnBQM {Z`´ ømMrhr `mfhVr hmU JaOM Anh. Ê`mZn `Aa `OMn dnna H gm Ham`Mn h kmV Pmè`ng {eH dÊ`mH aVm bnJUa dmZgm{hÊ` H g dnna d h {ZpíMVM g`Ob. Ê`m`i {ejH nÀ`m kmZnV A{YH ^a nSZ Ê`mMn Cn`mJ {dÚmWnÀ`n gdmJrU {dH ngngRr hmD eH b.

JWnbmZm gy dnVrbm `hZV hr Z, sm H andr bnJb, nU V Ê`m enim qH dn `hng{dÚmb`mH [aVm ■nM `bXn`r Rv eH V. ~{ÖOdr d Xgè`nÀ`n H bMr H Xa HaUman `nZ XUman g`mO KSdÊ`ngRr `XV hmBb. H naU AnOM {dÚmWu h CÚmM OmUH na ZnJ[aH ~ZVmV.

gX^ gMr

`[a`´ d~ñVa. (2003). Merriam Webster Collegiate Dictionary (11 Andîr).

gmdV, g[aH m. (2019). Plagiarism. àrEM.Sr. H ng àPQeZ. Eg EZ Sr Qr {hbm {dÚmnrR, `~B.



Editor-in Chief
Dr. Yogita Mandole



Co-Editor
Dr. Jitendra K. Aherkar



Supported By:

Organised By

भारतीय इतिहास अनुसंधान परिषद्

(शिक्षा मंत्रालय, भारत सरकार के अधीन एक स्वायत्तशासी संस्था)
INDIAN COUNCIL OF HISTORICAL RESEARCH
Autonomous Body Under the Ministry of Education, Government of India)



Department of History
MKLM's
M.R Nathwani College of Arts
JVPD Scheme, Vile-Parle(west),
Mumbai-56

NATIONAL CONFERENCE ON
"Dynamics of Women's Movement in India: Historical Legacy and
Contemporary Challenges"
Supported By ICHR

CHIEF PATRON

Adv. Shri. Mahendra K. Ghelani
Chairman, MKLM Trust.
Vile-Parle, Mumbai

Dr. Dilip S. Patil
Professor and Director, DLLE
University of Mumbai

Convenor of the Seminar

Dr. Jitendra K. Aherkar

Preface

Prof. Hasan Sanadi
University of Technology and Applied Science-HCT-Muscat, Oman

**INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND
TECHNOLOGY**

ISSN 2582-7359

PEER REVIEWED JOURNAL

IMPACT FACTOR 6.328

VOLUME 1 ISSUE 7 (SPECIAL ISSUE)

INDEX

S.No.	Content	Page No.
1.	Dynamics of Women's Movement in India Historical Legacy and Contemporary Challenges <i>Dr. Vibhuti Patel</i>	24
2.	Gendered challenges and empowerment of women doctors <i>Dr. Meherjyoti Sangle</i>	50
3.	Normative texts and reconstructing gender history: theory and practice <i>Nagendra Rao</i>	59
4.	Role of women in Sikh history <i>Dr. Daljit Kaur</i>	65
5.	Participation of woman in Assam in the freedom movement of India (1920-1942) <i>Dr. Mridul Deka</i>	71
6.	Role of Durga Bhabhi in the Indian Revolutionary movement (1907-1999) <i>Prabal Saran Agarwal</i>	77
7.	Fabricating Colonialistic Mentalities : Women of Bengal and their Marginalization in colonial city space <i>Sruti Dasgupta</i>	84
8.	Women Empowerment – A Case Study of Women presidents during Corona pandemic <i>Ms. Tejaswi Dinesh Prajapati</i>	92
9.	Mystery of Ancient Indian Hairstyle <i>Md. Ali Mikail</i>	97
10.	Use of Information and Communications Technology (ICT) by Women- A revolutionary movement in education <i>Dr. Shrima Banerjee</i>	103
11.	Discriminatory practice pertaining to property rights <i>Dr. Rupa Hazarika</i>	116

59.	Women Health an impetus to Women Rights in a Welfare State <i>Reni Francis, Dr. Aarti Sukheja</i>	413
60.	A Study on the Judicial approach towards Women's Empowerment in Our Democratic India <i>Mrs. Saisha Ghosalkar</i>	420
61.	Women's Liberation Movements in the Contemporary Period: The different Strands and Challenges in the Context of India. <i>Antara Hazarika</i>	427
62.	Dimensions of Women commodification –An Interpretation <i>Asmita Mukherjee, Roshni Mukherjee</i>	433
63.	From Sarmila And The Movement Against Armed Forces Special Power Act (AFSPA) <i>Suhail Mohammed</i>	438
64.	Paithani Saris and Women in Maharashtra: Patterns of Consumption and Preference Through Time <i>Diptarka Datta</i>	443
65.	Tarabai Shinde: A Study On Her Work Towards Opposition Of Patriarchy And Caste Discrimination <i>Rutuja Sahasrabudhe</i>	449
66.	Women In Social Reform Movement From Prior Independence To Modern Dynamic Era <i>Ms. Naimisha Chandrakant Kadiwala</i>	456
67.	Social Media Crime: Emerging Trends, Challenges and Solutions <i>Mr. Gopal Ramnarayan Mantri</i>	461
68.	Women In Social Reform Movement <i>Dr. Sunil S. Bidwalk</i>	468
69.	Status of Women in Indian Society <i>Afrida Nazir</i>	475

70.	Role of Women of Uttarakhand in Freedom Movement of India: A Historical Study <i>Suman Joshi</i>	480
71.	Missus of Jorasanko: From Ordinary To Extraordinary <i>Saipuri Sanyal, Madhurima Batabyal</i>	486

Dr. Meherjyoti Sangle

Head & Assistant Professor, University Department of History, SNDT Women's University, Mumbai.

Abstract

Abstract
This paper examines women's education in medicine and how the field of medicine empowered them in society. It analyzes how women faced many hurdles while entering in the professional courses. It evaluates patriarchal and gender biased society's opposition to the newly learned women who entered professional careers. It focuses mostly on the nineteenth century and how women who entered professional careers. Dr. Kadambari Ganguley and others women doctors faced multiple opposition and underwent dilemmas at that time. Sources were silent on their hurdles and achievements.

Multitalented Indian Women

Multitalented Men and Women: The 19th century was a remarkable century where questions were raised on women's ability to enter the education field as well as any professional courses. Earlier, women were banned from taking education in the formal institutions right from primary and secondary education. Women completed their primary education informally at home without proper direction and systematic syllabus, through vernacular languages, but it was not sufficient to enter any professional education.

In the nineteenth century, Maharashtra and Bengal had a renaissance. Both regions were forward and recognized the social causes of women. Social reformers and new learned groups of western science felt that women in India should get formal education in institutions and they should learn and earn for themselves.

Indian women were quite skilful in many talent-oriented activities. But these were not popularised or recognized by the society. Many talented women were recognized in various fields among the smaller social groups. Women had marked themselves as singers, artists, poets and authors. Some were in politics and engaged in revolutionary and nationalist activities. They could read, write and do their domestic accounts. There were women Sanskrit scholars who took initiatives to give education to women but in an informal way in their homes.

There was no formal education available for women outside of the house. Pearychand Mitter, the great literary figure of the nineteenth century in Bengal wrote in the preface to his *Adhyatmika* "I was born in the year 1814 (12th July)... While a pupil of the pathshala, at home I found my grandmother, mother, and aunts reading Bengali books. They could write in Bengali and keep accounts. There were no female schoolmen."

NATIONAL CONFERENCE ON
"Dynamics of Women's Movement in India: Historical Legacy and Contemporary Challenges"
 50
 Supported By ICHR

Social Reformers:

Though such a situation was very rare, and male reformers encouraged women to start education through domestic as well as in public spheres, but it was not an easy job to train women for formal education. Learning of women was mingled with many superstitious beliefs. Because they mostly lived at home, they could not develop modernity through education. Almost all social reformers of Maharashtra and Bengal encouraged women in their families and homes to take education at least at home. Anant Shastri Dongre took up the challenge and educated his wife and his daughter Pandita Ramabai. Mahatma Phule trained his wife and Savitribai Phule became the first women teacher. Justice Ranade educated his wife Ramabai and Mr. Gopal Joshi married Anandibai Joshi on the condition that he would educate his wife. Hindu Raja Radhakanta Deb and Raja Badaynath Roy, promoted girls' education in Bengal. Raja Ram Mohan Roy and Ishwarchandra Vidyasagar promoted this movement from the private sphere to public areas.

These efforts were at the personal level. Missionaries also took efforts and started formal schools for girls in Maharashtra and in Bengal. But their objects had changed from learning to the conversion so the people stopped sending the women of their families to the formal missionary schools. The Ladies' Societies and Associations started under the auspices of the various foreign Missionary bodies. The Serampur Mission was working in Bengal, Benaras, Allahabad and Arcan etc. A number of schools were started by Muslims and located in the Muslim areas. But due to lack of funds, two of them had to be closed during the second year in Jambhazar area in Bengal.

The Charter Acts of 1815 and the Dispatch of John Stuart Mill showed that the responsibility of education was on the government. In 1815, the Society for Promoting Education of the Poor within the Government of Bombay was established, later its name was changed to Bombay Native Education Society. But professional education was far away from all women. Some societies ran schools for poor classes and lower castes. Women were banned from education and this closed their entry to the male oriented medical profession. There were no trained women doctors to treat women in any emergencies.

Barriers for Professional education and Career:

was implemented on gender roles and their capabilities based on brain theory. Women were said to lack intelligence and were not science oriented. They were to be restricted to domestic duties.

By and large, the observation was that the patriarchal society accepted only two types of professions for Indian women. One was the teaching profession. This attitude and general understanding continue till today. Society felt that the teaching profession is a "safe"

NATIONAL CONFERENCE ON
"Dynamics of Women's Movement in India: Historical Legacy and Contemporary Challenges"
51
Supported By ICHR

profession for women. The psychology of the society behind this theory was that women had good temperament and patience to handle school students. Secondly, women had the innate skill to look after children. So in this scenario, the society had fixed women's profession not based on their skills but based on their being women! This was reflected in the Census reports. According to the Census of India 1971, seven out of every ten women teachers taught at the primary level and one in ten at the specialized, university or adult education level.

Another observation was that society has decided on one other profession for women based on their being women and their reproductive service to a family. Those who were destitute, ugly and or 'non-person' – widows and widows could serve others by taking care of them in their illness. This was a general attitude. These women did not work as doctors, but as nurses especially for women during their child birth as midwives, also called as *daais*.

Gender biased patriarchal society had banned normal, married women from entering medicine, especially high caste women. Women's entry in medicine was acceptable only in the midwifery profession. Educational institutions had not permitted women to take general and basic education in the schools, so in such a situation it was a distant possibility to take medical education. How did women overcome this challenge? Was their achievement accepted by the family and society?

Medical Field: Throughout the world, women faced a struggle to obtain admission in the male dominated field of medicine. The field of medicine was forbidden to women. With this background, when we can see the first five women doctors, we find that their lives were very hard. Coming to the Indian scenario, the European missionary women pioneers faced problems in taking admission in medical courses in Bengal and Madras presidencies. Mrs. Mary Scharlieb was the first medical student in India. Her life throws interesting sidelights on the struggles for medical education for women in Madras Presidency. A strong movement was started to open the gates of medical education to women at Calcutta Medical College.

Dr. Anandibai Joshi was well-known as the first Indian and Brahmin woman who completed her medical education in Philadelphia College in 1886. In the same year, Dr. Kadinbini Ganguly completed her medical course at Calcutta Medical College, Calcutta. Dr. Anne Jagannathan was another Indian woman who graduated in medicine in India. But Dr. Anandibai Joshi did not have sufficient financial back up for her foreign study. It affected her health in Philadelphia. Dr. Anandibai Joshi did not survive tuberculosis and could not join her position in Kolhapur. Dr. Anne Jagannathan completed her graduation from Madras Medical College and was appointed in the Cama and Albless Hospital for Women and Children in Bombay. Dr. Jagannathan also died during her job due to tuberculosis. So the death rate of

women doctors was also higher. Mostly lady doctors died due to tuberculosis or other epidemics.

The First Graduates: Dr. Kadinbini Ganguly and Chandramukhi Bose

In early nineteenth century conditions were not favorable for girls in India to complete medical education. These two students were the victims of these policies. One is Kadinbini Ganguly and the other Chandramukhi Bose, both were the first women graduates in the University of Calcutta and in the entire British India. But both gave a strong fight to appear entrance exams in Bethune College, Calcutta. But the management refused.

Dr. Kadinbini was born in Bihar on 18 July 1862. Kadinbini belong to a higher caste Bengali community. Dr. Ganguly had a great family background of reformers and Brahmo Samaj followers, who were supporters of women's education. Her father, Braja Kishore Basu was a renowned in the Brahmo Samaj and who propagated to the cause of women's education in the eighteenth and nineteenth century in Bengal. She belonged to an upper caste Bengali community that opposed women's education. She did not get admission in Bethune College at Calcutta because she belongs to non-Hindu community. So she first studied Arts at Reverend Alexander Duff's Free Church Institution in Calcutta in 1876.

After Bethune College refusal, both tried in the University of Calcutta, where also refused permission to Chandramukhi Bose and Kadinbini Ganguly to appear for the entrance examination because both were women and therefore not permitted to appear for the entrance examination. The University gave different reasons for both. They gave the reason to Kadinbini that she was a non-Hindu candidate. Chandramukhi Bose was a Christian Bengali student, still she was not given permission. The main reason why the management of the University denied them was that they were women. Because these rules were based on those of the Oxford and Cambridge University, Calcutta University followed the same rules and regulations that they did not give permission to female students for appearing for the entrance exam.

Before Kadinbini Ganguly, Chandramukhi Bose had already cleared her Entrance Examination in 1876 in Calcutta University. Dwarkanath Ganguly was her mentor and husband. He fought for admission for Kadinbini. In 1877, they got permission. Both had passed First Arts in 1880. Kadinbini and Chandramukhi were the first two women who graduated in medicine in British India, in 1882. The Calcutta Medical College refused to give the degree to Chandramukhi Bose and held back of her result because no one female students passed any entrance examination. Again Dwarkanath Ganguly fought for getting admission for Kadinbini in the Calcutta Medical College. After her graduation, she was the only (and first) woman to pass MA from the University of Calcutta, and the British empire in 1884. Because the University of Calcutta had refused to declare the name of Chandramukhi Bose.

The same treatment was received by Dr. Ganguly. She began to practise obstetrics and gynaecology at Lady Dufferin Hospital in Calcutta. The society opposed Dr. Kadambari because she was educated when society had not permitted women for professional education, she took courses from foreign countries and moreover she married a widower. Sen has mentioned one incident that once she was called for home delivery by a rich family. After the delivery, both mother and child were well. Dr. Kadambari and her assistant were given food in the veranda and later told to clean that area. This incident showed that the society treated child birth is a polluted stage. But they treated her like a dai rather than a lady doctor.

Being a Gynaecologist and Obstetrician, she had to visit the patient's house at any odd time as well as during night time, and hence many criticised her work.

"... In 1891, *Bangabasi*, a local and orthodox magazine targeted her as a despised symbol of Brahmo womanhood and indirectly called her a 'whore.' Dr Nitran Sarkar, Shibnath Shastri and Dwarkanath Ganguly took the matter seriously and went to the court not only to defend Kadambari but also to support the liberation of women from the strangulating forces of dreadful customs and evil prejudices of the then society. The court delivered judgement in favour of Kadambari, and Mahesh Chandra Pal, the editor of the journal *Bangabasi*, was smacked a fine of Rs. 100 and six months imprisonment. It showed mixed responses by legal activities and in society.

Appreciation:

Dr. Kadambari took charge of the medical treatment of the Queen Mother of Nepal Dev Shumsher Jang Bahadur Rana who was suffering for a long time during 1895-96. Dr. Ganguly treated the Queen Mother very well and she recovered from her long illness. After this achievement, Kadambari used to be called by Royal families for treatment.

Dr. Ganguly was talented. Another incident showed her intellectual ability and correct diagnosis. She was a brave doctor who took brave decisions for her patients. A male doctor diagnosed a tumor in a girl's abdomen, but Dr. Kadambari diagnosed and confirmed a case of the pregnancy and performed a surgery and delivered the baby, and the mother and infant were both safe.

Contribution in National and Social Activities:

Along with her husband Dwarkanath Ganguly, who always supported her in all her activities, Kadambari and five other ladies were allowed to attend the Indian National Congress's Bombay session. In the session Kadambari delivered the vote of thanks. She was hailed by Annie Besant for being a symbol signifying the uplift of India's womanhood. In the Indian National Congress's Calcutta session 1890, she delivered a lecture in English. After the partition of Bengal, she organized a Women's Conference in Calcutta in 1906. In 1908, she organized a meeting to support Satyagraha workers in Transvaal, South Africa. She formed an

NATIONAL CONFERENCE ON
"Dynamics of Women's Movement in India: Historical Legacy and Contemporary Challenges"
Supported By ICHR

association to collect money with the help of fundraisers to assist the workers. During the first World War, she presided over the meeting of the Sadharan Brahmo Samaj in Calcutta to honour Mohandas Gandhi during his Calcutta visit in 1914. Till a year before her death, she, accompanied by Bengali poet, Kamini Roy, worked for a government committee to enquire about the conditions of women miners in the Bihar and Orissa areas. After serving her nation through medicine and her social activities, she was active till her death. Ganguly passed away on October 3rd 1923.

Conclusion:

The great women doctors of the nineteenth century, had faced difficulties and struggled very hard for gaining education and employment. Being women, they played all roles in their personal and professional life. They faced fierce opposition from orthodox Indian society. Their lives were influenced by Indian society. They shattered the gender barriers. The hollow criteria of the patriarchal system were shaken. It showed that both these great ladies empowered themselves in all spheres of life.

References:

1. https://ia601209.us.archive.org/25/items/BethuneSchoolAndCollegeCentenaryVolume18491949/Bethune-School-And-College-Centenary-Volume-1849-1949_text.pdf, p. 12.
2. Chakraborty evaluated the term social death as a non-productive person to widows in Brahminical patriarchy. Chakraborty, Uma (1995) 'Gender, Caste and Labour Ideological and Material Structure of Widowhood' Economic and Political Weekly, September 9, 1995, p. 2248.
3. Bradford, E. W. C., Indian Medical Review, Government of India Press, New Delhi, 1938, p. 102.
4. https://en.wikipedia.org/wiki/Kadambari_Ganguly. Accessed on 2 April 2021 at 5:30pm
5. Ganguly and Bose's names were included later in the Bethune college of Alumni list. Ibid: Bethune College is a women's college located on Bidhan Sarani in Kolkata, India, and affiliated to the University of Calcutta. It is the oldest women's college in India. It was established as a girls' school in 1849, and as a college in 1879. But College has orthodox management who denied to give admission to Kadambari as well as Miss Bose based on different reasons: https://en.wikipedia.org/wiki/Category:Bethune_College_alumni Accessed on April 2, 2021 at 5:30pm
6. <http://uncover-ed.org/Kadambari-ganguly/>. Accessed on April 2, 2021 at 8:00pm
7. <https://en.wikipedia.org/wiki/op.Cit>.
8. The Times of India, 15 March 1883, p. 9.
9. <http://uncover-ed.org/Kadambari-ganguly/>. op. Cit.
10. Sen, B. K. (September 2014). "Kadambari Ganguly - An Illustrious Lady" (PDF). Science and Culture - Indian Science News Organization, vol.80, nos. 9-10, p.272. http://www.scienceandculture-ina.org/scp-get/2014/07%20Art_Kadambari%20Ganguly..by_B%20K%20Sen_Pg.271.pdf Accessed on April 2, 2021 at 8:00 pm.
11. <http://uncover-ed.org/Kadambari-ganguly/>. op. Cit.
12. Sen, op. cit.

NATIONAL CONFERENCE ON
"Dynamics of Women's Movement in India: Historical Legacy and Contemporary Challenges"
Supported By ICHR

13. Kopft David, History at Minnesota. Regents of the University of Minnesota. Archived from the original on 16 May 2006. Retrieved 5 November 2006.
https://en.wikipedia.org/wiki/Kadambini_Ganguly Accessed on April 2. 2021.
14. Chakrabarty, Roshni. "Kadambini Ganguly, India's first female doctor who made Calcutta Medical College start admitting women". India Today. Retrieved 26 March 2021. Accessed on April 5. 2021 at 7.45pm
15. Meherjyoti Sangle, " Women's Health Care and Women Physicians in the Bombay Presidency (1886-1947), Unpublished thesis, 2011, pp. 211-229.
16. Sen, op. cit.
17. Ibid.
18. Chakrabarty, Roshni, op.cit.
19. Sen, op. cit.
20. <http://uncover-ed.org/kadambini-ganguly/> op. cit.

४९

ISSN 0976-2957

साहित्य, कला, संशोधन व परिवर्तनवादी
पुरोगामी विचारांगी बांधिलकी ठेवणारे त्रैमासिक

अक्षरगाथा

वर्ष : अकरावे । अंक : दुसरा । १० जुलै-ऑगस्ट-सप्टेंबर २०२०



साहित्य, कला, संशोधन व पर्यावरणवादी पुरोगामी
विचारांगी बांधिलकी ठेवणारे प्रेमाधिक

अक्षरगाथा

भिट अंक

वर्ष : अकरावे । अंक : दुसरा । जुलै-ऑगस्ट-सप्टेंबर २०२०, नांदेड

संपादक : मा. मा. जाधव

परीक्षण समिती (Review Committee)	: डॉ. उमेश बगाडे डॉ. माधव पुटवाड डॉ. शैलेंद्र लेंडे	मुद्रिततपासणी राजेश मुखेडकर-९८९०१५३७००
संपादक मंडळ	: झीनत खान, स्मिता पाटील सोनाली नवांगुळ, बजरंग बिहारी विवेक घोटाले, संतोष मुरडकर	मुद्रक मुद्रा ऑफसेट प्रिंटर्स अँड प्रोसेसर्स शारदा टॉकीजवळ, एम. जी. रोड, नांदेड-०३.
कार्यकारी संपादक	: दिलीप चव्हाण, भगवान फाळके	मुखपृष्ठ सरदार जाधव
प्रकाशक	: अर्चना माधवराव जाधव बळीवंश प्रकाशन, 'बळीवंश', नृसिंह पॅलेसच्या मागे, नरहरनगर, नांदेड -५.	अक्षरमांडणी विजयकुमार चित्तरवाड अक्षरजुळणी दत्ता कोमटवार-८८८८९७१५७६

साहित्य व वर्गणी पाठविण्याचा पत्ता

मा. मा. जाधव

'बळीवंश', नृसिंह पॅलेसच्या मागे, नरहरनगर, नांदेड - ४३१ ६०५. भ्र. ९८८११९१५४३, ९४२२८७४३३६.

website : www.akshargatha.in e-mail : akshargatha@gmail.com

वार्षिक वर्गणी : व्यक्ती : ₹ ३००/- संस्था : ₹ ४००/- त्रैवार्षिक वर्गणी : व्यक्ती : ₹ ८००/- संस्था : ₹ १०००/-
१० वर्षासाठी : व्यक्ती : ₹ २५००/- संस्था : ₹ ३०००/- अंकाचे मूल्य : ₹ १००/-

● वार्षिक वर्गणी केवळ मनीऑर्डर/डी.डी./ रोखीने भरावी. ● त्रैवार्षिक व १० वर्षासाठीची वर्गणी मनीऑर्डर/घनादेश/घनाकर्ष (डी.डी.) 'अक्षरगाथा' या नावाने पाठवावा. ● मनीऑर्डरने वर्गणी पाठवताना पूर्ण पत्ता, पीन कोड, संपर्क क्रमांक लिहावा. अथवा भारतीय स्टेट बँक (S.B.I.) यशवंतनगर, नांदेड शाखेच्या 'अक्षरगाथा' खाते नं. 32204333102 (Current Account) वर Branch Code 1922 IFSC Code SBIN0001922 MICR Code 431002093 - वर्गणी रकम + ₹ ३० (शाखा विनिमय फीस) भरून पत्ता कळवावा.

महाराष्ट्र राज्य साहित्य आणि संस्कृती मंडळाने या नियतकालिकाच्या प्रकाशनार्थ अनुदान दिले असले तरी,
या नियतकालिकातील लेखकांच्या विचारांशी मंडळ व शासन सहमत असेलच, असे नाही.

* या अंकातील लेखांनून व्यक्त झालेल्या लेखकांच्या मतांशी संपादक, मुद्रक आणि प्रकाशक सहमत असतीलच असे नाही.
पृष्ठ क्र. ३ (मुखपृष्ठ व मलपृष्ठासह या अंकाची एकूण पृष्ठसंख्या १२४ आहे)

अक्षरागथा

जुलै-ऑगस्ट-सप्टेंबर २०२०

अ नु क्र म

विभाग : पहिला

- संत चोखामेळा : व्यक्तिच आणि अभिव्यक्ती

डॉ. माधव पुटवाड

७

विभाग : दुसरा

- कविता
- पीडा पीडितेला पिडते

छाया कोरेगांवकर
डॉ. नारायण भोसले

४०

४२

विभाग : तिसरा

- वैश्विक महामारी आणि मराठी साहित्य
- अण्णा भाऊंच्या शाहीरीतील कालातीतता
- मर्डेकोर मराठी कवितेची भाषाशैली
- पारशी-मराठी रंगभूमी आणि स्त्री भूमिका
- सत्यशोधक दासराव यांच्या साहित्याची समकालीनता

डॉ. सुनील अवचार
डॉ. दत्ता पाटील
डॉ. केदार काळवणे
डॉ. सतीश पावडे
प्रा. विश्वनाथ शिंदे

५३

५७

६५

७५

७९

विभाग : चौथा

- भटस्या जमाती आणि जमातवाद :
- जगत-वर्ग-लिगभावलक्ष्यी आकलन
- परीधान : पांडीवर आगरकरांनी केलेली समीक्षा
- कृषी कायद्यांची समीक्षा

प्रा. इनायत फटेशी
डॉ. मेहेज्योती सांगळे
समिनाथ घाळवे

८६

९४

९९

विभाग : पाचवा

- शालोभः चार शतकांतील ख्रिश्चन मराठी कवितेचे मौलिक संपादन
- तीन कवितासंग्रह : 'मायावीये तहरीर', 'पाण्यापास' आणि 'प्रेरानेया'
- वैचारिक मंथन : विचारशलाका

डॉ. देवानंद सोनटके
डॉ. पी. विठ्ठल
डॉ. राजेंद्र मार

१०४

१०९

११९

संपादकीय

‘अक्षरागथा’ नियतकालिकाचे अंतरंग सध्याच्या सामाजिक पारवर्धूमीवर बदलून ते सामाजिक, आर्थिक, सांस्कृतिक, राजकीय परिवर्तनशील रूपाने आविष्कृत करणारे असावे, असे मत संपादक मंडळाच्या सदस्यांनी व्यक्त केले होते. अर्थात, हे लेखन समकालीनतेत प्रश्नांची चिकित्सा करणारे अपेक्षित आहेत. त्यामुळे एकूण अंकांचे स्वरूप केवळ साहित्यानुवर्ती न राहता संशोधनपर, चिकित्सात्मक लेखनाला अधिक प्राधान्य देण्याचा प्रयत्न करणारे असणार आहे. कोरोनाव्या महाकाय रूपाने जाण्याची घडीच विस्कटून गेली आहे. केवळ हे एकमेव कारण आपले जाणे बदलण्याला कारणीभूत नाही, हेही सत्य आहे. आपली ध्येयधारणे, आपल्या देशातील सत्ता-संपत्तीकेंद्री होत असलेले लोकशाहीचे रूप, भांडवली व्यवस्था, जागतिकीकरण अशा अनेकविध कारणांनी आपल्या जगण्याचा व आपल्या लोकशाहीचा प्रवास एका मोठ्या संकटाकडे चालला आहे, हे कोणत्याही विवेकी माणसाला सहज लक्षात येत आहे. बरबर लोकशाही मूल्यांचा गजर चालू असून, त्या व्यवस्थेच्या मर्यादित सांविधानिक लोकशाही संपादिकांच्या प्राक्रियेचा वेग अधिक गतिमान होत आहे. त्यामुळे हा काळ आपासी लोकशाहीचा असून, त्याच्या आत भांडवली व्यवस्था, हुकूमशाही व परंपराग्रिय शोषणविचार दडलेला आहे. आपल्या लाभालाठी लोकशाही कशी वापरता येईल, हे अनेक संस्थांची कार्यपद्धती कशी बदलत आहे, हे पाहून आपल्या सहज लक्षात येते. सत्ता व राजकारण हे संस्थांचा व त्याव्यवस्थेचाही कसा वापर करत आहे, हे आपल्याला दिसत आहेच. या सर्व प्रश्नांची अनेकांनी उकल लेखनातून व्हावी, म्हणून अशा प्रश्नांची सहेतोड चिकित्सा करणारे लेखन प्रसिद्ध करण्याची ‘अक्षरागथा’ची भूमिका असणार आहे.

कोरोनाने धैर्यमान घातल्याच्या काळात संपूर्ण जीवनच बदलून गेले. मुख्य म्हणजे कोट्यवधी लोकांचा रोजगार गेला. मजूर, कामगार, छोटे व्यावसायिक यांची वाताहत झाली. एकूण समाजाचे केवळ अर्थकारणच बिघडले, असे नाही तर त्याबरोबर अनेक नवे सामाजिक प्रश्न गंभीर रूप घेऊन उभे राहिले. समाजाचे मानसिक स्वास्थ्यही बिघडले. जे बेरोजगार आहेत, त्यात आणखी भर पडली. कामात गुंतून असण्यापेक्षा रिकामे राहणे हे जीवघेणे ठरत होते. त्यातून पोटापाण्याचा मुख्य प्रश्न गंभीर रूप घेऊन उभा राहिला, त्याबरोबरच मानसिक स्वास्थ्य, बौद्धिक विचारशक्ती, कल्पनाशक्ती, नवे काही निर्माण करणारी सर्जनसमक ऊर्जा याला बरिस्त करवून लागल्यामुळे अनेकांचा कोंडमारा झाला. व्याधिग्रस्तांचे तर बेहाल झाले. विद्यार्थी ज्ञानार्जनाशिवाय थांबला. ऑनलाईन शिक्षणाचा काही मर्यादित विद्यार्थ्यांनाच लाभ घेता आला. या काळाची आणखी एक देण म्हणजे अनेक तत्त्वांची कल्पनाशक्ती, चिंतन करण्याची शक्तीच या माध्यमांनी संपन्न टाकली आहे. लेखन, वाचन व चिंतन स्वतंत्र विचार करण्याची, चिंतन करण्याची शक्तीच या माध्यमांनी संपन्न टाकली आहे. लेखन, वाचन व चिंतन यावर या समाजमाध्यमांचा वाईटच परिणाम अधिक झाल्याचे दिसून येते. विश्वातील कोणत्याही गोष्टीचे ज्ञान व माहिती आपल्या जवळच आहे, असा भास तर निर्माण झाला. परंतु, त्याचा प्रत्यक्ष उपयोग फारसा होत नसल्याचेच दिसून येत आहे. ज्या गोष्टीवर लक्ष केंद्रित करून कृती करणे आवश्यक होते, त्याऐवजी गरजेपेक्षा अधिक वेळ गरज नसणाऱ्या गोष्टी पण त्या समोर आल्या म्हणून पाहण्यात जात आहे. पूर्वी किराणा दुकानावर सामान आणण्याला जायचे असेल तर लागणाऱ्या साहित्याची यादी घेऊन जाऊन तेवढ्याच वस्तू आणल्या जात. पण, आता मॉल संस्कृतीत गरज नसणाऱ्या गोष्टीही समोर दिसल्यामुळे त्या गरजेच्याच बाजू लागल्या आहेत. तीच परिस्थिती वेळोवेळी समाजमाध्यमांच्या बाबतीतही पाहावयास मिळते. आपल्याला रिकामा वेळ आहे, ही गोष्टच चुकीची आहे. रिकामा वेळ असा नसतोच. आपण काम करण्याचा कंटाळा करतो. मर्यादित

परिधान : पगडीवर आगरकरांनी केलेली समीक्षा

डॉ. मेहेरज्योती सांगळे

विभागप्रमुख, इतिहास पदव्युत्तर विभाग, श्री. ना. दा. टा. महिला विद्यापीठ,
मुंबई-२०. प्र. ९८६९१७४५१९

साधारणतः पोशाखावरून व्यक्तीचे व्यक्तिमत्त्व समाजात ठरविले जाते. गोपाळ गणेश आगरकर यांनी 'सुधारक'मध्ये पोशाखावर सविस्तर समीक्षा केली आहे. प्रस्तुत पेपरमध्ये पगडीवर विविध दृष्टिकोनांतून चर्चा केली आहे. आगरकर यांच्या सुधारक लेखांचा आधार यासाठी घेतला आहे. या लेखांतून १९ व्या शतकामधील पोशाखावरील समाजाची मते, विचार, दृष्टिकोन प्रतिबिंबित होतात.

पोशाखाचा इतिहास हा आंतरविद्याशाखीय संशोधनामध्ये येतो. पोशाखाचा इतिहासामध्ये उगम, उत्क्रांती आणि विकास या घटकांबरोबर पोशाखाची उपयुक्तता, आराम आणि सौंदर्य या बाबी अत्यंत महत्त्वाच्या आहेत. भौगोलिक बदल, ऐतिहासिक वैशिष्ट्ये, सामाजिक रीती, व्यापार, औद्योगिकता, रोजगार, आर्थिक लाभ, कौशल्ये, कारागीर, लैंगिकता आणि नैतिकता हे मापदंड या विद्याशाखेमध्ये अभ्यासात येतील. प्रादेशिकता, धार्मिक परंपरा, सण, उत्सव यांनुसार पोशाखामध्ये बदल होतात. परिधानाचे तत्त्वज्ञान हे वास्तुतत्त्वनाकार, शिल्पकार, चित्रकार आणि नाट्यक्षेत्र यांमधील विकसित झालेले आढळते.

साधने:

आधुनिक काळातील पोशाखाचे संशोधन करताना मानववंशशास्त्र आणि कला इतिहासकाराचे कार्य महत्त्वाचे आहे. सरकारी अहवाल, कापड गिरण्यांचे अहवाल, चित्रे, शिल्पे, स्थापत्य, साहित्य, संग्रहालये, वर्तमानपत्रे, प्रवासवर्णने इ. साधने अभ्यासात येतील. अर्थात, शिल्पे आणि संग्रहालयातील पोशाखाची माहिती परिपूर्ण नसते. त्यासाठी सखोल निरीक्षण,

त्या त्या काळातील परंपरांचे ज्ञान असणे आवश्यक असते. त्यामुळे काही मर्यादा त्यावर पडतात.

अॅनाल्स विचारसरणी

अॅनाल्सच्या विचारसरणीनुसार संस्कृतीच्या अभ्यासाबरोबरच LEISURE आरामदायी या संकल्पनेचा विचार हा परिधानाच्या संशोधनासाठी कला येईल. कोणतीही संस्कृती ही पोशाखाने मानवी शरीराचे सौंदर्य वाढविते आणि शरीराला सजवते. फर्दिनंड ब्रॉडेल यांच्या सैद्धांतिक विचारानुसार संस्कृतीचा अभ्यास हा दैनंदिन जीवनाचे संशोधन करताना आणि आर्थिकदृष्ट्या समीक्षा करताना त्यावर इतर सामाजिक प्रभाव इतर घटकांवर सातत्याने होतो असा विचार त्यांनी Civilization and Capitalism, 15th to 18th Century या ग्रंथात मांडला आहे. पोशाख हे संस्कृतीचे वैशिष्ट्य आहे. पोशाखामधून मानव स्वतःला अनेक प्रकारे व्यक्त करू पाहतो.^१ पोशाखावरून व्यक्तीचे भविष्य जोखण्याच्या पद्धती पाश्चात्य देशांत विकसित असून समाजमानवर त्याचा प्रभाव आढळतो.

खरे पाहता पोशाख परिधान करणे याचा अर्थ झाकण्याची प्रक्रिया होय. चार्ल्स केवर्स यांच्या मता नुसार पोशाखाच्या इतिहासामध्ये तीन पायऱ्या आहेत. नग्नता, आच्छादन आणि परिधान या होत. या पायऱ्या कोणत्याही गोष्टीना विभागात, जसे नग्न मनुष्य, झाकलेला मनुष्य आणि पोशाखातील मनुष्य. म्हणजेच नैसर्गिक, सभ्यता आणि कला - काहीच नसणे, काहीतरी असणे आणि सौंदर्य? नैसर्गिक, सभ्यता

आणि कला... या तीन पायऱ्या नैसर्गिकतेकडून मानवी संस्कृतीपर्यंत येतात. प्राचीन काळात पोशाखाची सुरुवात ही आच्छादनापासून झाली तरी नंतरच्या काळात हानिकारक शक्ती किंवा जादूटोणा यांच्यापासून संरक्षण करण्यासाठी पोशाखाची सुरुवात झाली.

अर्थात या विषयावर मानसशास्त्रज्ञ, सि. इ. म. जोड म्हणतात - ऐश्वर्य, शक्ती, कुवत, अभिप्राय, अंमल, सामर्थ्य आणि गुंढता ही व्यक्तीच्या पोशाखावर अवलंबून असते. पोशाखामुळे व्यक्तीचे स्थान, प्रतिष्ठा कळते. परिधान व्यवसायामध्ये ग्राहकांना केंद्रित ठेवून प्रतिष्ठा, वर्ग, वय, प्रादेशिकता, धर्म (त्यानुसार सण), जात, लिंग आणि प्राप्तिव्यवस्थे व्यापारी चिन्ह या दृष्टीने उत्पादन केले जाते. व्यवसायाचे हे विभाग जनसामान्यांच्या दैनंदिन व्यवहारांमध्ये प्रतीत झाल्याचे दिसतात.

पोशाख आणि नैतिकता

लोकांमधील काही ओळी,
The art of dress never begin
Till Eve, our mother, learnt to sin
“पोशाखाच्या कलेची सुरुवात काहीही झाली नाही; जोपर्यंत आमची आई-एव्ह ही पाप करायला शिकली.”

पोशाख हा शरीरातील बदल झाकणे किंवा शरीरातील पूक आणि आवश्यक घटकाच्या दृष्टीने पाहणे वेगळे. १९ व्या शतकातील काही समाजशास्त्रज्ञांनी संस्कृती, व्यक्ती आणि काही सामाजिक गट यांनुसार पोशाखाचा विचार केला. पोशाखाचे सामाजिक मानसशास्त्र १९ व्या शतकामध्ये विकसित झाले. रोच - हिगिन्स यांच्यानुसार घरगुती अर्थशास्त्रज्ञ यांनी पोशाखाचा प्रभाव आर्थिक दृष्टीने विचार केला. १९५० पासून पोशाख आणि मानवी वर्तन याचा विचार हा अर्थशास्त्र, समाजशास्त्र, मानसशास्त्र, सामाजिक मानसशास्त्र यांनी कल्पनास सुरुवात केली. अर्थशास्त्रज्ञ यांनी पोशाखाचा प्रभाव आर्थिक दृष्टीने विचार केला. १९५० पासून पोशाख आणि मानवी वर्तन याचा विचार हा अर्थशास्त्र, समाजशास्त्र, मानसशास्त्र, सामाजिक मानसशास्त्र यांनी कल्पनास सुरुवात केली.

स. न. धर यांच्यानुसार पोशाख आणि नैतिकता यांचा कुठेही प्रत्यक्ष संबंध येत नाही, पोशाखावरून लज्जास्पद भावना आणि पापयुक्त विचार येणे हे केवळ

त्या व्यक्तीच्या मानवी मनाचा भाग आहे! मानवी मनामध्ये विकारात्मक भावना निर्माण होण्याच्या प्रक्रियेत तत्कालीन सामाजिक चाली-रीती, प्रथा, परंपरा यांची भूमिका असते. पितृसत्ताक पद्धती, लिंगभाव त्या अनुषंगाने स्त्री-पुरुषांकडे व्यक्तिमत्त्व न पाहता वस्तूच्या दृष्टीने जोखलाने पोशाखाबरोबरच संस्कृतीमध्ये नवीन नैतिकता सुरू झाली. याची सैद्धांतिक विकिरण सामाजिक मानसशास्त्रामध्ये केली जाते.

भारतीय पुरुषांचे पोशाख

पोशाख हा कालपरतबे बदलतो. मध्ययुगीन काळामध्ये भारताच्या वस्त्रोद्योगाने परमसीमा गाठली होती. राज्यकर्ते विविध प्रकारच्या पोशाखांचे शौकीन होते. मराठा कालखंड ने ब्रिटीश काळातील हिंदू पुरुषांच्या पोशाख आणि व्यवसायामध्येही कालपरतबे बदल झाले. मराठा ने पेशवा या काळात शरीराच्या वरील भागासाठी जाकेट, कुडते, अंगडे, अंगरखा, डगला आणि झगा इत्यादी वस्त्रे मराठा काळात वापरले जात. अंगरखा साधारण कमरेपर्यंतचे वस्त्र असे. सरदार झगा घालीत. चिता कापड, रेशम, आणि किनवाय कापडपासून अंगरखा बनवीत. विशेषतः त्याबरोबर अंगरखा हे खांद्यावरून विविध पद्धतीने घेत. पायजमा, इजारा, तुंबा, गुमान, सुवर आणि धोतीचा वापर केला जाई. साधारणतः दरबारातील सरदार झपाबरोबर पायजमा किंवा धोती वापरत असत. धोतीला काठाच्या नक्षीवरून विविध नावे आहेत. बदलीसाठी सोने, चांदी किंवा तांबे इ. च्या धार्यांनी किंवा या धातूंच्या तारोनी सुती कापडावर किंवा रेशमी कपड्यावर विणत असत. विशेषतः लष्करातील अधिकारी झगा हा बदलीने बनवला जाई. डोक्यावर पगडी किंवा पगोट असे. विविध धातूंचा- सोने, चांदी, मोती, हिरा-पाचू याचा वापर पगडीला अलंकारांनी सुशोभित करण्यात केला जाई. भरतक्षी व भजरी अंगरखे असत.

शिससंरक्षण

मानवी शरीरामध्ये डोक्याला इतर शरीरीक अवयवांमध्ये महत्त्वाचे मानले आहे, उत्कर्ष करण्यात

आणि उदर मेंदूंचे आवरण असलेला हा भाग जाणीव आणि जीवन प्रदान करणाऱ्याचे तत्त्व या प्रतीकांचा निर्देश मिमर्तःच करतो. डोक्याला विज्ञानाचा एक संक्षिप्त अंश मानले जाते. वैदीक धर्मशास्त्रामध्ये शिराला आध्यात्मिक व पवित्र मानले आहे. हा विचार अनेक संप्रदायांनी स्वीकारला आहे. धार्मिक स्थळामध्ये शिर झुकवणे हे जाणीवपूर्वक प्रमात्म्यापुढे समर्पण करण्याचे प्रतिक मानले जाते. अपघातात्मक किंवा जाणीवपूर्वक धोक्यापासून संरक्षण करणाऱ्यासाठी शिर नेहमी आच्छादित ठेवण्यावर भर दिला आहे. धूल, ऊन, पाऊस, थंडी यापासून डोक्याचे संरक्षण करणे, अति उष्ण किंवा अतिथंड हवामान, संवेदनशील कातडी, जीवनशैली, व्यवसाय, आरामदायी, हौशी इ. बाबींवर पागोट्याची लांबी आणि कापडाचा प्रकार बदलला जातो. त्यामुळे भारतात स्त्री-पुरुषांचे डोके हे समारंभपूर्वक आच्छादित करतात. हिंदूमध्ये पाडी किंवा पागोटे वापरतात. प्रस्थापित पितृसत्ताक व सामाजिक प्रथा आणि चालीरीती यानुसार हिंदू स्त्रियांच्या डोक्यावरही वस्त्र कायम ठेवणे बंधनकारक आहे. 'सिर ढकनां' असा वाक्यप्रचार यामुळे प्रचलित आहे. शिराजवळील संवेदनशील कातडीला आघात होऊ नये यासाठी कॉटन, रेशीम, मलमलचा वापर पाड्या बनवण्यासाठी केला जाई.

पाशातय देशामध्ये स्त्री आणि पुरुष दोघेही टोपी वापरतात. हॅट कधी, कोठे, कशी वापरावी याचे शिष्टाचार आहेत. कारण हॅट वापरणे हे सन्मानाचे चिन्ह मानले जाते. स्त्रियांसमोर, चर्चक्या समोर जाताना किंवा अंत्यसंस्काराला जाताना हॅट सन्मानपूर्वक काढली जाते. आधुनिक वैद्यकशास्त्रामध्ये व्यक्तीच्या मेंदूच्या स्थितीवर त्याचा जीवन-मृत्यू ठरविण्याची संकल्पना (Brain Dead) जगभर टूट झाली आहे. आजच्या काळात ही जरी फॅशन असली तरी खेळडू आणि सर्वसामान्य नागीक वाहन चालविताना वापरणारे हेल्मेट ही याच प्रकारामध्ये येते.

पाडी

भारतीय संस्कृतीमध्ये पाडीला सन्मान व शान

आहे. पाडी आणि मिशी हे भारतीय पुरुषांचे दर्दनी रूप समजले जाते. प्रत्येक राज्यात पाडी दैनंदिन आणि विशेष समारंभात विविध पद्धतीने घातली जाते. विविध रंगामध्ये असणाऱ्या पाड्या या प्रादेशिकतेची ओळख देतात. उदा., मराठी पाडी ही गुलाबी आणि केशरी रंगामध्ये असते. आजकाल त्याला फॅशनची जोड मिळाली असल्याने विवाहामध्ये सर्व जण (स्त्री आणि पुरुषही) घालतात.

'सुधारक'

इ. स. १८८८मध्ये 'सुधारक' या आगरकांच्या साप्ताहिकाला आगरकांनी परबड वाणीने राजकीय, सामाजिक आणि धार्मिकतेच्या पाखंडावर हल्ला चढविला. 'इथ असेल ते बोलणार आणि साध्व असेल ते करणार' या ब्रीदाला अनुसरून त्यांनी 'सुधारक'मध्ये प्रखर टीका केली. पागोट्यावर आगरकांनी 'सुधारक'मध्ये दोन लेख लिहिले आहेत.

फॅशनबद्दल आगरकांचे विचार कालातीत दिसतात. ते म्हणतात, "फॅशन उर्फ त-हा ही आंधळी आणि लहरी असते. विचाराचा दाब झुगारून देऊन एकदा ही तळवीच्या अधीन झाली म्हणजे ही कोणकडेही भडकत जाईल किंवा हिला कसले वळण लागेल, 'साक्षात ब्रह्मदेवाच्यानेदेखील सांगावणार नाही.' आगरकांच्या मते, कोणत्याही वस्तूची किंमत ही त्याचा उपयोग आणि त्याची शोभा या प्रकारे करता येते. आवश्यकता आणि चैन याचाही विचार करणे महत्त्वाचे आहे.

'सुधारक'मध्ये आगरकर पाडीच्या संदर्भात आपली मते स्पष्ट करतात. व्यवसायानुसार परिधानमधील बदल आगरकर मान्य करतात. "अंगरखा आणि पागोटे ही वस्त्रे आपण थोडाफार फेरफार करून मुसलमानांपासून उचलली असवीत. कारण, आश्रमात जीवन जगणाऱ्या आणि यज्ञयागामध्ये जीवन व्यतीत करणाऱ्या ब्राह्मणांना पाडी, अंगरखा किंवा झपाची आणि पायजम्याची गरज पडली नसेल." मात्र, कालांतराने ब्राह्मण दरबारात नोकरी करू लागले, त्या वेळी ह्या पोशाखाची त्यांना गरज

पडू लागली असावी. वस्त्रे ही व्यवसायानुसार असावी. स्थिती बदलली तर आपल्या चालीरीतीत, चालचलवणुकीत बदल करणे गरजेचे आहे.

बुद्धिमत्ता आणि पाडी

तत्कालीन सामाजिक प्रथांवर प्रखर हल्ले चढवताना, सर्वांनी ह्या पाड्या घालणे इष्ट नाही, असे आगरकांना वाटले. ही फक्त बुद्धिमान लोकांनी घालावी, असे आगरकांचे म्हणणे आहे. बुद्धिमान लोकांनी पाड्या घालून त्यांच्या व्यक्तिमत्त्वात भर घातली. उच्च विद्वान केलेपत नाना छत्रे आणि कृष्णशास्त्री चिपळूणकर हे मोठाली पाडी वापरत असत; परंतु ते बुद्धिमान असल्याने त्यांना त्या मोठाल्या पाड्या चांगल्या दिसत. वि. ना. मंडलिक, कृ. ल. नुरकसुद्धा मोठे पागोटे घालत असत. छोटे पागोटे न्यायभूमी म. गो. रानडे यांनी प्रचलित आणले. मुंबई विद्यापीठामध्ये पदवीदान समारंभात या छोट्या पाडीचा प्रवेश झाला.

आगरकरांना जसे वस्त्रामधील बदल आणि स्थिरचंतरे ही अपरिहार्य आहेत आणि ती केली पाहिजेत, हे अभिप्रेत आहे त्याचप्रमाणे समाजातील चालीरीती, अनिष्ट प्रथांमध्येपण विचारपूर्वक बदल करावेत, असे ते आवकून प्रतिपादन करतात. मात्र, वस्त्रामध्ये उपयुक्ततेचा आणि दर्शनीयतेचा विचार असावा. कारण, विचारपूर्वक केलेली सुधारणा ही टिकाऊ आणि सुखवह असते. एवढी कडक असण्यात पाड्याच्या समाजामध्ये विविध दळणवळणाच्या साधनामुळे तेवढी पाळली जात नाही. जे योग्य आहे तसाच बदल सातत्याने समाजाने अंगिकारावा असे आगरकांचे म्हणणे आहे.

त्यांना पागोट्यातील बदल आवडला नाही. ते म्हणतात, "अलीकडील पागोटे ही छत्रे झाले आहे." त्याची अनेक कारणे ते देतात. पाडीची तुलना ते पूर्वीच्या कानटोपी, शालजोडी किंवा पंच्याशी करतात. "पेशवाईत ब्राम्हणाची पाडी ही मुसलमानांच्या पाडीप्रमाणे होती. मात्र, पेशवाई बुडाली आणि आमची अक्कल आमच्या डोक्यातून बाहेर पडून आमच्या पाडीत शिरली." १६

पूर्वीच्या अधिहीन्याची टोपी आणि आताची पाडीचा आकार सातत्याने वाढत गेला आणि ब्रिटिशांच्या कालखंडात या पाडीने अण्णवी नवे रूप घेतले. आगरकर 'पाडी आणि पागोटे' मध्ये आपल्या प्रखर शैलीमध्ये टीका करताना म्हणतात की, "पाडी म्हणजे कोष्ट्यांनी विणलेल्या कापडाच्या तुकड्याचे शिच्यांनी शिवलेले कायमचे पागोटे व पागोटे म्हणजे..... केळे काय ! पट्ट्या काय ! कोकी काय ! सोरच तहेवाइक !... पागोटे म्हणजे कोष्ट्यांनी विणलेल्या नाना तहेच्या कापडांच्या लांबच्या लांब व त्याची पाडबंदानी डोक्यावर, गुडघा किंवा लाकडाच्या ठोकळ्यावर विशिष्ट रीतीने गुंडाळून तयार केलेली हंगामी किंवा टेंपरवारी पाडी!" १७ पाडीच्या पट्ट्या वारंवार बांधण्या लागतात. पाडी ही कापूस, अलावन, रेशीम यापासून बनवलेली असत. साधारणतः मानवी शरीराच्या कातडीसाठी कापूस, अलावन, रेशीम योग्य होते. पागोट्याचा उपयोग नाही हे सिद्ध करण्यासाठी पाडी तयार करण्यात सुभवात केली. मात्र, पाडी ही कायमची असल्याने ती बराच काळ वापरल्याने तिचा नंतर कसलाही उपयोग होत नाही. खर्चाच्या मानाने पाडी फवडत नाही.

पाडीच्या मानाने पागोट्याचे फायदे अनेक आहेत, पागोट्यावर केलेल्या खर्चाचा पूर्णतः पैसा वसूल करता आला पाहिजे, असे आगरकर सांगतात. "बिहिरीनून पाणी काढण्यासाठी, जनावरांना दावे करण्यासाठी, कोणाच्या मुसक्या बांधण्यासाठी, एवढेच काय तर बालंतिणीचे पोटे बांधण्यासाठी आणि आदी मृत्यू झाल्यावरदेखील शरीर झकण्यासाठीही त्याचा उपयोग करता येतो. पुन्हापुन्हा बांधण्याची, स्वच्छ धुवण्याची आणि रंगवण्याची सोय पागोट्यात आहे. त्यामुळे घामटपणा आणि विकटपणा बराच टाळता येतो. पागोटे निरोपयोगी जरी झाले तरी त्यानंतर त्याचा इतर कामांसाठी उपयोग करता येतो.

स्वच्छतेच्या दृष्टीने पाडी आणि पागोटे निरुपयोगी आहेत. कापडाची मोठी लांबी, घाम, त्यात पाण्याची दुर्भिक्षता यामुळे ही वस्त्रे सतत धुतली जात नव्हते.

महिनोन्महिने ही वस्त्रे तशीच वापरली जातात. तिथे सूक्ष्म जीवांचा प्रादुर्भाव होतो आणि त्यामुळे शारीरिक त्रास संभवतो. पगडी आणि पागोट्याच्या पट्ट्या फाटल्या की त्या पुन्हा दुरुस्त करता येत नाहीत.

पगडी आणि पागोट्याचे कार्य हे शिराचे रक्षण करणे हे आहे; मात्र पगडी आणि पागोटे ही दोन्ही शिरस्त्राणे मोठे वादळ, वारा, पाऊस यात काहीच रक्षण करत नाही. पगडी ही अशी असावी की ती डोक्यावर घट्ट बसावी. सुसाट वाऱ्यामध्ये हाताने जर पगडी किंवा पागोट्यास धरले नाही, तर दोन्ही हात धोतर आणि अंगरखा सावरण्यात गुंतलेल्या असल्यास डोक्यावरील पगडी किंवा पागोटे याला सावरण्यास एक हात मोकळा ठेवणे गरजेचे आहे, अन्यथा ते जमिनीवर पडेल यात शंका नाही. प्रखर ऊन व पाऊस यामध्ये पागोटे संरक्षण करते, मात्र पगडीचा काहीच उपयोग होत नाही उलट पगडी पावसाच्या पाण्याने चिंब भिजते आणि जड होऊन डोक्याला त्याचा त्रास होतो.”^{१८} मात्र आपण रूढीमध्ये इतके गुलाम झालो आहोत की, आपण याचा विचार करत नाही आणि यावर दुसरा उपाय शोधत नाही. आगरकर प्रखर टीका करताना म्हणतात, “असल्या चुंबळी डोक्यावर वागवून एकसारखे त्यांच्या तैनातीस असण्याचे काम, रूढीच्या पाशाने ज्यांचे हातपाय पूर्णपणे जखडून गेले आहेत अशा आमच्या हिंदूशिवाय दुसऱ्या कोणाच्यानेही व्हावयाचे नाही! गुलामांच्या राष्ट्रांतील सजीव वस्तुप्रमाणेच निर्जीव वस्तूंचीही गुलामगिरी बिनतक्रार करणार.”^{१९}

स्वतः आगरकर पागोटे वापरत असत, पण त्यासाठी ते सांगतात की, “आम्ही बोलते सुधारक आहो, कर्ते सुधारक नाही !! आम्हाला चांगली वाटलेली गोष्ट करणे, किंवा वाईट वाटलेली टाकून देणे हे केवळ कार्य हे आमच्या सोयीवर किंवा तब्येतीवर अवलंबून आहे! आम्ही बोलल्याप्रमाणे चालत नाही.”^{२०} याचा अर्थ पुढे लोक प्रतिशंका घेतील. त्यावर ते म्हणतात की मग आमचा उपदेश कोणी ऐकणार नाही आणि त्याची छाप लोकांवर पडणार

नाही. पुढे ते प्रखर हल्ला चढवतात, अमुक गोष्ट चांगली आहे, असे तोंडाने म्हणून तदनुसार त्याचे आचरण केले असता तिचा लवकर प्रसार होण्याचा संभाव असतो. परंतु, प्रत्येकाने स्वतःची विवेकबुद्धी वापरावी आणि त्यानुसार ती अमलात आणावी.

निष्कर्ष

पगडीऐवजी शोभा, उपयुक्तता, सहज वापर, आरामदायी leisure, स्वच्छता या दृष्टीने रुमाल वापरल्यास ते चांगले होईल, असे आगरकर नमूद करतात. मद्रासमध्ये एक रुपयापासून ते १०० रुपयापर्यंत रुमाल विकत मिळतात, याची ते माहिती देतात. त्याच्या शैलीनुसार रुमालाचे अनेक फायदे सांगतात. रुमाल सुशोभित करण्यासाठी आगरकर काही उपाय सुचवितात. वेळोवेळी भरजरी काठ रुमालाच्या कडेला लावल्यास त्याचा श्रीमंतीचा बाज वाढेल. पगडी किंवा पागोटे याचा उपयोगाच्या दृष्टीने, सौंदर्य, शोभा किंवा चैन याचा विचार केल्यास आगरकरांना १०० पैकी ५ गुणदेखील देणे अशक्य वाटते.

तळटिपा आणि संदर्भ:

१. Arvind Ganachari ' The Annales School ; History Beyond Traditional Frontiers' , in K. K. Shah & Meherjyoti Sangle (ed.s), Historiography: Past and Present, Rawat Publication, Jaipur, 2005, pp. 97-9.

२. S. N. Dhar, Costumes of India and Pakistan, D. B. Taraporevala Sons & Co. , Bombay, p. 1.

३. कित्ता.

४. ग. प्र. प्रधान (संपा), आगरकर लेखसंग्रह, साहित्य अकादमी, २००४, ७ वी आवृत्ती, पृ. २४३.

५. कित्ता, पृ. २४४.

६. कित्ता.

७. कित्ता.

८. कित्ता, पृ. २४५.

९. कित्ता, पृ. २४८-४९.

१०. कित्ता, पृ. २४६.



Original Research Article

Learning with peers: Does that foster critical reasoning?

Swati Paranjape^{1,*}, Madhavi Dharankar²¹Dept. of Physiotherapy, Seth GS Medical College, Mumbai, Maharashtra, India²Dept. of Educational Technology, SNDT Women's University, Mumbai, Maharashtra, India

ARTICLE INFO

Article history:

Received 08-08-2020

Accepted 13-08-2020

Available online 10-09-2020

Keywords:

Peer learning

Critical reasoning

Group dynamics

Group composition

Physiotherapy education

ABSTRACT

Background: Health science education is competency based education where one needs to critically think and analyse the problem. Critical thinking is meta-cognitive process where self-learning and meaningful learning are integral. Peer-learning helps in fostering higher order thinking and provides the environment for meaningful learning. There is a mixed evidence of effectiveness of peer learning. Very few studies have addressed changing group dynamics, group composition and its effect on critical reasoning ability. Hence present study aimed to assess effectiveness of peer-learning on critical reasoning ability, in physiotherapy undergraduate students, with changing group composition.

Methodology: This quasi experimental two group crossover study was conducted in two phases. Total 37 fourth year physiotherapy students were involved in the study by convenient sampling. The students were randomly allocated in two groups. In first phase, Group One was sub-grouped based on scores of content knowledge test taken before experiment, by grouping high, medium and low scorers together. Group Two was given a freedom to choose their partners. In second phase groups crossed over. Five case-based sessions were conducted in each phase and both groups fulfilled the objectives, by peer discussion within their sub-group. Outcome measure was health science critical reasoning ability using Health Science Reasoning Test score.

Results: There was no significant difference found in the test scores between both the groups. This study does not favour the effectiveness of the peer-learning in improving critical reasoning skills. There found no effect of changing group composition on critical reasoning ability. The results could be content and discipline specific.

© 2020 Published by Innovative Publication. This is an open access article under the CC BY-NC license (<https://creativecommons.org/licenses/by-nc/4.0/>)

1. Introduction

Health science education is competency based education. There are various implicit and explicit ways by which students learn e.g. in classroom lectures, clinical postings, laboratories. They learn through observations, practice, discussions, with and from each other. Thus peer learning is integral part of health science education. In order to be competent health professional one needs to possess ability to critically think and analyse the problem. Meaningful learning is important component of critical thinking.¹ Peer learning provides students meaningful learning environment

through social interactions.²

There has been research on effectiveness of peer learning on improving critical thinking or reasoning abilities. When the literature was searched for the present paper there was mixed evidence found in favor and in contrast to the effectiveness peer learning in improving critical reasoning abilities. Also it highlighted pitfalls in the research on the critical reasoning. Literature showed mixed evidence and was inconsistent as far as peer group design was concerned. There were very few researches found addressing the crucial part of group design and its effect on learning outcomes. Group dynamics was found to affect amount and quality of communication between peers which ultimately affects learning outcomes.³ Therefore this study was undertaken to

* Corresponding author.

E-mail address: swati.paranjape@kem.edu (S. Paranjape).

find effectiveness of peer learning on critical reasoning with changing group composition in physiotherapy education.

2. Review of Related Literature

In literature peer learning takes various terminologies like

1. Peer tutoring,
2. Peer mentoring
3. Collaborative learning,
4. Co-operative learning,
5. Near peer teaching,
6. Group learning.

2.1. Conceptual frame work

Literature provides the conceptual framework of the peer learning as well as addresses the key concepts to be considered in designing the research.

1. Falchikov (2003) have focused, on design, delivery, and evaluation of peer-tutoring, and its context. Report explores the key terms and issues around “peer”. It gives the context and provide practical guide for implementing the peer-learning. Importantly the report details the interactive factors operating and interacting with respect to the group design and characteristics and roles of the peers which were the focus of this paper.³
2. Topping (1996) in their review article have highlighted the need of quality in research design. They reported that peer learning being a very small part of curriculum its benefits can't be ascertained in terms of generalizability and measurability.⁴
3. Topping (2005) have explored more details on peer learning in their article, where important factors and variables affecting the study design and ultimately the learning outcome have been highlighted which was relevant to the present study.⁵

2.2. Critical reasoning

Literature on critical reasoning had the consensus on the importance of critical reasoning and how difficult it is to teach.

1. Willingham (2008) in their report have explored extensively on misconceptions, factors to be addressed while teaching the critical reasoning to the students. They highlighted importance of integrated approach, role of domain knowledge, self-learning and imbibing the “right type of thinking at right time” when it comes to critical thinking.¹
2. Persky et al. (2019) in their review article have focused on the importance and barriers of the critical thinking. They report the personal perceptive and cognitive characteristics can influence the critical thinking

ability. Critical thinking ability can be enhanced however takes lot of practice and efforts.⁶

3. Edwards (2007) highlighted difficulties of teaching critical thinking due to complexity of concept. Researcher emphasizes the need of critical thinking to be cultivated, learned, developed and practiced.⁷

3. Review of Related Research

As mentioned earlier when the research was reviewed on the effectiveness of peer learning on critical thinking there was mixed evidence found.

1. Gokhale (1995) when studied individualized versus collaborative learning, concluded that both are effective to improve factual knowledge but for critical thinking collaborative learning was more beneficial.⁸ Whereas Johnson et al. (2010) when used combined model of collaborative, team based social annotation model learning system they found no improvement in critical thinking.⁹
2. Dörner et al. (2019) found 2:1 peer learning model in clinical set ups enhances the critical thinking abilities among respiratory physical therapists.¹⁰ Burns et al. (2013) in their pilot study in anesthesia nursing students found no improvement in critical thinking and highlighted the need to explore more on instructional strategies.¹¹
3. Karami et al. (2012) in their quasi experimental study found that collaborative learning is effective in improving critical thinking.¹² When it comes to effectiveness of peer learning, literature highlights the importance of group dynamics as it affects amount and quality of communication between peers which ultimately affects learning outcomes. Group dynamics is complex as it is influenced by the group design, characteristics and role of peers.³ However research reports give mixed evidence and are inconsistent as far as peer group design is concerned.
4. Damodar et al. (2009) studied the effect of random allocation of peer group versus combined group of low, medium and high scorers.¹³ They found better achievement in combined group. Whereas Wing-yi Cheng et al. (2008) found that heterogeneity is not the determinant of learning efficacy.¹⁴
5. Senior and Howard (2014) studied the factor of friendship in group formation and found it to be effective.¹⁵ Similar findings were reported by Roberts (2009).¹⁶ However Greco & Morris, (2005) contradict the assumptions.¹⁷

There found no research report, addressing the crucial part of group design and its effect on critical reasoning. Thus the research question emerged as follows.

3.1. Research question

“What is the effect of changing group composition in peer learning on critical reasoning ability?”

To address this research question following study was conducted under title “Learning with Peers: Does that Foster Critical Thinking?”

3.2. Research objective

Objective intended to be fulfilled through the study was as follows

To compare effectiveness of groups formed through equating peer-led approach and groups formed through learners’ choices peer-led approach to case-based learning in physiotherapy education in terms of health science critical reasoning ability.

3.3. Hypothesis

In context of the present study following null hypothesis was to be tested.

There is no difference in the effectiveness of groups formed through equating peer-led approach and groups formed through learners’ choices peer-led approach to case-based learning in physiotherapy education in terms of health science critical reasoning ability

3.4. Methodology

The research methodology adopted for the present study was as follows;

3.4.1. Research design

This was quasi experimental two group pre-test post-test cross over study design. It was conducted in two phases. All the eligible participants were involved after obtaining the written informed consent. Study was approved by Institutional Ethics Committee of the researcher’s institution.

3.4.2. Population

Physiotherapy education is a UGC approved discipline. In Maharashtra it is under the Maharashtra University of Health Sciences, (MUHS), Nashik. Approximate population size was 1500 fourth year physiotherapy students from 40 colleges of physiotherapy across State of Maharashtra

3.4.3. Sample

All the participants were selected by convenient sampling from the Physiotherapy School and Centre. Sample size was 40. Student sample was between 21 to 23 years of age. However repeater students were excluded from the study. The resultant 37 students were included in the study.

3.4.4. Experimental treatment

Before the experiment began all the participant students underwent the content knowledge pre-test. Then the students were randomly allocated in two groups A & B. Group A was sub-grouped on basis of this pre-test score. High, medium and low scorers were grouped together in such a way that mean scores of all subgroups is equal. This group was the equating group. Group B was allowed to choose their sub-group partners. This group was learner’s choice group. After 20 days of wash out period these groups crossed over. Group A, then was allowed to choose their partners whereas Group B was sub-grouped on basis of equating scores. In each phase five case-based sessions were conducted where real life case scenarios were presented. Students were also given the objectives to fulfill by peer group discussion. Students were allowed to refer the resources like internet, books, and notes during the peer group discussions. They were expected to brain storm and discuss within their sub-group. Discussions or taking help from the other sub-groups were not permitted. After each session they were given the related case-let to solve. Students underwent the health science critical reasoning ability assessment before the beginning of experiment and after each phase of experiment.

Design and flow of participants through experiment is depicted in Figure 1.

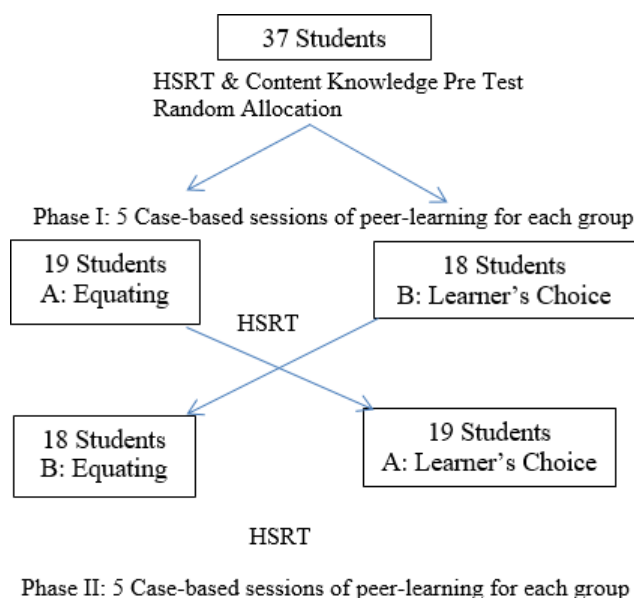


Fig. 1: Design & flow of participants through experiment

3.4.5. Tools for data collection

The tool used to assess the critical reasoning ability was Health Science Reasoning Test (HSRT). This instrument is developed by Insight Assessments.¹⁸ It is commercially available standardized tool to test critical reasoning skills

Table 1: Statistical analysis of normality testing for health science critical reasoning ability

Parameter	Mean	SD	SE	n	D	$D_{n,\alpha}$ 0.05	$D_{n,\alpha}$ 0.01	Distribution
Learner's Choice	15.37	5.27	0.86	37	0.16	0.14	0.16	Normal
Equating	15.13	4.86	0.79	37	0.13			Normal

D= Observed value, $D_{n,\alpha}$ = Critical Value

Table 2: Summary of inferential statistics for health science critical reasoning ability between equating and learner's choice group

	Mean	df	't' Obs	Table value 0.05	Table Value 0.01	CI 95%	'p' Value	Significance
Equating	15.13	36	0.41	2.03	2.72	-0.14 To 0.94	0.67	No
Learner's Choice	15.37	36						

df = Degrees of freedom, 't' obs = Observed 't' value, CI= Confidence Interval

specifically in health science professionals. This test is specially calibrated for trainees in Health Sciences educational programs, undergraduates and graduates. The HSRT overall score targets the strength and weakness of one's skill in making reflective and reasoned judgments.¹⁸ The test was administered online.

3.5. Results and findings

The data of the test scores were subjected to normality testing using Kolmogorov Smirnov Test.¹⁹ The statistical analysis is summarised in the Table 1.

3.5.1. Observations

1. The mean test scores in group formed through learner's choice peer-led approach were higher than group formed through equating for health science critical reasoning.
2. Data were normally distributed.¹⁹

Data were normally distributed, hence analysis for the significance of difference of mean between both the groups for health science critical reasoning ability was done using paired 't' test.²⁰ Inferential statistics is summarized in Table 2.

3.5.2. Observations and interpretations

1. Mean scores of HSRT were more in the learner's choice group as compared to equating group.
2. Observed 't' value was lower than critical 't' at 0.05 and 0.01.
3. The calculated 'p' value for significance of difference of mean between the groups was observed to be higher than the desired significance level ($p > 0.05$).

3.5.3. Findings

1. Difference of mean in HSRT scores between group formed through equating and through learner's choice peer-led approach was found to be statistically not significant.
2. the difference between the groups was statistically not significant the null hypothesis was retained.

The striking finding of the present study was, no improvement seen in the health science critical reasoning ability in both the groups. There was no significant difference between both the groups.

1. Previous literature has shown that peer learning or collaborative learning helps improving critical thinking which is core competency.^{1,21} Peer discussions, brainstorming, conflicts and disagreements are termed as "Cognitive conflicts" which contributes to learning.²² Dealing with conflicts fosters higher order critical thinking. However the present study findings contradict these findings.
2. Previous study done in nursing anaesthesia practice has shown similar results as present study, where they found no improvement in critical reasoning skills in their pilot analysis, where they used concept mapping technique.²³ That puts forth the need of more in depth research on the instructional strategies.
3. In nursing practice, studies have shown the traditional care practices have been shown to be superior in teaching critical reasoning skills.¹¹ Critical reasoning is one of the core competences which play a crucial role in problem solving.¹
4. However studies showed that critical or scientific thinking is based on domain and practice. It is not a set of skills which can be taught or deployed regardless of context or cannot assure once learnt can be applied in any situation. Process of thinking is not a skill. It is inter-wined with domain of knowledge. It is a thought process. It is seen that those with better prior integrated knowledge perform better.¹
5. Certain personal barriers have been identified which may hinder enhancement of critical thinking. Those are students' perceptual problem, weak metacognitive

4. Discussion of Results

skills, fixed mind set, heuristic or short cut way of thinking, inherent biases. In present study there could have been the influence of the personal attributes of the students influenced the results, however that cannot be endorsed due to lack of evidence.

6. Critical thinking is difficult to be developed and requires enormous practice. It is estimated about ten years of practice to develop critical thinking.⁶
7. Scientific thinking needs to be taught hand in hand with scientific content. Present experiment was based on the existing curricular program and the results highlight the need of strategic thinking on the curricular reforms which requires more integrated approach.
8. This was first ever formally designed experiment for the participating students where they were involved in brainstorming, group discussion which was self-regulated.
9. Probably the long term exposure and in depth exploration of the instructional strategy, nurturing and inculcating all throughout curriculum may foster better outcomes. That puts forth need of future research on role of peer-learning in improving critical reasoning.

5. Conclusions

This study does not favour the effectiveness of differential group composition in peer learning in improving critical reasoning skills. There found no effect of changing group composition on critical reasoning ability.

6. Limitations

The results could be content and discipline specific. Hence may not be generalised for different domain, content or discipline

7. Remedial Measures and Future Suggestions

This study has put forth the need of the future in depth research on the peer-learning instructional strategy and critical reasoning ability. Integrated curricular approach where scientific thinking goes hand in hand with scientific content and long term exposure may help in exploration of development of critical thinking.

8. Source of Funding

None.

9. Conflict of Interest

None.

References

1. Willingham D. Critical Thinking: Why Is It So Hard to Teach? *Arts Educ Policy Rev.* 2008;109(4):21–32.
2. Pittenger AL, LimBybliw AL. Peer-Led Team Learning in an Online Course on Controversial Medication Issues and the US Healthcare System. *Am J Pharm Educ.* 2013;77(7):150.
3. Falchikov N. Learning Together; 2003. doi:10.4324/9780203451496
4. Topping KJ. The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Educ.* 1996;32(3):321–45.
5. Topping K. Trends in Peer Learning. *Educ Psychol.* 2005;25(6):631–45.
6. Persky AM, Medina MS, Castleberry AN. Developing Critical Thinking Skills in Pharmacy Students. *Am J Pharm Educ.* 2019;83(2):7033.
7. Edwards S. Critical thinking: A two-phase framework. *Nurse Educ Pract.* 2007;7(5):303–14.
8. Gokhale AA. Collaborative Learning Enhances Critical Thinking. *J Technol Educ.* 1995;7(1). doi:10.21061/jte.v7i1.a.2.
9. Johnson TE, Archibald TN, Tenenbaum G. Individual and team annotation effects on students' reading comprehension, critical thinking, and meta-cognitive skills. *Computers Hum Behav.* 2010;26(6):1496–1507.
10. Dorner S, Fowler T, Montano M, Janisse R, Lowe M, Rowland P. Implementing a peer-learning approach for the clinical education of respiratory therapy students. *Can J Respir Ther.* 2019;55:21–7.
11. Burns SM, Mendel S, Fisher R, Cooper K, Fisher M. Critical Thinking in Nurse Anesthesia Education: A Pilot Study. *J Curriculum Teaching.* 2013;2(1). doi:10.5430/jct.v2n1p83.
12. Karami M, Pakmehr H, Aghili A. Another View to Importance of Teaching Methods in Curriculum: Collaborative Learning and Students' Critical Thinking Disposition. *Procedia Soc Behav Sci.* 2012;46:3266–70.
13. Damodar KS, Lingaraj J, Shabina KC, Shankarappa C. Performance-based stratified grouping to enhance peer learning. *Med Educ.* 2009;43(11):1092–3.
14. Cheng RW, Lam SF, Chan JC. When high achievers and low achievers work in the same group: The roles of group heterogeneity and processes in project-based learning. *Br J Educ Psychol.* 2008;78(2):205–21.
15. Senior C, Howard C. Learning in friendship groups: developing students conceptual understanding through social interaction. *Front Psychol.* 2014;5. doi:10.3389/fpsyg.2014.01031.
16. Roberts D. Friendship fosters learning: The importance of friendships in clinical practice. *Nurse Educ Pract.* 2009;9(6):367–71.
17. Greco LA, Morris TL. Factors influencing the link between social anxiety and peer acceptance: Contributions of social skills and close friendships during middle childhood. *Behav Ther.* 2005;36(2):197–205.
18. Health Sciences Reasoning Test (HSRT) [Internet]. Insight Assessment. 2020 [cited 28 July 2020]. Available from: <https://www.insightassessment.com/article/health-sciences-reasoning-test-hsrt-2>.
19. Ghasemi A, Zahediasl S. Normality Tests for Statistical Analysis: A Guide for Non-Statisticians. *Int J Endocrinol Metab.* 2012;10(2):486–9.
20. Kim T. T test as a parametric statistic. *Korean J Anesthesiol.* 2015;68(6):540.
21. Stone R, Cooper S, Cant R. The Value of Peer Learning in Undergraduate Nursing Education: A Systematic Review. *ISRN Nurs.* 2013;2013:1–10.
22. Dolmans DHJM, Wolfhagen IHAP, van der Vleuten CPM, Wijnen WHFW. Solving problems with group work in problem-based learning: hold on to the philosophy. *Med Educ.* 2001;35(9):884–9.
23. Maneval R, Filburn M, Deringer S, Lum G. Concept Mapping: Does It Improve Critical Thinking Ability in Practical Nursing Students? *Nurs Educ Perspect.* 2011;32(4):229–33.

Author biography

Swati Paranjape Assistant Professor

Madhavi Dharankar Associate Professor and Head

Cite this article: Paranjape S, Dharankar M. Learning with peers: Does that foster critical reasoning?. *J Educ Technol Health Sci* 2020;7(2):66-71.



Conceptual Review

Peer learning in health sciences-exploring pedagogy

Swati Paranjape^{1,*}, Madhavi Dharankar²¹Dept. of Physiotherapy, Seth G S Medical College, KEM Hospital, Mumbai, Maharashtra, India²Dept. of Educational Technology, SNDT Women's University, Mumbai, Maharashtra, India

ARTICLE INFO

Article history:

Received 07-04-2021

Accepted 25-04-2021

Available online 17-05-2021

Keywords:

Peer-learning

Pedagogy

Learning to learn

Student-centric

ABSTRACT

Learning is a social experience. In most of the health science disciplines students learn in variety of environments like clinical placements, laboratory and lecture-based setting. Peer learning can be a component in any of these environments. However, effectiveness of peer learning on learning outcomes is not extensively researched as like other formal instructional strategies. Present paper aims to discuss the conceptual understanding, theoretical basis and possible effects of peer learning on aspects of learning outcomes. This can offer the background information to design the future research on peer learning instructional strategy. Peer learning is beneficial pedagogical learning strategy which has all round effect on the process of learning. Cognitive benefits and outcomes on the learning as well as psychosocial outcomes like behaviour, critical reasoning, motivation, and appreciation of team work are also noted. However, scarcity and diversity in the research on peer learning makes it difficult to ascertain its benefits or shortcomings in terms of measurability and generalizability. Inclusion of peer learning as student centric, flexible and individualised approach can complement the individual needs of the learners. Comprehensive understanding of peer learning process, improved study designs considering the factors affecting group dynamics, and more representative sampling techniques can help overcome the barriers and can result in better understanding of this approach in health science education.

© This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

1. Introduction

Learning is a social experience. In most of the health science disciplines students learn from variety of environments such as clinical placements, laboratory and lecture-based settings. Students, learn from their own experiences, by interacting with the other fellow students or senior students and also by observations. Availability of the technology, social networking web 2 tools, for exchanging ideas and sharing knowledge has enhanced the opportunities to the students to go beyond curriculum. It was found that the undergraduate medical students extensively use 'Facebook groups' to seek advice from peers on study related issues or exam preparation. ¹ Learners integrate this information through their personal framework. All these

ways of learning, influence the learner's thought process, application, problem solving abilities and decision making, in real life situations. Peer learning can be a component of any of these environments e.g. when students help each other in clinical settings there occurs unintentional or incidental learning. ² Researchers have emphasized the fact that peer learning being a very small part of the curriculum, ascertaining its benefits in terms of measurability and generalizability is not possible. ³ There is a need of understanding the peer learning process. In present paper we focus on understanding peer learning as a 'process'. We discuss the conceptual understanding, theoretical basis, possible effects and shortcomings of peer learning on aspects of learning outcomes. This can offer the background information to design the future research on the peer learning instructional strategy.

* Corresponding author.

E-mail address: swati.paranjape@kem.edu (S. Paranjape).

2. Origin and Theoretical Perspectives of Peer Learning

Origin of peer learning can be found way back in 19th century. The comprehensive concept of peer learning was introduced by Jean-Pol Martin in 1987.⁴ However, peer learning was introduced in 1951 at 'Free University of Berlin' in higher education. It is seen that students can learn best when they are in intellectually motivating and challenging environment. One of such environments could be peer learning. This can be explained on basis which is related to the pyramid of hierarchy of needs introduced by Abraham Maslow, which consists, from base to peak, of

1. Physiological needs
2. Safety/security
3. Social/love/belonging
4. Esteem/self-confidence
5. Being/growth through self-actualization and self-transcendences.

The act of successful learning, preparation and teaching of others contributes to items three through five which essentially moving towards personal growth.⁵ Vygotsky (1930) quoted 'the one, who does the talking, does the learning; students learn by teaching their peers'. Some researchers have put forth cognitive theories, like Piagetian theory of constructivism along with Vygotsky's theory as basis of peer learning.⁶ These theories can help describing specific techniques used in peer learning. Some researchers have identified peer learning as instructional model based on the constructivist's theory of collaborative and cooperative learning.⁷

3. Historical Versus Contemporary Perspectives

Historically peer learning was considered more as pedagogical strategy; however, things have begun to change. The digital era has totally changed the way of learning. Rather than knowing how to do what is important today is to know where to look for. Recently a new term was introduced as "Peeragogy" in 2013. They gave peer learning a new perspective where the paradigm shifted from pedagogy to andragogy.

In educational reforms the traditional teacher-led model was challenged and the experiential learning was introduced. It supported learning as active and constructive process. It was argued that digital era has exposed the limitations of learning theories. A broad term "paragogy" was introduced which they called as a set of principles to understand learning together and "peeragogy" is specific term about peers learning together and teaching each other. Pedagogy refers to "child being supervised" whereas andragogy necessitates the adult educator or facilitator to be a part of the process. However actually these two are two ends of spectrum, rather than opposite terms. In peer-based

set up the role of teacher or facilitator is shared by all the participants.

1. Learners bring their own experiences, strengths and weaknesses.
2. Process goes through phases of forming, norming, storming and performing.
3. Group cohesiveness is important. It defines acceptable behavior and practices.
4. Group works more cyclic way than linear fashion.
5. Conflicts or chaos can lead to either productive or destructive outcome.
6. If one can't cope can feel depressed and frustrated.
7. Too much hierarchical control can make participants passive and too much autonomy can lead to ignorance, misconception and chaos.⁸

4. Conceptual Understanding

What is peer learning and who can be called as peer? When it was used first in 1951, peers were considered as the ones of same age and educational level. However, peer has been described as someone of same social standing. Peer group is of those at same status with whom one interacts.⁴ Whiteman (1988) classified peers as 'near-peers' i.e. tutors at more advanced level than tutee while 'co-peers' as partners at work deemed to be at same level.⁴ Peers have no power over each other by virtue of their position or responsibility.⁹ Thus, peer is the student at same or different academic or experience level and learning is acquisition of knowledge, understanding or skill through instruction or experience.² Thus peer learning is described as

"Acquisition of knowledge and skill through active helping and supporting among status equals or matched companions. It involves people from similar social groupings who are not professional teachers helping each other to learn and learning themselves by so doing".³

Peer learning involves form of student interaction with their peers and is designed to aid process of learning.⁴ Peer learning is an example of active learning where students get engaged into meaningful learning through not only by complex authentic problems but also social interactions.⁷ This social component in learning is unique feature of peer learning. Usually, peer learning approaches are used for learning outcomes like

1. Academic achievement
2. Meta-cognitive outcome
3. Study skills outcome
4. Nonacademic outcome like motivation, retention, attrition and attendance.⁴

There are various ways in which the recruitment of the peers is done. Peers can be same level equal/unequal status, cross level equal/unequal status. As there are varied methods used for group formation and recruitment of peers, groups

are structured in variety of ways where group members can assume different roles and can exchange the roles. The group dynamics is found to be affected by variety of factors which ultimately reflect the learning outcome.

1. Status congruence or consistency
2. Helping behavior
3. Self esteem
4. Recipients' reactions to help
5. Attributions by the recipient about help⁴

When groups are allocated randomly multiple factors interact and influence group dynamics. Factors like attitude or personality of the peer leader or group member, where a dominating person can take over the session. For a successful and productive outcome there needs trust, confidentiality and mutual respect among participants.¹⁰ Interpersonal dynamics, learning styles of individual learners play a crucial role in peer learning. The one who is more agreeable and open can embrace peer learning better. One needs to give up competitiveness and nurture sharing their own knowledge as well as appreciate uniqueness of others.¹¹

5. Forms of Peer Learning and Related Terminologies

Over the years peer learning has taken various forms like peer tutoring, peer mentoring, peer assessment and collaborative or cooperative learning. The understanding of definitions of peer learning, differences between various terminologies is necessary. Though these terms are used interchangeably they are different. 'Tutoring' is characterized by specific role taking as tutor and tutee, whereas 'mentoring' is more of one-to-one interaction from more experienced worker. Whereas cooperative learning is described as 'structuring positive interdependence', which often requires prior training or else it can result in 'blind leading the blind'. In cooperative learning teacher intervention is expected in setting the goals and also in measuring and evaluating the educational achievements.⁹ In collaborative learning open ended but focused task is set. Here activity may be set by teachers but means of achievements are left to learners.⁹ Collaborative learning is more about 'learning to learn'. One must remember that interaction with peers differs qualitatively than that with the professional teacher, which may have its own advantages and disadvantages.¹²

It is observed that initial trend of recruiting the "best students" as helpers is changing to same level as helped, so that both of them face equal cognitive challenges.¹³

6. Benefits of Peer Learning

Research suggests number of benefits to participants in co-operative learning environment. It can be in form of enhancing motivation, increasing academic performance

and retention, creativity, appreciation of diversity, and community skill development.⁴

Students find peer learning as a "safe learning environment".^{2,10} Maybe due to emotional support of fellow learners,¹⁴ comfort level, and freedom of expression. Students feel peers provide non-threatening feedback.²

Importantly peer learning not only helps learning material in question but also helps to learn about learning.¹⁵ It helps improving study habits, communication skills and self-confidence.² In peer learning learners learn through discussion and assimilation and not by rote.¹⁶ Peer discussions, brainstorming, conflicts and disagreements are termed as "Cognitive conflicts" which contributes to learning.¹⁰ Peer learning can give opportunity to a student to take responsibility of their own learning.⁹ Absence of instructor can be beneficial as it encourages self-directed learning. It can encourage reflective practice, self-awareness and lifelong learning competency. Often teachers provide information to the learners however it deskills the learners from developing one crucial competency of learning from each other. When teacher provides information skill of getting accurate information is never learnt. What is important to be learnt is 'how to judge the accuracy of information we receive'.⁹

7. Shortcomings of Peer Learning

Peer learning however can't replace the other instructor led approaches all together. As mentioned earlier the success of the peer learning entirely depends on the factors affecting the group dynamics. Being social individuals, many peers may not be willing to offer honest feedback to peers compromising on their social relationship.¹⁷ In competitive environment one may find idea of sharing one's knowledge with the others not very appealing. There could be inhibition whether one can really learn from peers.⁹ There could be conflict or apprehension about learning from peers than learning from experts in learner's mind.¹⁷ Students may find it lacking the details and can prefer learning from instructors rather than peers.² The biggest concern raised against peer learning is quality of the learning. Peer tutors or peers are neither content expert nor professional teachers.¹⁷ So quality is questioned as they lack complete knowledge and credibility.¹⁵ There may not be regulation over the content, so there is possibility of incorrect information being conveyed or learnt.¹⁰ Students may not be able to pullback and read through situation like professional teacher.¹⁶

8. Research Challenges and Pitfalls

When it comes to research on peer learning, Topping (1996) have emphasized the need of quality in design and execution of research. As discussed earlier, group dynamics is crucial and it directly influences learning outcomes. Hence considering group dynamics and controlling the

confounding factors is extremely essential. It was stressed that assessment in peer learning should be broadened including assessment of its impact on cognitive abilities and transferable skills. There was a concern raised on the generalizability of the research on peer learning.¹ Due to the social nature of peer learning, in light of socio-cultural theory, learning and in context with which it takes place are inseparable.¹⁷ Therefore, results of the peer learning experiments in controlled settings can't be assumed to apply in complex learning settings.

In spite of the differences in the opinions among researchers over possible benefits and shortcomings about peer learning it can certainly be recommended as supplementary strategy to augment the benefits on learning outcomes which can complement the individual needs of the learner. There is also a need of extensive strategic research on peer learning.

9. Conclusion

The literature on peer learning ascertains the benefits of peer learning. The uniqueness of peer learning is in its social aspect, where it can teach critical reasoning, self-directed learning and nurture lifelong learning. Peer learning not only offers cognitive benefits but also psychosocial benefits.

Present system emphasizes on teaching more than learning. Still the teaching remains teacher centric as most form of teaching occurs in form of classroom lectures. There needs shift the paradigm to student centric, individualized, problem based and flexible teaching programmes. Each student's approach to learning differs, which may differ not only from other student but also from the teachers' perspective. Understanding of learners' process of learning rather than teachers' teaching techniques is need of an

hour. Peer learning can prove a good adjunct to fill this gap. Peer Learning strategy is still underutilized may be due to its shortcomings, especially about the generalizability of the research findings in actual real-life scenarios. However, the answer to that is full proof research strategies needed to be adopted. As this paper highlights inclusion and consideration of factors and their interaction in group dynamics is crucial in designing future research. Quality of learning is also often questioned where teacher intervention to certain extent can control the quality of content being delivered or conveyed. However, when the objective fulfilment is left on the learners, it encourages self-confidence, decision making and most importantly learning how to learn. Potentials of this relatively less explored alternate teaching learning strategy can also prove a cost-effective adjunct to mainstream strategies.

10. Source of Funding

This paper or work was not supported financially by any of the funding agency or individuals.

11. Conflict of Interest

The authors declare that there is no conflict of interest.

References

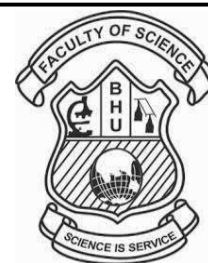
1. Pinilla S, Nicolai L, Gradel M, Pander T, Fischer MR, Borch P, et al. Undergraduate Medical Students Using Facebook as a Peer-Mentoring Platform: A Mixed-Methods Study. *JMIR Med Educ*. 2015;1(2):e12-e12. doi:10.2196/mededu.5063.
2. Henning JM, Weidner TG, Marty MC. Peer Assisted Learning in Clinical Education: Literature Review. *Athl Train Educ J*. 2008;3(3):84–90. doi:10.4085/1947-380x-3.3.84.
3. Topping KJ. The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Educ*. 1996;32(3):321–45. doi:10.1007/bf00138870.
4. Falchicov N, Blythman M. Learning Together. 1st ed. London: Routledge/Falmer; 2003.
5. Mathes E. Maslow's Hierarchy of Needs as a Guide for Living. *J Humanist Psychol*. 1981;21(4):69–72.
6. O'Donnell A, King A. Cognitive Perspective on Peer Learning. 1st ed. Hoboken: Taylor and Francis; 2014.
7. Pittenger AL, LimBybliw AL. Peer-Led Team Learning in an Online Course on Controversial Medication Issues and the US Healthcare System. *Am J Pharm Educ*. 2013;77(7):150. doi:10.5688/ajpe777150.
8. Corneli J, Danoff CJ, Pierce C, Ricaurte P, Macdonald LS. Pub Dom Ed Press. 2016.
9. Boud D, Boud D, Cohen R, Sampson J. Making the move to peer learning. *Peer Learning in Higher Education: Learning from and with each other*.
10. Sole G, Rose A, Bennett T, Jacques K, Rippon Z. A Student Experience of Peer Assisted Study Sessions in Physiotherapy. *J Peer Learn*. 2012;5:42–51.
11. Ladyshevsky R. Building Competency in the Novice Allied Health Professional through Peer Coaching. *J Allied Health*. 2010;39(2):77–82.
12. Burgess A, McGregor D, Mellis C. Medical students as peer tutors: A systematic review. *BMC Med Educ*. 2014;14(1). doi:10.1186/1472-6920-14-115.
13. Topping K. Trends in Peer Learning. *Educ Psychol*. 2005;25(6):631–45.
14. Christiansen A, Bell A. Peer learning partnerships: exploring the experience of pre-registration nursing students. *J Clin Nurs*. 2010;19(5-6):803–10. doi:10.1111/j.1365-2702.2009.02981.x.
15. Glynn LG, MacFarlane A, Kelly M, Cantillon P, Murphy AW. Helping each other to learn – a process evaluation of peer assisted learning. *BMC Med Educ*. 2006;6(1). doi:10.1186/1472-6920-6-18.
16. Ray S, Ray M. Incorporation of peer learning in first MBBS curriculum to enhance metacognition skills. *AJMS*. 2012;5(4):339–41.
17. Bennett D, O'Flynn S, Kelly M. Peer assisted learning in the clinical setting: an activity systems analysis. *Adv Health Sci Educ*. 2015;20(3):595–610. doi:10.1007/s10259-014-9557-x.

Author biography

Swati Paranjape, Assistant Professor

Madhavi Dharankar, Associate Professor and Head

Cite this article: Paranjape S, Dharankar M. Peer learning in health sciences-exploring pedagogy. *J Educ Technol Health Sci* 2021;8(1):12-15.



“From Sheep to Chic” For Wellbeing & Livelihood of Life & Environment

Mallika Dabhade- Samant^{*1} and Anshu Sharma²

^{*1}MKSSS's School of Fashion Technology, Pune, PhD Scholar at SNDT Women's University, Mumbai.
mallika@soft.ac.in

²Department TSAD, (Textile Science & Apparel Design) SNDT Women's University, Mumbai, India.
tsad@sndt.ac.in

Abstract: The paper exposes an unrevealed Textile from the rural parts of India- “Ghongadi”- a handspun, hand woven pure woolen blanket. Ghongadi is one of the most vital part of dressing as well as source of income of the nomadic community of Shepherds. Beside its natural aspects of being eco-friendly & sustainable from process to product, the additive values involve minimal usage of water, no use of energy, medicinal properties & mythological mentions; that makes this woolen blanket truly “Holistic”. Despite of being holistic in nature, Ghongadi has still remained undiscovered from Fashion scenario because of its typical stance of being just a blanket. The research aims at discovering the craft of “Ghongadi” & its scope in fashion context by proposing its ecofriendly, sustainable & holistic facet which has never been considered earlier & provide an opportunity to bring its worth to the conscious fashion world. To overcome the typical stance of “Ghongadi” by keeping its traditional as well as cultural significance intact; was a challenge in the product development specifically for the Fashion market. The exploration needed a strong base & apt methodology for understanding how the current market accept the changes done to the existing craft. Due to the extremely limited resources & data unavailability on the Craft; the methodology comprises extensive Interaction, Communication, Observation & Field work with the Artisans through a comprehensive Exploratory Research. The Data Collection through the market analysis in terms of Consumer scan & Fashion scan using a survey was essential in order to find the scope for “Ghongadi” if launched as a Fashion Product. This was conducted with a stratified sample consisting a mix of Fashion & Craft conscious people from Education, Design, Craft & Industry. The research is an initiative to highlight the craft into fashion context that answers the current needs & demands of global fashion agenda from eco & sustainable prospect. This also focuses “Economical, ethical, sustainable, holistic wellbeing & livelihood of Life & Environment” by promoting the

craft & community with a paradigm shift through a well thought Design/Fashion Product.

Index Terms: Holistic & Sustainable Craft, Life and Environment. Product Exploration, Woolen Blanket, Wellbeing & Livelihood,

I. INTRODUCTION

“It is time to slow down and consider the true cost of choosing quantity over quality.”(Kate Fletcher, an “eco-textile” consultant & author) The Indian Craft sector has been the pivotal in boosting the Economy of the country as they cater to the most authentic, original and pure products and processes in Traditional Crafts. The Textile crafts from India are known for its exceptional handmade and hand-crafted manner right from the use of Raw Material, the Manual Processes and the ultimate Product, which are the reflections of purity and identity of almost every state of India. The oldest techniques, the knacks of making and the authenticity of the process requires time, energy and man force to accomplish the Craft and hence are extremely tedious and time consuming. Despite of slow production speed, the Crafted products are known for its Quality, Durability and Sustainability for its lasting character. The communities from various states of India strive hard to retain these processes that create a plunged economy for themselves with a safe environment & surroundings for the future generations. These communities of “Craft Persons” indulge in variety of platforms that promote not only the “Sustainable Craft” but are also meant to provide source of income to the people who are involved in the production. According to Alison Gwilt (2014) Such source of income preserves the well-being & livelihood of the people and surroundings.

Such specialty of almost each Indian Textile, has always been a reason behind why they have always remained in the common

^{*}Corresponding Author

taste of the consumers acceptance, how globally they have made their mark to be most authentically hand-crafted products and have always been considered as “Classics” when it comes to the Craft conscious Consumers wardrobe.

India’s rich craft heritage has also been utilized and exposed through Fashion initiatives as Designers, Retail Brands, Education Institutes have promoted and exercised them for creating products as per Global taste & demand. Cole Mellino (2013) mentions that such exposure in Fashion field has leashed tremendous opportunities for the Craft as it churned the economy within that particular community by bringing in Business and Trade Openings.

As mentioned by Alison Gwilt & Timo Rissanen, (2011) the worth of such crafts has been portrayed in the very known “Sustainable Practices” because of the Nature of Production. Hence these Indian Textile Crafts have now become the most desired resources when it comes to Green & Sustainable Products as a global requirement. Which indeed has established an incredible response towards Indian Textile Craft sector as well as the Community who produce the craft.

But since every coin has two sides, there is other side for this scenario too. The numerous crafts and communities are flourished due to various initiatives and exposures, there still remains a cluster of Craft, that still have been ignored and never been explored.

Hence this research paper exposes one of such Textile from the rural parts of Maharashtra called “Ghongadi”.

II. WHAT IS “GHONGADI”

The “Ghongadi” is a regional name given to a khadi Blanket which is hand spun, hand woven in pure Desi wool. Produced by the Sub Community of Shepherds from rural parts of Maharashtra (One of the prime states of India) (Fig.1.1). The woolen Blanket- “Ghongadi” is known by various other names such as “Kambal & Kambli” in various regions of India for quite a few degrees of coarseness & softness of the surface. Vinutha Mallya (2017) says that the any Community dealing with Wool related supplies are believed to be the nomadic community of the shepherds, who breed, herd, posse and maintain the sheep and this maintenance involved timely cutting their hair. The Shepherd then sell these hairs to the Sub- Community who could make yarns out of those hairs, which are hand spun, naturally processed enabling them to weave together using a basic floor loom into the fabric- known to be as “Ghongadi”.

This Textile is an important piece of accessory used by both communities for their nomadic lifestyle as they required to walk long distances to provender the herd of sheep. This Ghongadi caters to all the needs of each seasonal changes comprising heat, cold and Monsoon which helps the shepherd to use it as a cape to protect from monsoon, cool for heat of summer and warm for the cold winter.

Dorina O, (2006) the natural coating of cellulose, crimp texture and heat absorbing property makes this textile a multi seasonal textile. Since the actual use of the textile was in the form of long piece- a Blanket, it was also used to cover the body, as a bed spread to sleep on and as a cape in the extreme seasons which were the most fundamental requirement of the nomads that were

fulfilled by Ghongadi.

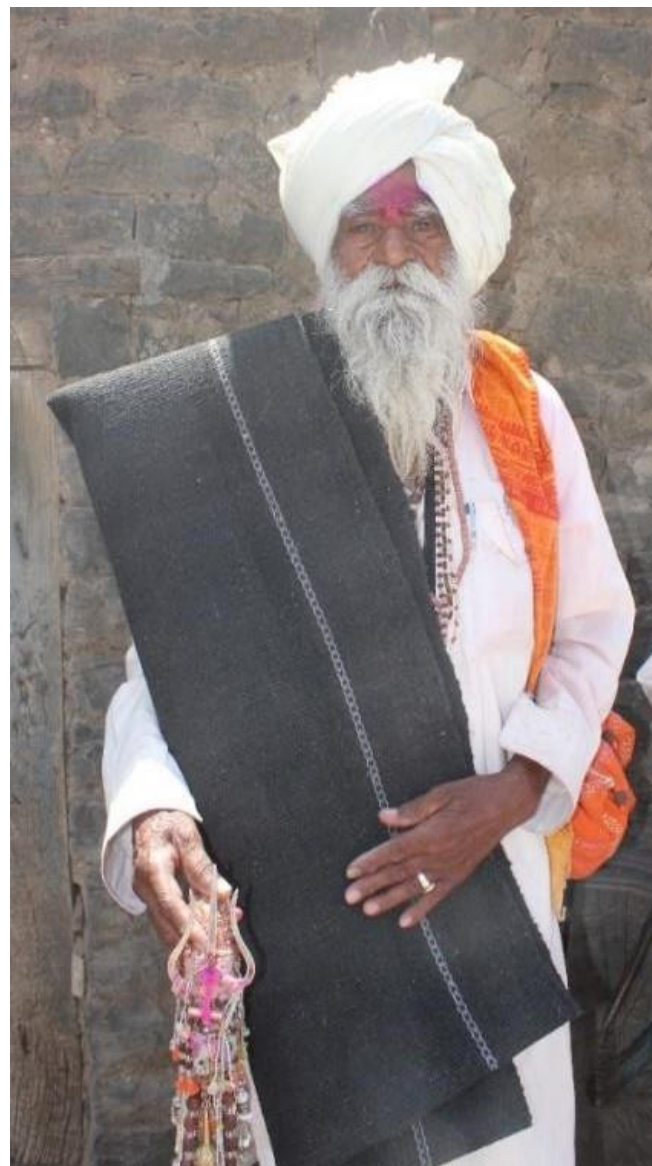


Fig. 1.1 “Ghongadi”- The Khadi Woolen Blanket of Rural Maharashtra

A. Characteristics of Ghongadi

Moman. H. (2018) specifies the characteristics that depend on the location and the sheep breed. The characteristics of wool fiber to withstand the extreme heat, cold and water repellent nature has reflected in the strong character of the textile made from it. Since it complies all these aspects in the textile- Ghongadi, it has been the most vital part of any Shepherds life style which even reflected in their clothing.(Fig.1.2)

According to the community, the Ghongadi also has certain therapeutic Properties. The course texture and crimp formation of the wool fiber gives a coarse uneven surface that creates a compression on acupressure points giving relief to person sleeping on it.



Fig. 1.2 Shepherds of Maharashtra- (Image courtesy- www.Ghongadi.com)

They also believe that such pressure points are also good to reduce Blood pressure, relief from back aches and even good to sleep on post-delivery as a floor covering or Carpet. (Fig.1.3) Komppa J.(2017)

The community also mentions that the smell of the wool fiber which is little pungent, keeps away the moth and reptiles making it very safe for putting on the floor and use it for the variety of the purpose.

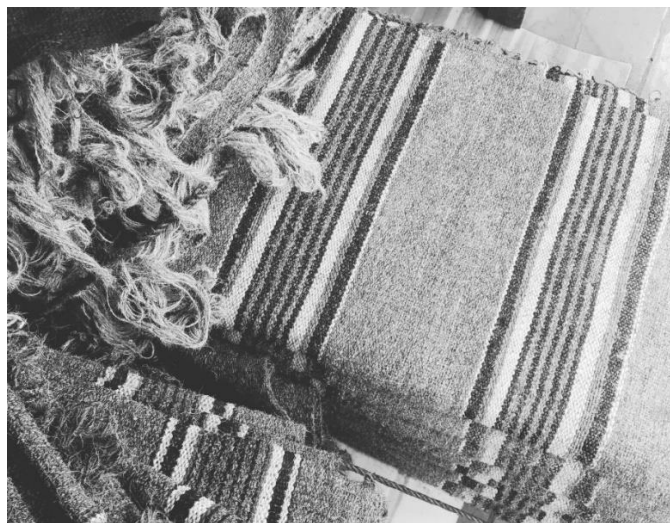


Fig. 1.3 The Multi-purpose Ghongadi

B. Community Beliefs

The community and Ghongadi together also had a great participation in the history of Maharashtra. The Great Emperor-Maharaja Shiv Chatrapati who ruled the state; had a special context of the community as they were the important community as a part of Shivaji army as well as the spies who used to wander

and get the newscast from different areas of the kingdom to the king.

Geetha Rao, (2012) Every Indian Community has their own beliefs, faith and set of sumptuary laws. The Shepherds are also not an exception for the same. Having the most pure form of textile as an important part of the lifestyle, the Community also believes in ritualistic standing of the textiles as their belief in deity God & Totem of the community- Khandoba,(Fig.1.4) in the nearest place of Pune called Jejuri to be their Idol who himself was from a Shepherds family. Hence, its believed to offer Ghongadi to the God as a symbol of respect and ritual. Due to the most pure nature, the Ghongadi is offered to the other God such as Vithalla of PandharPur (Fig.1.5) and Kalu Mama who believed to be a heavenly divine saint of the community.(Fig.1.6)



Fig. 1.4 Khandoba of Jejuri



Fig. 1.5 Vithalla of Pandharpur



Fig. 1.6 The Kalumama of Kadgaon
(The Ritualistic context of Ghongadi as offering to Deity.)

C. The Mythological Significance of Ghongadi

The making of Ghongadi, the Process incorporates a full attention of the weaver. Steps involved in process such as yarn winding on Charkha or applying starch and Dye to yarns or weaving requires complete attention and hence known to be a craft that requires coordination of senses, and connection to Body, Mind and Soul. With such metaphor the community also sings certain Shlokas and Abhangas (Mythological poems) which are written in the epic Literatures of Maharashtra like Dyaneshwari by Saint Dyneshwar. (Fig 1.7) These Shlokas have got mentions of Ghongadi. The significance of this blanket can also be traced back for its special mention in the most ancient & important work of literature and philosophy of India; “The Bhagavad Gita” (Fig. 1.7). The great piece of Mythological Literature in India mentions about the Blanket in one of the Adhyayas. (Mythological stories told by Lord Krishna)

Which means, Dhammapada (1993)

“The person who meditates by sitting on the Indian antelope’s skin will gain intelligence, the person who meditates on tiger skin will be free and released from samsara, and the person who sits on the Woolen blanket i.e ‘Kambala’ will gain eternity and will become strong, and unyielding.”

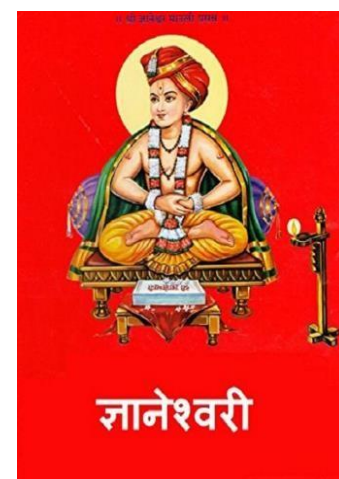
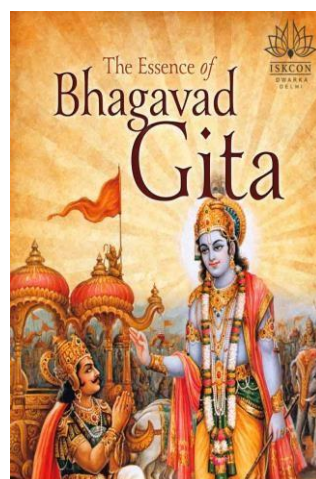


Fig. 1.7 The Great Mythological Literatures of India mentioning about the blanket.

Besides the physical properties, Historic, Literature connect, natural and handmade process and ritualistic background, fetches a very pure, sustainable and holistic approach to the Ghongadi; which none of the textiles in India have it together in one Textile Craft which is impeccable amongst a very few Sustainable textile globally. Kirsii Niinimaki (2018). But unfortunately, Ghongadi was never been explored out of its typical stance as a Blanket. The Primary research was conducted in order to analyze the loopholes and reasons behind Ghongadi being unexplored.

D. Research Aim

This Research hence discovers the reasons behind being unexplored and further to find out its scope and opportunity if explored as a most sustainable textile in the fashion context using a fashion product.

E. Relevance of the study

To explore Ghongadi, a detailed and informal connect was essential which started from visiting agricultural exhibits where the Rural participation can be witnessed. Such exhibitions led to the first contact of a Ghongadi weaver Mr. Datta Chalke (Fig.1.8) who is in Ghongadi production for more than 5 decades as his father used to weave Ghongadi and belongs to the community of shepherds.



Fig. 1.8 Mr. Datta Chalke Master artisan from Rural Part of Maharashtra near Aurangabad region.

According to the artisan Mr. Datta Chalke, the only young generation belongs to the Master artisan's family & the owner of NGO "Ahilyabai Ghongadi Utpadan Kendra", at Aurangabad (One of the growing cities of Maharashtra) According to him, the climatic conditions of the region play a major role in the thickness, color, softness & coarseness of the wool including the overall quality. The sheep that are raised in the warmer region tend to have darker wool mostly grey and blacks. The diet of the sheep also plays an important role in the color as well as quality of the wool.

The artisan also mentioned the current users of "Ghongadi" are the older generation who has possessed "Ghongadi" for its benefits & uses. The use of Ghongadi as simple Blanket or cape or just a bed spread as it was only considered to be the utilitarian textiles and was never explored for further possibilities for making any other sort of Products.

According to the recent article published in Times of India newspaper "The generation involved in the production of Ghongadi are also the older generation as the younger generation have moved to the metro cities for their survival & other job

opportunities, since the craft is not getting commercially sold". (Fig.1.9)



Fig. 1.8 & Fig. 1.9 The older generation- the senior most weavers of Ghongadi in the areas near Solapur and Kolhapur region.

F. Primary Research

There are many rural areas of Maharashtra state; where Ghongadi used to be practiced but are closed down due to the low demand & non-availability of the weavers.

The interaction and visit to the artisans place revealed that the lack interest by younger generation, lack of variety in products, lack of market linkages, lack of newness are the reasons why Ghongadi never received a recognition of a CRAFT and hence,

was never explored out of its typical stance of being blanket. Besides its “sustainable, eco-friendly, natural, historic, therapeutic, traditional, multi seasonal, most durable, zero maintenance features”, this craft is exceptionally blessed to be known as most “Holistic Textile”.

After the first interaction and interview with the above artisan and his family was conducted, the need to expose the craft for having such incredible Holistic aspect was extremely essential. It was really important to emphasize Ghongadi, as the contributor to Sustainable Goals for having such green and most ethical significance behind.

Fashion being one of the most polluting industries globally, are promoting ideas to introduce Sustainable Products and Processes in order to reduce the carbon footprints such as water pollution, use of unnatural products, exploitation of labour, excessive use of natural resources, garbage piles, excessive use of electricity and many more adverse effects that have caused on Environment as well as on the life

The Primary research was conducted with various people associated with Ghongadi for understanding the core process that involved the detailed, interpersonal interaction with senior citizens of rural areas around Pune & Aurangabad, (Fig. 1.10, 1.11, 1.12) Ghongadi weavers, owners of the shops and few government and non-government organizations.



Fig. 1.10 Primary Research conducted with Ghongadi Artisan from Kadgaon.



Fig. 1.11 Primary Research conducted with Ghongadi Artisan- The Yarn Spinner from Sangola.



Fig. 1.12 The Primary Research conducted with numerous people associated with Ghongadi at Pandharpur Market.

The Organizations that are studied to conduct the Primary Research are as follows.

- NGO's (Ahilyadevi Ghongadi Utpadan Kendra at Aurangabad and Solapur)
- Khadi Gramodyog Stores (Aurangabad, Pune & Mumbai)
- Industry such as WRA (Wool Research Association of India, Mumbai)

-WSC (Weavers' Service Center) Maharashtra
 -Govt. of Maharashtra initiative (Punyashlok Ahilyabai medhi
 va sheli vikas Kendra, Maharashtra)

III. THE PROCESS OF GHONGADI

The "Ghongadi" of Maharashtra is made using "Desi- Deccan or Usmanabadi" sheep having a coarser & crimpier texture depends on the climatic conditions of the region. The color of the wool depends upon the area where the sheep belongs, such as those belong to central and Vidarbha Maharashtra will have darker and blacker hair due to extremely hot weather whereas sheep that belongs to Solapur area may have lighter colors such as muddy white or beige and grey due to comparatively cold weather.

As per Djordjevic D., Smelcerovic M., Amin G., Micic D. (2016) The hair of the sheep is generally shredded twice a year; and after the sheep become 3 months old. The quality of the hair depends upon the age of the sheep; Smaller the age of the sheep, softer the quality of the wool, hence sold at relatively high prices & called as "Jawalachi Ghongadi". (Fig. 1.13) (First hair of the baby sheep)



Fig.1.13 "Jawalachi Ghongadi"

The "Ghongadi" is woven using 'Plain weave', due to which the Acupressure points are created from the coarse texture of the yarns that gives comfort to the body & the skin of the wearer. The surface texture of "Ghongadi" is very coarse & colors such as off white, grey & black colors are only found. (Fig. 1.14)

The additional feature is added with a lengthwise, pink colored band either chemically died or in acrylic wool is used. Sometimes the combination of off white, grey & black colors are used to create some patterns in checks & stripes to add variety.

The traditional size of "Ghongadi" is 10' by 4' to be used as a Blanket, shawl and the spread. The length of the Ghongadi for being so long is that it is turned into half by wrapping the body

from front and back; and became the prime reason why the older generation used a single piece to slip on the floor.



Fig. 1.14 The variety of Ghongadi available at Pandharpur region.

The fibers are converted into the yarn with the help of a Traditional way of spinning onto "Charkha", which is a symbol of self-reliance & freedom initiated by Mahatma Gandhi. This process of hand spinning of the yarn involves the concentration of senses that is only possible through the right coordination dedication of mind, body and soul at a time. Which is why this process of spinning is generally carried out by women of the family and further process of making "Ghongadi" is carried out by the men of the family.

The "Ghongadi" is woven using plain weave on a flat floor loom by the "Sangar" community. To add more aesthetic appeal; a band of contrasting color mainly of Pink, is added length wise at the time of warping. The production process from shredding of sheep hair, scouring i.e. cleaning of the fiber, sorting of the hair from various body parts, carding of fibers, spinning to convert the staple fiber into yarn and then into weaving is all done manually by hand with a very limited usage of water.

During the exploration of the process it was strongly observed that not only men of the family are involved in making a Ghongadi but it's the women of the family too contribute in certain steps of the process (besides spinning of yarns), which makes it an inclusive process. The inclusive nature helps in carrying out the production with a right speed and timely sell of the product. Since Ghongadi is seasonal production due to the shredding of wool, the timing of its production and selling needs to match. This in turn brings livelihood of the community as they are part of Rural Craft and hence Ghongadi is sold in many of the agriculturally based exhibitions organized at rural levels. It is one of the most famous and durable textiles that any person from the Rural or agricultural background opts for. Hence a very important source of earning and livelihood of the community.

Rugged yet smart, Basic but unique, Simple yet Chic, are some of the keywords that describe the textile. And these keywords

itself define the further exploration of Ghongadi to break its typical stance as a blanket and reintroduce it in a form of a smart, chic Fashion Product having a holistic Sustainable approach towards environment.

IV. METHODOLOGY

To redefine the typical character of “Ghongadi” from a Blanket to something new; by keeping its traditional as well as cultural significance intact; was a challenge in the product development. It needed a strong base for knowing how the current market grasps the changes done with the craft; the market analysis through a survey, was essential.

According to Mallika D.S. & Anshu S.(2020) Due to the unavailability and rare data published on “Ghongadi”, the Primary survey incorporates an interpersonal interaction conducted with Ghongadi weavers, Old people from the Community & other sources mentioned above, who gave the insight and ideas that lead to the further exploration of the craft.

A secondary survey was conducted to understand the need of the Research for which the sample was selected, that consists of Fashion and Non-Fashion professionals, Craft Lovers, store owners, artisans, Designers, NGO Owners and organizations. The data collected in the form of the reviews, feedbacks, forms, questionnaire & suggestions, furnished the idea about the further product development which is the outcome of the research paper. This provided an opportunity for the Consumer Scan and Fashion Scan in order to realize the Fashion choices and preferences for Ghongadi which further reflected in the product exploration. The method included collecting data using questionnaire method from the Fashion-conscious consumers. (Fig.1.15 to Fig.1.18 for Consumer Responses)

The reviews indicated following facts.

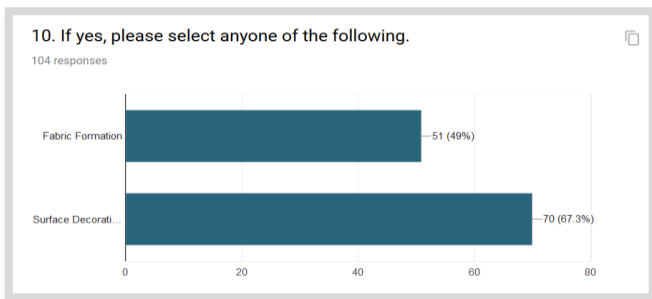


Fig. 1.15 Response through the secondary survey (Question- Specify which technique would suit the best as Value Addition on the product of Ghongadi?)

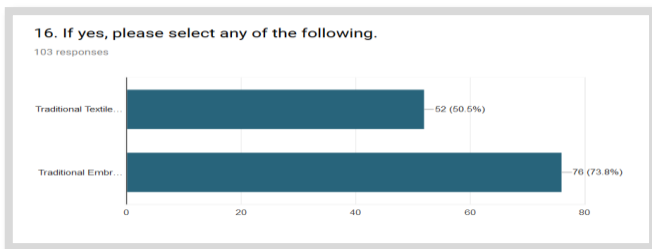


Fig 1.16- Response through the secondary survey (Question- What kind of technique according to you is most suitable for the product of Ghongadi?)

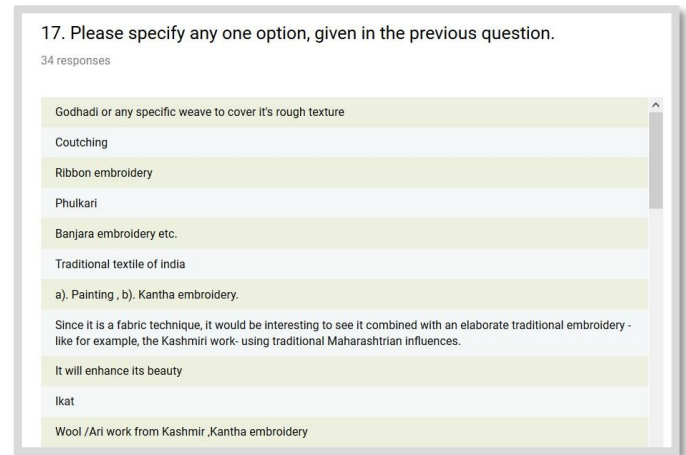


Fig. 1.17- Response through the secondary survey (Question- Specify which Product Range you would like to accept the Ghongadi in?)

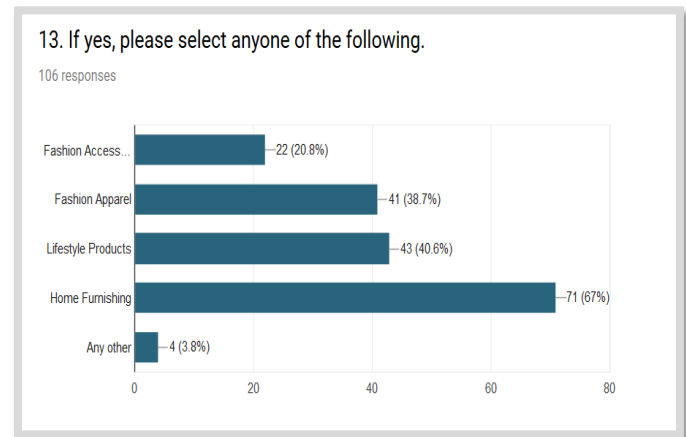


Fig. 1.18 Response through the secondary survey

The survey provided a scope of utilizing various surface exploration techniques that brings a change & newness to the simplicity as specified by Kovac.S. (2016) of the surface of Ghongadi having a rugged & coarse feel providing the possibility of utilizing various surface exploration techniques.. Based on the survey; various other techniques for Surface exploration of “Ghongadi” were suggested as follows.

- Natural dyeing techniques of woolen yarns of Bhuj, Gujarat
- Pitt Loom weaving of Bhuj, Gujarat
- Rabari Mirror work of Bidar, Karnataka

Based on to the survey & considering the identities of above techniques as the “Handmade and Hand crafted” utilizing sustainable raw materials that are practiced in the various communities from the various rural parts of India, were selected. It was made sure that every single detail that’s the part of the further Product Intervention is procured from the various other

Craft communities that strive to uplift their own craft for their survival.

V. RESULTS

Based on the secondary survey, the further Value Additions to overcome the coarse texture of “Ghongadi”; technique such as weaving techniques using pit loom of Gujarat have been explored. The above technique has worked wonders by providing supplementary surface through the weaving patterns using additional threads or extra weft, that facilitate in creating a more comfort feel of the surface reducing it coarser feel.

The variety of motifs that used in the traditional pit loom weaving of woolen shawls from Gujrat, have been utilized with Ghongadi in contrast colors. (Fig.1.19 & Fig.1.20) The special mention by Erkan G., Yilmaz D. (2016) specifies the variety of dyes used on wool, the exploration in this research has created a smart surface having a value addition that is not only aesthetic but functional too; that it reduced its rough feel and by using natural dyes using natural resources.



Fig. 1.19 Surface exploration and Value addition on Ghongadi using pit loom weaving from Gujarat



Fig. 1.20 Surface exploration and Value addition on Ghongadi using pit loom weaving from Gujarat.

The consideration for “Ghongadi” as a fashion product could be popularized by exploring it in regards with design attributes such as its patterns, addition of colors, smoothness and diversified products such as Fashion outerwear, Fashion accessories and Home Fashion and Lifestyle products that compliments its original use as specified in the upcoming Trend forecast by David Shah (2020)

The product development is a result of the detailed study of the craft in terms of its functions, characteristics & surface feel by keeping its holistic approach unbroken. The Fashion product (Women’s Outerwear) was selected based on the purpose of using “Ghongadi”. Since the use of “Ghongadi” is so versatile to be multi seasonal; the product development is a trial to make a product that too has the same characteristics.

The Fashion product that is designed is also multi-functional as it can be used as an outer wear, converted into a bag & used as the blanket, if required. The women’s outerwear- “Poncho” is designed (Fig.1.21 and Fig. 1.22) in such a way that it provides warmth when worn as an outerwear & can be converted into a “Tote” when not required. (Fig.1.23)



Fig. 1.21 The Hand Embroidered Edges with Hand Crafted tassels as a detail on surface of Cape/ Poncho.



Fig.1.22 The Hand Crafted details in the form of Tassels on Poncho

Keeping in mind the 100% pure natural, ethical & sustainable aspect of “Ghongadi”; every single detail that is added to make this product such as interlining, strings, threads, stylish trims etc. are either natural or procured from various communities who are involved in keeping their own crafts alive through livelihood & probably are also striving for the craft’s survival as “Ghongadi” does.



Fig. 1.23 Product exploration in Convertible Fashion Accessory- Outerwear (Poncho) converted into a Tote bag.

The results of the product development show the major acceptance of “Ghongadi” in the above form, considering fashion context & was extremely appreciated by the young generation. Namrata Rana (2010) as it’s the need of the hour to fulfill the market demand using Sustainable Products.

This has released the opportunities of young generation to embrace “Ghongadi” with a different dimension that is not only fashionable but functional as well. With its “Holistically sustainable approach”; “Ghongadi” has definite chances to not only bring the identity to itself but also to the other crafts that are amalgamated with it & can be proven to mean literally!

CONCLUSION/DISCUSSION

At present, when people are realizing the damage by industrial & commercial mode of fashion production to the environment; they are moving towards the Sustainable solutions in clothing. Such Sustainable solutions can be found in the versatile Textile Crafts of India, especially Ghongadi- the blanket from rural Maharashtra. The most sustainable, ecofriendly, ethical, fair and holistic nature of Ghongadi has a tremendous opportunity to regain & revive its importance from a Sustainable context. The immense scope for innovations using Fashion as a most accepted

tool in the society, Ghongadi has definitely become one of the most important resource to produce Sustainable Fashion Products.

With such Holistic Sustainable Characteristics of Ghongadi if further utilized in the field of Fashion can; not only deliver a livelihood to the community, but also gives it a recognition as Sustainable craft, that can be preserved for the future generations, and can be introduced in a form of more smart, chic sustainable Fashion Product line for Current life and future environment. Nayelli Gonzalez (2014)

This Practice based; exploratory research is an initiative to bring into attention the “Ghongadi” which has an incredible potential to stand in the Global Fashion agenda as the most “sustainable as well as holistic craft” from India. Tom Hoskin (2016) mentions such potential of the Sustainable Craft which can be brought back its market, interest of the weavers, awareness for Product Intervention and can bring a shift towards more – “commercial, ethical, sustainable and holistic paradigm to serve wellbeing & livelihood to Life & Environment” which can be conceivable for future “from sheep to being a Chic & Holistically sustainable Fashion product for the wellbeing and livelihood of life as well as Environment.”

ACKNOWLEDGMENT

I am thankful to my work Organization- MKSSS's School of Fashion Technology, Pune and the S.N.D.T. Women's University, Mumbai, where I am pursuing PhD; for allowing me to explore one of the rare craft of Ghongadi with all their support. I sincerely thank the Artisans of Ambad, Kadgaon and Sangola for giving me an opportunity to witness the exceptional Craft with its impeccable process of making with active interaction with weavers and the community. I am also greatly thankful to prestigious Organizations of KVIC- Khadi Bhandar at Aurangabad for sparing their valuable time to throw the light on Ghongadi's supply chain and Market Linkage. I am also thankful to the Artisans of Bhuj, Pitloom weavers who helped me to creatively explore the surface of Ghongadi to give it a different dimension aesthetically by sharing their treasured technique of woolen shawl weaving. And last but not the least My family members, without whom reaching & travelling to the remote interior places wouldn't be possible, hence greatly thankful and appreciate their efforts to make this Research possible.

REFERENCES

- Alison Gwilt (2014) A Practical guide to Sustainable Fashion, Australia, UK, Bloomsbury publication- First Edition.
- Alison Gwilt & Timo Rissanen, (2011) Shaping Sustainable Fashion, Australia, UK, Earthscan Publication.
- Cole Mellino (2013) <https://www.ecowatch.com/7-reasons-you-should-hate-fast-fashion>
- David Shah (2020) “Textile View- Autumn Forecast”, View Publications, Netherlands.
- Dorina O, (2006) “Analysis of the tensile strength of 100% wool yarns from different climatic areas”, Annals of University of Oreden, Romania, 20 (63-68) [http://textile.webhost.uoreden.roannels. \(DOAJ\)](http://textile.webhost.uoreden.roannels. (DOAJ))
- Dhammapada, John Rechards (1993): An Anthology of Buddhist Verses (Translated from the Pali)
- Djordjevic D., Smelcerovic M., Amin G., Micic D. (2016) “Coloring properties of wool fabric colored by new dyestuffs- Azomethines”, Annals of University of Oreden, Romania, 20 (41-46), [http://textile.webhost.uoreden.roannels. \(DOAJ\)](http://textile.webhost.uoreden.roannels. (DOAJ))
- Erkan G., Yilmaz D. (2016) “Dyeing of wool yarns with Lauras Nobilis Berries”, Annals of University of Oreden, Romania, 20 (53-58), [http://textile.webhost.uoreden.roannels. \(DOAJ\)](http://textile.webhost.uoreden.roannels. (DOAJ))
- Felin M. (2012) “New methods of applying microcapsules in the spinning process”, Annals of the University of Oreden: Fascicles of Textiles, XII (1), (98-102), ISSN- 2457-4880, <http://doaj.org/article.>
- Geetha Rao, (2012) “Woven to perfection” published in Deccan Herald.
- Kirsi Niinimäki (2018) “Sustainable Fashion in Circular Economy”, Aalto Arts Books, Finland.
- Komppa J. (2017) “Early carpets and tapestries on the eastern silk road”, Asian highlands perspectives, 45: (159-171) ISSN- 1925-6329 (Print) <http://doaj.org/article/08874.>
- Kovac. S. (2016) “The Production and Distribution of Hand Crafted products made of Wool”, Ethnoanthropology Publication, 0353-1589/2334-8801, 6 (4) 859-869, <http://doaj.org/article/ce164ddcc6d742.>
- Mallika D. S., Anshu S. (2020) “Woven Blessings of a Woolen Blanket ‘Ghongadi’ of India for ‘Holistic Social Design’”, JTATM Special issue-ITMA <https://ojs.cnr.ncsu.edu/index.php/JTATM/article/download/16121/7424>
- Moman. H. (2018) “Determination and Characteristics of the Wool fiber of sheep breeds: An Economically sustainable practical approach”, Fibers 6(3):55, 2079-6439, <http://doaj.org/article/03318afac4e4cc.>
- Namrata Rana (2010) Times of India, on CSR and Sustainability <https://www.futurescape.in/crafts-and-sustainable-livelihoods-in-india/Crafts & Sustainable Livelihoods in India.>
- Nayelli Gonzalez (2014) A Brief History of Sustainable Fashion <http://www.triplepundit.com/special/sustainable-fashion-2014/brief-history-sustainable-fashion/>
- Niraj Borate (2017) <http://www.ghongadi.com>
- Orfinskaya O., (2014) Institute of Archeology, Russian Federation 2 (8), (70-91), ISSN- 2500-2856, <http://doaj.org/article/4dcboec5ed.>
- Lance Hosey (Economic Times) THE BLOG ET “A Brief History Of ‘Sustainability’ 11/09/2016 03:13 pm
- Tom Hoskin (2016) http://www.huffingtonpost.co.uk/tom-hoskin/sustainable-fashion_b_12750082.html
- Vinutha Mallya (2017) Times of India, Mirror, On “Ghongadi”.

Data Preprocessing for Anomaly Detection

Ujwala Sav

P. G. Dept. of Computer Science, S.N.D.T. Women's University, Mumbai, India. ujwalasav@gmail.com

Ganesh Magar

P. G. Dept. of Computer Science S.N.D.T. Women's University, Mumbai, India.
gmmagar@gmail.com

Article Info

Volume 83

Page Number: 2188 - 2195

Publication Issue:

March - April 2020

Abstract

The security of data is challenging in the business sector due to its availability in cyberspace. Our data is most valuable, and it is the asset of an organization. Insider threats can be detected based on the anomalous behavior of inside users. There is a need to divide the data into two parts normal data and abnormal data. Therefore, it is required to find out the specific features based on which the researcher can train the dataset, perform analysis, and conclude that this converted into potential cyberattacks. A cyberattack may leak or damage the data, data theft, data sharing with the externals. These incidences may cause a considerable loss, spoil the image, or creditability; it may close the organization forever. This research paper proposed the data preprocessing process used for insider threat detection, which based on user behavior. It includes a survey of existing data sources, data quality, selection of the datasets for insider threats detection, data cleaning, feature extraction, and check data relevancy for further implementation. Data preprocessing is useful for the research to get accuracy and consistency in the result during implementation.

Article History

Article Received: 24 July 2019

Revised: 12 September 2019

Accepted: 15 February 2020

Publication: 18 March 2020

Keywords – Anomalous behavior, Insider Threat, Cyber Security, Data preparation, Machine learning, Data preprocessing

I. INTRODUCTION

Data selection is the most crucial pre-processing step of the research. In this research, due to the confidentiality and privacy rights of employees, organizations are unable to provide primary data for the research study. Therefore, it is required to work on existing data, i.e., secondary dataset. There are so many data sources are available for review and use. Universities, research centres, private organizations have made available data for the research study. This data has free open access. User can download the data from the respective site and use to process research work. In this research, the researcher has selected ten different types of data sources and studied its data relevancy for insider threat detection. Every kind of dataset is unique with various types of characteristics. Data preprocessing for insider threat detection. Datasets review is necessary for finalizing the dataset selection for actual algorithm implementation. After data review, select the

appropriate and relevant dataset for the implementation of an algorithm in the research domain. This dataset helps you to get the expected outcome. This processed dataset outcome will further process in machine learning and deep learning algorithm.

Research paper content arranged in 5 sections. Section 1 is an introduction, which presents a brief description of research work and its need. A literature review included in Section 2. Section 3 is of research methods and data processing. Section 4 consists of system architecture for data preprocessing, and section 5 provides an analysis of results, and section 6 includes the conclusion and future work.

II. RELATED WORK

Data preprocessing is the beginning stage for research. The research result is dependent on the data used for processing. The raw data is necessary to preprocess before actual

implementation. This section presents a similar study was done in insider threat detection and dataset used. While the literature review, it is observed that data is available in various types and formats. Secure Shell (SSH) and Skype used for encrypted traffic, which classified traffic. In this, classifiers are tutored on data from one network but tested on data from an entirely different system. Here five learning algorithms - RIPPER, SVM, AdaBoost, Naïve Bayesian, and C4.5 - are assessed applying flow-based features, where IP addresses, source/destination ports, and payload data are not used. Findings indicate the C4.5 created approach works well as compare to other algorithms on the detection of both SSH and Skype traffic on totally separate networks. [1],[2].

The researcher aims to find out anomalies in the MAWI (Measurement and Analysis on the WIDE Internet) archive implementing a different procedure that merges separate and individual detectors. It worked to evaluate the alarms created by sensors, although it works at separate traffic granularities. Anomaly detectors to increase over time the condition and array of labels [3]. It is necessary to advancing the state in detecting threats, but it is not easy to obtain suitable data for research. Therefore, the data generator is applied to allow research development [4]. Some of the researchers use synthetic data generation, and it helps to control flexibility. It is also economical as compared to other data collection methods. This method is useful to set the data with the required size, quality, and relative traits characteristics [5]. Not all data preprocessing techniques are valid for any one data set; it proposes a fundamental approach to determine the effectiveness of a data preprocessing method. In the paper, MatPCA, MatFLDA, SVM, NNC, K-means, AHC, INMKMHKS, NNC, KNN, Fisher, and Pseudo Inverse used to decide whether the structure is changed or not [6]. There are two steps to know about the dataset, and step one normalizes the input and output data. The second step computed

the difference between input/output values and standardized data. These two values merge employing a weighting act to approximate the learning conflict in the given dataset. This proposed algorithm used to optimize the performance of the system in real-world applications [7].

There are data mining uses clean, excellent, and reliable data. If data is wrong, then it will give you a false result and misguide in public as well as private scale. The sources and formats of the data are different for different processes. Sometimes it is not complete. In this study, an overview of data cleaning approaches, issues, comparison tools, and data quality is provided [8]. Data cleaning is useful for missing values, remove the wrong data, detect anomalies, and remove data inconsistencies. It is necessary to converts the data into an appropriate format for processing. Data cleaning help in reducing the loss of data and present the data in standard form. One can use analysis of histograms, analysis of clustering, and data segmentation [9].

Insider threats are responsible for Data leakage in an organization. Data leakage can be detected by identifying the transformation of a considerable amount of data. The researcher presents this challenge of data leakage in three steps. It tests the sensitivity by using adaptive weighted graphs. This method finds out the data leakage of data transformation [10]. In the area of the Intrusion Detection System, the research NSL-KDD dataset is used for the adaptive ensemble learning model. It works on the NSL-KDD dataset to verify the model, and the MultiTree algorithm accuracy is 84.2% [11]. Existing novel methods utilized to generate the features of the UNSWNB15 data set. These datasets are available on websites, and researchers are allowed to use data to find out the solution and explore the new methods [13].

III. RESEARCH METHODOLOGY

This section consists of details of the methodology used for data preprocessing. In the

above section of the literature survey, various data source references collected. Data is available on respective websites, and they are freely available for research purposes.

A. Data Preprocessing System

In the preprocessing, a literature survey is used to find out available data sources. The researcher

System architecture for data preprocessing for Insider Threat Detection is as given below.

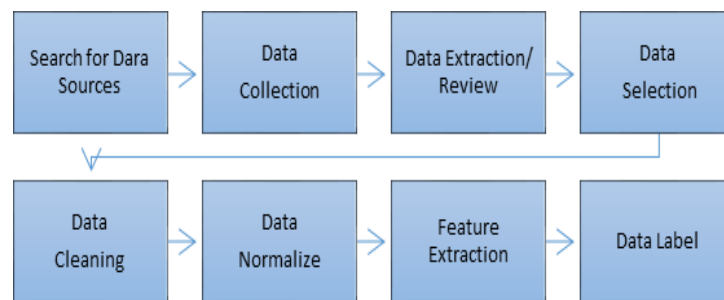


Fig. 1. Data Preprocessing System

B. Data Preprocessing for Insider Threat Detection

In the data preprocessing process, data is prepared for the actual experiment, evaluation, or implementation of the algorithm. This preprocessing helps to achieve the objectives of study, accuracy, and consistency in the result. In this research paper, data has preprocessed for Insider threat identification basis on the anomalous behavior of the inside user.

C. Data Source, Data Collection, and Data Review

There are many online data sources available on the website. Relevant data is required for the processing of Insider threat identification, which is based on the anomalous behavior of the inside user

has collected the data source references from existing research. Data is obtained from various sources in their raw format. Then data is extracted and transformed in readable form csv format. This data is reviewed to check the suitability for the study. A suitable dataset is selected for further processing.

model. Research is based on primary and secondary data. In this insider threat prediction research, the secondary data collection method is adopted. Because the necessary data for this research is confidential. It is not possible to collect the primary data as a privacy violation of the employee (insider). During the literature review, it observed that previous researchers had used the sample data available on the research website. This data is made possible by university and research organizations, especially for research purposes.

Websites of private and public sectors have checked to find out the existing data. The data collected only from the insider threat detection based on anomalous behavior domain. Data Source and its review is follows in Table 1.

TABLE 1. DATA SOURCES AND DATA REVIEW DETAILS

Data Source	Data Name	Data Format	Tool	Description	Data Review
NetMate	NIMS is Network Information Management Security	ARFF/ CSV Packets (ARFF-Attribute Rich File Format)	Weka	NetMate organization is hired to create flows and calculate feature values on the datasets [13].	Packets internally gathered at an exploration test-bed network. Data suggest six SSH services like SFTP, X11, Remote, Local tunneling, Shell login.

NLANR	NLANR National Laboratory for Applied Network Research	TSH (Time Sequenced Header) PCAP Convertible	Weka Note pad	The goal of NLANR is to give technical, engineering, and traffic support of NSF [14].	It is network packets captured for traffic analysis. NLANR is with a high performance and services connections site. HPNSP
Data Source	Data Name	Data Format	Tool	Description	Data Review
UCI	kaptail.dat It is a social network repository	HTML	notepad	The repository of the network is available with UCI. It scientifically helps network study [16].	The dataset is in a matrix format of 39x14 with row labels.
MAWI	MAWI (Measurement and Analysis on the WIDE Internet)	PCAP	Wire shark	The MAWI acting company has held out the measurement of network traffic analysis, WIDE Project [15].	MAWI [15] calculates whether the network acts as per the designed model and realizes anomalous behavior.
Canadian Institute for Cyber Security	NSL-KDD	.ARFF .TXT	Notepad	NSL-KDD gives solution to the problems of KDD99 dataset [17].	In all 42 fields in the dataset, including character type dataset like label, protocol, and flag fields are character types. In the algorithm, we need a numeric data type.
NETRESEC	Smia2011	PCAP	Wire shark	Netresec is working for network security. Its' main specialization in network forensics and analysis of users network data. [18].	It maintains a comprehensive list of publicly available PCAP files.
Numenta	Anomaly Detection	CSV	Notepad	Numenta organization is developing theory, software, and applications based on neocortex principles. Numenta is focused on machine intelligence [19].	Numenta has timestamped, ordered, and single-valued matrices data. Data files consist of notified anomalies.
UNSW-NB15	UNSWNB15	CSV, PCAP, BRO, Argus, and the reports filed	Notepad	The UNSW-NB15 source files can be downloaded from the website [21].	The traffic analysis clarifies the aggregate activities when the time of recreation while producing the UNSW-NB15 information set.
MAWILab v1.1	Anomaly classification	XML CSV	Notepad IE python	This is consists of four separate detectors, which are based on distinct background: They are Gamma distribution, Kullback Leibler, PCA, and the Hough transform [22].	MAWILab annotates traffic anomalies in the MAWI archive with four different labels: anomalous, suspicious, notice, and benign.

Carnegie Mellon University	CERT data	Tar.bz files to be converted in.csv	Em-Editor Notepad, Wordpad	Carnegie Mellon University has a CERT Division. This division has collaborated with ExactData, LLC, produced synthetic data for insider threat detection study [23].	There is large dataset generated which is used for the various research study. r1.1 to r6.2 versions are available.
----------------------------	-----------	-------------------------------------	----------------------------	--	---

The above data sources have been studied, reviewed, and compared the dataset for anomalous behavior identification of insider threat detection based on the user's irregular detection. CERT data selected for insider threat detection.

In this data preprocessing process, the author has focused on the anomalous behavior of the users who are in an organization and not on the outside users. Therefore malware or network data, payload not considered. Multiple connections derived features are used to compare normal and abnormal traffic, and characteristics are considered from packet headers. This feature helps to know about unusual traffic, which includes packet size, average flow duration, and algorithms like LOF, KNN, Clustering, SVM, mining are used.

IV. RESULTS AND ANALYSIS

In section 3, data sources, data collection, data Extraction-Transformation, and data selection covered in table 1. Data cleaning, data normalization, feature extraction, and data labeling, along with the required tools, techniques are evaluated for the selected dataset.

A. Data Selection

The data sources and features analyses and CERT dataset selected for the machine and deep learning algorithms implementation in the future study. These are supervised and unsupervised learning algorithms. The proper result required to extract the right features and to label the data. As per the data preprocessing system architecture, to ensure that algorithms were tuned to find anomalous data and not just artificial data, benign

events were injected as part of user histories as well.

This dataset is available on this site[25]. The critical data is generating by the Software Engineering Institute of Carnegie Mellon University in partnership with Exact data LLC. Privacy violation is the main issue while working on insider threat detection. Therefore, a synthetic test dataset that provides a dataset of a malicious user. Insider Threat Test Dataset selected for the Modelling of Insider Threat Detection for cybersecurity.

Insider Threat Test dataset consists of employee data. There is logon, device, LDAP, HTTP, email, psychometric data.

B. Data Cleaning, Data Normalized, Feature Extraction

Insider Threat data is the data that is required to make ready for the process. The insider threat test data presented in Table 2.

Insider Threat dataset checked and cleaned by removing corrupt, redundant, and inconsistent data from each dataset. In logon.csv, the domain name column is dropped. LDAP username field is dropped as if it is not used at the time of processing. 'Id' field can apply for the identification of the user. As data is enormous, the researcher has re-moved the unwanted, incomplete records from the dataset. Data normalized by managing missing values using statistical calculations. In this research, sklearn used to label and handle string data like logon/logoff to integers value for processing.

Table 2 describes the file used to extract the features from the collected data and data preprocessing process.

TABLE 2. DATASET AND DATA FEATURES

Dataset	Description	Features
Logon	1000 Users logon & logoff records. 13 IT admin with global access.	id, activity, date, user, pc (Logon and Logoff)
Device	Thumb drive usage by assigned users	id, activity, date, user, pc, (connect and disconnect)
LDAP	Monthly list of Active Users with details	employee_name, user_id, email, domain, role
HTTP	List of domain names to identify malicious websites.	id, date, user, pc, url
Email	Users to and from list	id, date, to, from
Psychometric	Psychometric list	employee_name, user_id, O, C, E, A, N

C. Data Preprocessing result for logon dataset

Preprocessed data of the logon dataset is consists of the following results. no.of users: 1000, no.of device: 407908, no.of pc: 947, psychometric records size (1000, 7), Check for missing values in each dataset is null, Separated logon and logoff activities and counted no. of activity per user and pc.

D. Graph Analysis: Inter-relationship between users and pcs

The undirected bipartite graph is constructed using 'users' and 'pc' as nodes, where edges representing the relationship between the users and pc(s) and edge weights representing the total number of Logoff events.

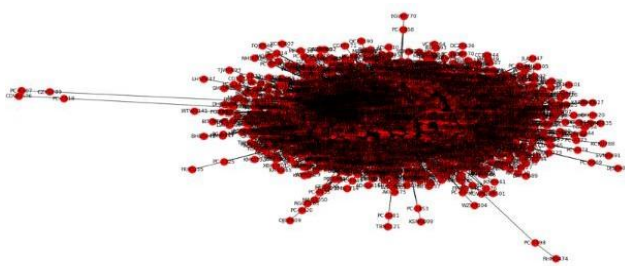


Fig. 2. Undirected bipartite graph

This graph shows the relation and behavior of the user, and it will be helpful to detect insider threats in future research.

V. CONCLUSION

This research paper proposed the data preprocessing for insider threat detection based on the anomalous behavior of the user. It is essential to check the relevancy of data which is used for our experiment and goal of study. Relevant data will go under the preprocessing. The data transformation step is essential if data is not in the required format. Data cleaning is useful for removing data noise, duplicate data and not relevant data from the dataset. There is a need for data normalization to fill the missing values in the dataset by using techniques like removing the record, calculate missing values using statistical techniques like mean, mode, and median. As data is enormous, we use sampling methods for the selection of data from the dataset. Features extracted for the specification of the algorithm. For Data labeling, sklearn used for supervised learning algorithms. The undirected bipartite graph is constructed using 'users' and 'pc' as nodes, where edges representing the relationship between the users and pc(s) and edge weights representing the

total number of Logoff events similarly another dataset is processed for anomaly detection. As research is focused on insider threat detection based on the behavior of insider, therefore, network payload is not used.

In future research, preprocessed data will use to detect insider threats by identifying anomalous behavior. Malicious significance will identify and prevent the data cyberattack caused by insiders.

ACKNOWLEDGMENT

The authors are thankful to the Software Engg. Institute of the University of Carnegie Mellon in partnership with Exact data LLC. For providing us users' behavior data for research study purposes.

VI. REFERENCES

1. R. Alshammari and A. N. Zincir-Heywood, "Investigating Two Different Approaches for Encrypted Traffic Classification," PST '08., 2008, vol., no., pp.156-166.
2. R. Fontugne, P. Borgnat, P. Abry, and K. Fukuda, "MAWILab: combining diverse anomaly detectors for automated anomaly labeling and performance benchmarking," Philadelphia, Pennsylvania, 2010, p. 1, doi: 10.1145/1921168.1921179.
3. B. Lindauer, J. Glasser, M. Rosen, and K. Wallnau, "Generating Test Data for Insider Threat Detectors," p. 15.
4. J. Glasser and B. Lindauer, "Bridging the Gap: A Pragmatic Approach to Generating Insider Threat Data," in 2013 IEEE Security and Privacy Workshops, San Francisco, CA, 2013, pp. 98-104, doi: 10.1109/SPW.2013.37.
5. C. Zhu and D. Gao, "Influence of Data Preprocessing," Journal of Computing Science and Engineering, vol. 10, no. 2, p. 7, 2016.
6. S. Ledesma, M.-A. Ibarra-Manzano, E. Cabal-Yepez, D.-L. Almanza-Ojeda, and J.-G. Avina-Cervantes, "Analysis of Data Sets With Learning Conflicts for Machine Learning," IEEE Access, vol. 6, pp. 45062-45070, 2018, doi: 10.1109/ACCESS.2018.2865135.
7. S. Devi and D. A. Kalia, "Study of Data Cleaning & Comparison of Data Cleaning Tools," p. 11, 2015.
8. S Lakshmi, "An overview study on data cleaning, its types, and its methods for data mining", International Journal of Pure and Applied Mathematics 119(12):16837-16847 (2018).
9. X. Huang, Y. Lu, D. Li, and M. Ma, "A Novel Mechanism for Fast Detection of Transformed Data Leakage," IEEE Access, vol. 6, pp. 35926-35936, 2018, doi: 10.1109/ACCESS.2018.2851228.
10. X. Gao, C. Shan, C. Hu, Z. Niu Z. Liu, "An Adaptive Ensemble Machine Learning Model for Intrusion Detection," IEEE Access, vol. 7, pp. 82512-82521, 2019, doi: 10.1109/ACCESS.2019.2923640.
11. N. Moustafa and J. Slay, "UNSW-NB15: a comprehensive data set for network intrusion detection systems (UNSW-NB15 network data set)," in 2015 Military Communications and Information Systems Conference (MilCIS), Canberra, Australia, 2015, pp. 1-6, doi: 10.1109/MilCIS.2015.7348942.
12. M. S. Sarma, Y. Srinivas, M. Abhiram, L. Ullala, M. S. Prasanthi, and J. R. Rao, "Insider Threat Detection with Face Recognition and KNN User Classification," in 2017 IEEE International Conference on Cloud Computing in Emerging Markets (CCEM), Bangalore, India, 2017, pp. 39-44, doi: 10.1109/CCEM.2017.16.
13. www.web.cs.dal.ca
14. www.nlanr.net
15. www.mawi.wide.ad.jp
16. www.networkdata.ics.uci.edu
17. www.unb.ca
18. www.netresec.com
19. www.numenta.com
20. ftp://download.iwlab.foi.se
21. www.unsw.adfa.edu.au
22. www.fukuda-lab.org
23. www.resources.sei.cmu.edu
24. www.digitalcorpora.org

Authors Profile



Mrs. Ujwala M. Sav holds a Bachelor's degree in Computer Science, Master's degrees in M.Sc. (CS), M.Ed., MBA(Marketing), M.Phil (IT), along with a Diploma in Business Management, and Diploma in Marketing Management. She is currently working as an Assistant Professor in the Department of Information Technology at

Vidyalankar School of Information Technology, Wadala, Mumbai. She is currently pursuing her Ph. D. from S.N.D.T Women's University, Mumbai. She is a life member of the Computer Society of India. Her research work focused on Cyber Security and Machine Learning. She has more than 15 years of teaching experience in computer science and information technology courses.



Dr. Ganesh M. Magar holds Bachelor's and Master's degrees in Computer Applications and also a Doctorate in Computer Science. He is currently working as Associate Professor Head in P.G. Department of Computer Science and (Ad-hoc) Dean, Faculty of Science and Technology at S.N.D.T. Women's University, Mumbai. He is a member of IEEE, ACM, ISCA, CSI, and many other scientific societies. He has published more than 20 research papers in peer-reviewed reputed international journals and conferences. His thrust research areas include GIS, databases, and image processing. He has more than 16 years of teaching and research experience and three years of Industry Experience.



IMPACT OF LOCK-DOWN AND COVID- 19 ON FINANCIAL AND EMOTIONAL HEALTH OF INDIAN WOMEN

Prof. (Dr.) Meera Shanker¹, Dr. Anita Chaware²

Abstract- This is perhaps first time in history that such a large population has been enforced to remain locked inside their homes. As the corona virus pandemic spreads its vicious tentacles across the globe, its horrifying impact on everyone lives is becoming clearer day by day. Lots of radical changes are coming in every walk of life. The present paper argued how the uncertainty of future and forced seclusion is affecting the financial and emotional health of a large number of people, particularly women of India. All together 749 women have participated in this study. It was revealed that women were apprehensive over losing jobs, uncertainty about managing their expenditure without financial support, prospect of financial ruin, fear of infection and losing loved ones. Resultant, they are anxious, depressed, fearful, showing symptoms of insomnia. What is compounding the anguishes is the miserable open-endedness of the pandemic

Keywords – COVID -19, lockdown, Financial health, Emotional issues, Indian Women

I. INTRODUCTION

The health, protection, and well-being of all individuals and to the communities that be impacted by public health emergencies (economic loss, job losses, closures, insufficient resources for medical reaction and poor distribution of needs)[1]. COVID-19 pandemic is overflowing across the globe, become a global challenge and has created worldwide emergencies. It has created not only health but social, economic and political crises in the world. It is completely known by now that Coronavirus disease is caused due to severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2), declared to be a Public Health Emergency of International Concern on 30th January 2020. Approximately over 5,105,902 coronavirus cases are registered and causing 330003 deaths (worldometers.info/coronavirus, 21st May , 2020)[2]. Those who recovered there is possibility of relapse or reinfection to them. Considering having a population of approximately 1.3 billion, only about few lakhs corona cases are registered and approximately over thousand corona death are registered, could be considered a success. Yet, seeing the issues of having large population, enforcing various restriction i.e. social distancing, home quarantines, travel restriction, ban on large gathering creating difficulties, this may take dangerous situation. People are scared particularly women, who are backbone of family.

Unemployment rate has increased more than 27% in India (FICCI survey) [3]. Around 14 million have lost employment. More than 45 % household across the nation have reported an income drop as compared to the previous year. It is suspected that if lockdown is extended, India may see more death than from the pandemic. Women who are living in metropolitan cities are mostly working and taking care of their household responsibilities as well. COVID19 has put them in difficult situation. Hence keeping these issues in mind, objective of the present study was designed.

The rest of the paper is organized as follows. Research methodology of the proposed work is explained in section II. Data analysis and its discussion is presented in section III. Concluding remarks are given in section IV.

¹ Professor in OB & HRM , Dept. of Edu. Management , JDBIMS, SNDT Women's University , Juhu Campus , Mumbai-49.

²Associate Professor and Head , P G Dept. of Computer Science , SNDT Women's University , Juhu Campus , Mumbai 49

II. RESEARCH METHODOLOGY

2.1 Objective: –

To understand immediate financial and emotional concerned of Indian women due to COVID -19 and lock down as perceived by them.

2.2. Sample–

All together seven hundred and forty nine Indian working women , have voluntarily participated and responded the questionnaire for the present study. The participants were in the age group of 25 to 57 yrs. Out of 749, 41% have completed their Masters, 22% had graduated, 36% had profession degree , 1% have completed their Intermediate. They were working in various sectors like IT, Educationist, and other different sectors, but due to lockdown currently there were at home.

2.3. Method:

A questionnaire was prepared related to understanding of COVID-19 and its impact due to lock down. Knowledge about this disease, kind of precaution people are taking, how much coronavirus has forced them to think about it, are they scared, what do they do to avoid getting coronavirus, what are the problems they are facing due to lockdown. Being at home what financial problems they are facing, reasons of getting worry during lockdown, concern about their health and family members. Their worry related their economical concern and its effect on their physical, mental and emotional state.

2.4. Data Collection:

A questionnaire was prepared related to different issues, problems women were facing due to COVID-19 and lockdown. Women who were working in different sectors were approached through emails and WhatsApp and requested to fill the questionnaire in form of google form. Women were also requested to share questionnaire link to others. Seven hundred and forty-nine responses were available to the researcher. Respondents opinions were analysed using frequency distribution and percentage analysis, charts were prepared accordingly

III. DATA ANALYSIS AND DISCUSSION

3.1. Data analysis

Available data were analyzed using frequency distribution and the same was presented using different charts.

Following are the data analysis and results. Despite of massive advertisement by Indian Government, when it was asked to the respondents ‘when did they get to know about COVID -19’, In response to a question ‘merely 2% of total respondents were aware of corona virus before December- 2019, however 14.2% women got to know about this deadly virus in December 2019. 28% became aware of Corona Virus in Jan 2020. Awareness increases about 27 % got to know about this virus in month of Feb-2020 . 28% respondents got to know about this virus in month of March 2020. Figure 1 shows the count of responses about the time of awareness about corona virus[4].

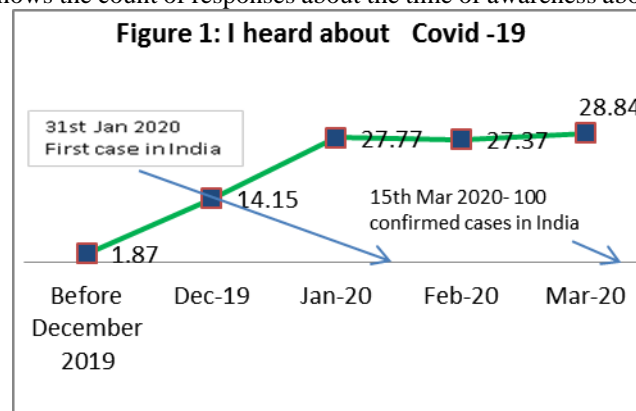


Figure1: Graphical representation of the % of responses got for the question “I heard about Covid -19”

Early protection, early identification, early diagnosis, and early isolation are crucial to combat with COVID-19 outbreaks. Collaborative efforts to counter the current coronavirus must be conducted that should focus on both ongoing strict lockdown and on the observation of positive found cases[5]. With this in mind whether in India women’s have started taking care of themselves was the next questions whose results are graphically represented in Figure 2 shows that 8.5% were started taking care once lock down was announced. 23.1% were taking extra care of

cleanliness, 19.9% started taking required precaution once they saw advertisement about disease, 47.3% started taking precaution once they heard first case of Corona Virus in India, surprisingly 1.2% were not bothered to take any precaution to combat COVID-19.

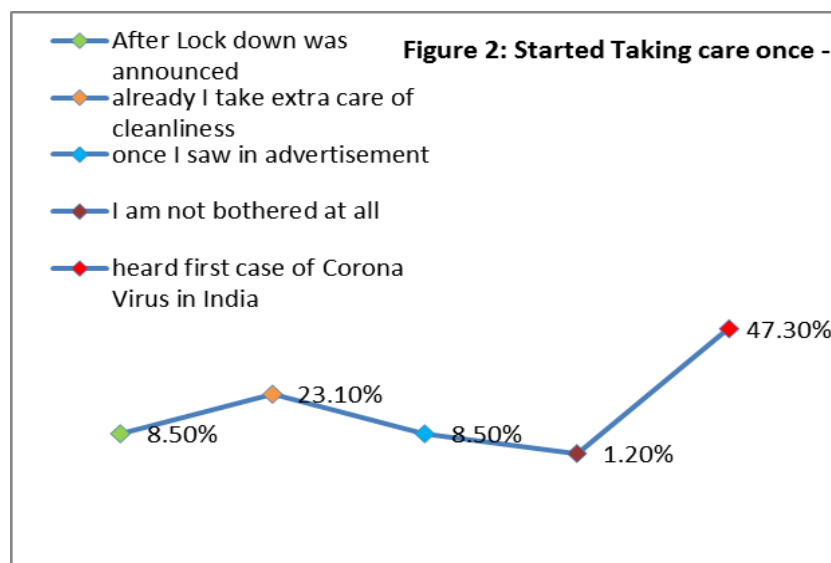


Figure2: Graphical representation of the % of responses for started taking care once-

Maintain a social distancing and Alcohol sanitization are the two ways to prevent the disease from spreading the virus. So the masses need to be made aware about these two remedies as infected people are the main source of infection for COVID -19. The incubation time for the virus is roughly 2-14 days. It is possible that they are asymptomatic, which plays a critical role in the transmission of this virus through respiratory droplets and contact are the main transmission routes[6]. As reported most of the respondents were aware about the pandemic due to COVID-19, about 67% people agreeing to this. 25% people agreed that it spread through the droplets of the people who suffers from corona virus disease. Unfortunately, few people were not bothered (Figure 3) thinking that they are young enough not to be infected with this deadly disease.

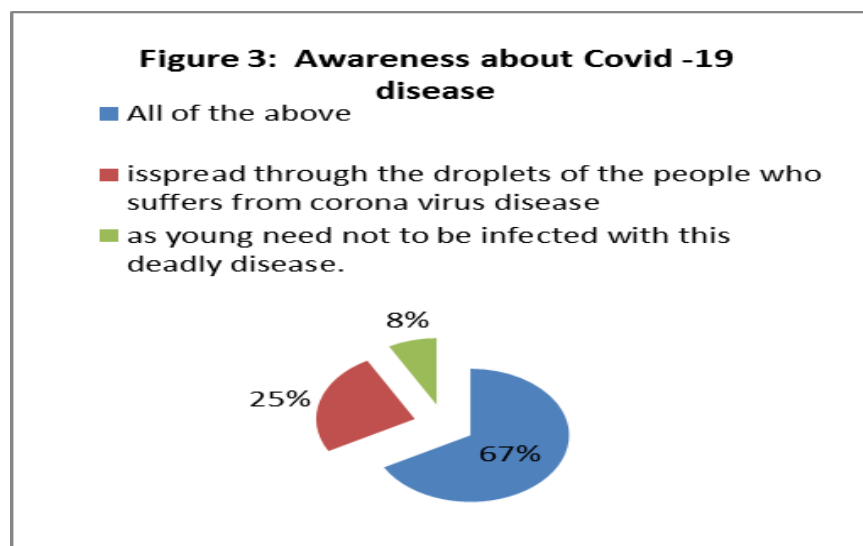


Figure 3: Graphical representation of % of responses got in response of Awareness about Covid-19 disease

As per government of India and WHO guidelines, everyone must wash their hands on regular interval, maintain minimum distance of at least one meter from the people who are coughing and sneezing, not to touch face, stay home if not well, to avoid getting infected with corona virus [7]. As per the Indian Government and WHO advisory, people are expected to take some preventive measures. Most people were aware and trying to prevent themselves by washing

their hands , taking care of personal hygiene , not going out under any circumstance . Respondents are taking care of their family members (19%) making sure that they must wash their hands at regular interval. Unfortunately, there are people (.03%) who are not following any preventive measures guidelines. The same is depicted in Figure4 above.

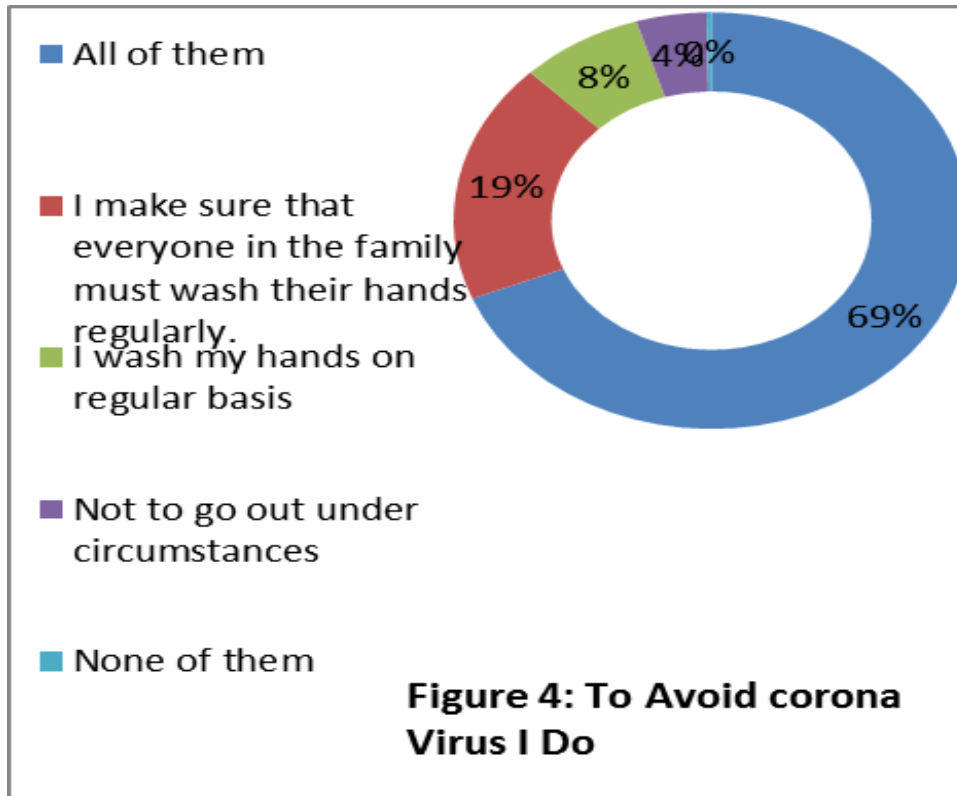


Figure 4: Graphical representation of the % of responses got for the question “To Avoid Corona Virus I Do ”

Humans are social animal and like to stay with the society . the current lockdown has lead them to anger, frustration, isolation and depression, because of the such restrictions on their free movement. In this frightening stretch of a worldwide epidemic, when entire country is shutting down, the insecurity neighboring coronavirus is hardest thing to handle. Covid-19 has scared everyone. People are living in great uncertainty and worried about their live. Country is shut down. The insecurity surrounding coronavirus is really difficult to handle. People living in scary situation were spending sleepless night (6.3%), restless (19.80%) , depressed (23%) and always anxious (23.2%). Regrettably, 27.8% people are not bothered, not even thinking about this virus as shown in Figure 5.

Figure 5 : Scare of Corona virus

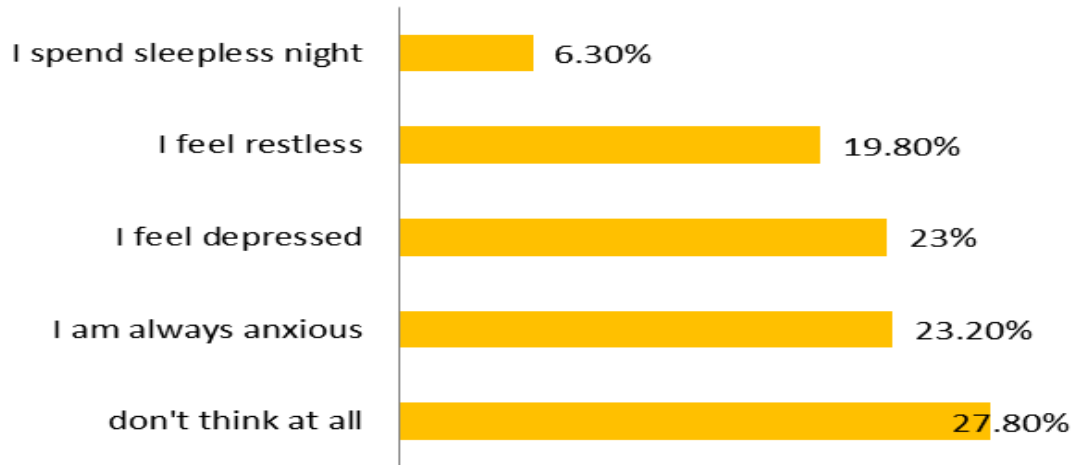


Figure 5: Graphical representation of the % of responses got for the question “Scare of Coron Virus”

Worldwide citizens are locked, quarantined and isolated during Covid-19. Families are more at home, which have revealed and compounded the double pressure on women. The pressure of handling the household work and their jobs i.e. the “work from home concept” together is putting more pressure on women which directly is affecting their health[8]. Being part of developing country with population of 1.3 billion India is facing tremendous problems to curb the impact of Covid -19. In response to their problems people are facing during lock down. Most of them (43%) are worried about the wellbeing of their family members. Another massive problem is reported was living in small house, where maintaining a social distancing is big challenge (25.20%). People are facing problems due to lock down because they are not allowed to go out and not able to do their work (19.60%). It was also seen that working women are not liking doing their house hold job (9.10%), which they are forced to do due to unavailability of helping hand as depicted in Figure 6.

Figure 6: Due to lock-down , problem I face

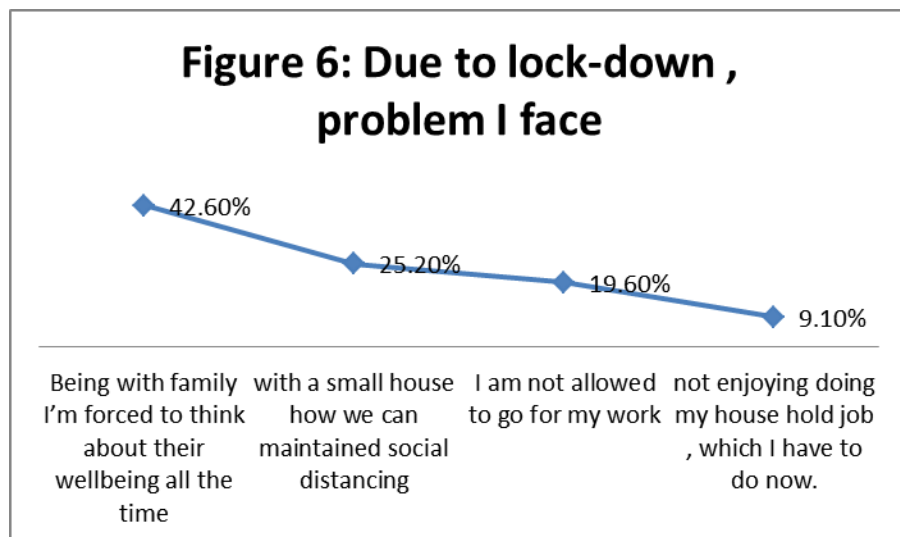


Figure 6: Graphical representation of the % of responses got for the question “Problems people are facing during lock down”

While the 'home' has taken a special place in the coronavirus strategy, the purpose and significance of the 'home' is different for many women's world wide. There are multiple reasons, due to which women are worried and concerned during lock down period. During the mandatory isolation, home provided some with a sense of security and comfort, while for others it's becoming a place of extreme abuse, sexism and different forms of worries. [9]. There are multiple reasons, due to which women are worried and concerned during lock down period. Psychologically speaking, they are anxious about their financial security. They (53.3%) are continuously getting worried about their and their spouse monthly salary and expenditure . 12.6% were worried and concerned about payment of house helpers. others (12%) were worried related to regular medical expenses of their family members. Women (25.1%) were uncertain about their job security and continuously reminding themselves what if they are served pink slip. Figure 7

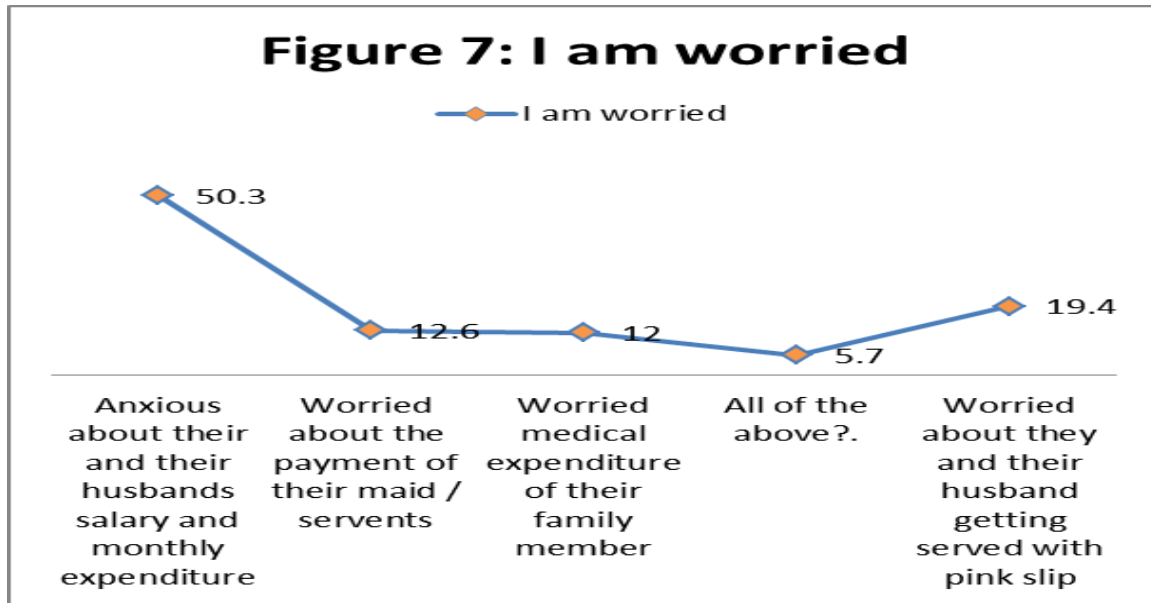


Figure 7: Graphical representation of the % of responses got for the question “I am worried”

Being developing nation, finances of India are not as strong as developed countries. Here people are more concern and worries about their financial security. In response to their financial crises 42.10% women responded that there will be great financial crises if lock down continue in coming months . 27.7% will barely be in position to manage their expenditure in coming month . However, about twenty percent (20.60%) women were able to management their coming month expenditure . Only 9.5% women do not have any financial issue, and they were in position to take care of themselves and family members' financial need very well as depicted in Figure 8.

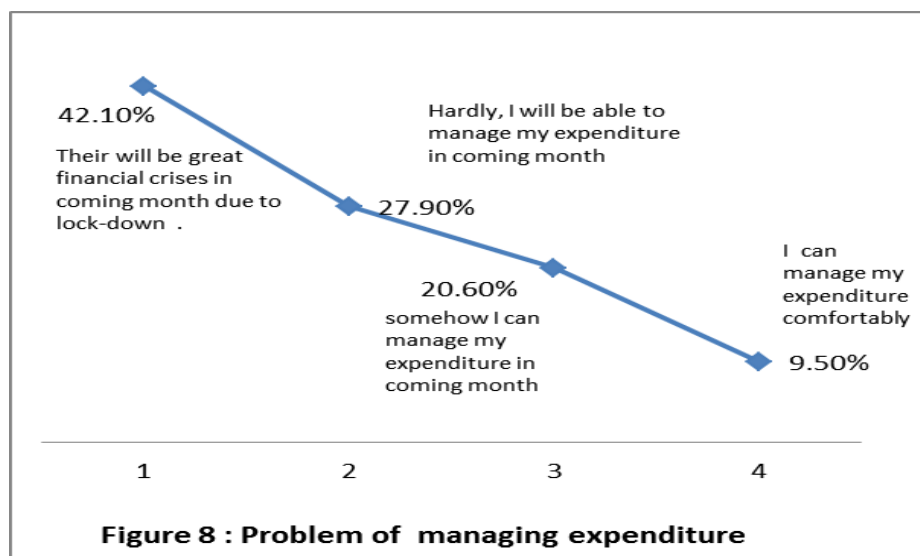


Figure 8: Graphical representation of the % of responses got for the question “Problems of managing expenditure”

Global momentum is emerging in the spread of the latest coronavirus in 2019 (2019-nCov), but today its disease epidemiology remains uncertain. There is little confirmation as to the cause of the epidemic, and there are currently no Covid-19 vaccines available, hence the most effective prophylactic steps are the isolation of the infected source, social distancing, wearing mask, and sanitization. Therefore, it is crucial to raise self-protection awareness for every family member, including older children and the elderly ones. The homemakers or the Women are continuously thinking (36%) and concerned about ‘what if’ their family members get infected due to Covid -19. Eleven percent women (11 %) are often concerned about this disease and getting infected. Twenty-six percent (26%) women were concerned for some time. However, 27 percent were not bothered at all and never think about anyone in their family could get infected due to corona virus as shown Figure 9.

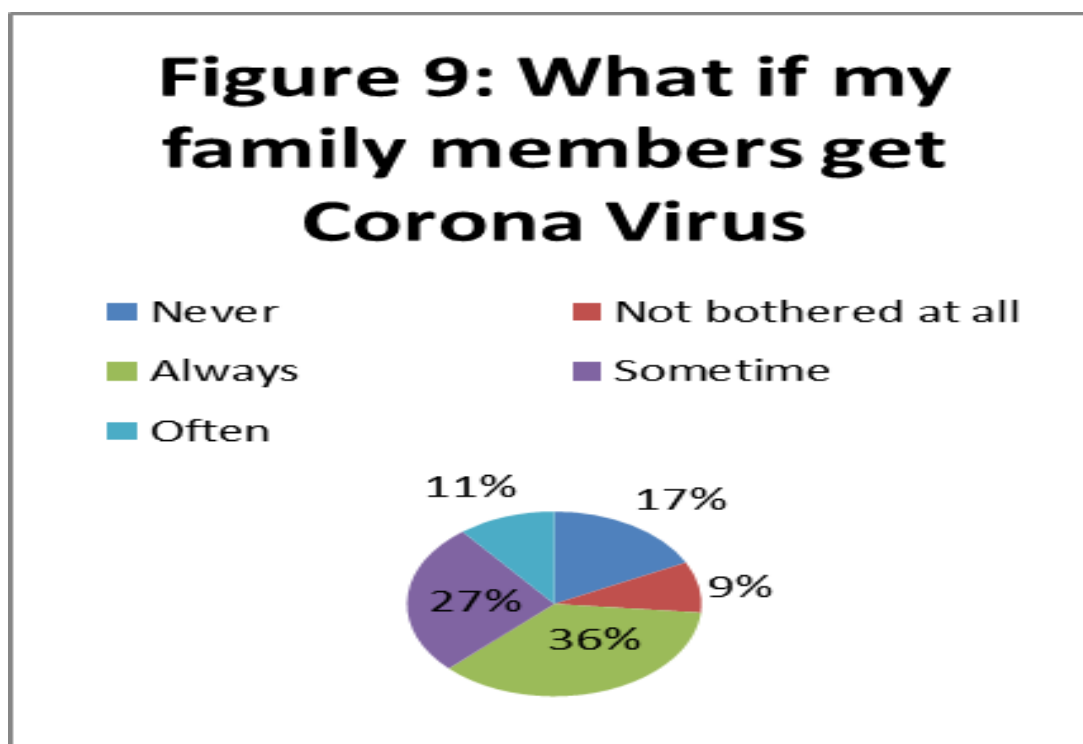


Figure 9: Graphical representation of the % of responses got for the question “what if my family members get Corona Virus”

COVID-19 is a global pandemic and a significant danger to human health, halting economic development, but it often is seen in the form of a "blessing under disguise." The lockdown period due to this pandemic could be the much needed wake-up call to the necessity of long-term changes to India's economic and social system. There is positive environmental effect may be temporary[10], but policymakers and individuals should learn how to reduce emissions in the long term from this lockdown. The preparation for problems like this is chronically underfunded (at just 1.28% of GDP) health system. When asked to respondents 76.6% responded yes, they agree to this and 23.4% said No, they don't agree to it. The same is depicted in the graphical representation in figure. 10

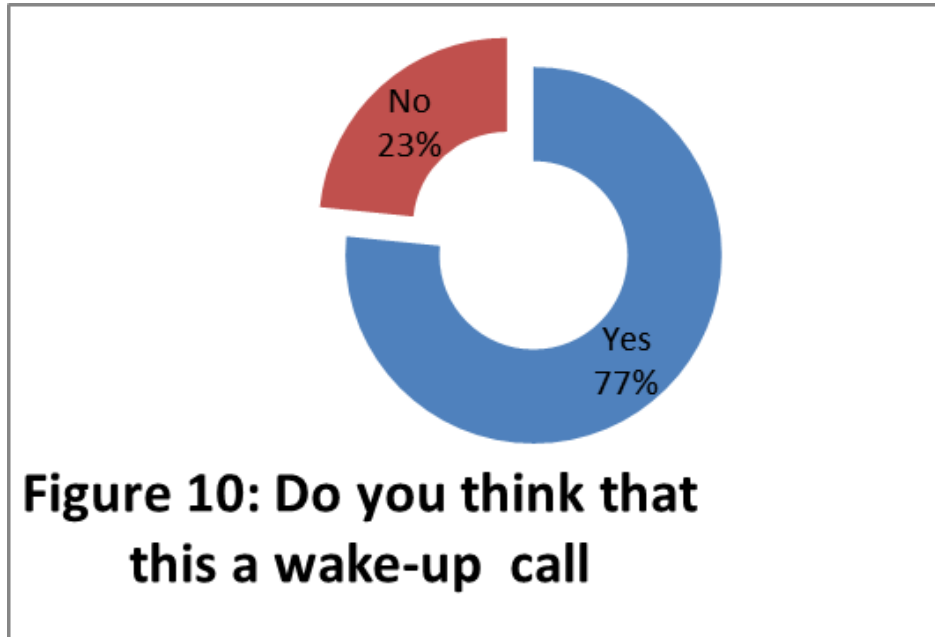


Figure 10: Graphical representation of the % of responses got for the question "lockdown is the wake up call for every one"

3.2 Discussion: As per findings anxiety, stress, worries and tensions are increasing among Indian women due to COVID-19 and lock down . Unexpected pandemic has brought many troubles in each and every household in India. Information and news about COVID -19 was circulating in India, many people (almost 28.9 %) were reported to know after lock down was announced. It was matter of great concern. It was an alarming issue. Though everyone is taking required precaution, yet if 1.2% people are bothered. This could be dangerous situation for a populated country like India. This pandemic has started affecting Indian women psychologically and emotionally. Most of them are depressed, anxious, restless, started showing the symptom of insomnia, which could cause their physical health. Their mental and physical conditions may aggravate due course of time, once this pandemic reaches to its peak and lock down increases. In metropolitan cities usually people are living in small houses, where maintaining the social distancing is becoming difficult, which will help spreading COVID-19 easily . That is matter of concerned to Indian women they are worried about wellbeing of their loved once. Financial crises and uncertainty, have started knocking the doors of the working and salaried persons. Majority of women are anxious about managing their day to day expenditure, medical and emergency expenses of elderly people, not able to clear helping hands' dues , apprehensive about not receiving salary on time or served pink slip. This is going to be frightening situation for everyone. It is an alarming situation, where women are unable to manage their expenses in coming months, only very few people will be in position to live comfortably in their house due to lock down. They are living under continuous fear of 'what will happen if family members get infected with this deadly virus', this could be major cause of their mental disturbance and distressed feeling. It is not clear to anyone, when there will be a vaccine and certified line of treatment. The job scenario is radically altered in non-government sectors. Further, the workers employed in informal and unorganized sectors are worst affected. The loss of business opportunity forcing organizations to cut cost and reduce employees. These are affecting the mental health of a large number of women in India. There is a strong need to handle financial and social concerns of middle class women who may suffer mentally due to intense pressure of family demand, will gradually lead to severe consequences . As reported by respondents, COVID -19 is a sort of wakeup call for all of us . Massive awareness is required to be reached to everyone because there are still some people who need to be made aware about the seriousness of this pandemic, to maintain cleanliness, isolation, which are the mantras of Corona free India and planet . Govt. must be prepared with

more hospitals and related facilities such as stocks of masks, body gears, sanitizers. It is essential to take care of peoples' financial needs. Everyone must get food during lockdown because it's not just corona but even hunger which is a huge problem in India.

IV.

CONCLUSION

In India, worst impact of COVID-19 is yet to be seen, unfortunately it has started reflecting in full swing, also people have started realizing its impact on their lives. As expected they have started reporting symptoms of depression, anxiety, insomnia, restlessness. They are extremely worried about their financial status in coming months, which will make situation worst as days passed by. Government of India is doing excellent job and trying its best to curb the impact of COVID - 19, yet concerns of the working middle class people must be addressed urgently. This study is expressing the true concern of the respondents as well as entire nation.

REFERENCES

- [1] B. Pfefferbaum, C.S. North, "Mental health and the Covid-19 pandemic", N. Engl. J. Med. (2020)
- [2] www.worldometers.com/coronavirus access on 21st may 2020
- [3] COVID-19 homepage (mohfw.gov.in)
- [4] World Health Organization, "Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV)".
- [5] Yaqing Fang, Yiting Nie, Marshare Penny, "Transmission dynamics of the COVID-19 outbreak and effectiveness of government interventions: A data-driven analysis", J Med Virol. 2020;92:645–659, downloaded from <https://onlinelibrary.wiley.com/doi/abs/10.1002/jmv.25750>
- [6] Pandey S, Gupta A, Bhansali R, Balhara S, Katira P and Fernandes G. Corona Virus (COVID-19) "Awareness Assessment - A Survey Study Amongst the Indian Population." J Clin Med Res., 2020;2(4):1-10.
- [7] World Health Organization., "WHO Director-General's opening remarks at the media briefing on COVID-19 – 11
- [8] McLaren, H.J.; Wong, K.R.; Nguyen, K.N.; Mahamadachchi, K.N.D. "Covid-19 and Women's Triple Burden: Vignettes from Sri Lanka, Malaysia, Vietnam and Australia.", Soc. Sci. 2020, 9, 87.
- [9] Nigam, Shalu, COVID-19, "Lockdown and Violence against Women in Homes", (April 28, 2020). Available at SSRN: <https://ssrn.com/abstract=3587399> or <http://dx.doi.org/10.2139/ssrn.3587399>
- [10] S Muhammad, X Long, M Salman, "COVID-19 pandemic and environmental pollution: a blessing in disguise? ", Science of The Total Environment, 2020 – Elsevier

Special Issue - Feast of St. Francis Xavier

RESEARCH AND REFLECTIONS ON EDUCATION

ISSN 0974-648X

a peer reviewed and refereed quarterly journal

UGC- CARE Approved

Volume : 18 No : 4A

Rs. 50

December 2020

PERCEPTUAL PROBLEMS
RELATED TO
PRESUPPOSITIONS

SOCIO-ECONOMIC
STATUS AND ACADEMIC
INTEREST

SOCIAL COMPETENCIES
OF SCHOOL
STUDENTS

JOB SATISFACTION
OF SCHOOL
TEACHERS

CYBER-CRIME
AWARENESS AMONG
B.Ed. TRAINEES

CONSTRUCTIVIST
APPROACH AND
INTEREST IN
MATHEMATICS

BRINGING GLOBAL
COMPETENCE TO THE
CLASSROOM

TAGORE'S PHILOSOPHICAL
THOUGHT ON HOLISTIC
APPROACH IN EDUCATION

EMPOWERING TEACHERS
IN PRESENT ERA

WHY DO STUDENTS
PROCRASTINATE?

PRACTICING
ALTERNATIVE
EDUCATION

WEB 2.0 TOOLS FOR
LEARNERS AT THE
HIGHER EDUCATION



St. Xavier's College of Education
(Autonomous)

[Re-accredited (3rd cycle) at 'A' Grade by NAAC with CGPA : 3.67]

PALAYAMKOTTAI - 627 002. TAMIL NADU.

Email: rresxce@gmail.com

Web: www.sxcejournals.com

Dear Readers!

Yet another special issue emanates from the portals of St. Xavier's College of Education, Palayamkottai, Tamilnadu in order to celebrate the feast day of St. Francis Xavier SJ, the patron of our College. Francis Xavier, a Jesuit missionary from Spain reached at Goa, India in 1542 where he drove home the importance of Collegiate Education including literature, Philosophy and Theology through a seminary which catered to mainly seminarians and later to all from other sections. Known for his zeal, passion, sincerity and selflessness in his service to least in the society, he established himself among the Indians as the best teacher in communicating the 'Good News'. In fact he was considered to be an icon of an innovation and child-centred thoughts as he followed a unique way of attracting the children and elders for his sharing of his 'good news'. Reading the situation, he was able to transcend his academic superiority and became incarnated in the lives of the ordinary people of India.

In the context of today's educational scenario, one of the major impediments for a quality education is identified as the unwillingness of the teacher to reach the level of the students; this is because of the lack of in-depth reading of the profile of the students. Sometimes, even after knowing the background, teacher shirks his or her responsibility to modify the pedagogical strategy so that the students are motivated and attracted to learning. Leave alone the use of technology in the classroom transaction, the element of constantly accompanying the students in his or her academic search through the right pedagogy, appropriate reinforcement and comprehensive evaluation does not occur on the part of the teacher; this hinders the classroom climate and consequently the eagerness and attitude of the learners.

What do have to do? A constant refreshment of the teaching fraternity in the techniques and pedagogy which would suit the needs and expectations of the learners becomes essential and indispensable. A low percentage of teachers seems to be exercising enthusiasm in updating themselves with modern trends whereas the maximum depend upon and wait for the initiatives of the Government education authorities to impose upon or organise the in-service programmes. A wonderful scheme titled as 'Samakra Shikshan' by Central Government is gaining momentum and able to collect the teachers across the table for a critical and evaluative thinking that leads to innovation and creative communication of content among the learners. Apart from the efforts of the Government, the teaching community has to be continually enthused for personal efforts of reading and reflecting on recent developments in their subjects which will enhance the teacher personality. With the advent of ICT, the student community has become well-informed and therefore teaching community too must be well-prepared in meeting the challenges from the classroom.

Dear Readers, we have good number of research papers and articles in this special issue; enjoy the reading and enhance your professional efficiency. I am sure, we will be able to mould a wonderful and fruitful younger generation with all our comprehensive efforts. Kindly send us your feedback and we will be grateful to you.

Thanking you in anticipation
Editorial Team

RESEARCH AND REFLECTIONS ON EDUCATION (A Quarterly Journal)

Reg.No : TNENG / 2003 / 10220

ISSN : 0974-648X

CONTENT

A Study on the Perceptual Problems related to Presuppositions among Secondary School Students of Paniya and Kurichiya Communities of Kerala, India

Dr. Mariamma Mathew

Impact of Socio-economic Status on Academic Interest of the Secondary School Students in Meghalaya

Toba Lamare, Dr. Euodia B. Myrthong

A Study of Social Competencies of Secondary School Students

Dr. Viquar Unnisa

A Study on Job Satisfaction of Secondary School Teachers

Ms. Reema Rai, Dr T.j.m.s Raju

A Study of Cyber-crime Awareness Among B.Ed. Teacher Trainees

Dr. Harpreet Kaur, Ms. Arshdeep Kaur

Effect of Constructivist Approach on Interest in Mathematics

Dr. Sheena Thomas, Dr. Hemant Khandai

Bringing Global Competence to the Classroom: Competency-based Curriculum Approach

Cheptoo Ruth, Dr. Ramadas, V.

Reflection of Rabindranath Tagore's Philosophical thought on Holistic Approach in Education

Cheptoo Ruth, Dr. Ramadas, V.

Empowering the Teacher in Present Era: A Visionary Approach to make them more Efficient in Indian Context

Lovish Raheja

Why do Students Procrastinate? Empirical Derivate from the relation between procrastination and learning resistance

Jijo Varghese, Dr.M.N.Mohamedunni Alias Musthafa

Practicing Alternative Education Policy through Swayam

Mohini Tripathi

A Study of Web 2.0 Tools for Learners at the Higher Education

Dr. Anita Chaware

A STUDY OF WEB 2.0 TOOLS FOR LEARNERS AT THE HIGHER EDUCATION

UGC CARE
APPROVED

Introduction

With the invention of the Internet, a wealth of data is always available to the digital indigenous youth. The advancements in technology, telecommunications, and entertainment have made the internet immensely powerful. This development further generated the need for fresh tools to manipulate digital formats and tools to navigate through the internet (Madden and Fox 2006). Web 2.0 techniques are one such tool. Web 2.0, also referred to as read-write Web 2.0, enables information to be interpreted and allows contribution into knowledge development. Web 2.0 reflects the second level of Internet use. The first level, Web 1.0, also called read-only web 1.0 tools focused on knowledge presentation. The next step, Web 2.0, allows for both reading and writing in knowledge building. Since knowledge of programming or HTML or complicated publishing software is no longer needed, anyone can read and write the information on these Sites. This needs an Internet browser and a little bit of technical expertise to work with the Web 2.0 tools (Rosen & Nelson 2008). However, there are still questions on how Web 2.0 can be effectively used to support the learning process. Learning or seeking information about a problem at work, school, or to just satisfy a curiosity can take advantage of digital and networked technologies. To do so, one uses web 2.0 tools to search for the required information and to exchange their knowledge with the world. Thus, today's learners should

not be seen as passive consumers of information, rather, they are active co-producers of content (McGloughlin & Lee, 2010).

Background of the study

SNDT Women's University is India's oldest and leading University, with the impressive implementation of the use of ICT for 24x7 hours access to the Internet throughout the year. Universities aim at their learners to develop skills required in the 21st century using these facilities to improve student interest and motivation and accelerate the learning process. These tools provide students with professional content, resources to help them improve their learning in a customized way at their own pace. This study, partial work of the project funded under SUUTI by the University, focused to find the Familiarity, Awareness, and Usage of the web 2.0 tools by the students of SNDT University, Mumbai during the period between March 2018 till June 2019.

Significance of the study

This study is important to understand the behavior of students about the usage of web 2.0 tools in their leisure time and their learning. The study will bring awareness among students about the importance of web 2.0 tools in learning

Dr. Anita Chaware

Associate Professor, PG Department of Computer Science, SNDT Women's University, Mumbai - 49.

processes. This study is also significant for the University, to motivate the faculties and students in large to use web 2.0 tools in their learning process, to inculcate the habit of self-learning.

about students such as age, education level and information about students' computers and frequency of Internet usage, student's levels of awareness about the Internet tools, and their frequencies of usage.

Objectives

- 1. To find the level of awareness and usage of Web 2.0 tool in their learning among the students at the University.
- 2. To find the types of Web 2.0 tools used by the students in the University.
- 3. To find the reasons for using the web 2.0 tools in their daily activities.

A study at EDUCAUSE Center for Applied Research shows that undergraduate students of information technology use social media with a steady increase from 2007 to 2010. It also found the difference between the use of social media among older and younger students is disappearing (Smith & Caruso, 2010). Thus, this implies that there can be differences in the Awareness of web 2.0 tools among the UG/PG students of the University, hence the hypothesis.

Hypotheses

- 1. There is no significant difference between undergraduate and post graduate students in the awareness of web 2.0 tools.
- 2. There is no significant difference between undergraduate and post graduate students in the usage of web 2.0 tools.

Methodology

The study was largely quantitative with structured questionnaires. The questionnaire was validated by the five (5) experts from the education and psychology departments of the university before full-scale data collection could commence. Pre-test or pilot test of the questionnaire was done on Non-IT students to check the understandability of the questions. Randomly selected 50 respondents from each University department / Conducted College were expected to participate in the study. The study was analyzed using SPSS 16.0.

The questionnaire used in this study consisted of closed-ended items. They included personal information

Analysis of data,

The study was targeted at 700 students who were served with questionnaires. Out of 700 targeted respondents, 507 filled-in and returned the questionnaires which made a response rate of ~72%. The study done by Mugenda and Mugenda(2003) indicated that a response rate of 40% to 80% of the total sample size can be generalized to represent the opinion of the entire population. This high response rate can be attributed to the fact that the researcher administered the questionnaires personally along with one field worker and so was available to clarify queries as well as prompt respondents to fill the questions. This study mentioned 12 different Web 2.0 tools including self-engaging tools like PodCase, Forum, Tagging, TED, Wikis, Blogs (Zimmerman, B. J. 2000), Web-Polls for online polling, social networking tool like Facebook, Twitter an (a micro-blogging platform (Rankin, 2009), media sharing tools such as Flickr and YouTube and RSS- a web-feed tool, Google drive- a tool to files store, synchronize files and share files (Dabbagh & Reo, 2011). Frequency Distribution and Independent samples t-test was used to analyze and to interpret the collected data.

Findings and Interpretations

Table 1

Profile of respondents

Age groups Respondents	25-30yrs 59(11.60%)	31-36yrs 7 (1.38%)	37-42yrs 3(0.59%)	43-48yrs 2(0.39%)	less than 25 436(85.99%)
Level of education	PG - 247 (48.72%)	UG - 260 (51.28%)	Do You use the Internet for Learning	NO 5(0.99%)	Yes 502(99.01%)
Familiar with term Web 2.0 tools	NO 87(17.20%)	Yes- 420(82.8)			

The above table 1 shows that out of the 507 respondents, 59(11.6%) are in the age group of 25-30 years, 7(1.38%) are in the age group of 31-36 years, 3(0.59%) are in the age group of 37-42 years, 2(0.39%) are in the age group of 43-48 years, and 436(85.99%) are in the age group of fewer than 25 years, which indicates the

enthusiasm of young students inclined towards these tools. The profile shows that 502(99.01%) students are using internet for their studies and only 5(0.99%) are not using the internet for their studies. Further the profile shows that among the 502(99.01%) respondents using the internet for their studies, it is found that 420(82.8%) students are familiar with the term Web 2.0 tools and 87(17.2%) students are not familiar with these tools.

Tools used and Rank

Objective 1

The first objective of this study was to find all tools the university students used in their daily activities.

Table 2

Type of tools used by the respondents along with the count and rank of count

Web 2.0 tools	Used	Rank	Web 2.0 tools	used	Rank	Web 2.0 tools	Used	Rank
Wikis	401	3	Forum	373	4	RSS	94	11
Blogs	271	5	Web Polls	131	8	Social Bookmarking	133	7
Podcast	8	12	Facebook	410	2	Flickr	106	9
Tagging	97	10	Twitter	234	6	You tube	483	1

The table 2 shows that among the web 2.0 tools used by the students YouTube ranks first, Facebook 2nd, Wikis 3rd, forum 4th, Blogs 5th, whereas Twitter, Social Bookmarking, Web Poll are in the middle positions i.e 6th 7th and 8th rank, Flicker and Tagging, RSS, Podcast are in the last 4 ranks in order. Baro et al. (2013) identified in their findings that Flickr, RSS feeds, podcasts, and social bookmarking have been amongst the least commonly used, same results we could find in our research. Podcasts (rank 12), RSS(rank 11), Tagging(rank 10), Flicker(rank 9), web-polls(rank 8) were least used, whereas these tools are particularly important for educational purposes.

Objective 2

The second objective was to find the Current level of awareness and usage of the Web 2.0 tool in the learning activity

To study this objective, the respondents were also asked in the survey questionnaire to indicate the level of awareness and the level of usage of Web 2.0 tools in learning. The question was designed with 2 Likert-type items one for awareness of the above-mentioned web 2.0 tools and the other for Usage of the same in learning. Respondents were asked to rate their level of awareness and level of usage of web 2.0 tools in learning.

Table 3
Mean scores, standard deviation, ranks, and the degree of use of Web 2.0 tools by the respondents

Web 2.0 tool	Awareness				Usage			
	Mean	SD	Rank	Level	Mean	SD	Rank	Level
Wikis	3.08	1.4	4	High	3.03	1.35	4	High
Blogs	2.02	1.2	5	High	2.09	1.17	5	Medium
Podcast	0.03	0.3	12	Low	0.01	0.24	12	Low
Tagging	1.82	1.2	7	Medium	1.8	1.21	7	Low
RSS	1.29	0.7	11	Low	1.27	0.69	11	Low
Social Bookmarking	1.56	1.1	8	Medium	1.54	1.08	8	Low
Forum	3.09	1.6	3	High	3.09	1.55	3	High
Web Polls	1.47	0.9	9	Low	1.47	0.92	10	Low
Facebook	4.24	1.5	1	High	3.24	1.46	2	High
Twitter	1.97	1.3	6	Medium	1.82	1.27	9	Low
Flickr	1.38	0.9	10	Low	1.37	0.84	8	Low
YouTube	4.14	1.2	2	High	4.14	1.16	1	High

Table 3 shows that the mean scores for individual tools in case of awareness ranged from 0.03 to 4.24 and in case of usage from 0.01 to 4.14. The most popular Web 2.0 tools used by the students are Youtube (4.14), followed by Facebook with a mean of 3.24, Google Drive third 3.09, Wikis 3.08 on 4th and Blogs 2.02 on the fifth rank.

Web 2.0 technologies, however, are typically introduced in higher education based on the premise that the digital indigenous students use these technologies such as Twitter, Facebook, Google Drive, Wiki, and social network sites, in their daily lives for socializing (Hicks and Graber 2010). However, Garoufallou and Charitopoulou(2011), in their study on the awareness of Web 2.0 tools by Greek students, found that although the knowledge of the tools was there the usage was limited. This statement is found correct in this research also. Other than youtube, Facebook, google drive wikis, and blogs the other tools are not used or very little used by the respondents in their learning.

Objective 3

The third objective was to find the reasons for using the web 2.0 tools in their daily life activities.

Table 4
Activities using web 2.0 tools

Web 2.0 tools	Learning / Research	For fun activities	Sharing personnel contents/photos	Sharing lecture contents /videos
Self-engaging tools (PodCase, Forum, Tagging, Wikis, Blogs)	102(9%)	731(64%)	243(21%)	74(6.4%)
Social networking tools (Facebook, Twitter)	15(1.3%)	349(30%)	227(20%)	53(5%)
Media sharing tools (Flicker and YouTube)	120(10%)	285(25%)	154(13%)	30(2.6)
Social Bookmarking	133(12%)	0	0	0
A web-feed tool(RSS)	70(6.08%)	0	0	24(2%)
online polling (Web Polls)	46(3.9%)	50(4.3%)	10(0.8%)	25(2.1%)
Total (in %)	528 (8.67%)	1415 (23.25%)	634 (10.42%)	227 (3.73%)

It is understood from table 4 that the reasons for using the web 2.0 tools by the 33.67% respondents were mainly for fun activities and sharing personnel contents and photos . The study also found that 12% of respondents used the web 2.0 tools for learning or research and sharing lecture contents. Thus in the usage pattern of students, there was a remarkable difference in using these tools for fun activities and in learning activities.

Hypothesis1 : There is no significant difference between undergraduate and post graduate students in the usage of web 2.0 tools.

Table 5
Difference between the level of education and Usage of web 2.0 tools.

Level of education	N	Mean	S.D.	Calculated 't' Value	Remark
UG	260	1.79	0.409	2.112	S
PG	247	1.87	0.342		

It is inferred from the table 5 that there is a statistically significant difference between undergraduate and post graduate students in the usage of web 2.0 tools. While comparing the mean scores postgraduate students use web 2.0 tools more than that of undergraduate students. Hence the hypothesis undergraduate and post graduate students in the usage of web 2.0 tools is accepted.

Educational Implications

According to these study findings, the researcher recommends the following:

- i) The findings indicate that Web 2.0 applications were not being fully exploited by the undergraduate and post graduate students. It should be noted that the usage of Web 2.0 tools for Educational purposes are at the early stages in Indian education. As a result, Web 2.0 tools do not appear to have a big impact on educational activities.
- ii) Apparently, the study shows that Digitally cultured students are aware of Web 2.0 tools. However, once the students understand how these tools work, they will be able to use them effectively in their learning process. Training and workshops must be planned to provide usages of Web 2.0 tools for students and faculty members in education and learning.
- iii) Web 2.0 tools are the easy and affordable pathway for getting educational resources at an exceptionally low price. Students can use these resources at their own pace anywhere and anytime for their learning and research, other than socializing and fun activities.
- iv) Too much Usage of Web 2.0 tools embraces security threats. These tools capture users email and phone numbers from the registration process. This personal data which is very crucial can lead to many cyber security threats. Hence, students those who use these new technologies should be made aware of these security concerns. Cyber securityAwareness training and workshops should be conducted to protect these digitally literate students.
- v) Finally, the web 2.0 tools are used to engage the learners with the ocean of information.

Using these tools students become self engaged and self-managed. Students should be taught to choose what is good for them to learn .

References

1. Atulomah, B. C & Onuoha, U. D. (2011),“ Harnessing collective intelligence through online social networks: a study of librarians in private Universities in Ogun state, Nigeria”,*Ozean Journal of Social Sciences*, 4 (2): 71 – 83.



2. Baro, E.E., Idiodi, E.O. and Godfrey, V.Z. (2013), "Awareness and use of web 2.0 tools by librarians in university libraries in Nigeria", *OCLC Systems & Services*, Vol. 29 No. 3, pp. 170-188.
3. Dabbagh, N., & Reo, R. (2011), "Back to the future: Tracing the roots and learning affordances of social software", *Web 2.0-Based E-Learning:Applying Social Informatics for Tertiary Teaching*, IGI Global, 1-20.
4. Garoufallou, E. and Charitopoulou, V. (2011), "The use and awareness of Web 2.0 tools by Greek LIS students", *New Library World*, Vol. 112 No. 11/12, pp. 490-498.
5. Hicks, A., and Graber, A. (2010), "Shifting paradigms: Teaching, Learning and Web 2.0", *Reference Services Review* 38(4), 621-633
6. M. J. W. Lee, & C. McLoughlin (Eds.), *Web 2.0-based e-learning: Applying social informatics for tertiary teaching* (pp. 1-20). Hershey, PA: IGI Global
7. Madden, M., and Fox, S. (2006). *Riding the waves of "Web 2.0": More than a buzzword, but still not easily defined.* Pew Internet Project, 1-6.
8. McGloughlin, C., & Lee, M. J. W. (2010). *Personalised and self-regulated learning in the Web 2.0 era: International exemplars of innovative pedagogy using social software*, *Australasian Journal of Educational Technology*, 26(1), 28-43.
9. Mugenda, O. M. & Mugenda, A. G. (2003). *Research methods: Quantitative and qualitative Approaches*. Nairobi: African Centre for Technology Studies.
10. Rankin, M. (2009).Some general comments on the "Twitter Experiment".
11. Rosen, D., & Nelson, C. (2008). *Web 2.0: A new generation of learners and education*. *Computers in the Schools*, 25, 211-225.
12. Smith, S. D., & Caruso, J. B. (2010). *The ECAR study of undergraduate students and information technology, 2010: EDUCAUSE Centre for Applied Research (ECAR)* <http://www.educause.edu/ecar>
13. Zimmerman, B. J. (2000). *Attaining self-regulation: A social cognitive perspective*. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (p. 13-39). Academic Press. <https://doi.org/10.1016/B978-0121098902/50031-7>

Continuation of Page 48

UGC CARE
APPROVED

PRACTICING ALTERNATIVE ...

3. Ulleberg, Inger (2009). *The role and impact of NGOs in capacity development: From replacing the state to reinvigorating education*. France: International Institute for Educational Planning. Page 20.
4. NCF 2005 Chapter 5: Systemic Reforms. Page 121.
5. *Guidelines for developing Online Courses for SWAYAM by Government of India Ministry of Human Resource Development, Department of Higher Education on 1st June 2017. Page-4*
6. <http://indianexpress.com/article/what-is/what-is-swayam-4744152/> as retrieved on 23 Feb, 2018.
7. Jayalatha, K. T. (2016) *Web Based Learning and Library & Information Science Education in India*. *Research Front*, 4(4), 49-54
8. *Guidelines for developing Online Courses for SWAYAM by Government of India Ministry of Human Resource Development, Department of Higher Education on 1st June 2017. Page-8*
9. Hiremath, Rahul (2017) *SWAYAM: The dream of Indian MOOC*. *International Journal of Advance Research and Innovative Ideas in Education*, 2(3), 242-247
10. *Guidelines for developing Online Courses for SWAYAM by Government of India Ministry of Human Resource Development, Department of Higher Education on 1st June 2017. Page-6*
11. *Guidelines for developing Online Courses for SWAYAM by Government of India Ministry of Human Resource Development, Department of Higher Education on 1st June 2017. Page-6*
12. *Guidelines for developing Online Courses for SWAYAM by Government of India Ministry of Human Resource Development, Department of Higher Education on 1st June 2017. Page-6-7*
13. *Guidelines for developing Online Courses for SWAYAM by Government of India Ministry of Human Resource Development, Department of Higher Education on 1st June 2017. Page-7*
14. <https://swayam.gov.in/Institutions> as retrieved on 23 Feb, 2018.
15. [https://swayam.gov.in/courses /public](https://swayam.gov.in/courses/public) as retrieved on 23 Feb, 2018.
16. <https://swayam.gov.in/Institutions> as retrieved on 20 Feb, 2018.
17. <https://swayam.gov.in/Faculty> as retrieved on 20 Feb, 2018.
18. <https://www.swayamprabha.gov.in> as retrieved on 23 Feb, 2018.
19. *Guidelines for developing Online Courses for SWAYAM by Government of India Ministry of Human Resource Development, Department of Higher Education on 1st June 2017. Page-4*



‘શ્રી ઝવેરચંદ મેઘાણી લોકસાહિત્ય કેન્દ્ર’ના ઉપક્રમે જાહેર થયેલા પુરસ્કારોની અર્પણવિધિ, લોક, સંત અને ચારણીસાહિત્ય વિષયક પ્રકાશન અનુસહાય તથા વિવિધ સ્થળે મેઘાણી સવાસોમી જયંતીના ઉપલક્ષ્યમાં વિવિધ કાર્યક્રમોની યોજનાનું પ્રારૂપ નિશ્ચિત થઈ રહ્યું છે. કેન્દ્રની અનુસહાયથી અભ્યાસક્રમને અનુરૂપ વિવેચન અને સંશોધન પ્રકલ્પો માટે પણ વિદ્વાનો સમક્ષ અમારી દરખાસ્ત માટેની માગણી દોહરાવીએ છીએ. ‘મેઘાણી પુનઃ મૂલ્યાંકન’, ‘લોકસાહિત્ય સિદ્ધાન્તની નૂતન અવધારણા’ અને ‘કેન્દ્ર દ્વારા પ્રકાશિત ગ્રંથો વિશે પરિસંવાદ’ની રૂપરેખા આગામી દિવસોમાં થશે. કેન્દ્રને મહાનુભાવો દ્વારા પ્રાપ્ત થયેલ અનુદાનથી યોજાતી ત્રણેક વ્યાખ્યાનમાળાઓ સંદર્ભે તાજેતરમાં ડૉ. રતિલાલ રોહિતે ‘બળવંત જાની સંતસાહિત્ય વ્યાખ્યાનમાળા’ અંતર્ગત ‘ભારતીય સંત સાહિત્ય’ વિશે વિદ્વાપૂર્ણ વક્તવ્ય આપ્યું. અન્ય વ્યાખ્યાનો પણ યોજનાર છે. આપ સહુની સક્રિયતા પ્રોત્સાહક અને પ્રેરકબની રહે છે.

૧૫-૧૦-૨૧
વિજયા દશમી

ડૉ. જે. એમ. ચંદ્રવાડિયા

ISSN : 2320-8872
UGC Care List No. 184

લોકગુર્જરી

સર્ગાંશ અંક : એકસઠ

(ત્રિમાસિક : દસમું વર્ષ, બીજો અંક, સપ્ટેમ્બર-૨૦૨૧)

સંપાદક : ડૉ. બળવંત જાની

લોકગુર્જરી

સર્ગાંશ અંક : એકસઠ

સર્ગાંશ અંક : એકસઠ

શ્રી ઝવેરચંદ મેઘાણી લોકસાહિત્ય કેન્દ્ર
સૌરાષ્ટ્ર યુનિવર્સિટી, રાજકોટ-૫

લોકગુર્જરી

સર્ળંગ અંક : એકસઠ

(ત્રેમાસિક : દસમું વર્ષ, બીજો અંક, સપ્ટેમ્બર-૨૦૨૧)

સંપાદક :

ડૉ. બળવંત જાની

શ્રી ઝવેરચંદ મેઘાણી લોકસાહિત્ય કેન્દ્ર

સોરઠાજી યુનિવર્સિટી

રાજકોટ-૫

'Lok Gurjari-61'

Quarterly Journal of Oral Traditional folk Literature of Gujarat,
Edited by Dr. Balvant Jani, Published by 'Shri Jhaverchand Meghani
Loksahtya Kendra' and Gujarat Sahitya Academy,
Gandhinagar-382017

ISSN : 2320-8872

પ્રકાશન : દસમું વર્ષ, બીજો અંક, સપ્ટેમ્બર-૨૦૨૧

પાન : ૩૦૦

પૃષ્ઠ : ૨૦+૧૪૦ = ૧૬૦

મુલ્ય : ફુલ્લ કિંમત રૂ. ૫૦-૦૦

(વાર્ષિક લઘુલખ કેડમાં રૂ. ૧૫૦, દસ વર્ષનું લઘુલખ રૂ. ૧૦૦૦,
સોરઠાજી યુનિવર્સિટીના સ્થાપનાવર્ષ નિમિત્તે લઘુલખમાં ૫૦% રે)

પ્રકાશક :

ડૉ. જે. એમ. ચંદ્રલાલિયા

માનક નિપામક,

શ્રી ઝવેરચંદ મેઘાણી લોકસાહિત્ય કેન્દ્ર

સોરઠાજી યુનિવર્સિટી, રાજકોટ-૫

મુદ્રક :

કિશ્ન શાહિસ્ત

૯૬૬, નારાયણજી જુના તામ, નારાયણજી,

અમદાવાદ-૩૮૦૦૧૩

ફોન : ૦૭૯-૨૭૪૭૪૩૯૩

અનુક્રમણિકા

વિભાગ - ૧ : નારી સંકલ્પ

૧. નારીવિમર્શ અને મરિયા સંત-બક્તોની અજનકાણી :	ડૉ. જયવંત જાની	૩
૨. પંકોડેશિનિગદ્ય અને સીતાકથા : ભારતીય નારીવિમર્શ	ડૉ. કાર્તિકા બોઝ	૧૪
૩. માલપાદી જાતિના સંસ્કારગીતો : અભ્યાસપૂર્ણ સંશોધન	ડૉ. કવિતા પટેલ	૨૩
૪. કન્યાવિકાસનાં શોકગીતો : સંસ્કારગીત શોકસંસ્કારકર્મ	ડૉ. અરુણા શ્રી. ત્રિવેદી	૩૬

વિભાગ - ૨ : ચારણીસંકલ્પ

૫. ચારણીસાહિત્ય : કૃતિ અને સંસ્કૃતિ	ડૉ. જયલ પટેલ	૪૫
૬. ચારણી સંસ્કૃતિ : સીધાપૂર્ણ કહેણી અને કાણી દિનેશ માવલ		૬૫

વિભાગ : ૩ : શોક અને સંત સંકલ્પ

૭. શોકપર્મની સમન્વયપ્રાપ્ત ભારતીય પદ્યો	ડૉ. અરુણા શ્રી. કલ્લઃ	૭૫
૮. સંતરામ મહારાજની અજનકાણી	ડૉ. બીમલ આચરિયા	૮૨
૯. વજ્રભાષે ન્યાય તોળ્યો	ડૉ. પુષ્પકેશી જાની	૧૦૩
૧૦. શોકમાયાનાં અમુલ્ય રાગો : 'કુદિપ્રબોધ'	ડૉ. કવિત પટેલ	૧૦૮
૧૧. કાળકાગિણીસામ્રાજ્યની અવૃત્તિ : 'જલજલે રાગા'	ડૉ. વિનોદ જાડ	૧૨૧
૧૨. શોકગિણના અને મલેરજનનું માધ્યમ : 'શોકભાટક અવાદી'	ડૉ. જયકેશ પ્રજાપતિ	૧૩૩



ઈકોફેમિનિઝમ્ અને સીતાકથા : ભારતીય નારીવિમર્શ

ડૉ. દર્શના ઓઝા

ઈકોફેમિનિઝમ્ અને ઈકોફેમિનિઝમ્ વિષયે છેલ્લા બે-ત્રણ દાયકાથી વિચારણા રૂપે તત્ત્વચર્ચા અને વિનિયોગલક્ષી અભ્યાસો થઈ રહ્યા છે. મને ભારતીય નારીચરિત્રો, દ્રૌપદી, સીતા, દમયંતી, ગંગા, પાર્વતી, લક્ષ્મીની ઉત્પત્તિ, નિવાસ અને વિવિધ સંદર્ભે પર્યાવરણીય તત્ત્વ કોઈ ને કોઈ સાથે નિયોજાયેલું અવલોકવા મળતું હોઈને એ જળતત્ત્વ, પૃથ્વીતત્ત્વ, વાયુ-પર્વત, વનતત્ત્વ સાથેના એમના અતૂટ સંઘર્ષો ઈકોફેમિનિઝમ્નું ભારતીય રૂપ જણાયું છે. આથી એ વિશે મેં એની ચરિત્રાત્મક સાહિત્યકૃતિઓ પ્રાપ્ત થતી એ એકત્ર કરી. પ્રાચીન, મધ્યકાલીન અને અર્વાચીન કે અનુઆધુનિક સુધી એનો તંતુ અવલોકવા મળે છે. 'સૈરન્ત્રી' એનું તાજું ઉદાહરણ છે. એમાં પર્યાવરણીય તત્ત્વો કેટલાં નિકટથી, કેટલાં ઊંડાણથી જોડાયેલાં અવલોકવા મળે છે. આવું ચરિત્ર સીતાનું પણ છે. એના સંદર્ભો પણ ઈકોફેમિનિઝમ્ દષ્ટિકોણની વિચારધારા સંદર્ભે અવલોકવા રસપ્રદ બની રહે એવા છે.

* * *

આપણે ત્યાં ભારતીય સાહિત્ય તત્ત્વવિચારણામાં અર્થાત્ કળાવિચારણાની પરંપરામાં માનવજીવનની વિવિધ મૂર્ત-અમૂર્ત બાબતોનું ચિંતન થતું રહ્યું છે. સમાજ, જીવન અને કળા વચ્ચેના સંબંધોનું પરિશીલન પણ જુદા જુદા સમયે, જુદા જુદા સંદર્ભે, જુદા જુદા દષ્ટિકોણથી થતું રહ્યું છે. છેલ્લા બે-ત્રણ દાયકાથી



ભાષાભાષાનાં અમૂલ્ય રત્નો : ‘રૂઢિપ્રયોગ’

કવિત પંડ્યા

“નવું જોવું, નવું કહેવું,
નોખું જોવું, નોખું કહેવું,
ઊંડું જોવું, ઊંડું કહેવું,
અઢળક જોવું, અઢળક કહેવું.”

— મનુષ્યનો આ મૂળભૂત સ્વભાવ રહ્યો છે. કહ્યો કે નવીનતા, અલગતા, સૂક્ષ્મતા અને વિશાળતા એમની ઈશ્વરદત્ત પ્રકૃતિ રહી છે. ઈશ્વર દ્વારા મળેલી મનુષ્યની આ જન્મજાત પ્રકૃતિમાંથી - સ્વભાવમાંથી રૂઢિપ્રયોગનો જન્મ થાય છે. બીજી રીતે એમ પણ કહી શકાય કે, મનુષ્ય એ આનંદ કરવાની અને આનંદ કરાવવાની એમની વૃત્તિમાંથી વાતચીતના જે અનેક પ્રયોગો ઊભા કર્યા, એવા અનેક પ્રયોગોમાંનો એક પ્રયોગ તે આ રૂઢિપ્રયોગ, જે આપણી સંસ્કૃતિ અને સંસ્કારવારસાની અમૂલ્ય નીપજ છે. રૂઢિપ્રયોગે આપણી ભાષાને સમૃદ્ધ તો બનાવી છે, સાથોસાથ વૈવિધ્યસભર પણ બનાવી છે. એનું ઉત્તમ ઉદાહરણ ગોંડલના મહારાજા શ્રી ભગવતસિંહજીની ૨૬ વર્ષની તપશ્ચર્યાને અંતે સર્જાયેલ ‘ભગવદ્ગોમંડલ’ના ૧થી ૯ ભાગ છે. જેમાં દરેક ગ્રંથને અંતે રૂઢિપ્રયોગોની સંખ્યા આપી છે તે જોઈએ :

MEDIATING EFFECT OF FASHION PRODUCT KNOWLEDGE ON THE RELATIONSHIP BETWEEN FASHION INVOLVEMENT AND SELF CONFIDENCE OF YOUNG INDIAN FEMALES

**Nitin S. Wani*

**Associate Professor of Marketing, JDBIMS, SNDT Women's University, Mumbai*

ABSTRACT

This study provides new insights about young Indian females and examines the influence of fashion involvement and fashion product knowledge on self-confidence of young Indian females. The study also tries to examine the mediating effect of fashion product knowledge on the relationship between fashion involvement and self-confidence of young Indian females. Data was gathered from Indian females in the age group of 20-24 years using a self-completion questionnaire. Two research models were hypothesized and were tested using AMOS, a covariance-based structural equation modelling (SEM) technique. The results indicate a statistically significant relationship between fashion product knowledge and Self-confidence. Fashion Product Knowledge was found to mediate between Fashion Involvement and Self-confidence. The researcher did not find any similar study focused specifically on young Indian females involving all these factors. The study not only contributes to the body of knowledge but will also help the marketers in formulating their marketing and communication strategies.

Key words: Young females, Fashion, Fashion Involvement, Fashion Product Knowledge, Self-confidence, Structural Equation Modelling, Mediation.

१ ते १५ मे २०२१ । किंमत २५ रु.

(एकूण पृष्ठे ११४)

परिवर्तनाचा वाटसरु



शिवाजी महाराजांवरील इतिहासलेखन : विविध अन्वयार्थ



चित्र : सुनिल अभिमान अवचार

प रि व र्त ना चा
वाट्सरु

df© 21 / A\$H 2
qH . 25 é. / 16 Vo 31 'o 2021

ISSN: 2250-3145

dJ©UrMo Xa ... dm{f©H ... 600 é., ìjdm{f©H ... 1,600 é.,
Xedm{f©H ... 5,000 é., gm°âQ H m°nrgmRr dm{f©H 200 é.,
gm°âQ + NmnrB 700 é. darb nî¶mda B© 'Zr Am°S©a, MoH
qH dm {S'm\$S S'mâQZo dJ©Ur nmRdmr. "n[adV©ZmMm dmQgv ' ¶m
ZmdmZo MoH / {S'm\$S S'mâQ Agmdm.

-±H Q'mÝg' aZo dJ©Ur ^aÊ¶mgmRr Vnerb
-±H Am°' B\$S¶m, ' ½¶w@gZ H m°boO amoS emlm, nwUo & -MV ImVo
... Pariwartanacha Vatsaru
~MV ImVo H«. ... 051410110013969 & Am¶E' Eggr H«. .
... BKID0000514 & E'Am¶grAma H«. ... 411013014
Google Pay gmRrMm 'mo-mB©b ZS-a ... 8888708963
¶wnrAm¶ no'jQgmRr -ma H moS



¶wOrgr Ho Aa J«wn 1 'Ü¶o "n[adV©ZmMm dmQgv ' nm{jH mMm
'pëQ{S{gpßbZar ¶m H moQrH« 'm\$VJ©V g'mdoe Ho bm Amho.

gŝñWmnH gŝnmXH

A^¶ H mšVm*

gŝnmXH

àkm X¶m ndma & Zmam¶U ^mogbo & 'mYwar Xr{JV & gwa|Đ Om|Yio

i¶dñWmnH s¶ gŝnmXH

àemšV ndma

H m¶©H mar gŝnmXH

Xod|Đ BšJio & {Xbrn MihmU

gŝnmXH 'šš ī

àÁdbm VÅo, dram amRmoš, H br' AOr',

'¶war gm'sV, A{OV A^šJ, amhr lw. J., dYfmr 'JXÿ'

ghì¶dñWmnH

àH me dmK'mao

gŝnH© nšmm

59/64, H m;ñVw^ AnmQ©'|Q

XpH mZ Zš. 7 E, H g-m noR

' Ur Amir Vmb'rOdi, nwUo 411011

gŝnH© ... 9763206212

pwatsaru@yahoo.com

www.pvatsaru.com

*nr. Ama. ~r. H m¶ÚmZwgma gŝnmXH s¶ O-m-Xmar

¶m

AS
H m
V

g\$nmXH s¶
'amRm AmajUmMr pñW{VJVr 5
Zmam¶U ^mogbo

g'gm'm{¶H
{ddoH mMr EoerVjer 11
amOrd ^mJ©d AZw. AZSV KmoQJmiH a

AmXam\$Obr
hmVr {Zlmao XoD Z Jobm 19
{XZmZmW dmK'mao

gšemoYZna {blmU	
^y{‘H m	25
bol gmXa H aÊ¶mMr 9{H« ¶m	27
gšX^©{df¶H ‘mJ©Xe©H gyMZm	29
{edmOr ‘hmamOmšdarb B{Vhmg bolZ ...	
{d{dY AÝd¶mW©	32
OmiñdšXr dmš-yaH a	
gm{dìrMr nmZš	
J^©nmV H m¶ÚmV gwYmaUm?	64
ñZohm Jmoao	
ñWbmšV[aV H m‘Jma dOm {ó¶m	69
b{bV ^dao	
{Z{‘šmmZo	
...Cf...H mb hmoVm hmoVm	75
XîmàgmX Xm^mobH a	
AZwdm{XV H {dVm	
PaZm gÝ¶mb AZw. F {fHo e BšJio	82
nwnñVH Amoil	
"VgZg'Mr ‘yè¶i¶dñWm	84
‘h Ð H X‘	
i¶dñWoÀ¶m ‘¶m©XmšMm Vmio-šX	105
JUoe amD V	

gš nm X H s ¶

‘amR m AmajUmMr pñW{VJVr

Om{V-Ō ^maVmV AmO gmV hOmanojm A{YH OmVr AmhoV.
`m OmVr Ē`mšÀ`m lmg Aem CĚnmXZ ì`dgm`mMr noQšQ Amoil
gmXa H aV AgVmV. Ym{‘©H {H« `mH ‘© d `wŌ `mda Vm-m
RodUmè`m JQmZo Amnbo ñWmZ daMo Rodbo d -mH sÀ`mšZm
Imbr Rodbo. VoWyZM gm`m{OH KgaUrbm gwédmV Pmbr.
gÜ`m ‘hmami`mV AZwgy{MV OmVrV-59, AZwgy{MV O`mVrV-
47, Amo~rgrV-346, {deof ‘mJmg dJm©V-7, ^Qš`m
O`mVrV "A" ‘Ü`o-14, ^Qš`m O`mVr "~" ‘Ü`o-35,
^Qš`m O`mVr "H" ‘Ü`o 01, ^Qš`m O`mVr "S" ‘Ü`o 01
Aem doJdoJù¶m JQmV EHy U 510 OmVr-O`mVr gm`m{OH
‘mJmg Ra{dÊ`mV Amè`m AmhoV. Ē`mšZm 52 Q,o AmajU
XoÊ`mV Ambo Amho.

Joè`m eš`a dfm©V àhUOo Clma-dgmhVH mi Am{U
ñdmVšl`molma H mimV Var `m OmVr-O`mVr gm`m{OH ‘mJmg
Agè`mZo ġlmm, gšnVr, à{Vðm `mšnmgyZ Xya Agè`mMo {XgVo.
Ē`m`wio ^maVr` gš{dYmZmZo `mšÀ`m Cp`ZmgmRr AmajUmMr
ZrVr AmUbr. gmd©O{ZH joimVrb à^wĚdembr OmVtMr

'o Xmar 'moSyZ H mTUo Am{U gm'm{OH 'mJmgmSZm È`mV AdH me
 XoUo hrM AmajUm'mJrb 'yi gSH ënZm hmoVr. ^maVr`
 amÁ`KQZoV AmajUmMr gw{dYm nwadUmè`m AZwÀNoX 14(4)'Ü`o
 ZmJ[aH mSÀ`m ElmÚm 'mJmg dJm@bm gaH mar godmS'Ü`o nwaogo
 à{V{Z{YËd {'iV Zmhr, Ago gaH maMo 'V Pmè`mg È`m
 dJm@bm bm^ {'idyZ XoÊ`mÀ`m ÑirZo {Z`w'Ë¶m qH dm hpÔo
 {Z`m@U H aÊ`mgmRr AmajUmMr VaVyX H aÊ`mnmgYz gaH mabm
 H moUrrh à{V-ŸY H v eH Uma Zmhr `mMr H miOr KQZoÀ`m
 `m H b'mZwgma KoVbr OmB@b. AmajU ho gm'm{OH
 'mJmgbonUmgmRrÀ`m CP`ZmgmRrMo gmYZ 'mZbo hmoVo. Vo
 H Yrrh Xm[aDç {Z'y@bZmMo gmYZ 'mZÊ`mV Ambo ZihVo qH dm
 È`mMr 'mJU Am{W@H ÑiQçm H 'Hw dVmšgmRrhr H aÊ`mV Ambobr
 ZihVr. dV@`mZ AmajU àUmbr hr Cnamo° 'yb^yV g'Omda
 AmYm[aV Amho. `m 'wiohr 'amRm AmajU {QH Uma Zmhr AgS
 ~mobbs OmV hmoVSM.

'hmami' mV 'amRm OmV Eo{Vhm{gH H mimnmgyZ à^wËdmÀ`m
 ñWmZr Agbobr {XgVo. amOonX, NñVrnX, gaXma, gaSOm'Xma,
 O{'Zr darb gdm@{YH 'mbH s, CÚmoJm darb gdm@{YH 'mbH s,
 gdm@{YH {ejU gšñWm, gmla H malmZo, J«m'nšMm`V Vo 'w»`Šir
 nXmn`aVmo gdm@{YH XmdoXma ho 'amRm OmVrMo am{hbobo AmhoV.
 ZORH À`m H mimVrb 'mJmg OmVrdaÀ`m AÊ`mMmamVhr `mšMm
 g'mdoe Amho. **280** Am'XmamSV gdm@{YH Am'Xma 'amRm
 AmhoV. ~mSYH m' i`dgm`mVhr `mSZr MmšJbmM O' ~g{dbm
 Amho.

‘šSb Am`moJmZo Hw U~r OmVrbm BVa ‘mJmg àdJm©V AmajU
 {XboM Amho. nwT o Hw U~r d ‘amR m EH M AmhoV Ago
 XmldÊ`mMr H gaV H aÊ`mV Ambr. VÊH mbrZ CÚmoJ ‘šir
 Zmam`U amUo `mšÀ`m AÜ`jVolmbr 21 ‘mM© 2013 amoOr
 EH m gš‘VrZo ‘amRm Am{U Hw U~r g‘mO EH M Agè`mMo
 AZ{Vhm{gH nUo Omhra Ho bo. Hw U~r àhUOo àÊ`j eoVrV
 H i` H aUmam dJ© Va ‘amRm dJ© àhUOo Á`mšÀ`m ‘mbH sÀ`m
 Oš‘Zr hmoÊ`m Vmo dJ© O‘rZXma, dVZXma qH dm àemgH s` nXo
 AgUmam dJ© hmoVm Am{U Amho. ZWH VoM gdm}f Ý`m`mb`mÀ`m
 nmM Ý`m`yVvÀ`m KQZmÊ`H ISSnrRmZo ‘amRm AmajUmÀ`m
 {damoYr 12 ‘o 2021 amoOr ‘hîdmMm {ZH mb {Xbm. gdm}f
 Ý`m`mb`mZo “‘hmami’ mV ‘amRm g‘mOmMo AmajU ho gš{dYmZmV
 ~gUmao Zmhr’ Agš àhQbš Amho. “50 Q,o AmajUmMr ‘`m©Xm
 RadUmè`m {ZU©`mda nwÝhm {dMma H aÊ`mMr JaO Zgè`mMš‘hr
 gdm}f Ý`m`mb`mZo àhQbš. ‘amRm AmajU ho 50 Q,o AmajU
 ‘`m©XoMS C,šKZ Amho. 50 Q,o AmajUmMr ‘`m©Xm nma
 H aÊ`mgmRr H moUÊ`mhr àH maMo d;Y H maU Zmhr Agš ñni ‘V
 gdm}f Ý`m`mb`mZo i`o Ho bš. ‘hmami’ mVrb Jm`H dmS gš‘VrZo
 ‘amR m g‘mO hm Am{W©H Am{U gm‘m{OH ÑiQçm ‘mJmg
 Agè`mMš H maU XoV AmajU XoÊ`mV Ambš hmoVš. gdm}f
 Ý`m`mb`mZo ‘amRm AmajU H m`Xm aÔ H aVmZm Agš àhQbš
 H s, ‘amRm g‘mO hm Am{W©H d gm‘m{OH ‘mJmg dJm©V
 ~gV Zmhr.

ZOrH À`m nmíd©^y`rda Ñ{ijon QmH è`mg Owbi 2016nmgyZ

'amRm g'mOmZo amÁ`^a 'yH 'moM} H mTm`bm gwédmV Ho br. `m
 'moMm^wio VEH mbrZ ' SUdrg gaH madaMm X-md dmTV Jobm.
 àE}oH 'moÀ`mOv {H 'mZ bmlmo bmoH . 'moM} àMSS Agbo Var
 AJXr VnerbmV {Z}moOZ Ho bobo {Xgbo. Ago EHy U 57
 'moM} {ZKmb. `m EH m 'moMmOMm IM© 20 H moQ rhÿZ OmñV
 Agè`mMo AZoH OmUH mam\$Mo 'V Amho. `m 'moMm^Zr amOH s`
 Am{U gm`m{OH dmVmdu TdiyZ {ZKmb. 'yH 'moMm^MS ho
 dmXi Am° JñQ 2017'Ü`o E'. Or. Jm`H dmS `m\$À`m
 AÜ`jVolmbr g{'Vr ñWmnZoZ\$Va g\$nb\$. 15 Zmoih|-a 2018
 amoOr }m 9 gXñ`r` g{'VrZo 'amRm g'mOmMm Aä`mg H v Z
 AmajU XoÊ`mÀ`m {g' maergh gaH mabm 5,000 nmZm\$Mm
 Ahdmb gmXa Ho bm. `m AhdmbmÀ`m AmYmao 30 Zmoih|-a
 2018 gmbr {hdmir A{YdoeZmV Xod|Ð ' SUdrg gaH maZo
 'amRm AmajUmMm H m`Xm '\$Oya Ho bm. gdm}f Ý'm`mb`mZo hm
 H m`Xm Am{U È`mZwf\$JmZo {Xbobo AmajU ZWH VoM aÔ Ho bo.
 AmVm ho AmajU XoÊ`mMo g\$nyU© A{YH ma g\$gXobm AmhoV.

'amRm g'mOmÀ}m AmajUmÀ}m 'mJUrMm {dMma H aVmZm
 nwTrb H mhr Jmoir bjmv KoUo JaOoMo Amho. AZoH nmhÈ}m\$Zwgma
 ZmJar godm\$À`m A, ~, H, S dJm^Ü`o 'amRm g'mOmMS
 à{V{Z{YEd g'mYmZH maH Agè`mMo {XgyZ Ambo Amho. Iwè`m
 àdJm©Vrb ZmoH è}m\$Yè}m 48 % nÿH s 'amR m g'mOmMS
 à{V{Z{YEd EHy U 33.23 % Amho. Jm`H dmS Am`moJmZo
 Xmldbobo 11.86 % ho à'mU MwH sMo Amho. Iwè`m àdJm©nÿH s
 Am`EEg'Ü`o 15.52 %, Am`nrEg'Ü`o 27.85 % Am{U

Am`E' Eg 17.97 % 'amRm g'mOmMŠ à{V{Z{YĒd Amho.
'amRm g'mOmÀ`m bmoH gŠ»`oZwgmà àemgH s` nmVirda È`mŠMŠ
à{V{Z{YĒd OmñV Amho. `mbm H maU {H 'mZ Joë`m es`a
dfm©V Var 'amRm OmVrÀ`m à`wĒdmÀ`m gŠgmYZmV ^aM nSV
Jobr Amho. Hw U~r `m OmVrbm AmYrM AmajU XoÊ`mV Ambo
Amho. Á`m Hw U~r Hw QwŠ-mŠZr Amnë`m OmVr 'amRm bmdë`m
hmoÈ`m È`mŠZr nwT 'mì nwYhm Hw U~r OmVrV àdoe Ho bm. 'mì
Oo Xoe`wl, gaXma KamÊ`mVbo hmoVo È`mŠZr 'mì ñdV...bm 'amRmM
àhUUo ngŠV Ho bo. 'amRm hr à`wĒdmMr Amoil nwgVm Z
Amë`mZo gm'm{OH 'mJmgbonU {gÕ H aVm Ambo Zmhr.
AmajUmgmRr gm'm{OH 'mJmgbonU Eo{Vhm{gH Agmdo bmJVö.
OmJ{VH sH aU, ImOJrH aU d CXmarH aUmÀ`m YmoaUmŠÀ`m
ñdrH mamZŠVa ^maVmVrb gd©M g'mOmVrb bmoH Am{W©H nV
Kgaë`mZo Jar~ Pmbo AmhoV. nU È`mŠMr J[a~r hr d{`{° H
~m- amhVo. È`mŠMr gm'm{OH nV daMr Agë`mg Am{W©H nV
~XbÊ`mMr e³¶Vm amhVo. Jar~ ^ŠJr Am{U Jar~ amOnyV
`mV ^ŠJr i`° s dm OmVrMr gm'm{OH nV lmbMr RodÊ`mV
Amë`mZo ^ŠJr OmVrÀ`m i`° sbm dm OmVrbm gm'm{OH
AmajUmMr JaO AgVo. Ver Jar~ amOnyV i¶° sbm ZgVo.
gm'm{OH ÑîQçm AmYrM à`wĒdmÀ`m ñWmZr Agboë`mŠZm nwZ...
à`wĒdmÀ`m ñWmZr ZoÊ`mgmRr AmajU ZrVr dmnaVm `oUma
Zmhr.

ejj{UH d Am{W©H ÑîQçm 'mJmg d emo{fV-nr{SV 'amRm
gŠ»`m gwÕm bjUr` Amho. È`mŠMm àiZ AmajUmÀ`m 'mÜ` 'mVyZ

gmoSdVm `oUo eŠ` Zmhr ho ññi Amho. Aem pñWVrV emo{fV-
nr{SV dJm©Mo KQH `m ZmĚ`mZo Vo ^maVr` g`mOmVrb OmVdJu`
{df`VoMo d emofUmMo CfmQZ HaĚ`mgmRr nwTmH ma KoVrb
H m? `oWyZ nwT Vo dJ©OmV{df`VoMo g`W©H àhUyZ ^y{`H m
{Z`mdUma H s, dJ©OmV{df`VoÀ`m {damoYmV C^o amhUma? `m
àíZmŠMr CîmaŠ àĚ`j ì`dhmamVyZ Vo H em nŌVrZo XoD BpÀNVmV
`mdaM Ě`mŠMo Am{U Ě`mŠÀ`m ^mdr {nTçmŠMo ^{dVi` AdbŠ~yZ
AgUma Amho!

Zmam¶U ^mogbo

'wš-B© {dŪmnrR, B{Vhmg {d^mJ, 'wš-B©

B©'ob- bhosalenr@gmail.com



'n[adV©ZmMm dmQ gy 'Mm
ZdrZ gšnH© H« 'mŠH

g'gm'm{¶H

{ddoH mMr
EoerVjer

amOrd ^mJ©d

AZw.

AZSV KmoQJmiH a

‘mZd gmoSyZ BVa H moUË`mhr àmÊ`mH S VH mo{¶V {ZU©`
KoÊ`mMr j‘Vm Zmhr. ‘mUgmA¶m `m doJionUm‘wio ‘mZd hm
EH {ddoH s àmUr Amho Ago àhQbo OmVo. naSVw ho {dYmZ
Zoh‘rM A{Ve`mo° R abo Amho. VWm{n àË`oH ‘mUyg
Amnè`mbm AZwHy b n[aUm‘ bm^mdm Aem àH mao Vm{H© H
`w{° dmX H am`bm {eHy eH Vmo, `m {dYmZmV ‘mì ‘wirM
A{Ve`mo{° Zmhr. Vm{H© H VoV AZoH {dY H m`} AZwñ`yV
AgVmV. ElmÚm Jmoì rMo gd©gm‘mY` AmH bZ H éZ KoUo
Am{U Ë`mÚmao gd©gS‘V {ZU©`màV nmohmoMUo, H moUVr Jmoì
ànVwV Amho Am{U H moUVr Zmhr ho ñni AmoilUo, Amnbo
glmob qMVZ àH Q H aUo Am{U Ë`mV gwgSJVr AmUUo,
~amo-a Am{U Mwh sMo, MmSJbo Am{U dmB©Q, bjUr` Am{U

boIH {X,,rpñVV Odmhabmb Zohv {dÚmnRmMo amÁ¶emómMo {Zd¶Îm
àmÜ¶mnH AgyZ gÜ¶m Vo grEgSrEg ¶m gSemoYZ gSñWoV ``^maVr¶ {dMma`
{d‘mJmMo gSMmbH AmhoV. AZwdmXH H moëhmnyapñVV {Zd¶Îm {ejH AmhoV.

¶rQa - @Rajeev_Bhargava

B©‘ob - anant.ghotgalkar@gmail.com

Xwb©jUr`, {ZH SrMo Am{U H`r`hîdmMo Ago dJuH aU
H aUo Aer Vr AZoH {dY H m` } hmoV. AmnU nyU©V... {ddoH s
H YrM ZgVmo Am{U lao Va Agyhr Z`o. na\$Vw {ZVm\$V Amdi` H Vm
AgVmZmhr VH© -wÔrMm dmna Z H aUo hm EH Va ewÔ `yl©nUm
AgVmo qH dm `J {ZImbg H nQrnUm.

{ddoH mMo AĒ`SV Aíbm;` 7 n

AmO Amnë`m ^modVmbÀ`m OJmV Am{U {deof H éZ
Bbo\$Q`m`{ZH `mÜ``m\$V Vm{H© H Vm AYmoJVrbm Jobobr Amnë`mbm
{XgVo. qH -hpZm Vm{H© H VoÀ`m {d{dY ASJm\$Zm hoVwnwañga H nQr
diU XoD Z dñVwpñWVrbm ~Jb XoUo, Vr `wÔm` Yyga H aUo,
{Vbm doJù`mM dmQm `mo\$Uo qH dm {Vmo ApñVĒdM ZmH maUo
Aer aUZrVr gd©l ñdrH mabr OmV Amho. Xwgè`mMo -mobUo`Ü`oM
Wm\$-dbo OmVo, MM}V AS Wio AmUbo OmVmV Am{U
dñVwpñWVrbm doJmM a\$J XoD Z Amnë`m -mOyZo PwH dbo
OmVo. Vm{H© H Vobm A`yVnyd©[aĒ`m ñd{hVmMr Am{U gîmoMr
~QrH ~Zdbr Jobr Amho. Ē`m`wio {VMm nyU© Zm`ZmQ Pmbm
Zgbm Var {Vbm AĒ`SV {hSrg v n {Xbo Jobobo Amnë`mbm
{XgVo. {-Mmarbm {Zli XmofjH Ñir Am{U gmYZr`yV ~Zdbo
Jobo Amho.

{ddoH mMr Aer {dQ\$-Zm hmoVo Voihm eāX nmoH i ~ZVmV.
ZwgVm AW©hrZ Jb~bm. ~m;{ÔH `V^oXm\$Zm à{e{JV
H m|~\$çm\$À`m Pw\$OrMo ñdv n `oVo, H s, bwQwnwQrMo `w{`i`wÔ`āhUy
`m? H mhr {-«{Qe nîH ma H Āa COi`m {dMmagaUrÀ`m

¶lwHo Am¶lnrMo (`wZm`QoS qH JS' B§{Sn|SSQ nmQu) ZoVo Agboë`m
 Zm`Oob ' amO `mSÀ`m `w{° dmXmVrb ' mobnUm CKS_m nmSVmV,
 È`mSÀ`m ~mobÊ`mVrb Kmoa {dg§JVr ññi H aVmV Am{U gd©kmV
 Vĩ'o È`mSÀ`m Vm|Smda 'o Hy Z È`mSMM ImoQonUm XmldyZ XoVmV. ho
 nmhÿZ VwH r© boplH m BOo Vo'oHw amZm àhUVmV H s, ho àhUOo
 ElmÚm H ~wVamer ~w{Ö~i loiÊ`mgmalo Amho. Vwàhr H moUVrhr
 Mmb Ho **br** Var Vo H ~wVa **gJir** B`mXr{-Xr {dñH Q_zZ QmH Vo
 Am{U nQmda {eQyZ RodVo. È`mZ§Va Jdm©Zo Amnë`mM {dO`mMm
 H bH bmQ H aV Vo CSyZ OmVo Am{U {ZñVam`Mr KmU VodTr
 Vw`À`m dmQçmbm CaVo. AkmZ Am{U AmH mS§ VmS§ d hrM
 Á`mS§Zr Amnbr 'w»` 'yë¶lo ~Zdobor AmhoV Am{U È`mZwgmaM
 Á`mSMo AmMaU MmbVo È`mSÀ`mer H moUË`m g`mZ nmVirdéZ
 g§dmX gmYm`Mm? VwH r© amĩ`mÜ`j [aOon Vm`rn EXm}JmZ `mSÀ`m
 nmRram»`mS-amo-a C§MV amOH s` MMm© H er AeŠ` Amho
 `mMo dU©Z Vo'oHw aZm `mS§Zr Ho bobo Amho. È`m àhUVmV, È`mSÀ`mer
 ~mobU§ àhUOo {Šgabm PmH U Z KmbVm {ÈH eoH
 ~ZdÊ`mgmalo Amho. bmoH mS§Zr PwJmv ZM Úm`Mm Ag§ EH Xm
 Radb§ H s, {ddoH hV-b hmoVmo.

"Voihm H m ZmhrMm Kmofm

Qo{bpìhOZda AmOH mb hmoV Agboë`m MM}Vrb gdm©V
 ÌmgXm`H Jmoĩ àhUOo H moUË`mhr gmd©O{ZH 'hĩdmÀ`m
 {df`mdarb H moUVrhr Rmög MMm© h,,r nQH Z H m±J«og Am{U
 ^mOn `mSÀ`m`Yrb AZmdĩ`H Am{U AdmOdr Aem "Vy Vy

‘ç ‘ç’H S diVo. Ouy àĚ`oH ^maVr` hm EH Va ^mOnMm qH dm
 ‘J H m±J«ogMm Amho. ‘w»` àhUOo Xa doir H moUĚ`mhr MMjV
 H m±J«ogZō H Yr H mir Ho boĚ`m qH dm Z Ho boĚ`mhr MWH mšH S
 bj didV dV©‘mZmV Ho ě`m OmV AgboĚ`m MWH mšMr O~m~Xmar
 Amamo{nV H éZ ñdV...da Xmof KoUo Qmibo OmVo (Whataboutery).
 CXmhaUmW© A{bH S {X,,rV Á`m {ZKY©U hĚ`m PmĚ`m Ě`m~Ôb
 Hw Ur ~mobm`Mo Zmhr, H maU 1984 gmr Ho boĚ`m {elmšÁ`m
 hĚ`mH mšS mbm O~m~Xma AgUmao 2020bm {X,,rV KSbo
 Ě`m~Ôb H moUĚ`m Vm|S mZo ~mobVmV? Myn! Ě`mMà`mUo
 dŸîmnîñdmVšÍ`mÀ`m ‘wñH Q Xm~r~Ôb qH dm gŸ`mÀ`m
 amOdQr{deŌ ~« H mTVmZm gd©gm‘mŸ` bmoH mšZm dmQUmĚ`m
 ^rVr~Ôb Hw Ur VH« marMm gya H mTbm Va bJoM ‘Ü`o nSyZ
 Bš{XamOtZr Omar Ho boĚ`m AmUr~mUrMr ^md-š~mi eāXmšV
 qZXm CJmiv Ě`mbm Jβn Ho bo OmVo. našVw EH m njmZo Amāhmbm
 g‘Om ñdmVšÍ`q qH dm AŸ` ElmXr `mo½` Jmoî {Xbr Zgob Va
 Ě`m`wio XwgĚ`m njmMo `m~m~VrVbo An`e H go H m` YwVbo
 OmVo?

g‘Om Mmirg dfm^anydu EH ‘mUyg àĚ`j Mmoar H aVmZm
 nH Sbm Jobm Am{U Ě`m~Ôb Ě`mbm {ejmhr Pmbr. AmO
 Ě`mbmM Hw UrVar bwQVmo Am{U Vmo nmobrgmšH S JwŸhm Zm|Xdm`bm
 OmVmo. `mda nmobrg Ě`mbm gaiM {dMmaVmo, 80 gmr Mmoar
 Ho bobm VyM Ziho Vmo? Vwbm MmoarMr VH« ma H am`Mm ‘wirM
 A{YH ma Zmhr. ho CKS CKS hmñ`mñnX Zmhr H m? ElmŸm
 ‘mUgmZo nydu H mhr MyH Ho br àhUyZ XwgĚ`mZo Ho boĚ`m MWH s~Ôb

VH« ma H aÊ`mMm qH dm {ZfoY Zm|XdÊ`mMm Ê`mMm h, gšnwimV
 `oVmo H s, H m`? hm H gbm `wŕ dmX àhUm`Mm? ElmXm JwÝhm
 Pmë`m Pmë`m AJXr bJoM Ago H mhr ~mobbo Jobo, Va Ê`mV
 H mhr VÌ` Amho, Ê`mbm H mhr AW© Amho ho `mÝ` H aVm
 `oB©b. nU OgOgm H mi {ZKyZ OmVmo Am{U n[apñWVr ~XbVo
 VgVgm hm `wŕ dmX `w gH m RaVmo. ZmPr O`©ZrZo Xwgao `hm`wŕ
 gwv H éZ Omo hmhm:H ma `mOdbm Ê`m-Ôb O`©Z ami`mbm
 O-m-Xma YaUo MmirgÀ`m XeH mV `mo½` hmoVo. nU AmVm
 EH {dgmì`m eVH mV VrM {H a{H ar aoH m`S dmOdV amhUo
 hmñ`mñnX hmo`. Vmo JwÝhm hmoVm ho `mÝ` Ho bo Jobo, gš-š{YVmSZm
 Ê`m-Ôb arVga {ejm XoÊ`mV Ambr. {H Ê`oH dfm`nyduM
 Z{VH ÑiQçm `m àdŕÎmrVyZ Amnbr gmoSdUyH H éZ KoVboë`m
 O`©ZmSZr eàXmVyZM Ziho Va Hŕ VrVyZhr gš-š{YVmSZr j`m`mMZm
 Ho br. `m AnamYmMr ñ`ŕVr gšñWmÊ`H nmVirda {OdSV ahmdr
 àhUyZ Ê`mSZr ñ`maHo hr C^r Ho br. `m gmè`m Jmoit`wio O`©ZmSZr
 AmUlr {Z^©ËgZm AmVm AZmdí`H RaVo. {deofV... AmO Oo
 ñdV...M ñdmVšÌ`mMr JiMonr H aV AmhoV Ê`mSZr H Yr H miÀ`m
 Ê`m H Wm AmidÊ`mbm H m` AW© Amho?

AmUr-mUr hr AË`SV ^`H mar KQZm hmoVr. ^maVr`
 bmoH emhrbm bmJbobm Vmo EH H m`Mm H bSH Amho. {VMr
 nwZamdŕÎmr hmoD Z`o àhUyZ Amnë`mbm {VMr AmRdU RodbrM
 nm{hOo. naSVw AmO à`wl {damoYr nj Agbobm H m±J«og nj
 gaH maÀ`m gÜ`m CMbë`m OmV Agboë`m AmUr~mUrgÑi`
 nmdbmš{déŕ {ZfoY Zm|XdV Agob Va Ê`mbm Vm|S ~šX H am`bm

Vmo B{Vhmg gmSJUo ho {Zidi hmñ`mñnX Amho. gÎmaÀ`m XeH mV È`m NimVyZ Jobobm Am{U AmVmhr È`mMr nwZamdYÎmr ^moJmdr bmJy eH Umam gm`mY` ZmJ[aH ^mfUñdmVŠÌ`mdarb hëë¶m{déÕ, ~\$XràÈ`jrH aU h, mÀ`m (Habeas corpus) ñW{JVR{déÕ qH dm ñdVŠÌ Y`m`i`dñWobm bJm` KmbÊ`mÀ`m à`ÈZmS{déÕ AmdmO CRdV AgVmZm È`mbm {ZdSH VodTr QrH m H aUo WmS-d, Ago àhUUo hm Va {Zidi YmoH mXm`H doS mMma hmo`. Amnë`m h, mŠÀ`m gmŠàV hmoV Agboë`m `wñH QXm-r-Ôb {ZfoY i`° H aUmë`m H moUmhr ZmJ[aH mbm `mJo VgoM KSbo È`m{déÕhr È`mMjUr ~mobm`bm bmdUo hr àÈ`oH mbm X`XmQr H éZ Myn ~gdÈ`mMr H nQ ZrVr hmo`.

AmnU dV©`mZmH S diy `m. H mhr ^mOn ZoÈ`mŠZr {Xboë`m KmofUm {Z...gŠe`nUo qhgobm CÎmoOZ XoUmë`m hmoÈ`m ho AmnU gmaoM OmUVmo. È`mŠMo {MìrH aU Ho bo Jobo Amho. {ZdSuyH Am`moJmH S Vo {MìrH aU gmXa Ho bo Jobo Amho. `m ZoÈ`mŠda {ZdS UyH àMma H am`bm ~\$Xr KmVbr Jobr Amho. hr An[adV©Zr` dñVwpñWVr Amho. hr KmofUm àW` {Xbr Jobr Vr Amnë`m XoemÀ`m amOYmZrV. È`mZŠVa bJoM {X,,r qhgoÀ`m AmJrV hmoanibr. `m JwYhoJmamS{déÕ E`.Am`.Ama. Zm|Xdbm Omdm `mgmRr Ooihm Y`m`mb`mnwT OZ{hV`m{MH m gmXa Ho br Jobr Voihm ~MmdmgmRr Agm `w{° dmX Ho bm H s, `m gmë`m Ôof`w° ^mfUmŠMr arVga VnmgUr Pmë`m{edm` H mhr H madmB© hmoD Z`o. hm Jm|Yi nwaogm ZihVm àhUyZ H s, H m` `m MMjV AmUlR EH Kmoi KwgSbm Jobm. EH m H m±J«og ZoÈ`mMo OwZoM

^mfU 'mÜ`'mV àgYV H aÊ`mV Ambo. ho ^mfU AJmoXa
 ^SH mdUmao R abo ZihVo. Varhr Vr OUy ElmXr ñ' moQ H
 KmofUm Amho, Ago ^mgdÊ`mV Ambo. ho H aUmè`mSZm `mVrb
 H m`Xoera ' mobnUm nwaVm 'mhrV hmoVm. Var `m bmoH mSZr Ago
 H m Ho bo? bmoH mSZm Jm|YimV QmHy Z Ê`mSMr {Xem^yb H aUo
 AmfU MMm© ^aH QdUo hmM Ê`mSMm hoVy hmoVm. ho H m` -K, ho
 MmbVo` hmo`? Aem ^{whatabouery}Mr Zdr 'j ar PmSÊ`mgmRr
 nwadbobm hm PH mg XméJmoimM ZihVm H m`?

amOH s` H¥ VtMo 'yü`mnZ

EH m Q`šgr S'm`ihaer Amgm`Yrb amí' r` ZmJ[aH
 Zm|XUrg\$X^mOV ~mobÊ`mMm `moJ Zwh VmM Ambm. ho gdjU
 H aV Agboè`m A{YH mè`mda H mogiboè`m gSH Qm-Ôb EoHy Z
 'bm ' ma dmB©Q dmQ Vo, Ago 'r Ê`mbm àhUmbmo. Ê`mMr
 i`mdgm{`H {Zðm H mbnadmn`aV dmXmVrV hmoVr nU AmVm
 'mì Ê`mÀmda nmM JwYømSMr Zm|X Pmbr hmoVr. Agm H m`
 JwYhm Ho bm hmoVm Ê`mZo? Amnbo ZmJ[aH Êd {gÕ H aUmar
 H mJXnìo Z gmXa H v eH bobo lyn gmao qhXy bmoH Ê`mbm
 AmTibo hmoVo AmfU AmVm Ê`m gmè`mSZm Ê`mZo ~oH m`Xoera
 a{hdmgr KmofV Ho bo hmoVo. naSVw `m`wio 'wirM AñdñW Z
 hmoVm Vmo S'mñiha 'bm àhUmbm, nU gmho-, hm nm{H ñVmZmV
 AgVm Va Ê`mSZr Ê`mbm Jmoir KmbyZ Rma Ho bo AgVo. ^maV
 hm nm{H ñVmZnojM {H VrVar OmñV g{hîUy Amho, Ago Ê`mbm
 àhUm`Mo hmoVo. ^maVmV ElmÚmbm ImoQçm JwYømV ASH dyZ

VwéšJmV Sms-yZ ' ma Va È`mÀ`m hmbMmbrda -šYZo AmUbr
 OmVmV. CbQ nm{H ñVmZmV AemM àH maÀ`m H¥ È`mMr gOm
 àhUyZ '¥È`wXSS {Xbm OmVmo. `m Wambm OmVmo whatabouteryMm
 'mWo{ ' v nUm! H moUÈ`mhr amOH s` H¥ VrMo ^maVmV AmVm XmoZ
 {ZH f bmdyZ 'yè`mnZ Ho bo OmVo. n{hbm {ZH f Amho H m±J«ogMo
 XwamMma Am{U Xwgam {ZH f Amho gr'on{bH SÀ`m È`m Xwi
 XoemVrb ApñVÈdmV Agbobo qH dm Zgbobo Owbw'r H m`Xo.
 Amnbo amOH maUr Am{U È`mšMr ^wai nSboè`m PmSyZ gJù`m
 bmoH mšZr KQZmÈ`H 'ybVÎdo Am{U amOH s` Zr{V'yè`o OUy
 lwsQrbm QmšJbr AmhoV.

(yi BšJ«Or bol 4 'o 2021 amoOr "X qhXÿ" Xi{ZH mV à{gÕ Pmbm hmoVm.
 gm^ma nwZ'w{o{DV)

"n[adV©ZmMm dmQgv 'gmR r bolZ nmRdVmZm

Amnbo bolZ nmRdVmZm gšnmXZmšqm gmoqrgmRr Vo gwdmf
 AjamV {b{hbobob dm Q šH {b{IV dm gšJUH mÛmam 'w{DV
 Ho bobo AgmdoV. 'w{DV bol E'Eg dS © AWdm
 noO'oH a'Ûqo lrXod 7-0708 qm AWdm 'šJb, E[aAb
 qw{ZH moS, CÈgmh, {edmOr qH dm VÈg' qw{ZH moS
 ' m`ÈQ'Ûqo nmRdmdo.

AmXamSOb

hmVr {Zlmao
XoD Z Jobm

{XZmZmW dmK'mao

"H moQ©' {gZo'mbm Am°ñH a nwañH mamgmRr Zm'mS{H V Ho è'mMr
~mV'r YSH br Vgo 'mÜ`'mSmo ' moZ KUKUy bmJbo. gd© OU
dram gmWrXma 'mSzm 'oQm`bm gSKf© dm{hZrA`m H m'm©b`mH S
'oV hmoVo. È'mdoir dram, 'r Am{U 'wHwS X {Pamo 'mBëG`m
Qnarda Mhm KoV hmoVmo. dramMr XmTr dmTbr hmoVr. Moham RrH
H amdm àhUyZ gbyZ emoYm`bm {ZKmbmo. eodQr Ya'noR'Ü'o
EH XwH mZ {'imbo. nU nigo Úm`bm ÈmZo plí'mV hmV
KmVbm Voíhm 5 én'o {ZKmbmo. Amàhr hmoVmo àhUyZ pñWVr
{Z^mdbr. 'wbmIVr Pmè`m, àgm[aVhr Pmè`m 'mì à{gÖrMm
hm JdmJdm 'mJo QmH sV Xwge`m {Xder Pmboè`m AmSXmobZmV
dram C^m amhÿZ Zmao XoV hmoVm.

"H moQ©'ZS'Va drambm H mhr {MìnQmÀ`m Am°' ahr Amè`m,
nU Vmo gm' ZH ma XoD bmJbm. Amàhr àhUmbmo, dram, nigo

bolH ZmJnyapñWV gSKf© dm{hZrMo H m{©H V} AgyZ ^Q'¶m {d'w°
MidirVhr H m{©aV AmhoV.

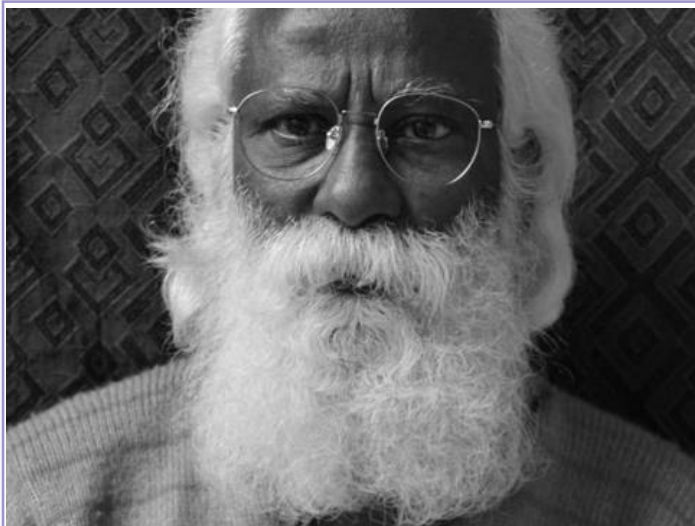
B©'ob- dinanathwaghmare@gmail.com

{iVrb. nU Vmo àhUmbm "r Vmo Zmhr, 'r H m`©H Vm© Amho'. hmo, H moQ©Mm Zm`H Zmam`U H mš-io lamolaMm dramM hmoVm. ew^« nmšT ar XmT r, amnbobm Moham, H Ula -mUm, amH Q ñd^mdmMm, nU AmV`Ü`o 'YXw Agbobm. dramgmalm H m`©H Vm© ghOmghOr KSV Zmhr. È`mgmRr AZoH df} dmQ nhmldr bmJVo.

dramMo lao Zmd {dO` am'Xmg djamJS d 'yi Jmd ho dYm© {OëomVrb goby Vmbwš`mVrb Pser. 10dr Zmnmg Pmë`mda d{SbmšZr È`mbm Jwao Tmoao amlÈ`mgmRr H m'mbm bmdbo. -m-mgmho- Amš-os H amÀ`m {dMmamZo ^mamdbobo am'XmgOr dÜ`m©Vrb -m-mgmho-mšÀ`m Omhra g^mšZm OmVrZo hOa Agm`Mo. 'wbmšÀ`m ^{dì`m{df`r ñdßZmiy Agbobm -mn {MSyZ àhUm¶Mm H s, hm -m-mgmho- -Zbm AgVm, nU AmVm Jwao amlVmo.

ZmJnya'Ü¶o Amë¶da OmoJrZJa PmonSnÀrV bhmZmMm 'moRm Pmbobm dram 'Oyar, [ajmMmbH , H malmY`mVrb amoOšXmar 'Oya Aer H m'o H am`Mm. Varhr lwšQbobo {ejU nwT ZoÈ`mÀ`m {dMmamZo -aoMXm YwirZo 'mlboë`m H nšçmZo dJm©V àdoe H am`Mm. È`m'wio È`mMo ho dolionU dJ© {'lÀ`m 'ZmV ^am`Mo.

nwT dram nìH ma ~Zbm, gšKQZm Cà`m Ho è`m, AmšXmobZo Ho br. 'ohZVrZo eara amH Q Pmbo. gm'm{OH ^mZ d bTmD dYÎmrMr YJ È`mbm AmšXmobZmV KD Z Ambr. Om{Vi`dñWoMm Vmo H Rmoa {damoYH hmoVm. AmSZmdmdéZ OmV JYhrV Yabr OmVo àhUyZ È`mZo dram gmWrXma ho Zmd YmaU Ho bo. EH m AÈ¶mMmamÀ¶m KQZoÀ`m {damoYmV nwînmddhZr d dram XmoKohr



Am\$XmobZmV gh^mJr Pmbo hmoVo, È`mdoir nwînm d{hZr JamoXa
hmoVr, Vmo {Xdg hmoVm {dO`mXe`rMm. AgÈ`mda gÈ`mMm
{dO` Am{U Am{Xdmgr na\$nam, g\$ñH¥ Vr ajH amdU `mMo
àVrH àhUyZ hmoUmè`m ~mimMo Zm\$d b\$Ho e Ago Rabo. Va
OmVr Y'© `m\$'Yrb ^oX g'yi Zi H aÊ`mMr àWm KamVM gwv
H amdr àhUyZ nwT b\$Ho ebm Ooïhm 'wbJm Pmbm È¶mMo Zmd
Aí' mH C,,m Ago Rodbo.

VéUnUr dram ~wQr~moarV H\$ nZr'Ü`o H m'mbm bmJbm.
nagmoSr JmdmV am{hbm. `mM H mimV È`mMo b¾ bmJbo. nËZr
nwînmbm ASJUdmSr go{dH m àhUyZ ZmoH arhr bmJbr. dram
nagmoSr `oWrb J«m' n\$Mm`VrMr {ZdSUyH bTbm d An'er
R abm. `m An'emZo, EH m gm'm{OH H m'©H È`m©Mm

bmoH emhrVrb {ZdSUyH à{H« `odarb {dídmg CSmbm. nìgm, Xmv, XSSobemhr, PmoqQJemhr, Cà`m Cà`m ‘mUgo laoXr H aÊ`mÀ`m HÝ ßÊ`m B. bmoH emhrbm ‘maH Jmoïr gam@g KSè`m. emSVVoÀ`m ‘mJm@Zo d a° nmV Z hmoVm gîmoMo hñVmsVaU hmoÊ`mgmRr ‘w° d {ZH mon {ZdSUwH m Amdí`H AmhoV. Oa nìgodmbo bmoH ElmÚm amOH s` njmÀ`m {ZdSUyH {ZYrV aH ‘m QmHy Z {ZdSUwH sda à`md QmH Ê`mMm à`EZ H aVrb Va hoM bmoH CÚm gîmmYmar njmH SyZ Ê`mSÀ`m {hVmMo H m`Xo -ZdyZ KoVrb. AmO Zo`Ho hoM hmoVmZm {XgVo Amho. g`mOmVrb {df`Vm H m`‘ R odUmè¶m {ZdS UyH àUmbrMo A¶`mZmZo AmnU CXmîmrH aU H aVmo, VoM ‘wimV ’ gdo Amho.

EH Xm H malmÝ`mV ‘erZda H m’ AgVmSzm AnKmVmV dramMo EH -moQ H m`‘MoM Jobo. ‘Oya g\$KQZm {gQyÀ¶m ‘mÜ¶`mVyZ AnKmV {ZYrgmRr bT^{mB0} bTbr, Ê`mVhr An`e Ambo. 1984bm ZmJnya`Ü`o nmaYr g`mOmÀ`m EH m `wdH mMr hÊ`m H aÊ`mV Ambr. `m KQZoÀ`m {damoYmV nPmbmb amOnyV, JUoe ndma Am{XSÀ`m gmhmæ`mZo nmaYr g`mOmMr g\$KQZm -mSYyZ AmSXmobZ Ho bo. -oamoOJmar, Jar-r, Om{Vi`dñWoÀ`m {damoYmV amOm Tmbo, Zm`Xod Tgmi `mSÀ`m ZoVYÊdmV C^r Pmboè`m X{bV n±Wa `m **MidirH S** dram AmHY`i Pmbm d VmH XrZo H m¶©àdUhr Pmbm.

MidirMm {ZômdSV d g\$Kf©erb H m`©H Vm© àhUyZM dramZo Am`wî`^a H m’ Ho bo. g`mO à-moYZmMo {dMma bmoH mSn`aV nmohmoMdÊ¶mMo ‘mÜ`‘ àhUyZ Xj{ZH ‘hmgmJa `m dV©`mZnìmV

ĒļmZo nīH ma āhUyZ ZmoH ar nĒH abr. nwT {dDmohr ‘m{gH mMo
 gšnmXH nX ^yf{dbo. AZoH dYīmnīmV gXabolH āhUyZhrH
 m’ Ho bo. Omhra g^mš‘Ū’o ‘mšg©-Amš-oSH a gmšJm`Mm, Voihm
 ElmŪm Vīdk dmQ m`Mm. nWZmQ ç, ZmQ Ho , bmoH H bm,
 bmoH gšJrV `mš‘YyZ g‘mOì`dñWoMo ñdv n bmoH mšg‘moa A{YH
 à^mdrnUo ‘mšVm `oVo, `mMr {eH dU {dZm`H lamS `mšZr
 Ē`mbm {Xbr hmoVr. Zdmo{XV H bmdšVmšZm X{bV ašJ^y`rV
 AmUÊ`mgmRr à{ejU d H m`©emim KoVē`m. Midirbm
 Cn`w° Aer JrVo {b{hUo, ĒļmšÀ`m Mmbr bmoH gšJrVmda
 AmYm[aV RodyZ JmUo, àMma àgmamMo à~šYZ H aUo Aem {d{dY
 nmVùĒmšda Vmo H m`© H arV Ago. Obí`mšMm ĒļmZo MidirgmRr
 ‘moRçm à`mUmV dmna Ho bm.

‘mPm gš-šY dramer 2012 nmgyZMm. H moQm©À`m H m‘m{Z{‘īm
 d{H bmgmo-V ~jRH sV AgVmZm A°S {ZhmbqgJ ĒļmšZr ‘mPm
 ĒļmÀĒmer n[aM` H éZ {Xbm. Vo āhQbo H s, "dram^mD `mšZm
 O`rZ ‘mbH s h , , A{VH« {‘V O`rZr, ^y-gšnmXZ B.



H m`Xo{df`H ~m~tMr ~arM 'm{hVr Amho d È`m~m~VrVrb
 Ý`m`mb`rZ bTohr Vo bTV AmhoV.' g\$Kf© dm{hZr V'} Am`mo{OV
 ami`r¶ O`rZ h, n[afXoÀ`m doir È`mMo {dMma g'OyZ KoÊ`mMr
 g\$Yr 'bm {`imbr. nwT {d{dY g\$KQZm\$Umam Am`mo{OV YaUo,
 'moM}, Am\$XmobZo BÈ`mXr\$À`m 'mÜ`'mVyZ hm g\$-SY ÑT hmoV
 Jobm. d;Mm[aH ÑiQcm H Yrhr H moUmerhr È¶mZo VSOmoS Ho br
 Zmhr. d\${MVm\$À`m àiZmda Cnm` àhUyZ Jm`H s©, 'm³g©, {' Sob
 d ~m~mgmho~ Am\$~oSH a `m\$À¶m {dMmam\$da È¶mMm {dídmg
 hmoVm.

`mM H mimV Zjb g`W©H Agè`mMm RnH m È`mÀ`mda
 RodÊ`mV Ambm Am{U nmo{bgm\$Mm ggo{'am È`mÀ`m'mJo bmJbm.
 'w\$-B©bm H moQ {gZo`mMo eyqQJ gvw AgVmZm drambm AQH
 H aÊ`mgmRr nmo{bg VoWo nmohmoMbo hmoVo. EHo H mir Jwao amlUmam
 dram AZoH Am\$XmobZmMm ZoVm Am{U nwT ami`r` nwañH ma àmá
 {MìnQmMm Zm`H hr Pmbm. "H moQ©`Yrb ^y{'H m È`mÀ`m àÈ`j
 OrdZmer {ZJ{SV hmoVr. "H moQ©Z\$Va AÈ¶SV VwaiH Aem
 {gZo`m d bKwnQmV È¶mZo H m' Ho bo. CXm. V{'i {MìnQ
 "njr'. "AmYm Mm\$X Vw' al bmo' Am{U "H {'O' ho bKwnQ.
 "H moQ©`Yrb emhra g\$^mOr ^JVÀ`m AmdmOmVrb eāX
 AmhoV, nmoibo hmV È`m\$Zm {dñVdmMo XmZ ao! ZWH VrM gmRr
 CbQbobm dram gmWrXma Vo eāX lao H éZ, nwTÀ`m {nTrÀ`m
 hmVmV {Zlmao XoD Z Jobm.





gšemoYZna {blmU

Z'ñH ma.

"n[adV©ZmMm dmQgv 'À`m `m A\$H mnmgyZ àhUOo 16 E{àb 2021nmgyZ Amàhr gšemoYZna {blmUmMm EH ñdV\$ì Am{U doJm {d^mJ gvw H aV AmhmoV. {dÚmnrR AZwXmZ Am`moJmÀ`m {e' magnmì Aä`mgn{IH m\$À`m `mXrV 2019'Ü`o ñWmZ àmá Pmè`mnmgyZ hm àñVmd "dmQgv 'À`m {dMmamYrZ hmoVm. {d{dY joIm\$V gšemoYZ H aUmè`m àmÜ`mnH Am{U {dÚmWu VgoM ñdV\$ì gšemoYH m\$Mr àH meZmMm Mm\$Jbm AdH me CnbāY hmoÊ`mMr JaO `m'wio ^mJdbr OmB©b, Agm Amàhmbm {dídmg Amho. `m {d^mJmÚmao AH mX{'H MMm©{dídMV A{YH 'hIdmMo Am{U AW©nyU© `moJXmZ XoÊ`mMr "dmQgv 'Mr j'Vm XwUmdob, Aerhr Amàhr Anojm H aVmo.

gšemoYZna bolZ dmQgv 'Ü`o àH meZmW© nmRdÊ`mMr Am{U Ê`m {blmUmMr àH meZnyd© {M{H Ēgm H aÊ`mMr EH nŌV "dmQgv 'Zo AmlyZ KoVbr Amho. Ê`m {ŪñVar` JmonZr` narjU (peer reviewed) nŌVrMo {Z`' nŸđ H«. 14 da {Xbobo AmhoV. {blmU nmRdÊ`mnydu Vo Aä`mgmdoV, hr {dZ\$Vr. "dmQgv 'Ü`o

{blmU nmRdÊ`mgmRr {df`mMo qH dm jolmMo ~\$YZ Zmhr.
 VgoM Vo bolZmV Xmldboë`m ^m{fH qH dm MMm©Ê`H
 gÿOZ{ebVodahr Zmhr. Amåhr '° EdTrM Anojm HaVmo
 Hs, {blmUmMm CÔoe JS^ra Agmdm, {blmUmMr AH mX{`H
 {eñV nmibobr Agmdr Am{U g'H mbrZ 'amRr MMm©{didmV
 Ê`mÛmao Mm\$Jbo `moJXmZ {`imdo.

XwXEdmZo, g'H mbrZ 'amRr MMm©{didmV g-g\$X^© MM}Mr
 Am{U AmUlr `hldmMo åhUOo gd^H f AmH bZmMr H 'VaVm
 {XgVo. A{^Zdoer Amamon-àÊ`mamonm\$Û`o ASHy Z MMm© nwT
 OmV Zmhr, Ag\$hr KSVmZm {XgV\$. `mnmRr'mJo g'mO'mÛ`m\$Mr
 ^mD JXu, M'H Xma {dYmZm\$Mr Am{U VmÊH mi Cîma XoÊ`mMr
 hmjg, Amnbn `wÔm VnmgyZ nhmÊ`mMr JaO Z dmQUo Agm
 ~Xbbobm H mimMm '{h'm {XgVmo. Cnamo° {d^mJm'Û`o
 MMm©{didmbm J«mgyZ AgUmè`m `m Xmofm\$Mm àmXw^m@d hmoUma
 Zmhr, Aer Anojm Hé`m.

`m ñdV\$Ì {d^mJmMr gwédmV Ho ë¶mnmgyZ Am'À¶mH S
 AZoH g\$emoYZna bol O'm Pmbobo AgyZ Ê¶m\$Mr narjU
 à{H« ¶m gwv Pmbobr Amho, ho gm\$Jm¶bm Amåhmbm AmZ\$X
 dmQVmo. Am'À`m ^mdr bolH -dmMH m\$Zm `m {Z{^îmmZo {dMma{did
 gKZ hmoÊ`mgmRrÀ`m ew^oÀNm!

- g\$nmXH

bol gmXa H aÊ¶mMr 9{H« ¶m

1. Amnbo AàH m{eV gšemoYZna bol 'm¶H« mogm`âQ dS ' mBob ñdv nmV ¶w{ZH moS ' mÊQ²g'Ü¶o ('šJb, E[a¶b ¶w{ZH moS, H mo{H im B.) nYð H« 'mšH Am{U erf©H Z'yX H v Z research.watsaru@gmail.com 'm B©'ob nî`mda nmRmdo. B©'obloarO AY` nŌVrZo nmRdy Z`o. bolH mMo Zmd, nîmm, H m'mMo ñdv n, B©'ob Am`Sr Am{U gšnH© H« 'mšH `mMr Zm|X bolmÀ`m eodQr H amdr.
2. gšemoYZna bolmšZm {df`mMo ~šYZ Zmhr, našVw eāX`m©Xm 2,000 Vo 5,000 eāX Agmdr.
3. gšemoYZna bol ho d;Mm[aH {blmU Agè`mZo È`m'Ü`o ^mfoMm à'm{UV dmna, gšX^m³À`m emómo° nŌVrMm Cn`moJ, {dMmamšMm ñdVšìnUm AgUo JYhrV Am{U JaOoMo Amho.
4. Hw Rè`mhr àH maÀ`m dmL²'¶Mmj`m©g "n[adV©ZmMm dmQgv ' {ZfoYmh© 'mZVmo Am{U Aem àH maÀ`m

bolZmg 'wirM àmoĖgmhZ {Xbo OmUma Zmhr.

5. nrEM.Sr. à-šYmVrb àH aUo nmRdy ZŋoV.

6. nyd@à{gŎr {'imbobo bol ŋm {d^mJmV nmRdy ZŋoV.

7. gšemoYZna bol àH m{eV H aÊ`mgmRr "dmQgv ' Xwhoar JmonZr` narjU nŎVrMm Adbš~ H aVmo. bol à{gŎ H aÊŋmgmRr Hw Rbohr ewëH dmQgv AmH maV Zmhr. `m à{H« `obm OmñVrV OmñV Mma '{hÝ`mšMm H mbmdYr bmJy eH Vmo. narjH 'šSimZo {Xbobm {ZU©` Aš{V' Am{U ~šYZH maH amhrb, `mMr HŸ n`m Zm|X `mdr.

8. bolmMr nmoMnmdVr Am{U bol àH meZmgmR r ñdrH maÊ`mV Amë`mMr qH dm Z Amë`mMr 'm{hVr bolH mšZm "dmQgv 'H SyZ ñdVš`nUo Am{U doimodoir ' ° B@'obŬmao H idbr OmB@b. Ê`mgmRr ' moZ qH dm BVa gšnH© gmYZmšMm dmna H v Z`o.

gšnmXH

g\$X^©{df¶¶H ‘mJ©Xe©H gyMZm

"n[adV©ZmMm dmQgv 'gmRr g\$emoYZna bolZm'Ü¶lo bolH mZo
BZ Qo³ñQ nªa¶Wo¶QH b Am°Wa So¶ gm¶¶QoeZ (In Text Par-
enthetical Author-Date Citation) ¶¶m g\$X^© nÖVrMm
Adb\$- H amdm. ¶¶m nÖVrZwgma àË¶j bolm'Ü¶lo Amboë¶¶m
g\$X^m³Mo AmYma XoUo A{^àoV AgVo. Ë¶¶m'Ü¶lo bolH mMo
AmSZmd, g\$X^©J«\$WmMo àH meZdf© Am{U WoQ CX²Y¶V Agob
Va n¥. H« . Zm|X{dUo Amdí¶¶H AgVo. CXm. (nmQrb
1997, n¥. 43) g\$X^©J«\$Wm{df¶¶rMo AÝ¶¶ Vnerb
bolmÀ¶¶m eodQr OmoSboë¶¶m g\$X^©¶¶mXr'Ü¶lo XoUo AnofjV
Amho. CXm. (nmQrb, M\$DH m\$V (1997) ... Mm;H Qr~mhoaMo
Mohao, OZe°s dmMH Midi, Amja\$Jm~mX.)

B\$J«Or d 'amRr g\$X^©¶¶mXr ñdV\$ì Agmdr. hr 'm{hVr XoVmZm
H« ' J«\$W (ñdV\$ì, g\$nm{XV B.), {Z¶¶VH m{bH , dV©'mZnì,
AàH m{eV H¥ Vr; à~\$Y B., g\$Ho VñWi d g'mO'mÜ¶¶'
Agm Agmdm.

EH mM bolH mMr AZoH nwnVHo Agë¶¶mg Va g\$X^©¶¶mXr'Ü¶lo
dfm©ZwH« ' nmimdm.

bolm'Ü¶lo EH mM gmYZmMm g\$X^© bmJmonmR ¶¶loVmo Voihm "Vljd'

eāX dmnv Z nŸð H« 'mšH Úmdm. CXm. ('mšSHo 2020, nŸ. 27), (Vljd 29)

g\$X^© gyMr bolH m\$ÁŹm AmSZmdm\$ZwH« 'o d Z\$Va dfm³ZwH« 'o Úmdr. OoWo EH mM bolH mMo EH mM dfm©Vrb bol AWdm J«\$WmMm g\$X^© Agob VoWo CXm. 2017 A, 2017 ~ Agm dmna H amdm. OoWo bolmMo AWdm J«\$WmMo EH mnojm AŸYH bolH AgVrb VoWo n{hëŹm bolH mÀŹm ZmdmZ\$Va "d BVa' Ago OmoSmdo. g\$X^© gyMrVrb AÝŹ C,,ol Imbrbà'mUo AgmdoV. BZ Qo³ñQ gmŹQoeZ nwT Hš gmV {Xbo AmhoV.

bolH mMm J«\$W ... nmQrb, M\$DH m\$V (1997) ... MmjH Qr~mhoaMo Mohao, OZe° s dmMH Midi, Amja\$Jm~mX. (nmQrb 1997, nŸ. 78)

gnm{XV JŹŹ ... ^moio, ^m. b. d {H emoa ~oS{H hmi (g\$nm) (2003) ... ~XbVm 'hmami', Sṁ. ~m~mgmho~ Am\$~oS H a AH mX'r, gmVmam. (^moio d ~oS{H hmi 2003, nŸ. 178)

gnm{XV JWmVrb bdl ... ^mJdV, d\$XZm (2009) ... "nwYhm EH Xm "Sm°ëg hmD g", JrVmbr, {d. '\$. (g\$nm) óràiz gmoSdVmZm, {XbrnamO àH meZ, nwUo, nŸ. 412-418. (^mJdV 2009, nŸ. 413)

{ZŹŹVH m{bH mVrb bdl ... ~m~a, AemoH (2015) ...

"'~' ~irMm ... EH ^maVr¶ noM', Apñ'VmXe©, dm{f©H
 {deofmSH , nY. 10-21 (~m-a 2015, nY. 20)
 dV'¶Zn¶Vrb b■ ... QoH mio, Sm'. ZmJoe (2021) ...
 "{hadmB© hoM lao Am;fY', 'hmami' QmB©åg, 16 E{àb
 2021, nY. 6 (QoH mio 2021, nY. 6)
 AàH m{eV H Vr ... ndma, àkm X¶m (2015) ... "Jmo. nw.
 XoenmSS o ¶mSÀ¶m ZmQ H mSMm {M{H ĖgH Aä¶mg',
 (AàH m{eV à~SY, 'wS-B© {dÚmnrR) (ndma 2015, nY.
 188)

g\$Ho VñWimdarb bol ... ~m\$XoH a, àdrU XeaW (2021)
 ... "IwÁ¶m gmdë¶mSMm H mi"

<https://www.loksatta.com/lokrang-news/matt-spelling-mistake-for-printing-alumni-posters-banners-or-leaflets-akp-94-2452328/>

(g\$Ho VñWimbm ^oQ 26 E{àb 2021) (~m\$XoH a 2021)
g'¶O'¶Ü¶ ... Ho ed dmK'mao (2021)

[https://m.facebook.com/](https://m.facebook.com/story.php?story_fbid=3962216370538487&id=100002504892114)
 story.php?story_fbid=3962216370538487&id=100002504892114
 (g\$Ho VñWimbm ^oQ 26 E{àb 2021) (dmK'mao 2021)

gšemoYZ

{edmOr 'hmamOmšdarb
B{Vhmg bolZ ... {d{dY
AYd¶mW©

Omñd\$Xr dmš-yaH a

^maV Xoembm 'moRm àXrK© B{Vhmg bm^bm Amho. Odinmg
Mma hOma dfm^À`m `m B{VhmgmV ^maVmV AJ{UV amOo hmoD Z
Jobo. 'mì È`mš'Ü`o {edmOr 'hmamOmšMo ñWmZ AZÝ`gmYmaU
Amho. "Abm{H H H VY©Èd Agbobm `wJàdV©H amOm' Aer
È`mšMr à{V`m OZ`mZgmV éObobr Amho. 'hmami`mV H mhr
bmoH È`mšZm {edmMm AdVma 'mZVmV. Joë`m XmoZeo dfm^V
{edM[almda glmob gšemoYZ Pmbo Amho. 'hmami`mVrb
B{VhmgH mamšda `m {df`mMr Aer H mhr 'mo{hZr hmoVr H s,
XrK©H mi "'hmami`mMm B{Vhmg àhUOo ' ° {edmOr 'hmamOmšMm
B{Vhmg' Ago OUy g`rH aU {Z`m©U Pmbo hmoVo. AmOVmJm`V
È`mšÀ`mda AZoH J«šW {b{hbo Jobo. Ho di B{VhmgbolZM
Ziho Va nmodmS o, H mì, ZmQ H , H mXS-ar Aem AZoH
gm{hÈ`àH mamšZm È`mšZr {df` nwa{dbo AmhoV. È`mšÀ`mda 'amRr

bo{IH m 'wš-B©pñWV Eg. EZ. Sr. Qr. '{hbm {dÚmnRmÀ¶m B{Vhmg
{d`mJmV gh¶moJr àmÜ¶mnH àhUyZ H m¶©aV AmhoV.

B©'ob- jaswandi75@yahoo.com

d A'amRr B{VhmgH mam\$Zr bolZ Ho bo AgyZ `m B{VhmgbolZmda AZoH J«\$W {b{hVm `oVrb, BVH s `m {df`mMr `i`már 'moRr Amho. {edmOr 'hmamOm\$À`m B{VhmgmEdTmM È`m\$À`mdarb "B{VhmgbolZmMm B{Vhmg' hm a\$OH d O{Qb Amho.

B{Vhmg àhUOo "yVH mim{df`r dñVw{ZðnUo Ho bobo {Zìdi H WZ' Aer YmaUm àgYV Amho. àÈ`jmV 'mì, Á`m H mimV B{VhmgbolZ Ho bo OmVo, È`m H mimVrb amOH maUmVrb à`mdr VîdàUmbt'wio Vo à`m{dV Pmbobo AgVo, Ago gd©gmYmanUo {XgVo. qH -hpZm dV©`mZH mbrZ amOH maU loiÈ`mMo EH à`mdr VmpîdH hÈ`ma Ago ñdv n È`mbm à`má hmoVo. kmZ hr EH e°s Amho, `m AWM©Mo EH B\$J«Or {dYmZ Amho. È`mMm {dñVma H v Z "Eo{Vhm{gH kmZ hr gîmm {'idÈ`mgmRr dmnabr OmUmar EH e°s AgVo', Ago àhUVm `oB©b. ^maVr` B{VhmgmVrb BVa H moUE`mhr {df`mnojm {edmOr 'hmamOm\$À`m H ma{H Xu{df`r Oo B{VhmgbolZ Ho bo Jobo Amho, È`mbm Vo A{YH bmJy nSVo.

{edmOr 'hmamOm\$darb B{VhmgbolZmMo {dîbofU H aÈ`mMm à`ÈZ `m bolmV Ho bm Amho. EH m emoY{Z-\$YmMm AmdmH m bjmV KoVm gd©M B{VhmgH mam\$À`m 'm\$SUrMm nam'e© `m {RH mUr KoUo AeŠ` Amho. 'mì H mhr à`wl B{VhmgH mam\$Zr {edmOr 'hmamOm\$da Oo bolZ Ho bo Am{U ^maVr` B{VhmgbolZm'Ü`o Oo 'hîdnyU© 'mZbo Jobo Amho, Aem bolZmMo {dîbofU H aÈ`mMm à`ÈZ `m bolmV Ho bm Amho.

dmgmh{VH B{VhmgbolZ

{edmOr 'hmamO `mšMo n{hbo M[a]l Hʔ iUmOr AZšV g^mgX
`mšZr 1694 Vo 1697 `m H mimV {b{hbo. H mñ'mo- X-½dmX©
`m nmoVw©JrO bolH mZo "bmB©' Am°' {X go{b~«oQoS {edmOr'
(Life of the Celebrated Shivaji) `m erf©H mMo {edmOr
'hmamOmšMo M[a]l 1697'Ü`o {b{hbo. 'mì Á`mbm emóewÕ
B{Vhmg bolZ àhUVm `oB©b, Aer B{Vhmg bolZ našnam
^maVmV dmgmh{VH H mimV àhUOoM {-«{Qe Aš'b àñWm{nV
Pmè`mZšVa gvw Pmbr.¹ H° BQZ Ooàg Ho a, am°-Q Am°©, 'ma{WAg
p¼¼IMZ ñà|Job, ESdS ñH m'Q doA[a`J, Ooàg {`b, 'mD šQ
ñQw AQ © Epè' ÝñQ Z Aer 'amR çmšMm B{Vhmg {b{hUmè`m
A^maVr` gšemoYH mšMr XrK© našnam Amho. `m gšemoYZmVyZ "h,,m
H aUmam bwQmv , -ššImoa' BWnmgyZ Vo "OJmÀ`m nyd© ^mJmVrb
gdm©V 'moRm amOH maUr' BWn`aV {edmOr 'hmamOmš-ÔbÀ`m
{d{dY à{V`m gmH maè`m Joè`m. `mšñjH s H mhr gšemoYH
i`dgm`mZo B{VhmgmMo àmÜ`mnH hmoVo. Va H mhr B©ñQ Bš{S`m
Hš nZrVrb A{YH mar hmoVo. 'amRçmš{df`r dmQUmè`m {OkmgonmoQr
ho bolZ àm'w»`mZo Ho bo Jobo hmoVo. VgoM ho B{VhmgbolZ Á`m
18i`m eVH mV Ho bo Jobo, È`m H mimVrb ^maVmVrb amOH s`
gšX^©hr bjmV KoVbo nm{hOoV. `m H mimV {-«{Qe-'amRm
gšmm-gšKf© gvw Pmbm hmoVm. 1818 gmbr 'hmamii`mV {-«{Qe
Aš'b àñWm{nV Pmbm. `m H mimV AZoH àemgH s`
A{YH mè`mšZr ^maVmMm B{Vhmg {b{hÈ`mMo àH èn hmVr KoVbo.
È`mšMo ho CÚmoJ {Zli kmZbmbgonmoQr gvw Pmbobo ZihVo.

‘amRçmS{df`r kmZ {‘i{dUo hm gwá hoVyhr `m B{VhmgbolZm’mJo hmoVm. È`m’mJo {-«{Qe dmghm{VH amÁ`mMo {hVgS`\$Y XSbobo hmoVo. ‘amRçmSda amÁ` H am`Mo Va ‘amRçmSMr àemgZ i`dñWm H er hmoVr, ho OmUyZ KoUo È`mSÀ`m Ñi rZo ‘hldmMo hmoVo. àhUyZhr Vo ‘amRçmSÀ`m B{VhmgmH S dibo.

H moUVrhr naH s` amOdQ Amnbr glmm Ho di X-md V\$imÀ`m gmhmæ`mZo {QH dy eH V Zmhr. Á`mSÀ`mda amÁ` H am`Mo, È`m àOoÀ`m gS`VrZo d ghH mamZoM {Vbm amÁ`H ma`ma H aUo eS` AgVo. {-«{QemSZr Amnbo gm`«mÁ` {QH dÊ`mgmRr `oWo Amnbo à`wĒd (hegemony) ñWmnZ H aÊ`mMm à`ĒZ gvw Ho bm. “^maVr` bmoH amÁ` H aÊ`mÀ`m bm`H sMo ZmhrV,’ Ago B{VhmgmVyZ {gŌ H v Z {-«{Qe Amnè`m amÁ`mbm “AŸY`mY`Vm’ (legitimacy) {‘i{dÊ`mMm à`ĒZ H arV hmoVo. BŌñQ B\$S`m H\$ nZrMo ^maVmVrb amÁ` ho “H m`ÚmMo amÁ`” (Rule of law) Amho, “ZY`u (Secular) amÁ`” Amho, “H è`mUH mar amÁ`” (Welfare state) Amho, Aer {‘WWho àgŸV H aÊ`mV Ambr. `mCbQ {-«{QenydŌH mbrZ ^maVmVrb amÁ` ho AamOH VoMo amÁ` hmoVo, Aer à{V`m {Z`mŌU H aÊ`mV Ambr. ^maVmVrb bmoH ñdV...da amÁ` H aÊ`mÀ`m bm`H sMo ZmhrV; VgoM nyd}H Srb bmoH mSZm ehmuo H v Z gmoSuo ho Jmoè`m ‘mUgmÀ`m SmoŠ`mdarb AmoPo (white man's burden) Amho Am{U àhUyZ `m Xwhoar hoVy\$Zr {-«{Q emSZr ^maVmV amÁ` ñWmnZ Ho bo, Aer {‘WWho B{VhmgbolZmVyZ àgŸV H aÊ`mV Ambr. È`mSZr Amnè`m à`wĒdmMo Omio ^mfm, gm{hĒ`, {ejU, B{VhmgbolZ, {dkmZ, g\$JrV

Aem gmšñHY {VH joimšV {dUm`bm gwédmv Ho br. Ooåg {`bZo
 ^maVr` B{VhmgmMm "àmMrZ àhUOo qhXy H mblSS, 'Ü`wJrZ
 àhUOo 'wnbr` H mblSS d AmYw{ZH àhUOo {-«{Qe H mblSS"
 Aer H mb{d^mJUur H v Z B{VhmgbolZmŰmao ^maVmV
 O'mVdmXmMr ~rOo noabr. B{VhmgbolZ ho EH mM doir {-«{Qe
 amÁ`mbm A{Y'mÝ`Vm {`idyZ XoUmao Am{U ^maVr`mš'Ü`o 'y Q
 nmSUmao EH "XwYmar eó' ~Zbo.

Om`Z am`-Q grbo (1834-1895) `mZo 'amRçmšMo amÁ`
 àhUOo EH bwQmv šMr gšKQZm hmoVr, Ago dU©Z Ho bo; Va ga
 pihšÝgoÝQ pñ`W (1848-1920) `m {-«{Qe B{VhmgH mamZo
 {edmOr hm MmoamšMm ZoVm hmoVm, Aer AkmZ'ybH d {-Z-wšmMr
 {dYmZo Ho br hmoVr.² Ooåg H qZJh` J«±Q S' (1789-1858)
 `mMo {edmOr 'hmamOmšdarb B{VhmgbolZ ho dmgmh{VH
 našnaoVrb gdm©V 'hîdmMo 'mZbo OmVo.³ J«±Q S' hm gmVmam
 amÁ`mMm "nmo{b{QH b EOšQ" d "ao{gS|Q" àhUyZ H m' H arV
 Ago. Ě`mMm "E {hñQ`r Am`' {X 'amRmO²' hm J«šW 1826 gmb
 à{gŎ Pmbm. 1829'Ü`o "'amRçmšMr ~la' `m ZmdmZo Ě`mMm
 'amRrVrb AZwdmXhr à{gŎ Pmbm. "'amRr gîmoMm CX` ho
 H mhr EH m XrK© dî^dembr našnaoMo ' {bV ZihVo; Va dUdm
 Ogm OšJbmV AMmZH bmJVmo, Vgm Vmo {Zidi AMmZH nUo
 Pmbobm EH CDoH hmoVm', Agm {gŎmšV Ě`mZo `m nwñVH mV
 'mšSbm hmoVm. 'amRçmšÁ`m amÁ`mV XšJoYmono, 'wbyl{Jar hmoVr,
 Agohr {ZiH f© Ě`mZo `mV 'mšSbo hmoVo. S' Mm hm J«šW 'wš-B©
 àmšVm`Yrb embo` Aä`mgH«`mV g`m{di Pmbm. 'hmami`mVrb

gw{e}jV m\$Mr n{hbr {nTr {edmOr 'hmamOm\$darb hm B{Vhmg dmMyZ 'moRr Pmbr. nwT B{VhmgmMm`© amOdmSo, dmgwXodemór lao, [a`mgVH ma gaXogmB©, OXwZmW gaH ma `m gd© bolH m\$Zr S' À`m B{VhmgbolZmVrb ÌwQr Xml{dè`m.

AWm©V gd©M dmgh{VH B{VhmgbolZ ^maVm{df`r qZXmZmbñVr H aUmao ZìhVo. 'mD \$Q ñQwAQ Epè' ÝñQZ (1779-1859) `mZo {b{hboè`m "{hñQ`r Am°' B\$S`m' (1844) `m J«\$WmVyZ È`mZo {edmOr 'hmamOm\$df`r JmjadmoÔma H mTbo AmhoV. Epè' ÝñQZbm 'amRçm\$df`r AÈ`SV AmXa hmoVm. Ooåg {`bZo {b{hbobm ^maVmMm B{Vhmg È`mbm A`mÝ` hmoVm. EH Hw eb goZmZr, 'wÈgÔr, H V©~Jma amOm àhUyZ È`mZo {edmOr 'hmamOm\$Mm Jmjad Ho bm AgyZ VÈH mbrZ 'wbyl{Jar H aUmè`m g\$YgmYy amOH maÊ`m\$noj m È`m\$Mo doJionU È`mZo XmldyZ {Xbo. 'hmamOm\$À`m `mo½`Vo`wioM 'amR "EH amì" àhUyZ CX`mbm Ambo, Aem eāXm\$V È`mZo 'hmamOm\$Mo 'moRonU ì`° Ho bo Amho.⁴ 'amRr glmobm "amì" àhUyZ g\$-moYUmam Am{U {edmOr 'hmamOm\$À`m H ma{H Xubm "ñdmV\$Í`wÕ' Ago g\$-moYUmam n{hbm A'amRr B{VhmgH ma àhUOo Epè' ÝñQZ hmo`.⁵

amì`dmXr à{V{H«`m

J«+Q S' À`m bolZm{df`rMr Vrd«`à{V{H«`m Zr. O. H sV©Zo `m EH m 'hm{dÚmb`rZ {dÚmì`m©À`m EH m {Z~\$YmVyZ C`Qbr. È`mZ\$Va S' À`m bolZmbm àÈ`wìma XoÈ`mgmRr 'hmani`mVrb AZoH g\$emoYH nwT Ambo. S' À`m B{VhmgmZo 'amRr 'mUgm\$À`m

Apñ'Vm XwImdë`m Joë`m. ^maVmÀ`m d 'amRçmSÀ`m nam^dmMo
eë` `oWrb Zd{e}jV 'Ü`dJm©bm SmMy bmJbo hmoVo. Amnë`m
B{Vhmgm{df`r `m dJm©V EH Zdo AmË`^mZ {Z`m©U hmoD
bmJbo hmoVo. `mSVyZM 19i`m eVH mÀ`m CîmamYm©V B{Vhmg{df`H
Or EH bmQ Cgibr, È`mSVyZ amii`dmXr d àmXo{eH B{VhmgmMo
AZoH {dY Am{dîH ma nwT Ambo.⁶

'hmXod JmoqdX amZS (1842-1901) `mSMM "{X amB©O
Am°' 'amRm nm°da' (1900) hm 'amRçmSÀ`m B{Vhmgmdarb
A{^OmV J«SW 'mZbm OmVmo. amZS|Zr `m J«SWmV S' À`m dUdm
{gÕmSVmMm à{VdmX Ho bm. "amRr gîmoMm CX` H mhr AMmZH nUo
Pmbm Zmhr, È`m'mJo H mhr Xidr `moJm'moJ ZihVm; Va ^mf, m
gm{hË`, gSñHY Vr, Aem KQH mSZe EH {iV ~mSYboë`m 'amRr
g'mOmÀ`m "amii`-Z{©VrMm Vmo EH Am{dîH ma hmoVm,' Agm
EH Zdm AYd`mW© È`mSZr `m J«SWmV 'mSSbm. `m J«SWmVrb
àH aUmSMr erf©Ho nm{hbr Var `mMr H ënZm `oD eH Vo.
"O'rZ H er V`ma Pmbr', "-rO H go noabo', "-rOmbm ASHw a
H go 'w Qbo', "dYj 'w bbm', "dYjmbm ' io Ambr' BË`mXr.
'amRr gîmoÀ`m CX`mgmRr ^° s MidirZo nmofH gmSñHY {VH
d gm'm{OH dmVmdaU {Z`m©U Ho bo Am{U È`mMm amOH s`
Am{dîH ma àhUOo {edmOr 'hmamOmSMm CX`, hm amZS| Mm
AYd`mW© 'hîdnyU© hmoVm.⁷ È`mSÀ`m `m J«SWmZo 'amRr {dîdmV
emór` B{VhmgbolZmMm nm`m KmVbm.

~hþOZH| Ðr B{VhmgbolZ

19i`m eVH mVrb {edmOr ‘hmamOm\$darb Xwgao EH
‘hîdnyU© qMVZ àH Q Pmbo Vo ‘hmĒ‘m ’w bo (1827-1890)
`m\$Ā`m bolZmVyZ. ‘hmĒ‘m ’w bo ho H mhr i`dgm`mZo B{VhmgH ma
ZìhVo. ‘mì Vo EH g|{Ð` ~w{Ō‘SV hmoVo.⁸ OmVr-A\$VmMr
Midi Am{U ór-‘w° s **Midi** `m XmoÝhrhr **MiditMr**
Ywam dmhUmao ’w bo ho -hþOZm\$Mo ZoVo hmoVo. Ē`m\$Ā`m bolZmVyZ
^maVr` B{VhmgmH So nmhĒ`mMr EH ‘ybJm`r Ñir Ē`m\$Zr
{Xbr. “maVmMm B{Vhmg àhUOo dU©-g\$Kfm©Mm B{Vhmg Amho’,
Ago EH Zdo gyl Ē`m\$Zr ‘m\$Sbo. Ē`m\$Ā`m “NìNvr {edmOr amOo
^mogbo `m\$Mm ndmSm’ (1869) `m H mì`mVyZ Ē`m\$Zr “a`VoMo
gwl nmhUmam, àOm{hVXj amOm, Agm`mÝ` `moŌm, ‘wĒgŌr
goZmZr’ Aer {edmOr ‘hmamOm\$Mr à{V`m C^r Ho br.⁹
“Hw idmSr-^yfU’ Agm ‘hmamOm\$Mm C,,ol Ē`m\$Zr Ho bm.

`mM nmodmSçmV Ē`m\$Zr ^maVr` B{VhmgmVrb àmMrZH
mimH S **bj** doYbo Amho. “~«m÷UemhrZo j{ì`m\$Mo {ZXm©bZ H
go Ho bo, naewam`mZo j{ì`m\$Mm {Z:nmV H gm Ho bm’, Aer ‘m\$S
Ur H aV “‘hmAar ho nyduMo j{ì` hmoVo Am{U Z\$Va An^«se
hmoD Z Ē`m\$Zm ‘hma ho Zmd nSbo’, Aer i`wĒNlMr Ē`m\$Zr
gm\$Jvbr. hm nmodmSm Ē`m\$Zr Hw U-r, ‘hma, ‘mir, ‘m\$J
`m\$gmRr {b{hbm AgyZ Ē`m\$Zm g‘Omdm àhUyZ Vmo Ē`m\$Zr gmoß`m
^mfoV {b{hbm Amho, Agohr nmodmSçmbm {b{hboë`m ànVmdZoV
Ē`m\$Zr Z’yX Ho bo Amho. ’w b|Mo ho B{VhmgbolZ A{Ve`
‘hîdnyU© hmoVo. `mVyZM nwT ^maVr` B{VhmgmH S ~KĒ`mMr

Zdr Ñir XoUmao "A-«m÷Ur B{VhmgbolZ' {dH {gV Pmbo.
 'w b|Mr "qbJ^md-g'Vm' `m Vldmda AT ĭ lŌm hmoVr.
 "H YrH Yr Amnë`m nĚZrMm-gB©-mB©Mm g,,m KoUmam hm amOm
 {ô`mSÀ`m ~m-VrV {H Vr CXma YmoaU ~miJV Ago', `mMr
 nmodmSçmV Ě`mSZr AmdOy©Z Zm|X Ho br Amho.

EH mo{Ugmì`m eVH mVrb {Vgao C,,olZr` M[aì àhUOo
 amOmam'emór ^mJdV (1851-1908) `mSMo 1889 gmb
 àH m{eV Pmbobo "{edNìInVtMo M[aì' ho 83 nŸđmŠMo NmoQolmZr
 nwn̄VH hmo`. ^mJdV ho 'wš-B©À`m g|Q Po{d'a 'hm{dÚmb`mV
 gšñHŸ VMo àmŸ`mnH hmoVo. embo` {dÚmì'm³Zm Cn'moJr nSVrb
 Aer H mhr Eo{Vhm{gH M[aìo Ě`mSZr {b{hbr. {edmOr
 'hmamOmŠMr OJmVrb 'hmZ `moŌo d amOo {gHŠ Xa, grPa,
 Zonmo{b`Z, AmjašJŌo-, bm'S ŠbmB©ih `mSÀ`mer VwbZm H v Z Vo
 Ě`mSÀ`mnoj m lođ hmoVo, Ago Ě`mSZr `mV Xml{dbo Amho.¹⁰

{edmOr 'hmamOmSÀ`m M[aì-H WoZo 'amRr gm{hĚ`mbm AZoH
 {df` nwa{dbo AmhoV. {-«{Qe H mimnmgyZ 'amRr gm{hĚ`mV
 {edmOr 'hmamOmŠda AZoH H mì`-'hmH mì`, ZmQHo {b{hbr
 Jobr AmhoV. `m gm{hĚ`mVyZ {d'yVrnyŌoMm Am{dīH ma hmoVmo.¹¹
 'hmXod 'moaoída Hš Q `mSMo "amOm {edmOr' (1869-1871),
 JUoe emór bobo `mSMo "{edmOr M[aì' (1873), d ASVmOr
 hSuH a `mSMo "lr{ed{dŌ`' (1891) -- hr 'hmH mì`o
 àhUOo {edmOr 'hmamOmSMo JmjadJ«šWM hmoVo. {edmOr
 'hmamOmSÀ`m amÁ`ñWmnZo'mJo ñdamÁ` d ñdmVŠíŋ] `m 'yi
 àoaUm hmoĚ`m, hm {dMma Hš Q `mSZr Amnë`m H mì`mVyZ 'mSŠbm

Amho. {edmOr ‘hmamOmšdarb ho bolZ ‘. Jmo. amZS `mšMo
 bolZ à{gÕ hmoÊ`mnyduMo Amho, ho {deof Amho. {-«{Q e
 amOdQr{déÕ bTÊ`mgmRr d ñdamÁ` ñWmnZogmRr àoaUm
 {‘imdr, Agm gwá hoVy `m VrZhr ‘hmH mì`mSÀ`m bolZm‘mJo
 hmoVm.

{dgmì`m eVH mVrb B{VhmgbolZ

{dgmì`m eVH mV {edmOr ‘hmamOmšda Oo B{VhmgbolZ
 Ho bo Jobo, Ê`mMo dJuH aU XmoZ {d^mJmš‘Ü`o H aVm `oBOb : EH
 àhUOo gšemoYZ-nÕVrMm Adbš~ H v Z gšemoYH s` {eñVrV
 Ho bobo B{VhmgbolZ Am{U Xwgao àhUOo, i`dgm`mZo B{VhmgH ma
 ZgyZhr {edmOr ‘hmamOmšÀ`m H ma{H XuMo A{Ve` A{^Zd d
 ‘hîdnyU© nÕVrZo Ho bobo g‘mbmoMZ hmo`. dmgmh{VH
 B{VhmgbolZmbm àÊ`wîma àhUyZ ‘hmamì’ mV {edmOr
 ‘hmamOmšdarb B{VhmgbolZmbm Amaš^ Pmbm. eš^a dfm^À`m
 `m àXrK© H mimV {edH mbm{df`rMr doJdoJir gmYZo {‘iV
 Jobr. `m Eo{Vhm{gH XñVEodOmšMo ‘hîd AmoilyZ Vr Jmoim
 H v Z àH m{eV H aUmè`m B{Vhmg-gšemoYH mšMr EH ge°
 ‘irM ‘hmamì’ mV {Z`m©U Pmbr.

B{Vhmgm{df`r AZmñWm AgUmè`m ‘mUgmšH S pIVnV
 nSboè`m ‘hîdnyU© Eo{Vhm{gH XñVEodOmšMo OVZ H aUo ho
 H m’ ‘moR XwamnmñV hmoVo. ‘amRr, ‘magr, gšñH¥ V, qšJb
 (amOñWmZr), BšJ«Or, ‘«| M, nmoVw©JrO, SM Aem {d{dY
 ^mfms‘Yrb bjmdYr H mJXnlo, J«šW, àdmg-d¥lmmšV, amoO{Zem

gšemoYH mšZm {‘iy bmJë`m. ~lar, eH mdë`m, nì-ì`dhma,
 "Amkmnl' d BVa emór` J«šW - Aer {H VrVar gmYZo
 Ćmamolma CnbāY hmoV Jobr. `m gmYZmšMr H R_{ma} {M{H Ėgm
 H aV 'moR n[al' KoD Z Am{U {H Ė`oH doim 'moRr Am{W©H
 Pi gmogyZ B{VhmgbolZ H aUmè`m gšemoYH mšMr 'moRr našnam
 'hmamī`mV {Z'm©U Pmbr. "H mī`o{Vhmg gšJ«h'H V} H m{eZmW
 Zmam`U gmZo (1851-1927), "Eo{Vhm{gH bolgšJ«h'Mo
 gšnmXH dmgyXod dm'Z lao VWm dmgyXodemór lao (1858-
 1924) d "B{Vhmg gšJ«h' `m 'm{bHo Mo H V} X. ~m. nmagZrg
 (1870-1926) `mšZr 'amRçmšÀ`m B{VhmgmMr gmYZo Jmoim
 H v Z Vr NmnĖ`mV Amnbo gd©ñd doMbo.¹²

dmgmh{VH B{VhmgH mamšZr àm'w»`mZo {edmOr 'hmamOmšer
 {ZJ{SV 'mo{h'm dm bT`m`m `mšMm B{Vhmg {b{hbm. H maU
 "B{Vhmg àhUOo JVH mbrZ amOH maU' Aer B{Vhmg{df`H
 'mZ{gH Vm Ė`m H mimV à`mdr hmoVr. 'mì hr ZdrZ gmYZo
 'amRçmšMm gm'm{OH, Am{W©H d gmšñHY {VH B{Vhmg
 {b{hĖ`mÀ`m NīrZohr A{Ve` 'hīdnyU© hmoVr. Ė`m'wio `m
 gmYZmšÀ`m AmYmao {edmOr 'hmamOmšÀ`m H maH sXuÀ`m BVa
 nībyšda àH me QmH Uo eš` Pmbo. 'hmamī`mÀ`m B{Vhmgmer
 {ZJ{SV Eo{Vhm{gH H mJXnīmšMm emoY KoD Z Ė`mšMo OVZ
 H aUo hoM {dídZmW H m{eZmW amOdmS (1863-1926)
 `mšMo Or{dVŪ`o` -Zbo. Ė`mšZr hr gd© H mJXnìo "amRçmšÀ`m
 B{VhmgmMr gmYZo`m erf©H mgh 1891 Vo 1926 `m H mimV
 Vā-b 22 IŠSmš'Ū`o àH m{eV Ho br. Ė`mšÀ`m 'YĖ`yZšVa Ė`mšZr

Jmoim Ho boë`m XñVEodOm\$Mo AmUlr Mma ISS àH m{eV Pmbo.
 `m gmYZm\$Mr H R_{moa} {M{H Ègm H v Z È`m\$Mm B{VhmgbolZmgmRr
 Cn`moJ H v Z {edmOr `hmamOm\$df`r d {edH mim{df`r
 A{Ve` glmob gšemoYZ Ho bo Jobo. `m`Ü`o `amRr d A`amRr
 Aem XmoYhr B{VhmgH mam\$Mm g`mdoe hmoVmo.

i`dgm`mZo B{VhmgH ma ZgyZhr {edmOr `hmamOm\$À`m
 H ma{H XuMo Á`m\$Zr A{Ve` A{^Zd d `hîdnyU© g`mbmoMZ
 Ho bo, Aem {dMmad\$Vm\$Mr EH Xwgar našnam `hmami`mV {dH {gV
 Pmbr. "B{Vhmg {b{hUo hmM B{Vhmg KS{dÊ`mMm EH `mJ©
 AgVmo', Ago AmoHo em°Q `mMo EH {dYmZ Amho. `m Ý`m`mZo
 `hmami`mVrb AZoH ZoVo, {dMmad\$V, g`mOgwYmaH `m\$Zr {edmOr
 `hmamOm\$da bolZ Ho bo. `m`Ü`o `hmÊ`m `w bo, HÝ . A. Ho iygH a,
 am`ZmW MihmU, eaX nmQrb, eaX Omoer `m\$Mm g`mdoe
 hmoVmo. `m {dMmad\$Vm\$Zr {edmOr `hmamOm\$Mm "-hpOZH| Ðr B{Vhmg'
 `m\$Sbm. VgoM H m`°S S m\$Jo, bmbOr n|Sgo, JmoqdX nmZgao `m\$Zr
 {dH {gV Ho bobr EH `m\$g©dmXr našnam Amho.

B{VhmgbolZ d amOH maU

H moUÊ`mhr nam^yV ami`m`Ü`o B{Vhmg ho g`mOm`Ü`o ami`dmXr
 Om{Udm {Z`m©U H aÊ`mgmR rMo EH Cn`w° gmYZ AgVo.
 `hmami`mVhr Ago à`EZ Pmbo. Ho di emóewÕ B{VhmgbolZM
 Ziho Va Eo{Vhm{gH H mX\$-ar, ZmQHo `mÛmao Amnbm dî`dembr
 B{Vhmg g`mOmV nmoMdÊ`mMm à`EZ `m H mimV `hmami`mV
 Ho bm Jobm. nam^yV ami`m`Ü`o ñdEdhaUmMm YmoH m `moRm AgVmo.

"nmíMmî` našnam hr {ddoH {Zđ, AmYw{ZH , emór` , ^m;{VH dmXr
 Va ^maVr` našnam hr AVm{H© H , 'mJmg, Aemór` ,
 AmÜ`mpĚ`H ' , Aer {ÛY«wdr` 'mšSUR ^maVmV dmgmh{VH H mimV
 hmoD bmJbr hmoVr. nm;dm©Ě`dmX aħUOo nyd}Mo dñVw{ZđnUo
 Ho bobo {MÌU ZihVo, Va nmíMmî` n[aàou`mVyZ Ho bobo Vo
 nyd}Mo nm;dm©Ě`rH aU hmoVo.¹³ Aem H mimV {edmOr
 'hmamOmšgma»`m Eo{Vhm{gH {d'yVrMo Jm;adrH aU `m 'mJm©Űmao
 ^maVr`mšMr Apñ`Vm OmonmgĚ`mMm à`ĚZ Ho bm Jobm. 'hmĚ`m
 'w bo d HŸ . A. Ho iygH a `mšZr {edO`šVr CĚgd gwv Ho bo.
 bmoH 'mÝ` {QiH mšZr **(1856-1920)** {edO`šVr CĚgdbm
 MmbZm {Xbr. "{edO`šVrMm amí`r` CĚgd` `m bolmV {edmOr
 'hmamOmšA`m M[alm`wio amí`dmXr Om{Udm H em -iH Q H aVm
 `oB©b, Ago {Q iH mšZr 'mšS bo.¹⁴ {edmOr 'hmamOmšdarb
 B{VhmgbolZ ^maVr` ñdmVšÍŋ MidirA`m nmíd©š`y`rda Ambo.
 Ě`m`wio {edmOr 'hmamO ho `m H mimV ^maVr` amí`dmXmMo
 àUoVo ~Zbo. `m H mimVrb B{VhmgbolZ dmgmh{VH QrHo bm
 àĚ`wîma aħUyZ AmĚ`m`wio ^yVH mimA`m naIS {M{H ĚgoEodOr
 Ě`mMo AdmOdr CXmîmrH aU ho OUy `oWrb B{VhmgbolZmMo
 EH i`dÀNoXH bjU ~Zbo. 19i`m eVH mÀ`m eodQÀ`m
 XeH mV d 20i`m eVH mÀ`m Amaš`r ^maVmVrb d 'hmamí`mVrb
 amOH maUmV {~«{Qe dM©ñd{damoYr amí`dmXr àdmh, qhXy-`wñbr
 gšKf© dmT{dUmam O`mVdmXr àdmh d ~«m÷U--«māhUoVa àdmh
 `m à`wl {dMmaYmam hmoĚ`m. `mMo 'hmamí`mVrb B{VhmgbolZmdad
 n`m©`mZo {edmOr 'hmamOmšdarb B{VhmgbolZmda XyaJm`r

n[aUm' Pmbo.¹⁵ Amnbr amOH s' ^y{'H m {gÕ H aÊ`mgmRr B{VhmgH mam\$Zr d ZoÊ`m\$Zr {edmOr 'hmamO `m {d^yVrMo Amnë`m amOH s' JaOoZwgma {MÌU H aÊ`mMo IQmQmon Ho bo. ñdY'© d ñd^mf m hm 'amRr amÁ`gÌmoMm nm`m hmoVm d Jmo~«m÷U à{Vnmi ho Ê`m\$Mo C{Ôi hmoVo, hm g'O ÑT hmoÊ`mg {edmOr 'hmamOm\$noj m 'wñbr' brJ OmñV H maUr^yV Pmbr, ho Sm'. AaqdX Xoenm\$S `m\$Mo {dYmZ ' ma AW©nyU© Amho.¹⁶

àmMrZ H mi hm qhXy H mi AgyZ Vmo ^maVr` B{VhmgmVrb ^a^amQ rMm H mi hmoVm. EdT oM Ziho Va Vo ^maVmÀ`m B{VhmgmVrb "gwdU©`wJ' hmoVo, Aer {'WHo `m H mimV {Z'm©U Pmbr. `mCbQ 'Ü`wJrZ H mb hm 'wñbr' amOdQrMm H mi AgyZ Vo ^maVmÀ`m B{VhmgmVrb "ASyma`wJ' hmoVo, Aer 'm\$SUr nm;dm©Î`dmXr d amî`dmXr B{VhmgbolZmVyZ hmoD bmJbr hmoVr. {-«{Qem\$Mo " moSm d PmoSm' ho amOH maU Am{U ^maVmV C'o am{hbobo à{V{Z{YËdmMo amOH maU `m\$'wio qhXy-'wñbr'-Eo\$`mbm J«hU bmJbo. Am`©g'mO d 'wñbr' brJ `m\$À`m ñWmnZm ho nwZé,mrdZdmXr d O'mVdmXr amOH maUmMo Am{dîH ma hmoVo. àma\$^rÀ`m B{VhmgH mam\$Zr {edmOr 'hmamOm\$Zm amî`r' Eo\$`mMo d amî`dmXmMo àUoVo 'mZbo. {dgmî`m eVH mÀ`m nydm©Ym©V 'mì O'mVdmXr amOH maUmMm à^md àhUyZ "'Ü`wJrZ ASyma`wJmVyZ amî`mbm dm 'hmamî`mbm -mhoa H mTUmam qhXy ZoVm' Ago {edmOr 'hmamOm\$À`m H ma{H XuMo {MÌU hmoD bmJbo. "Jmo~«m÷Uà{VnmbH ' d "qhXdr ñdamÁ`mMo {Z'm©Vo' Aer 'hmamOm\$Mr à{V'm nwT AmUbr Jobr. {edmOr 'hmamOm\$Zr

‘mì Amnbo amÁ` H Yrhr "qhXdr ñdamÁ`' àhUyZ Kmo{fV
 Ho bo ZihVo. È`m\$Mo amÁ` ho a`VoMo amÁ` hmoVo. È`m\$Mr AZoH
 YmoaUo, È`m\$Mr amO`wDm `m\$dv Z `mMr ½dmhr {‘iVo. Á`m {edmOr
 ‘hmamOm\$Zr Y`m©da AmYm[aV amOH maU Ho bo Zmhr, È`m\$À`mdarb
 B{VhmgbolZmVyZ ‘mì Ym{‘©H Úof nga{dÊ`mMr "A{ed" Hÿ È`o
 Ho br OmD bmJbr.

{edmOr ‘hmamO ho O`mVdmXr amOH maU loiÊ`mgmRr
 VgoM ~«m÷U-~«m÷UoVa g\$Kfm©gmRr ZoÈ`m\$Zm Am`VoM aUjoì
 {‘imbo. ÁYd`mWu n[aerbZmEodOr VoM VoM Vnerb qnOyZ
 H mT È`mV H mhr g\$emoYH YÝ`Vm ‘mZy bmJbo. {edmOr
 ‘hmamOm\$darb B{VhmgbolZ È`m\$À`m Am`wì`mVrb ZmQÇ‘`
 KQ Zm\$ñwaVo gr{‘V Pmbo. È`m\$À`m OY‘{VWrdr Z
 B{VhmgH mam\$Ybo dmX JmObo. ‘hmamì`mVrb amOH maUmVrb
 ~«m÷U-‘amRm g\$Kfm©Mo gmdQ B{VhmgbolZmda nSbo. {edmOr
 ‘hmamOm\$Zm àoaUm XoUmao g`W© am`Xmg ñdm`r hmoVo, ho {gÕ
 H aÊ`mgmRr Am{U È`mMm à{VdmX H aÊ`mgmRr ~«m÷U-~«m÷UoVa
 Aä`mgH m\$‘Ü`o MTmAmoT bmJbr hmoVr. {dgmì`m eVH mVrb
 B{VhmgbolZmMm Aä`mg H aVmZm `mMo ^mZ Rodmdo bmJVo.

{edmOr ‘hmamO Am{U ^° s Midi

{d. H m. amOdm\$ `m\$Zr "“amRçm\$À`m B{VhmgmMr gmYZo` `m
 Amnè`m ISSm\$Zm {b{hboè`m àñVmdZm\$YyZ È`m\$Mo ‘amRçm\$À`m
 B{Vhmgm{df`rMo qMVZ àH Q Pmbo Amho. "‘hmamì` Y`©` hm
 ‘Ü` `wJrZ H mimVrb ‘hmamì`mVrb `wJY‘© hmoVm Am{U g`W©

am'XmgmSÀ`m bolZmVyZ Vmo Am{dîHŸ V Pmbm Am{U È`mMmM
amOH s` Am{dîH ma {edmOr 'hmamOmSÀ`m v nmZo Pmbm,' Aer
'msSUr amOdmS `mšZr È`mSÀ`m bolZmVyZ Ho br.¹⁷ 'hmami' –
Y'm©Mo Zo'Ho ñdv n H m` hmoVo, `m {df`r È`m H mimV -arM
'V'VmSVao hmoVr. {edmOr 'hmamOmSÀ`m CX`mbm gšV MidirZo
Oo `moJXmZ {Xbo, Vo amOdmSçmšZr A'mÝ` Ho bo; È`mSÀ`m H m`m©bm
g'Wmà`m 'hmami'-Y'm©Mo VmpldH AŸôMZ hmoVo, Aer È`mšMr
ÑT YmaUm hmoVr. amOdmSçmšMr 'hmami'-Y'm©Mr H ënZm hr
~«m÷UH| {DV hmoVr, Aer QrH m È`mšda Pmbr.

amOdmS `mšZr {edmOr 'hmamOmSMo ñdVŠì M[ai] {b{hbo
Zmhr. 'mì È`mSÀ`m ISSmSÀ`m àñVmdZm d bol `mš'YyZ È`mšMr
'hmamOmS{df`rMr 'Vo i`° hmoVmV. È`mšMm "{edmOrMr JwUgšnXm'
hm bol `m ÑirZo 'hîdnyU© Amho.¹⁸ ñdamÁ` d ñdY'© `mšMo
ajU H aÊ`mÀ`m hoVyZo {edmOr 'hmamOmšZr H m`© Ho bo, Ago
à{VnmXZ amOdmS `mšZr Ho bo. Vo {b{hVmV, ""{edmOrMo dV©Z
ZrVrMo, namH« 'mMo, ñdY'©nam`UVoMo d naY'© g{hîUwVoMo hmoVo.
XmoZ Mmaeo bTm`m 'mv Z È`m {dO`r hmoUo, VrZ Mmaeo {H „o
'jXmZmV, Sm|Jamda d g'wĐVramda -mšYUo; ZdrZ gjÝ` V`ma
H aUo; ZdrZ Ama'ma {Z{`©Uo; Zdo H m`Xo H aUo; ñd^mfobm
CîmoOZ XoUo; ñdV... nÚaMZm H aUo, H dtZm Aml` XoUo, Zdr
ehao dg{dUo, ñdY'm©Mo gšajU H aUo; Jmo~«m÷UmšMm à{Vnmb
H aUo; øm bmoH moîma HŸ ÈŸmš'wio {edmOr 'hmamOmšMr Wmoadr
{gŌ hmoVo".¹⁹

ì mdgm{`H B{VhmgH mamšZr {edmOr 'hmamOmš-Ôb Ho bobr

'mSSUr Am{U BVa g'mOgwYmaH d ZoË`mSZr Ho bohr 'mSSUr hr
 ñdVSi -oQ ZihVr. Va È`mSÀ`mV EH ÛSÛmË`H ZmVo hmoVo.
 {edmOr 'hmamOmSda bolZ HaUmao -hpVmše B{VhmgH ma ho
 ~«māhU hmoVo Am{U {edmOr 'hmamO d am'Xmg ñdm'r
 `mSÀ`mVrb Jwé{eî` ZmVo È`mSZr JYhrVM Yabo hmoVo. `mbm
 gd©àW' NoX {Xbm Vmo HY. **A. Ho iygHa (1860-1934)**
 `mSZr. 1906 gmbR "j{I` Hw bdVšg NlnVr {edmOr'hmamO'
 ho È`mSMo nwñVH àH m{eV Pmbo.²⁰ Vo 'hmË'm 'w è`mSMo gË`emoYH
MidirVrb EH ghH mar Am{U ~«m÷UoVa MidirVrb EH
 ZoVo hmoVo.²¹ {dëgz 'hm{dÜmb`mV Vo àmÜ`mnH hmoVo.
 AmS-oSH amSZm {dÜmWuXeoV È`mSZr 'mJ©Xe©Z Ho bo hmoVo. È`mSZr
 Amnë`m ghH mè`mšgh 1887 gmbR 'wS-B©V "'amRm-EoS`oÀNw
 g^m' Zm'H gšñWm ñWmnZ Ho br. hr g^m Xadfu {edO`šVr
 CËgd gmOam H arV Ago. È`mSMo ho nwñVH È`mSZr emhÿ 'hmamOmSZm
 An©U Ho bo Amho. `m J«šWmVyZ {edmOr 'hmamOmšMr "JmoaJ[a-mšMm
 d a`VoMm amOm' hr à{V'm Ho iygH a `mSZr AYmoaopIV Ho br.
 Ho iygH amSZr Amnë`m J«šWmV XmXmoOr H m|SXod d am'Xmg ñdm'r
 ho Xmokohr H go {edmOr 'hmamOmšMo amOH s` Jwv ZihVo, Aer
 'mSSUr Ho br.²² qH -hpZm gšV VwH mam' 'hmamOmSZm Amnbo Jwv
 H amdo, hm 'hmamOmšMm hoVy hmoVm; 'mì VwH mam'mÀ`m AH mbr
 {ZYzmZo Vmo A{gÕ am{hbm, Ago È`mSZr AYmoaopIV Ho bo. BšJ«O
 B{VhmgH mamSZr {edmOr 'hmamOmSda ~šSImoanUm, H nQrnUm,
 H«y anUm d Di`mbmo^mZo byQ H aUo, Ago Oo Amamon Ho bo hmoVo,
 È`mMohr ISSZ È`mSZr Amnë`m `m nwñVH mV Ho bo. `m J«šWmMr

qhXr d JwOamWr ^mfm\$Vaohr àH m{eV Pmbr. `m nwn̄VH mMm B\$J«Or AZwdmX 1921 gmr Eg. VmH mlmd `m\$Zr à{gÕ Ho bm. `m nwn̄VH mMm erf©H hmoVo, "{X bmB©' Am°' {edmOr 'hmamO : {X ' mC\$Sa Am°' {X 'amRm Eānm'a'.²³

JmoqdX glmam' gaXogmB© (1865-1959)

H m. Zm. gmZo, dmGWxodemór lao, {d. H m. amOdmS d X. -m. nmagZrg `m B{Vhmg-g\$emoYH m\$Zr Or gmYZo àH memV AmUbr, È'm\$Mm Cn'moj H v Z JmoqdX glmam' gaXogmB© `m\$Zr 'amRçm\$À'm B{Vhmg {b{hbm. "amRr [a'mgV' `m ZmdmZo 1902 Vo 1932 `m H mimV à{gÕ Pmbobo È'm\$Mo 'amRçm\$À'm B{Vhmgmdarb AmR ISS ho 'moRoM {dÛîmmnyU© J«SW AmhoV. `m\$njH s "eH H Vm© {edmOr' `m J«SWmÛmao È'm\$Zr {edmOr 'hmamOm\$darb Zdo g\$emoYZ nwT AmUbo. "eH H Vm© {edmOr' `m J«SWmMr È'm\$Zr Xhm àH aUm\$'Û'o {d^mJUr H v Z àÈ`oH àH aUmbm EH doJio erf©H {Xbo.²⁴ È'm\$Zr {Xboë'm "mdimVrb ~fm', "Xoe'wlm\$Mm nwT mar', "ñdamÁ`mMm {^joH ar', "ñdmV\$Í`mMm H; dmar', "ñdY'm©Mm godH ', 'hmami`mMm {Z`\$Vm', "gmd©^m;`mMm CN oX²H ', "ñdXoemMm CÕmaH ', "qghmgZmYrída' d "qhXynVnmVemhrMm {Z'm©Vm' `m erf©H m\$déZhr gaXogmBªZr 'hmamOm\$À'm H ma{H XuMo 'yè`mnZ H go Ho bo, `mMr H ënZm `oD eH Vo. Amnbo g\$emoYZ 'moRçm A'amRr dmMH dJm©n`aV ZoÈ`mgmRr OXwZmW gaH ma `m\$À'm AmJ«hmdv Z È'm\$Zr "Ý'y {hñQ'r Am°' {X 'amRmO²Mo VrZ ISS

1946 Vo 1948 `m H mimV B\$J«OrV à{gÕ Ho bo.

{edmOr 'hmamOm\$da A'amR r B{VhmgH mam\$Zr Ho bobo
B{VhmgbolZ

amo'oe M\$D Xîm (1848-1909) `m\$Zr {edmOr 'hmamOm\$À`m
OrdZmda AmYm[aV "'hmami'" OrdZ à`mV' ZmdmMr H mX\$-ar
~\$Jmbr ^mfoV {b{hbr. Vr dmMyZ gwa|ÐZmW goZ {edM[aîmH S
AmH {f©V Pmbo. adtÐZmW QmJmoa `m\$Zr "{edmOr CËgd' hr
H {dVm {b{hbr. 19i`m eVH mV {QiH m\$Zr gvw Ho bobm
"{edO`\$Vr CËgd' ~\$Jmbn`aV nmoMbm hmoVm. glmam' JUoe
XoD ñH a `m\$Zr ~\$JmbÀ`m ' miUrÀ`m doir Vmo A{Ve` bmoH {à`
Ho bm.²⁵

OXwZmW gaH ma (1870–1958)

{edmOr 'hmamOm\$da Á`m A'amR r B{VhmgH mam\$Zr
B{VhmgbolZ Ho bo, È`m\$ñjH s OXwZmW gaH ma ho EH à`wl
B{VhmgH ma 'mZbo OmVmV. 'moJbH miMm B{Vhmg hm È`m\$À`m
g\$emoYZmMm à`wl {df` hmoVm. Amja\$JOo-m{df`r Aä`mg H aVmZm
Vo {edmOr 'hmamO `m {df`mH S AmH¥i Pmbo Am{U È`m\$Zr
{edmOr 'hmamOm\$da XmoZ J«\$W {b{hbo: "{edmOr A±S {hO
QmB©åg' (1919) d "hmCg Am°" {edmOr' (1940).

OXwZmW gaH ma ho hmSmMo g\$emoYH hmoVo. Eo{Vhm{gH i`°s`Mr
{d^yVrnyOm È`m\$Zm A`mÝ` hmoVr. H moUVrhr gmYZo dmnaVmZm

È`m\$Mr AñgbVm d {dídgr`Vm àñWm{nV H aUo È`m\$Zm A{Ve`
 'hîdmMo dmQV Ago. 'hmamOm\$Mo M[a] {b{hÊ`mgmRr È`m\$Zr
 'magr ^mfoVrb gmYZm\$Mm Cn`moJ Ho bm. am\$Ho na\$naoVrb `m
 B{VhmgH mamZo dñVw{Zð B{Vhmg {b{hÊ`mMr 'hîdmH m\$jm
 ~miJbr. {edmOr 'hmamOm\$darb g\$emoYZ H aVmZmhr È`m\$Zr
 hmM Ñ{îH moZ ~miJbm. È`m\$Zr Amnë`m g\$emoYZmgmRr B\$J«Or,
 nmoVw©JrO, 'magr d q\$Jb (amOñWmZr) ^mfoVrb H mJXnîm\$Mm
 Cn`moJ Ho bm. Am{U nwnñVH m\$À`m Zi`m AmdŸlmrV Zi`m Ame`mMr
 ^a Vo KmBV am{hbo. àhUyZM È`m\$À`m "{edmOr A±S {hO
 QmB©åg`m nwnñVH mÀ`m 1952n`aV AZoH gwYm[aV AmdŸl`m
 à{gÕ Pmë`m. È`m\$À`m `m nwnñVH mMm 'amRr AZwdmX {dZm`H
 gXm{ed dmH gH a `m\$Zr "{edmOr d {edH mb`m ZmdmZo
 à{gÕ Ho bm.

{edmOr 'hmamOm\$Mm B{Vhmg {b{hÊ`mgmRr lwÔ 'amRr
 gmYZo 'mì OXwZmWm\$Zr H '-Añgb Radbr Am{U È`m\$Mm
 dmna È`m\$Zr Qmibm. {edmOr 'hmamOm\$Mm amii`nwéf àhUyZ
 È`m\$Zr Jmjad Ho bm; 'mì 'hmamOm\$Mo àemgZ OmVr-Y`m©da
 AmYmabobo hmoVo Am{U àhUyZ amii`r`nmVirda CXma`VdmXr
 amÁ`ñWmZ H aÊ`mV È`m\$Zm An`e Ambo, Agm {ZîH f©
 È`m\$Zr H mTbm. Amnë`m nwnñVH mV È`m\$Zr 'hmamOm\$Mm {edm
 Agm EH©ar C,,ol Ho bm. nwaoem gmYZm\$À`m A`mdr {edmOr
 'hmamOm\$Zr Ho bobm A' PblmZmMm dY hm g\$ajUmgmRr Ho bobm
 h,,m hmoVm AWdm Zmhr, Agm {ZîH f© H mTUo H RrU Amho,
 Agm A{^am`È`m\$Zr {Xbm. È`m\$À`m `m 'Vm\$wio 'hmamii`mVrb

"B{Vhmgào'r {ed^o' ZmamO Pmbo. 'hmami''mV gaH mam\$À`m {blmUm-Ôb Vrd« à{V{H« `m C'Qbr. gaH ma `m\$Mr AZoH 'Vo Z\$VaÀ`m H mimV A. am. Hw bH Uu `m gmjonr B{VhmgH mamZo nwami`m\$Zer {ZamYma Radbr.

OXwZmW gaH ma {b{hVmV, ""{edmOr-ÔbÀ`m doJdoJù`m AmR ^mfm\$'Yrb H mJXnì\$Mm H miOrnyd©H , glmob Aä`mg Ho è`mda {edmOrMo B{VhmgH ma `m {ZiH fm©àV `oVmV H s, {edmOr ' ° 'amRm H m`©H Vm©, Abm;{H H nwéf hmoVm. amÁ`o Zi Pmbr, amÁ`H È`m^'Ü`o Xw' ir 'mObr, gîmm Zmhrer Pmbr VargwÕm g\$nyU© 'mZdOmVrÀ`m B{VhmgmV {edmOr-ÔbMr "bmoH ZoVm amOm' Aer AmRdU H m`'Mr H moabr Jobr Amho. bmoH m\$À`m Amem AmH m\$jm\$Mm AmYmañV\$^, OJmÀ`m BÀNolko H| ðñWmZ, 'Zmbm CîmoOZ XoUmam, H ënzmsZm MoV{dUmam, `oUmè`m H mimVrb bmoH m\$Zm àoaUm XoÊ`mMo namH moQrMo à`ÈZ H aUmam - "-hpV OZmgr AmYmv ' Aer È`mMr à{V'm amhrb".²⁶

Sm'. gwa|ÐZmW goZ (1890–1962)

'amRçm\$À`m B{Vhmgm{df`r d {deofV: {edH mbm{df`r H 'mbrMr AmñWm ~miJUmao Xwgao ~\$Jmbr B{VhmgH ma àhUOo Sm'. gwa|ÐZmW goZ hmoV. È`m\$Zr "{edNìNvr' (1920), "{X A°S{"{ZñQ' o{Qih {gñQr' Am°' {X 'amRmO²' (1923), "" m°aoZ ~m'moJ«m' sO Am°' {edmOr' (1927) d "{X {"{bQar {gñQr' Am°' {X 'amRmO²' (1928) ho J«\$W {b{hbo. H bH îmm {dÜmnrrMmo VEH mbrZ Hw BJwv AmewVmof 'wIOu `m\$Zr

{dÚmnRmVrb B{Vhmg {d^mJmV 'amRo, aOnyV d erl `mSÀ`mda
 gšemoYZ H aÊ`mgmRr AÛ`mgZmMr {Z{^Vr Ho br. Ê`m {RH mUr
 Sm'. goZ `mSMr {Z`w°s Pmbr.²⁷ goZ `mSZr 'amRr, n{e©`Z,
 nmoVw©JrO d BSJ«Or Aer gd© gmYZo dmnv Z 'amRçmSmm B{Vhmg
 {b{hbm. {edmOr 'hmamOmSmm g'H mbrZ Agboë`m Hÿ îUmOr
 g^mgX `mZo {b{hboë`m ~larMo VgoM "{ed{Xp½dO`' d
 "{MQUrg ~la' `m XmoÝhr J«\$WmSVrb H mhr ^mJmSMo Ê`mSZr
 BSJ«OrV ^mfmsVa Ho bo. "'amR ho Ho **di** bwQmv ZihVo; Ê`mSZr
 Amnë`m gm'm{OH d amOH s` našnamšer Agbobr Zmi VmoSbr
 Zmhr. àemgH s` ì dñWoV Zdo à`moJ H v Z Ê`mSZr A{YH
 H m`oj' ì dñWm {Z'm©U Ho br,' Ago {ZîH f© Ê`mSZr
 'amRçmS{df`r H mTbo AmhoV.²⁸

{edmOr 'hmamOmSmm B{Vhmg ZmQç` KQZmS'Ü`o ASHy Z
 nSbm hmoVm. Ê`mbm Ê`mVyZ ~mhoa H mTyZ {edmOr 'hmamOmSMr
 àemgZ ì dñWm d bîH a-ì dñWm `m Xwb©{jV n{byšda Ê`mSZr
 àH me QmH bm. Ê`mSÀ`m 'Vo, {edmOr 'hmamOmSÀ`m
 H ma{H XunmgyZ 'amRçmSÀ`m B{VhmgmV EH m Zì m ndm©bm gvw dmV
 Pmbr. 'hmamOmSZr gašOm'emhr ì dñWoVrb d;JwÊ`o ~mOybm
 Rodbr. Ê`mSÀ`m g{Y`mVrb H moUVohr nX dšenašnamJV ZihVo.
 Ê`mSÀ`m H mimV OhmJra nŌVrMm Adbš~ Z H aVm
 nXm{YH mè`mSZm nigo d dñVwénmV nJma {Xbm OmB©. g{Y`m'Ü`o
 Ê`mSZr H SH {eñV AmUbr. H moUË`mhr 'mo{h'oda AgVmZm
 {ò`m, ~«m:U, JmB©, H moUVohr Y'©J«\$W `mSMr {dQš-Zm H v Z`o,
 Agm Ê`mSmm XSSH hmoVm. bTmB©da OmVmZm gmo-V ór, Xmgr dm

Z{V©H m AmUuo hm EH JwÝhm hmoVm Am{U È`mgmRr 'merMr
 {ejm {Xbr OmB©. {edmOr 'hmamOmSZr Amnè`m bmoH mSZm d
 gÝ`mbm CÀÀ` Ü`o`mg° s d àoaUm `m\$Mo ~miH Sy {Xbo hmoVo.
 qhXdr ñdamÁ`mMo BpßËgV àamá H aÊ`mgmRr Xoe^o 'mUgm\$Mr
 'm;O 'hmamOmSÀ`m ^modVr Jmoim Pmbr. È`m\$Mo amOH maU ho
 'Ü`wJrZ g\$YgmYy d ñdmWu amOH maUmnoj m doJio hmoVo.
 amí`dmXmÀ`m CÀM Ü`o`mZo ào[aV Pmboè`m È`mSÀ`m amOH maUmV
 amí`Z{`©VrÀ`m e\$`Vm XSè`m hmoÈ`m.²⁹ goZ `m\$Mo ho g\$emoYZ
 A{Ve` 'hídmMo 'mZbo OmVo.

gr. E. qH Ho S d So{Zg qH Ho S

Mmëg© AboŠPm\$Sa qH Ho S ho EH {-«{Qe gZXr A{YH mar
 hmoVo. È`mSZr X. ~m. nmagZrg `mSÀ`m 'XVrZo {edmOr d
 'amRçmSÀ`m B{Vhmgmda g\$emoYZ Ho bo. È`m\$Mo "{hñQ`r Am`' {X
 'amRmO²`' m J«\$WmMo VrZ ISS àH m{eV Pmbo. n{hè`m ISSmV
 È`mSZr {edmOr 'hmamOm\$Mm B{Vhmg {b{hbm Am{U È`m\$Mm
 Jmjad Ho bm Amho.

So{Zg qH Ho S `m\$Mo "{X J«±S [a-ob' ho {edmOr 'hmamOm\$darb
 nwñVH 1937 gmbr àH m{eV Pmbo. È`mSZr 'hmamOm\$Mr VwbZm
 O`©ZrMm amOm '«o S[aH Xwgam, BQbrVrb H« m\$VH maH J`[a-mëŠr
 `mSÀ`mer H v Z {edmOr 'hmamOmSZm "qhXy amí`dmXmMm àd`m
 Ago g\$-moYbo Amho. `m J«\$WmMm 'amRr AZwdmX ^JdSV Xoe`wl
 `mSZr àH m{eV Ho bm.³⁰ B\$J«Om\$nydu 'moJb `oWrb gímmYre
 hmoVo, Agm g`O Amho; 'mì B\$J«OmSZm Á`mSÀ`mer H Sdr Pw\$O

Úm̥dr b̥mJbr, Aer g̥l̥mm áhUOo ‘amR hmoV, Aer ‘m̥s̥Ur qH Ho S ‘m̥s̥Zr Ho br Amho. B̥S̥J◀Om̥S̥Mm ‘maVmV ‘oÊ‘m̥Mm H mb Am̥{U ‘amR̥cm̥S̥À‘m CX‘m̥Mm H mb hm EH M hmoVm, Aer Ê‘m̥S̥Mr YmaUm hmoVr. {ed̥mOr ‘hmamOm̥s̥Zr ‘amRr g̥l̥moMo ~rO amodbo. ‘amR̥cm̥S̥Mr hr našnam n̥wT ZmZmgmho~ noedo, Pm̥SerMr amUr, B̥S̥XyaÀ‘m Ahè‘m-mB© VgoM ½dm̥ehoa d H moèhm̥nya ‘oWrb amOKamUr ‘m̥s̥Ūmao {dH {gV Pmbr, Aem eāXm̥SV ‘hmamOm̥S̥Mo ‘h̥l̥d Ê‘m̥s̥Zr {deX Ho bo Amho.

ñdmV̥S̥l̥‘mošma H mimVrb B{Vhm̥gbolZ

‘maVmMr ñdmV̥S̥l̥‘ámár (1947) d ñdV̥S̥l̥ ‘hmam̥i’ mMr {Z‘©Vr (1960) ‘m KQZm̥s̥‘wio ‘maVmVrb B{Vhm̥gbolZmV EH Zdm Q̥βnm g̥wv Pmbm. g̥s̥‘w° ‘hmam̥i’ Midir‘wio ‘amRr g‘mOmV ‘amRr àmXo{eH Apñ‘VoMo bmoU ngabo. ‘mMo ‘moR n[aUm‘ ‘amR̥cm̥S̥darb B{Vhm̥gbolZmda KSyZ Ambo. ‘amR̥cm̥S̥À‘m B{Vhm̥gm̥Mm ÁYd‘mW© bmdVmZm Vmo H Yr na-àm̥SV Ūofr Pmbm Va H Yr H Åa qhXwĒd{ZĒ ~Zbm. {ed̥mOr ‘hmamO ho ‘amRr Apñ‘VoMo àVrH ~Zbo.

ñdmV̥S̥l̥‘mo̥lma H mimV X̥l̥mmo dm‘Z nmoVXma, í̥š. eš. eoOdbH a d J. h. lao ‘m̥s̥Zr hmVr KoVbobo {ed̥M[ḁl̥ bolZmMo H m‘© nyU© hmoD eH bo Zmhr.³¹ ‘m̥l̥ “lr {ed̥N lnVr : g̥s̥H p̥enV {ed̥M[ḁl̥mMr àñVmdZm, Amam̥l̥S̥m d gm̥YZo’ (1964) hm J◀SW eoOdbH am̥s̥Zr à{g̥Ō Ho bm. eoOdbH a (1895-1963) ho hm̥SmMo g̥šemoYH hmoVo.³² H moUĒ‘mhr {d{ei V̥l̥dàUm̥brÀ m

n[aaòú`mVyZ È`mSZr B{VhmgbolZ Ho bo Zmhr. ‘amR çmSÀ`m B{Vhmgm{df`r È`mSMr H mhr RiH {ZarjUo hmoVr Am{U Vr È`mSZr nalSnUo ‘mSSbr.³³ gSVmSÀ`m Y‘©-gwYmaUo‘wio qhXy g‘mOmV Am‘ybmJ« ~Xb KSdyZ AmUUmar H« mSVr Pmbr Zmhr, Ago È`mSMo ñni ‘V hmoVo. {edmOr ‘hmamOmSMo H m`© ho ñd`šào[aV hmoVo. È`mSÀ`mdarb am‘Xmg ñdm’tgma»`m amOH s` Jwv Mm à`md ho ~«m÷U B{VhmgH mamSZr V`ma Ho bobo {‘WH Amho, Ago È`mSZr ‘mSSbo. Vo {b{hVmV, “...AmYw{ZH ~«m÷UmSZr {edmOrÀ`m JwÉEdmMo ‘moRonU ñdV...À`m OmVrbm {MH QdUo hrM ^«{‘inUmMr namH moQr àhQbr nm{hOo. nU Aem ~m{be Mmù`mV ‘hmamí`mVrb ehmÊ`mgwaÈ`m bmoH mSZr VrZ {nTçm H mbmni` Ho bm d bmoH mSZm MwH sÀ`m ‘mJm©da qhSdbo, hr Jmoi B{VhmgmV {dgaVm `oÊ`mgmalr Zmhr”.³⁴

qhXy gšñHY VrMo gšajU-gšdY©Z hm {dO`ZJa `oWrb Am{U {edmOr ‘hmamO `mS`Yrb g‘mZ YmJm Amho, Ago È`mSMo ‘V hmoVo. {edmOr ‘hmamSOmÀ`m ñdamÁ` {Z{‘©Vrbm È`mSZr “à`moJOY` CnH« “ Ago gš-moYbo. {edmOr ‘hmamO ho ñdV... qhXy Agbo Var ‘wñbr` gšñHY VrÀ`m Mm;H QrVM È`mSZr amÁ`H ma`ma Ho bm H maU È`m H mimV VrM Mm;H Q È`mSZm CnbāY hmoVr. eoOdbH a {b{hVmV, “{edmOr àhUOo nmMeo dfm^aÀ`m qhXw`wgb`mZ bTçmMm AYd`mW© g‘Obobm EH ‘od H Vm© nwéf; ‘wgb`mZr gšñHY VrVrb gd© Cîm’ ASJo AmÉ`gmV Ho bobm EH namH« ‘r dra, qhXwÉdmMm {ZVmSV A{^`mZ Agbobm EH Y‘©{Zð ‘mUyg; ...qhXySMm gd© B{Vhmg àhUOo, H mēn{ZH d;`{°H Ü`o`o

AmMaUmV AmUÊ`mMm AAmhmg Yv Z ñdV...À`m KamV Jwbm`
hmoD Z -gboë`m, Xw-ù`m, ' gboë`m bmoH mSMm B{Vhmg ho
È`mg H iyZ MwH bo hmoVo. Mmoamda 'moa hmoD Z hm dO«bon
B{Vhmg Amnë`m h`mVrV È`mZo ladSyZ QmH bm".³⁵

ñdmVŠí`molma H mimVhr AZoH A'amRr B{VhmgH mamSZr
{edmOr 'hmamOmSMo M[al] {b{hbo. È`mŠn;H s Sr. E'. H maH m
'mSMo 1969 gmbr à{gŌ Pmbobo "{edmOr : nmoQ'}Q Am''
Abu BŠ{S'Z' ho EH à'wl M[al] hmo`. ^maVmV amí'dmX `m
gSH ënZoMm CX` hmoÊ`mÀ`m VrZeo dfm³nydu ^maV ho EH "amí"
ihmdo Aer 'Zrfm ~miJUmao {edmOr 'hmamO ho EH XyaXeu
amÁ'H V} hmoVo; Vo Ho di EH àmXo{eH ZoVo ZihVo, Aer
È`mSMr à{V'm `m J«SWmVyZ È`mSZr gmH mabr.³⁶

{X. {d. H mio `mSMo "NìnVr {edmOr 'hmamO' (1958),
dm. HŸ . ^mdo `mSMo "wJàdV©H {edmOr 'hmamO' (1955),
dm. gr. ~|Đo `mSMo "lr {edmOr 'hmamO' (1972) Am{U goVy
'mYdamd nJSr `mSMr "NìnVr {edmOr' hr 'amRr d BŠJ«Or
^mfms'Yrb M[al]o -- Aer H mhr à'wl M[al]o à{gŌ Pmbr.
'Ü`wJrZ H mimgS-ŠYr ZdZdrZ gmYZo àH memV `oV Jobr.
È`m gmYZmSÀ`m AmYmao ZdZdr {edM[al]o àH m{eV hmoD bmJbr.
"{edH mbrZ nlgmagSJ«hm'Mo VrZ ISS àH m{eV Pmë`mZŠVa
È`mSMm Cn'moJ H v Z dm. HŸ . ^mdo `mSZr "wJàdV©H {edmOr
'hmamO' ho Amnbo {edM[al] à{gŌ Ho bo. ^mdo `mSÀ`m 'Vo,
^maVmÀ`m B{VhmgmV AZoH amÁ'H V} hmoD Z Jobo. 'mì È`mŠn;H s
{edmOr 'hmamO ho `wJàdV©H Rabo. A{^Zdoer dm A{VaoH s

'mSSUrMm A^md, g'Vmob AÝd`mW© Am{U gmYZmSda AmYm[aV
bolZ `mS'wio nJStMo {edM[aì lyn bmoH {à` Pmbo.³⁷ JOmZZ
^mñH a 'oh|Xio `mSMm "lr amOm {edNlñVr : ISS 1 d 2'
(AZwH« 'o 1996 d 1999) hm AbrH SÀ`m H mimVrb EH
'hldnyU© C,,olZr` J«SW Amho. {d{dY ^mfmsVrb Añgb
gmYZmSda AmYmabobo ho M[aì {dÛ,mZmS'Ü`o dmlmUbo Jobo.

{edmOr 'hmamOmSMr Wmoadr Á`mSZr Amnè`m ì`m»`mZmSVyZ
Am{U bolUrVyZ 'hmamì`mÀ`m H mZmH monè`mV nmoMdb, È`m,
ñdV...bm {edemhra àhUdyZ KoUmè`m ~m-mgmho~ nwaSXao `mSMo
"amOm {edNlñVr' (1958) ho 'hmamOmSdarb EH bmoH {à`
M[aì Amho. VgoM {edH WmH ma {dO`amd Xoe'wl `mSMo
{ÛISSmÈ`H "eH H V} {edam`' (1980-82) ho EH à{gÕ
M[aì Amho.

A. am. Hw bH Uu (1925–2009)

ñdmVŠì`molma H mimV 'amRçmS{df`r d {edH mbm{df`r Á`mSZr
A{Ve` 'hldnyU© Eo{Vhm{gH gšemoYZ Ho bo, Ago B{VhmgH ma
àhUOo A. am. Hw bH Uu AmhoV. {edmOr 'hmamOmSÀ`m
OrdZmVrb È`mM È`m KQ ZmSMo M{d©VMd©U Z H aVm EH
àemgH , àOm{hVXj d XyaXeu amOm àhUyZ {edmOr 'hmamOmSZr
amÁ`mbm Am{W©H ñWj`© XoÈ`mgmRr H moUVr YmoaUo Amlbr,
'mda È`mSZr àH me QmH bm Amho. È`mSÀ`m "{edH mbrZ 'hmamì`m`
(1977) d "Aer hmoVr {edemhr' (1999) `m J«SWmSVyZ
È`mSZr {edH mbrZ gm'm{OH , Am{W©H , gmšñHY {VH B{Vhmg

nwT AmUbm.³⁸ H moH UmVrb {‘RmÀ`m i`mnme`mbm gšajU
 XoUmao VgoM eoVrÀ`m AW©H maUmbm àmoĖgmhZ XoUmao “-ir
 amOm {edmOr ‘hmamO’ Ė`mŠZr gmH mabo. eoVr, CÚmoJYŠXo d
 amÁ`mMo CĖnP H go dmT{dVm `oB©b, `mgmRr ‘hmamOmŠZr H er
 YmoaUo Amlbr, `mMr ‘mŠSUR Ė`mŠZr `m nwñVH m’Ü`o Ho br
 Amho. `m ĖirZo Ė`mŠMo “{‘RmMm ‘m’bm bml ‘mobmMm’ d
 “-ir amOm : H moH UmMm amOm’ d “~m÷U àhUyZ H moU
 ‘wbm{hOm H v nmhVmo’ ho bol ’ ma ‘hîdnyU© AmhoV.
 gmYZmŠdarb à`wĖd d dñVw{ZñUo Ho bovr Vî`mŠMr ‘mŠSUR hr
 Ė`mŠÀ`m gšemoYZmMr d{eîQço àhUVm `oVrb.

^maVmVrb d ^maVm{df`rÀ`m B{VhmgbolZmMo H mhr à`wl
 Qšno / našnam (schools) ‘mZĖ`m OmVmV. Ė`mŠ`Ü`o nmjdm©Ė`dmXr,
 dgmhVdmXr, ami`dmXr, àmXo{eH , O`mVdmXr, ‘mŠg©dmXr d
 A~«m÷Ur, Ago H mhr à`wl àdmh AmhoV. {edmOr
 ‘hmamOmŠdarb B{VhmgbolZhr gd©gmYmaUnUo `m d{Mm[aH
 à`mdmŠVyZ {dH {gV Pmbo, Ago {XgVo.

{edmOr ‘hmamOmŠdarb ~hpOZdmXr B{VhmgbolZmMrhr EH
 ge° našnam Amho. bmbOr n|S go `mŠMo “Y`© H s H« mŠVr’
(1942), H m’‘oŠ S mŠlo `mŠMr **(1899-1991)** “-mam ^mfUo’
(1967), JmoqdX nmZgao **(1933-2015)** `mŠMo “{edmOr
 H moU hmoVm?’ **(1988)**, eaX Omoer **(1935-2015)** (d
 BVa) `mŠMo “eoVH Ė`mMm amOm {edmOr’ **(1988)**, eaX nmQrb
(1925-2014) `mŠMo “{edmOrÀ`m qhXdr ñdamÁ`mMm lam
 ely H moU hmoVm : ‘hšā`Xr H s ~«m÷Ur?’ **(1992)** Am{U am.

Zm. MihmU (1913-1993) `m\$À`m "eH H V} lramOm {edNlñVr : EH àoaH g'mO à-moYH d n[adV©ZH ma' (2007) -- `m nwnñVH m\$VyZ {edmOr 'hmamOm\$df`r AZmolo bolZ nwT Ambo Amho. EH m bolmÀ`m 'm©XoV `m gd© bolZmMm nam'e© KoUo eŠ` Zmhr. hm EH m ñdV\$Ì bolmMm {df` Amho. `m {df`mMr i`már `mì `m gwMrVyZ bjmV `oVo. `m {df`mda nwT ñdV\$ÌnUo {b{hÊ`mMm 'mZg Amho.

g\$X^© Am(U {Q nm :

1. A{YH 'm{hVrgmRr nhm -

1) A. am. Hw bH Uu, 'amRçm\$Mo B{VhmgH ma (B{VhmgbolZ nÕVr), Sm`'SS npābHo eÝg, nwUo, 2007.

2) Raja Dixit, 'Historical Writings and Research', in Rajendra Banahatti and G. N. Joglekar (Ed.), *A History of Modern Marathi literature, Vol II, (1800-2000)*, Maharashtra Sahitya Parishad, Pune, 2004, pp. 238-278.

2. A. am. Hw bH Uu, 'Ü`'wJrZ 'hmami', Sm`'SS npābHo eÝg, nwUo, 2007, n¥. 12-13.

3. A{YH 'm{hVrgmRr nhm -

A. am. Hw bH Uu, Ooåg H qZJh`' J«±Q S' : 'amRçm\$Mm B{VhmgH ma d àemgH, nwUo {dÜmnRr, nwUo, 1971.

4. Varsha Shirgaonkar, *Eighteen Century Deccan : Cultural history of the Peshwas*, Aryan Book International, New Delhi, 2010, p. 5.

5. Stewart Gordon, *The New Cambridge History of India : The Marathas 1600-1818*, Cambridge, University Press, New Delhi, 1998, p. 3.

6. A{YH 'm{hVrgmRr nhm -
Sm'. amOm Xr{jV, "B{Vhmg dml^{2'} : 1950-2000', am. J. OmYd (gšnm.), 'amRr dml^{2'} mMm B{Vhmg : ISS gmVdm : 1950 Vo 2000: ^mJ {Vgam, 'hmami' gm{hE` n[afX, nwUo, 2010, nŸ. 459-481.
7. ' . Jmo. amZSo, (AZw.) Z. a. ' mQH, 'amRr gImoMm CEH f©, 'hmami' amA` gm{hE` gšnHY Vr 'SSi, 'wš-B©, 1964.
8. AaqdX XoenmSSo, "n`m©`r gšnHY VrMo OZH ', har ZaHo (gšnm.), emoYmA`m Zi`m dmQm, Sm'. -m-mgmho- Amš-oSH a, 'hmE`m 'w bo Am{U amO{f© emhÿ M[a]l gmYZo àH meZ g{Vr, 'wš-B©, 2006, nŸ. 1-16.
9. ` . {X. ' SHo (gšnm.), 'hmE`m 'w bo g'J« dml^{2'}, 'hmami' amA` gm{hE` gšnHY Vr 'SSi, 'wš-B©, 1991, nŸ. 33-72.
10. nhm -
XwJm© ^mJdV, amOmam'emór ^mJdV : i`{° {Mì d dml^{2'} {ddoMZ, ñdpñVH npābqeJ hmCg, 'wš-B©, 1947.
11. A{YH 'm{hVrgmRr nhm-
Xlmm ndma, amOm {edmOr : dml^{2'} rZ {W, gm{hE` gšdmX àH meZ, 'wš-B©, 2001.
12. A. am. Hw bH Uu, 'amRçmSMo B{VhmgH ma (B{VhmgbolZ nŌVr), nydm}°, nŸ. 157-242.
13. Edward Said, *Orientalism*, Penguin Books, New Delhi, 2001, p. 49.
14. VHo VrW© bú'Uemór Omoer (gšnm.), bmoH 'mÝ' {QiH bolgšJ«h (bmoH 'mÝ' ~mi JSJmYa {QiH 'mšMo Ho garVrb {ZdSH bol), gm{hE` AH mX'r, Ý`y {X,,r, 1969, nŸ. 388-389.
15. AaqdX XoenmSSo, "hmami' mVrb B{VhmgmMr dmQMmb', nam'e©, nwUo, ISS 10, ASH 3, Zmoih|~a 1988, nŸ. 37.
16. Vljd, nŸ. 41.
17. A. am. Hw bH Uu, 'amRçmSMo B{VhmgH ma (B{VhmgbolZ nŌVr),

nydm}°, nŸ. 194-198.

18. VhO VrwO bú'Uemór Omoer (gšnm.), amOdmS bolgšJ«h, gm{hÈ' AH mXo'r, Ý'y {X„r, 1958, nŸ. 231-237.

19. Vl;d, nŸ. 233.

20. HŸ îUamd AOwOZ Ho iygH a, j{l' Hw bmdVšg Nln{V {edmOr 'hmamO `mšMo M{aI, 1920. (àW'mdŸÎmr : 1906).

21. nhm - YZSO` H sa (gšnmXH), Jwéd'© HŸ îUamd AOwOZ Ho iygH a : AmÈ'M{aI d M{aI, 'wš-B© 'amRr J«šWgšJ«hmb`, 'wš-B©, 1977, nŸ. 132, 139-140.

22. Ho iygH a {b{hVmV, Voihm EHš XarV H m` H s, ñdXoem{^mZ, ñdY'mO{^mZ, ñdamÁ'm{^mZ d ñdmVšI`am{á øm dŸ{Îm g'Wmªgma»`m Jmogmì`mÁ`m -moYmZo 'hmami' mV nwT H mhr H mb OmJŸV am{hÈ`m Ago àhUÈ`mnoj m È`mšMo -rOmamonU gšJmonZ {edmOr 'hmamOmšÁ`m C,db M{aI`{hÁ`mZoM 'w»`V: Pmbo hmoVo ho àhUUo {deof g'w{° H {XgVo. nhm - HŸ îUamd Ho iygH a, nydm}°, nŸ. 652.

23. nhm - N. S. Takkhav, *The Life of Shivaji Maharaj : Founder of the Maratha Empire*, Manoranjan Press, Bombay, 1921.

24. JmoqdX glmam` gaXogmB©, 'amRr [a`mgV : lšS 1 : ehmOramOo ^mogbo, eH H Vm© {edmOr, nm°ß`wba àH meZ, 'wš-B©, 1988. (à. Am. : 1902).

25. A. am. Hw bH Uu, 'amRçmšMo B{VhmgH ma (B{VhmgbolZ nÕVr), nydm}°, nŸ.363.

26. Vl;d, nŸ. 391.

27. A. am. Hw bH Uu, 'Ü` `wJrZ 'hmami', nydm}°, nŸ.284-285.

28. Shailendra Nath Sen, *Administrative System of the Marathas*, K. P. Bagachi, Calcutta, 1976. (First Edition: 1923).

29. Shailendra Nath Sen, *Military system of the Marathas*, K. P. Bagachi, Calcutta, 1979. (First Edition : 1928).

30. So{Zg qH Ho S, (AZwdmXH : ^JdšV Xoe'wl), 'hmZ -ššlmoa, 'm{hVr d Z^modmUr 'šimb', {X,,r, 1962.
31. amOm Xr{JV, nydm}°, nŸ. 469.
32. amOm Xr{JV (gšnm.), {ZdSH eoOdbH a, gm{hĚ` AH mXo'r, Zdr {X,,r, 2007.
33. amOm Xr{JV, "àñVmdZm', Vljđ, nŸ. x-xiii.
34. Vljđ, nŸ. 31.
35. Vljđ, nŸ. xii.
36. D. F. Karaka, *Shivaji : Portrait of an Early Indian*, The Times of India Press, Bombay, 1969.
37. nhm -
- 1) Setu Madhavrao Pagadi, *Chhatrapati Shivaji*, Continental Publication, Pune, 1974.
- 2) goVy 'mYdamd nJSr, NlnVr {edmOr, Z°eZb -wH Q'ñQ, Zdr {X,,r, 1989.
38. nhm -
- 1) A. am. Hw bH Uu, {edH mbrZ 'hmami", amOhšg àH meZ, nwUo, 1993.
- 2) A. am. Hw bH Uu, Aer hmoVr {edemhr, amOhšg àH meZ, nwUo, 1999.

gm{dìrMr nmZ§

J^@nmV H m¶ÚmV
gwYmaUm?

ñZohm Jmoio

AbrH S oM, àhUOo E{àb 2021‘Ü`o amÁ`g^oZo

J^@nmVmÀ`m H m`ÚmV gwYmaUm HaUmao {dYo`H nm[aV Ho bo
Am{U ‘mJÀ`m dfu bmoH g^oZo nm[aV Ho bobo ho {dYo`H
H m`Xm -Zbo. ømVrb XmoZ ‘hîdmÀ`m VaVwXt`wio ho {dYo`H
H go nwamoJm`r Amho `mMr -arM MMm© Pmbr. EH àhUOo øm
gwYmaUmS`wio AmVm J^@YmaUoÀ¶m 24 AmRdSçmSn`^v J^@nmV
H aVm `oD eHo b. AWm©V ‘yi H m`ÚmZwgma ømV gwÔm AZoH
AQr AmhoV Am{U Ê`mSMr nyV©Vm Ho ë`mZSvAm Aem J^@nmVmbm
‘mÝ`Vm {‘iy eH Vo. Xwgao Ago H s, øm H m`ÚmVrb {ddm{hV
ór Am{U {VMm Zdam ho g§-moYZ ~XbyZ ór Am{U {VMm
nmQ©Za Ago Ho bo Jobo Amho, øm`wio A{ddm{hV {ó¶mSZm gwa{v
J^@nmV {‘iÊ`mÀ`m dmQm lwè`m Pmè`m AmhoV, Ago ‘mSSbo
Jobo Amho. ømM-amo-a H m`ÚmVrb EH m ZdrZ gwYmaUo-
ASVJ©V J^@nmV H v BpÀNUmè`m órMr JmonZr`Vm A-m{YV

H« m§{VÁ¶moVr gm{dìr-mB© `w bo ór Aä¶mg H| Ð, gm{dìr-mB© `w bo nwUo
{dÚmnR, nwUo

B©‘ob- gole.sneha@gmail.com

Z RodUmè`m d;ÙH s` ì`mdgm{`H mbm {ejm hmoD eH Vo. ho
gd© -Xb dada -KVm ñdmJVmh© dmQV Agbo Var øm gwYmaUm
nwZamoËnmXH Ý`m`mÀ`m H gmoQrda nSVmiyZ ~{KVè`mg È`m
lynM VmoH Sçm AmhoV ho bjmV `oVo.

øm g\$X^m©V Omo n{hbm `wÔm AmnU bjmV KoVbm nm{hOo
Vmo hm Amho H s, ^maVmV `wimV J^©nmVmbm H m`Xoera `mÝ`Vm
XoUmam H m`Xm Ambm Vmo ór MidirÀ`m `mJU`wio Zmhr, Va
^maVr` amÁ`-g\$ñWoÀ`m bmoH g\$»`m dmTrbm Amim KmBÊ`mÀ`m
YmoaUmVyZ. âhUOom J^©YmaUobm Am{U n`m©`mZo J^©nmVmbm
órÀ`m ñdV...À`m earamdarb h, Am{U Vmo àñWm{nV H aÊ`mMm
à`ÊZ hm {dMma øm H m`ÚmÀ`m H| ÐñWmZr ZihVm, Va CbQ
J^©nmVmH S Hw Q;S`-Z`moOZmMo EH `mÜ` `Aem nÔVrZo ~{KVbo
Jobo. âhUyZM AmnU hm H m`Xm nm[aV Pmbm VoihmÀ`m g\$gXoV
Pmboè`m MMm© ~{KVè`m, Va È`mV gmVÈ`mZo J^©nmV H v
BpÀNV Agboè`m ~hpVmSe {ó`m øm {ddm{hV AgVmV Am{U
ZH mo Agbobo/MwHy Z Pmbobr J^©YmaUm `mVyZ È`m\$Zm `w°s
{`imbr nm{hOo, VgoM ømVyZ amí`mÀ`m {dH mgmbm hmV^ma
bmJob ømda ^a Agbobm Amnè`mbm {XgVmo. øm gwYmaUm\$Zr
EH m nmVirda A{ddm{hV {ó`m\$À`m J^©nmVmbm `mÝ`Vm {Xbr
Agbr Var AZoH àiZ AZwîm[aV amhVmV.

øm H m`ÚmZr AmVm J^©nmV H aÊ`mMm A{YH ma hm Ho di
óramoJ qH dm àgy{Vemó `m`Ü`o nmìVm/VÁk Agboè`m\$ZmM
{Xbm Amho. ^maVmagma»`m XoemV {OWo EH\$ XarV bmoH g\$»`oÀ`m
`mZmZo d;ÙH s` ì`mdgm{`H / S m`SQam\$Mr H `VaVm Amho, {VWo

Aem àH maMo H m`Xo {ó`mšÀ`m gwa{JV J^©nmVmÀ`m h, m`Ü`o
 'moRm **ASga** RaVmV. Aä`mgmš'YyZ Ago nwT Ambo Amho H s,
 ^maVmVrb Odi-Odi 50 Q, o J^©nmV ho ANM Xm`r qH dm
 BVa H aVmV, Aem n[apñWVrV È`mšZm à{ejU XoD Z gj'
 H aÊ`mEodOr H m`UmZo J^©nmVmÀ`m gw{dY AOyZ H 'r à`mUmV
 H em CnbāY hmoVrb `mMrM VaVyX Ho è`mgmalr {XgVo.

H m`Um`Yrb JmonZr`Vo-m-VMo ZdrZ H b' gwŌm da da
 nmhVm ñdmJVmh© dmQbo Var J^©nmVmMm H m`Xm Am{U nm`šgmo
 (-mb bē{JH Nim{damoYr H m`Xm) gma»`m H m`Um`Yrb
 JwšVmJwšV 'mì`m ZdrZ gwYmaUmšZr gwQV Zmhr. nm`šgmo à`mUo
 bē{JH Nī Pmbm Amho **Aer** ešH m Oar Ambr Var È`mMr
 dXu nmofbgmšZm XoUo ho Sm`šQamšda H m`UmZo ~SYZH maH Amho.
 AmVm AZoH doim, 16-18 d`moJQmVrb EH 'oH mšÀ`m gš`VrZo
 Pmboè`m bē{JH gš-šY Am{U È`m`wio Pmbobr J^©YmaUm
 AšVV... Sm`šQamšH S J^©nmVmgmRr `oVo, Voihm Sm`šQamšZr H m`
 H amdo? J^©nmVmÀ`m H m`UmZwgma JmonZr`Vm amlmdr H s,
 nm`šgmoZwgma JwÝhm Xmlb H amdm hm 'moRm àiZ BWo AZwîm[aV
 amhVmo. ømgmRr nm`šgmogma»`m H m`UmšZr 18 dfm©Imbrb
 nU 16 dfm©darb Am{U {OWo XmoÝhr 'wbJm Am{U 'wbJr
 È`mM d`moJQmVrb AmhoV Am{U XmoKmšMr gš`Vr hmoVr Ago
 gmšJV AmhoV Aem àH aUmšZm doJio H mTyZ, H m`UmMm nwZ{d©Mma
 H aUo JaOoMo Amho. Vmon`aV 16-18 ¶m d`moJQmVrb 'wbTÀ`m
 J^©nmVmÀ`m h, mMm àiZ AZwîm[aV amhVmo Am{U È`mVyZ {d{dY
 àH maÀ`m -oH m`Xoera àH mamšgmRr nmofH dmVmdaU V`ma hmoVo.

ZdrZ gwYmaUmš'wio AmVm 20 AmRdSçmn`aV EH m Sm'SQaA`m
 gëëllmZo Va 20-24 AmRdSçmšn`aV XmoZ Sm'SQamSÀ`m gëëllmSZr
 J^©nmV H aVm `oD eH Vmo. nU 20-24 AmRdS J^©m@anU
 AgVmZm J^©nmVmMm n`m©` hm Ho di H mhr {d{ei n[apñWVrb
 {ó`mšgmRr CnbāY H v Z {Xbm Amho. ømV -bmEH mamÀ`m
 ~ir Agboëllm {ó`mšMm g'mdoe hmVmo. øm nwTo OmD Z,
 H m`Xm AmVm 24 AmR dS çmZSva gwÕm J^©nmV H mhr
 n[apñWVr'Ü`o H aVm `oB©b. H m`ÚmV Aem àH maÀ`m J^©nmVmbm
 nadmZjr XoÊ`mgmRr d;ÚH s` 'SS 卐 ñWmnZ H amdo Ago àhUbo
 Amho. 'mì J^©nmV H Yr H aVm `oB©b `mÀ`m AQR KmbyZ XoV
 AgVmZm 'mì, nwYhm EH Xm órÀ`m Amamo½ qH dm Am`wì`mbm
 YmoH m Agob qH dm J^m©V JS^ra XmoF Agob, hmoUmao ~mi ho
 AnSJ/ "Xì`mšJ" (àemgH s` H moQH« ') àhUyZ OY'mbm
 `oUma Agob Va AerM `mXr {XgyZ `oVo. ømV {ó`mSÀ`m
 h, mnojm gwàOmZZemómMo {Z', AnSJËd/AnyU©Ëd `m gš-SYr
 Agboë`m gm'm{OH OmUrdm Am{U Á`mbm BSJ«Or'Ü`o
 E~{b.Á' (ableism) àhUOoM gm'm{OH [aË`m nyU©/ YSYmH Q
 g'Obo Joboë`m earamMr A{Ygímm øm Mm;H Qr RiH nUo nwT
 `oVmV. J^©nmV H Yr H aVm `oB©b ømMm H mi dmTdV AgVmZm
 ømVyZ {ó`mšMm È`mSÀ`m earamdarb h, àñWm{nV H aUo hm
 hoVy È`mV ZgyZ, {-ZH m'mMr/ g'mOmda ~moOm Rv eH Vrb,
 H m`øj`Vm Am{U doJmÀ`m ZdCXma'VdmXr OJmV Á`mSZm OmJm
 Zmhr Ai`m ~mbH mSZm Zi H aÈ`mMr dmQ OmñV lwbr Ho br
 OmVr Amho. H moUmbm OY' ;`m`Mm A{YH ma Amho Am{U

H moUmbm Zmhr `m-m-VMo ^mî` È`mV OmñV Amho AmfU Oa
H m J^m@V XmoF **AgVrb** Va dîÚH s` ‘SS **î 24** AmRdSçmZSva
gwŌm J^@nmVmbm ‘SŌwar XoD eH Vo Ago H m`Xm àhUVmo.

àhUOo órbm J^@nmV H am`Mm Amho H s, Zmhr, `m nojm
dîÚH s` VÁk È`mbm ‘mÝ`Vm XoVmV H m `mdv Z J^@nmV
hmoUma H s, Zmhr Vo RaV amhVo. H m`ÚmVrb gwYmaUm øm Aem
nŌVrZo Ho è`m AmhoV H s, àÈ`oH nm`arda órbm J^@nmV H m
JaOoMm Amho ho gVV nQdyZ Úmdo bmJUma, È`mgmRrMm nwamdm
gXa H amdm bmJUma, È`m`wio dada MmSjè`m dmQUmè`m øm
gwYmaUm naV EH Xm ‘mVŸÈd ho Zìg{J@H / ñdm^m{dH AmfU
J^@nmV hm AndmXmÈ`H / AZìg{J@H hr {dMmaYmamM éOdVmV.
eŠ`Vmo J^m@anU ho ~mimÀ`m OÝ`mVM namd{V@V ihmdo,
È`mbm`Ü`oM WmS-dUo ho AZìg{J@H Amho, qH -hþZm àhUyZM
È`mMr laoM JaO Amho H m, ho gVV VnmgyZ ~KUo JaOoMo
Amho **Aer** Mmjh Q BWo nwT `oVo. hr Mmjh Q AWm@VM ‘mVŸÈdmMo
g`W@Z H aVo. àhUyZ øm gwYmaUm Oar `mo½` {XeoZo QmH bobo
nmD b AmhoV Ago dmQV Agbo, Var J^@nmVmbm {ó`mSMm
h, àhUyZ àñWm{nV H aÊ`mnmgYZ AOyZ AmnU lyn bmS-
AmhmoV ho bjmv KoVbo nm{hOo. J^@nmV 24 AmRdSçmSñ`aV
HaVm `oD eH Vmo ho Oar lao Agbo Var {VWn`aV nmohMUo ho
{ó`mSgmRr {dMmaYmaoÀ`m AmfU ì`dhmamÀ`m nmVirda AOyZ
Var ASWù`mSMr e`@VM RaUma Amho.



gm{dlrMr nmZ§

ñWbm§V[aV

H m'Jma dOm {ó¶m

b{bV ^dao

JVdfu (25 'mM©, 2020 nmgyZ) H moamoZm amoJmÀ`m, H mopihS-19Zm'H {dfmUybm namñV H aÊ`mgmRr ^maV gaH maZo g§nyU© XoemV g° sMr Qmio-§Xr bmJy Ho br hmoVr. È`m Qmio-§XrÀ`m -è`m-dmB©Q n[aUm'mVyZ gmdaV Zmhr, VmoM naV EH Xm H mopihS-19 {dfmUyÀ`m {damoYmV "bTÊ`m'gmRr 'hmami' emgZmZo "-«oH X MoZÀ¶m (bm°H SmD ZM) ZmdmZo 15 Vo 30 E{àb Am{U È`mZ§Va 1 'o Vo 15 'o 2021n`aV Qmio-§Xr bmJy Ho br Amho. È`m'wio nwÝhm EH Xm 'mM©, 2020'Ü`o Ogo naVrMo ñWbm§Va H aVmZm H m'Jmam§Mo Am{U È`m§À`m Hw Qw §-r`m§Mo hmb Pmbo hmoVo, ømMr nwZamdÝlmr hmoB©b H m? øm Am{U AemàH maÀ`m ñWbm§V[aV H m'Jmam§À`m g`ñ`m§darb MMm© 'moRçm à`mUmV OZgm'mÝ', Aä`mgH , g§emoYH Am{U àgma'mÜ`'m§Ümao gww Amho. `mMm AW©, H moamoZm àmXw^m©dmnydu ñWbm§Vang§X^m©V MMm©M

ghm¶H àmÜ¶mnH , H« m§VÁ¶moVr gm{dlr-mB© 'w bo ór Aä¶mg H| Ð,

gm{dlr-mB© 'w bo nwUo {dÜmnRr, nwUo

B©'ob- lbhaware@gmail.com

hmoV ZihVr, Ago 'wirM Zmhr. naSVw H moamoZm Am{U Qmio-šXrÀ`m
 {Z{`immZo, ehamSMŠ ehanU H iimZo C^Š H aUmè`m ñWbmSV[aV
 OZg'yhmsZm, naVrMo ñWbmSVa H aUo g° sMo -Zbo Am{U È`m'wio
 ñWbmSV[aV 'OwamSMo ehamÀ`m {dH mgmVrb `moJXmZ Ñi` Pmbo.

`m nmíd©^y'rda 'mJrb EH dfm©nmgyZ amoOJma d AY`
 H maUmSZr ehar ^mJmV ñWbmSV[aV Pmboë`m H m'JmamSMo àiZ
 Zoh'rnojM A{YH àH fm©Zo qMVZmÀ`m AJ«^mJr Ambo. `m'wio
 ^{dì`mV emgZmbm ñWbmSV[aV H m'JmamSÀ`m -mOyZo gH mamÈ`H
 YmoaU {Z{iMVr H aÊ`mgmRr AemàH maÀ`m Aä`mgmMm Cn`moJ
 hmoD eH Vmo Aer Aem AmnU ~miJy eH Vmo. naSVw, EH y UM
 H moamoZm àmXw^m©dmnyduÀ`m Am{U g`H mbrZ ñWbmSV[aV
 H m'JmamSÀ`m MMm©{didmV (H mhr AndmX dJiVm) {ó`mSMr
 ñdVŠì "H m'Jma' qH dm "H È`m©` àhUyZ Agbobr ^y{`H m
 ZmH mabobr {XgyZ `oVo. ho bjmv KoVm, àñVwV bolm'Ü`o
 ^maVmVrb ñWbmSV[aV ór H m'JmamSÀ`m H VjnUmMr qbJ^md
 n[aàou`mVyZ CH b H aÊ`mMm à`EZ H aÊ`mV Ambobm Amho.

^maVm'Ü`o H mhr AndmX dJiVm, ñWbmSVa{df`H nmašn[aH
 gšemoYZ qH dm {gŌmÝVZ 'moRçm à`mUmda qbJ^md AmŠYio
 (Gender blind), nwéfr AZw^dH| {ĐV, Am{W©H n;bySZm AdmñVd
 'hîd XoUmao, nwéfmSMo loðEd Am{U {ó`mSMo H {ZðEd 'mZUmao
 am{hbo Amho. È`m'wio Aem Aä`mgmV nwéfmSZm H m`M "'w»`
 ñWbmSV[aV' Am{U {ó`mSZm nVrda Adbš-yZ AgUmè`m, gh-
 ñWbmSV[aV qH dm nwéfmSÀ`m/nVrÀ`m 'mJo 'a' QV OmUmè`m
 -m`H m àhUyZM nm{hbo Jobo. n[aUm'r ñWbmSV[aV {ó`mSMo

gm'm{OH -gmšñHY {VH -Am{W©H AmKmSrdarb `moJXmZ Am{U
nĚZr/-m`H m AgĚ`m-amo-aM "H m'Jma' àhUyZ Agbobr
^y{`H m, Amdí`H Ě`mà'mUmV nwTl `oD eH br Zmhr.

Ě`m'wio, Á`mdoir nwéf H m'Jma ghHw Qwš- ñWbmšVa H aVmo,
Voihm VmoM Hw Qwš-mMm H Vm© qH dm 'hldnyU© EH H àhUyZ -{KVbm
OmVmo. Va {ó`mšH S Xwæ`', Ka gmš^miUmè`m, gh-ñWbmšV[aV
àhUyZ nm{hbo OmVo. našVw, AZoH Xm dmñV{dH Vm doJir AgVo.
Ě`mgšX^m©V H mhr Aä`mg Ago Xe©{dVmV H s, Hw Qw š-
ñWbmšVam'Ü`o nwéf ho gh-ñWbmšV[aV AmhoV, Va {ó`m øm
'w»` ñWbmšV[aV AmhoV. {ó`mšZm {'iUmè`m Am{W©H gšYrÀ`m
^ademda AZoH Hw Qwš-mšZr ehamšH S ñWbmšVa Ho bo Amho.
VgoM ñWbmšV[aV {RH mUr {ó`mšZm {'iUmè`m amoOJmamMo à`mU
nwéfmsšBVHo M qH -hpZm nwéfmsÀ`m VwbZoV A{YH Amho. Xwgar
-m- àhUoO, ñWbmšVamZšVa nwéfmsZm {'iUmè`m amoOJmamMr
A{Z`{'VVm Am{U A{Z{íMVVm {ó`mšnojM A{YH Amho.
Ě`mšZm AZoH Xm amoOJmamgmRr A{YH dmQ nmhmdr bmJV. Ě`m
VwbZoV {ó`mšZm KaJwVr H m'Jma qH dm d;{° H godmš'Ü`o
ghO amoOJma {'iĚ`mMr A{YH eš`Vm {Z'm©U Pmbr Amho.
{ó`mšZm nyaH H 'mdĚ`m 'mZĚ`m JoĚ`m'wio, H 'r 'mo-XĚ`mda
Ě`mšÀ`mH SyZ H m' H adyZ KoVbo OmVo qH dm {nVŷgłmmH /qbJ^mdr
ì`dñWo'Ü`o Ě`mhr H 'r 'mo-XĚ`mda H m' H aĚ`mg V`ma
hmoVmV. našVw, ømCbQ nwéfmsZm 'w»` H V} 'mZbo JoĚ`m'wio, Vo
H 'r 'mo-XĚ`mda H m' H aĚ`mnojM A{YH doVZmÀ`m amoOJmamMr
dmQ -KVmV. Ě`m'wio ñWbmšV[aV Hw Qwš-mÀ`m ^aU-nmofUmMm

A{YH Mm ^ma {ó`m\$A`m {eamda `oVmo. 'mJrb ASrM-VrZ
 XeH m\$nmgyZ (àm'w»`mZo 1990Z\$Va) CXmarH aU, ImOJrH aU
 d -mOmanoRmÝ'wl ì`dñWo'wio ^maVmagma»`m XoemV, {Z'm©Vj'
 Am{W©H dmTr'wio 'moRçm à'mUmda naXoer ^m\$SdbmMr Jw\$VdUyH
 Am{U CĒnmXZ hmoV Amho. Á`m'Ü`o Bbo\$Q`m`{ZH , amgm`ZH ,
 'm{hVr V\$ìkmZ Am{U dó CÚmoJm\$Zm àmoĒgmhZ {Xbo OmV
 Amho. AemàH maÀ`m Am\$Vaami`r` -XbmMm AZwHy b à^md,
 Cf Hw eb ì`mdgm{`H Am{U gw{e{fjV 'Zwî`-imda nSbm
 Amho. Va Xwgè`m -mOybm VwbZoZo AHw eb Am{U A{e{fjV
 AgUmè`m H m'Jma dJm©'Ü`o, da {ZX}{eV Ho boè`m -mOmanoRr`
 ì`dñWoV H 'r qH dm {'iob Ē`m doVZmda amoOJma H aĒ`mgmRr,
 ñnYm© {Z'm©U Pmbr Amho. Aemdoir Aën doVZmda, H moUĒ`mhr
 àH maMo H m' H aĒ`mg {ó`m V`ma Agè`m'wio, -mOmanoRoV
 Ē`m\$Mr 'mJUr dmTV Amho. Ē`m'wio l'mMo Am{U "ñWbm\$V[aV
 H m'Jmam\$Mo órH aU' KSyZ `oV Amho. `m l{'H -mOmanoRoVrb
 -XbmMm à^md J«m'rU-ehar ñWbm\$VamdaXolrb nSbm Amho.
 {Xdg|{Xdg TmgiV OmUmar J«m'rU AW©ì`dñWm Am{U eoVr
 jolmVrb A[aïm'wio, -oamoOJma eoV 'Owam\$Mo Am{U Ē`mVhr
 -oamoOJma {ó`m\$Mo à'mU dmTV Amho. Á`mMm ^mJ àhUyZ
 J«m'rU-ehar ñWbm\$VamÀ`m à{H« `o'Ü`o dmT Pmbr Amho.
 VgoM, AbrH SÀ`m H mimV {d^o Hw Qw\$-m\$Mm CX`, Kam-mhoarb
 amoOJmamV {e{fjV {ó`m\$Mm gh^mJ dmTUo Am{U Cn^moJmÀ`m
 -XbĒ`m Z'wÝ`m'wio órH| {DV godm\$Mr 'mJUr dmTbr Amho.
 Am{U Ē`m'wio {d{ei OmV Am{U dJm©Vrb Kam\$YyZ KaJwVr

‘XVZrg, ‘wbo gms’miUmar XmB©, nyU©doi KamgmRr H miOrdmhH
 B. àH maÀ`m godm jolmMm {dñVma hmoV Amho. n[aUm‘r, A{YH
 à`mUmV ñWbmSV[aV {ó`mSZm amoOJma {‘iÊ`mMr eS`Vm {Z`m©U
 Pmbr Amho. Va Xwgè`m ~mOybm R^{do} XmasÀ`m ‘m’© V, drQ ^År
 qH dm D g VmoSUrÀ`m H m’mgmRr, hSJm‘r H m’Jma àhUyZ
 bmlmo ñWbmSV[aV ‘OwamSZm H m^qW\$S{-H EH H qH dm ór-nwéfmSÀ`m
 OmoS rbm amoOJmamgmR r KoVbo OmV Amho. AemàH maÀ`m
 amoOJmam‘Ü`o Ho di nwéfmSZm ‘hîd Z XoVm, ór-nwéfmSÀ`m
 OmoSrbm amoOJma {‘iV Amho. Ê`m’wio `m{RH mUr nwéfmSÀ`m
 BVHo M {ó`mSÀ`m ñWbmSVambm d Ê`mSÀ`m amoOJmambm ‘hîd
 àamá hmoVmZm {XgyZ `oV Amho.

lè`m AWm©Zo ñWbmSVamÀ`m à{H« `oVrb {ó`mSMo `moJXmZ
 ‘hîdnyU© am{hbobo Amho Am{U nwTohr amhUma Amho. `mgSX^m©V,
 AmjaSJm-mX ehamVrb ñWbmSV[aV dñÊ`mSMm OmV-qbJ^md
 n[aàou`mVyZ Aä`mg `m {df`mda ‘r ZwH Ê`mM Ho boè`m gsemoYZ
 Aä`mgm‘YyZ hr ~m- àH fm©Zo nwT Ambr. ^maVmVrb {ó`m
 ‘moR çm à`mUmda amoOJma, Am{W©H J{VerbVm, Hw Qw \$-mbm
 AmYma XoUo, hpSSçmH [aVm nigo Jmoim H aUo, nmašn[aH gm‘m{OH
 g\$amZoÀ`m VmdSrVyZ {ZgQÊ`mgmRr Am{U Ag\$»` Aem Ü`o`
 nyV©Vo H [aVm ñWbmSVa H arV Agè`mMo ¶lm Aä¶lmgmVyZ AmTiyZ
 Ambo. ñWbmSV[aV {RH mUr {Zdmè`mÀ`m i`dñWonmgY Vo Hw Qw\$-mMo
 ^aU-nmofU H aÊ`mn`aV {ó`mSMo `moJXmZ ‘hîdnyU© am{hbo
 Amho. ñWbmSV[aV {RH mUr {ó`mSZm {‘iV AgUmè`m Am{W©H
 amoOJmamMm ‘mo-Xbm H ‘r Agbm, Var Hw Qw \$-mÀ`m

CXa{Zdm@hmH [aVm Vmo 'hldnyU© RaV Agbobm {XgyZ `oVmo.
 Ago AgVmZmhr, JVH mbrZ Am{U g'H mbrZ (Qmio-ŠXrÀ`m
 H mimV) KSyZ Amboë`m ñWbmŠVamÀ`m MM}V àm`w»`mZo nwéfmŠZm
 H| ĐñWmZr RodyZ ñWbmŠVamÀ`m àiZmŠMr MMm© Ho br OmV Amho.
 VgoM, 'w»` H m'Jma àhUyZ, nwéfmŠMo amoOJma Am{U È`mŠÀ`m
 ^{dì`mVrb OJÊ`m{df`r ~mobbo/{b{hbo OmV Amho. naŠVw
 È`m VwbZoV ñWbmŠV[aV ór H m'JmamŠZm J'dmdm bmJboë`m
 amoOJmamMr Am{U È`mŠÀ`m ^{dì`mÀ`m àiZmŠMr MMm© 'maer
 KSyZ `oV Zmhr/AmbR Zmhr. n[aUm`r emgZ H È`mŠÀ`m YmoaU
 {Z{'©VrV ór H m'JmamŠZm dJibo OmÊ`mMm YmoH m qH dm {ó`mŠMo
 H V}nU PmH ibo OmÊ`mMr gŠ^mì`Vm A{YH dmTÊ`mMr eŠ`Vm
 ~imdVo. È`m`wio ñWbmŠV[aV OZg'yhmŠÀ`m JŠVi`ñWmZmÀ`m
 (ñWbmŠV[aV {RH mUÀ`m) amoOJmamMr Am{U "H m'Jma' àhUyZ
 Agboë`m ^y{'Ho Mr qbJ^md n[aàou`mVyZ g'rmj H aUo
 Amdí`H ~m~ ~ZVo.



gm{dìrMr nmZŠ

{Z{‘šmmZo

...H s Cf...H mb
hmoVm hmoVm

XîmàgmX Xm^mobH a

"^Ji¶m {dH mgmMr nhmQ" `m Xj. bmoH gîmmÀ`m 5 ‘o
2021 amoOrÀ¶m Ho ed CnmÜ`o `mšÀ`m bolmÀ`m gšX^m©V H mhr
‘wÔo {dMmamV ¿`md`mg hdoV. Amnè`m OdiOdi eš^a
dfm^À`m AWH dmQMmbrV, gšKmZo ^maV^a gd©ì bjUr`
gš»`oV {eñV-Õ H m`©H« ‘ ñd`šgodH {Z’m©U Ho bobo AmhoV.
godm^mdr gšñWmšMo EH Omio ^maV ^a ngadbo Amho. gšKmMo
ho `e Hw Urhr ZmH mv eH Uma Zmhr- àý EdTmM Amho, H s
gšKmbm H m` H amd`mMo Amho?

gšK ñWmnZ Pmbm È`mdoir Am{U È`mZšVahr AZoH df}
gšKmV ‘ ° qhXyZmM àdoe hmoVm. ‘J gšKmZo Amnbo Zmd
"amii`r` ñd`šgodH gšK’ Ago H m Rodbo? qhXy ñd`šgodH gšK
Ago H m Rodbo Zmhr?- gšK àMmaH mšMo gm{hÈ` dmMbo Va ho
Ago Zmd RodÈ`m`mJo EH loir hmoVr. qhXy gmoSyZ ~mH s gd©
Aamii`r` AmhoV, hm gšXoe È`mVyZ Úmd`mMm hmoVm. gšKmMr

bolH gmVmam{Zdmgr AgyZ {X,,rÀ¶m lram‘ BpÝñQQcyQMo {ZdÝîm djkm{ZH
AmhoV.

B©‘ob- dabholkard155@gmail.com

dmQMmb nm{hbr Va AmnUmbm H m' {XgVo? g\$KmZo KSdbobr
qH dm KSV AgVmZm `moOZm-Õ arVrZo VSmlo-šX à{VH ma
H v Z 'moSbobr n{hbr X\$Jb àhUOo 3 g\$Q|-a 1927 `m
{Xder gæ`X 'ra gmho- `m\$Mr ñ'¥Vr OmJ{dÊ`mgmRr {ZKmbœ`m
{`adUwH sÀ`m doirMr X\$Jb. `m X\$JbrMo nyU© dU©Z Sm'. {d.
am. H a\$XrH a `m\$À`m "VrZ gag\$KMmbH ' `m nwñVH mV n¥ð
276da `oVo. ho gmao dU©Z dmMè`mda X\$Jb Hw Ur KSdbr,
Hw Ur 'moSbr `m-m-VMm {ZU©` àÈ`oH dmMH mZom `mdm.
'mì, `mV AmUlr EH AñdñW H aUmao dmš` Amho, "gmar
`moOZm H aUmao Sm'šQa hoSjodma È`mdoir ZmJnwamV ZihVo. 'mì,
X\$½`mÀ`m g\$X^m©V Sm'šQam\$Zr Or AmUlr Ho br hmoVr Vr nyU©
`eñdr Pmbr.'

Sm'šQa hoSjodma `m\$À`m 'ZmV 'wgb'mZm\$À`m-Ôb H moUlr
^y{`H m hmoVr? 22 g\$Q|-a, 1935 `m {Xder Zmhmq `m\$À`m
nìmbm Cîma XoVmZm Sm'šQam\$Zr àhQbš`, "'wgb'mZ 'Zmod¥lmr hr
Zoh'rM gÈH m`m©V {d;Z AmUUmar AgVo ho AmnU OmUVm'
^maVr` g'mO`ZmV 'wgb'mZ Úof ngadyZ g\$KmZo H m` Ho bo ho
Zo`š`m eāXmV gaXma nQobm\$Zr gm\$JVBš`. 8 `o ~w«dmar 1948
amoOr em'màgmX 'wIou `m\$Zm nì nmRdyZ È`m\$Zr ISgmdb`,
"ho H m` Mmbbš'? 'hmÈ'm Jm\$YtMm lyZ Pmbm` Am{U
Xoenm\$š d 'h\$V {Ûp½dO`ZmW Zohv šZm ' mgmda bQH dbo nm{hOo
àhUyZ gm\$JV qhSV AmhoV.' `m {RH mUr ho 'h\$V H moU ho
g'OmdyZ `md`mg hdo. ZWwam`bm {nñVwb nwadbo àhUyZ
È`m\$Zm Z\$Va AQH Pmbr hmoVr Am{U `m 'h\$VmZm ho {nñVwb

g\$KmÀ`m ZmZmOr Xoe'wl `m\$Zr {Xbo àhUyZ È`m\$Zm H b' 302
 Imbr ghm {hZo Vwé\$JmV Rodbo hmoVo. È`mVyZ Vo nyU©nUo {ZXm}f
 gwQ bo. nU È`mdoir 6 'o, 1948 amoOr gaXma nQ obm\$Zr
 em'màgmX 'wIOu `m\$Zm nì nmRdyZ gm\$Jvbo, "Jm\$YrOtMm lyZ
 g\$KmZo H Q H v Z Ho bm, H s Zmhr ho Rm'nUo gm\$JvM `oUma
 Zmhr. 'mì, g\$KmZo `m XoemV Oo {dfmar dmVmdaU {Z'm©U Ho bo
 hmoVo, È`mVyZ hm lyZ Pmbm` Am{U 'mÂ`mH S o Amboë`m
 Ahdmbmà'mUo È`mdoir g\$KmÀ`m ñd`\$godH m\$Zr AZoH {RH mUr
 {'Rm^{BO} dmQbr Amho.'

JYh'sìr gaXma nQobm\$Zr È`m'wio g\$Kmda ~\$Xr KmVbr. Jwv
 JmoidbH am\$Zr g\$K hr gm\$ñH¥ {VH g\$KQZm Amho. amOH maUmer
 {VMm H mhrhr g\$~SY Zmhr, Ago {b{IV dMZ XoD Z hr ~\$Xr
 CRdyZ KoVbr. È`mZ\$Va g\$KmZo H m` Ho bo ho ~bamO 'YmoH m\$Zr
 gm\$Jvbs`. È`m\$Zr àhQbs`, "nQobm\$Zm H mIOMm KmQ XmlDV
 g\$KmMr EH emIm àhUyZ g\$KmZo OZg\$K ñWmnZ Ho bm.' OZg\$K
 ñWmnZ Pmbm. È`mdoir em'màgmX 'wIOu `m\$Mo gdm©V OdiMo
 ghH mar àhUyZ 'YmoH H m`©aV hmoVo. ASdmZr È`mdoir 'YmoH m\$Mo
 goH«o Qar hmoVo. 'YmoH Z\$Va OZg\$KmMo ImgXma Am{U AÜ`jhr
 hmoVo. È`m\$Zr Amnë`m "qhXy ñQ oQ ' `m nwñVH mV {b{hbs`,
 "g\$KmZo OZg\$K ñWmnZ Ho bm. È`mdoir Am'À`m KQZoV Amàhmbm
 qhXyami' hm eāX Kmmbd`mMm hmoVm. nU gaXma nQ obm\$Mr
 XheV EdTr 'moRr hmoVr, H s Amàhr Vmo eāX Jmibm. 'mì,
 {S gl~a 1952'Ü`o H mZnya `oWo Pmboë`m n{hë`m ami' r`
 A{YdoeZmV, {ejUmV Cn{ZfXo, ^JdÒrVm, am'm`U `m\$Mm

g'mdoe Agmdm Am{U gšñH¥ V hr A{Zdm`© ^mfm àhUyZ
emim, H m'boOmV {eH {dbr Omdr, Ago XmoZ Ramd Amàhr
nmarV Ho bo.'

È`mZ\$Va XmoZ Jmoir KSè`m. OZg\$KmmO AU`j 'm;brM\$D
e'm© `m\$Zm -SV`© H aÊ`mV Ambo. {X,,r qH dm Cîma qhXyñWmZ
{d^mJmMo à'wl Agbobo dg\$Vamd AmoH `mM 'mJm©Zo Jobo.
OZg\$K hr g\$Kmmr H RnwVir àhUyZ dmnabm OmVmo', AgoH
mhrgo -bamO 'YmoH, {H bm}ñH a 'm{gH mgmR r 'mo. J. Vññdr
'm\$Zm {Xboè`m {dñV¥V 'wbmIVrV 'YmoH àhUmbo Am{U
'm;brM\$D e'm© `m\$À`mà'mUo `m\$Mrhr njmVyZ hH mbnÀr Pmbr.
'mì, È`mZ\$Va em'màgmX 'wìOu `m\$Mm '¥È`y g\$e`mñnX Amho. Vo
JwéOtZm SmoB©S hmoV hmoVo, Ago àhUUmao 'YmoH A{YH AmH«
'H Pmbo. {XZX`mi CnmÜ`m` `m\$Mm amlr aoëdoVyZ nSyZ Pmbobm
'¥È`y hm AnKmV ZgyZ, dmOno`r Am{U ZmZmOr Xoe'wl `m\$Zr
{'iyZ Ho bobm lyZ Amho, Aer gmYma 'm\$SUr H aUmao nwnVH
È`m\$Zr {b{hbo. AmVm ZrQ MmjH er H am qH dm 'mÂ`mda IQbm
^am, Aer 'mJUr È`m\$Zr Ho br.

AWm©VM 'YmoH m\$Mo Amamon ho Amnbm An'mZ Pmbm àhUyZ
Vmob gwQboè`m i`° sZo Ho bobo Amamon AmhoV, Ago g'OyZ
AmnU Xya Rodbo nm{hOoV. 'mì, g\$Kmm 'wgb'mZ Uof g'OmdyZ
z`md`mg hdm. Jwv JmoidiH am\$Zr Amnè`m {dMmaYZmV
àhQb\$', "" miUrZ\$Va `m XoemV am{hbobo gd© 'wgb'mZ
n\$M'ñV\$^r AmhoV, Ago Amàhr 'mZVmo.' È`mZ\$Va bmb-hmXya
emór `m\$Zm `oQyZ ""wgb'mZm\$Mm 'VXmZmMm h, H mîyZ z`m.'

àhUyZ È`m\$Zr gm\$JVB\$` . ~mimgmho~ Xodag ho g\$KmMo gdm©V
 CXma`VdmXr gag\$KMmbH . È`m\$Mr hr CXma`VdmXr ^y{`H m
 nmhÿZ È`m\$Zm OwY`m OmUÈ`m ñd`sgodH m\$Zr d`àMmaH m\$Zr {dMmabo,
 "g\$KmZo Amnbr `ybVÎdo gmoSbrV H m?" Xodagm\$Zr È`m\$Zm
 gm\$JVB, "A{O~mV Vgo H mhr Zmhr. g\$KmMm `° EH H b`rH
 m`©H« `Amho. "qhXyMmM qhXyñVmZ". àhUOo ho qhXy ami` Amho Am{U
 Á`mdoir AmnU ho qhXyami` Amho, Ago àhUVmo È`mdoir
 ^Jdm ÜdO hm ami`ÜdO Am{U EH MmbH mZydVuÈd `m Jmoir
 AmnmoAmn `oVmV. `mì ho gmao Agbo Varhr JmoqdXmMm`©
 àhUmboV "Amàhr `wldQ KmbyZ qhSVmo` qH dm ho A\$YH
 ^oXH eàXmV Jwv JmoidiH a `m\$Zr OZg\$KmV OmUmè`m\$Zm
 gm\$JVB hmoVo, "dmam\$JZod ZYn{ZVr AZoH én:' ho bjmV Rodm.
 `mì, {eñV~Õ, àm`m{UH , nmaXe©H , H`imiy Am{U g`{n©V
 H m`©H V} ~amo-a AgVmZmhr n{hè`m n\$Yam dfm^À`m dmQMmbrV
 amOH s` jolmV OZg\$KmMo ApñVÎd ZJÈ` hmoVo, ho Ago H m
 hmoV\$` Am{U `mda Cnm` H m` Vo ZmZmOr Xoe`wlm\$Zr gm\$JVB\$` .
 Vo àhUmboV, "Am`À`m bjmV Ambo hmoVo. g\$K Am{U OZg\$K
 `m\$Zm `m XoemVrb bmoH Jm\$YrOtMm hÈ`mam g`OVmV. È`m`wio
 È`m\$Zm Xya RodVmV. È`m`wio Amàhr bmo{h`m, O`àH me `m\$À`m
 lyn Odi Jobmo Am{U JR-\$YZ gvv Ho bo. bmo{h`m, O`àH me
 `m\$Zr Amàhmbm ñdrH mabo È`mdoir `m XoemVrb OZVoZohr
 Amàhmbm ñdrH mabo' - hr amOH maUmVrb EH {dbjU
 loir hmoVr. `hîdmMo àhUOo `mMo gm`m{OH n[aUm`hr `hîdmMo
 hmoVo. Á`mdoir Vwàhr Jm\$YrOtZm ñdrH maVm È`mdoir "B©œa

A,,m Voamo Zm' àhUVm qhXy- 'wgb'mZ g'Ýd` ñdrH maVm.
'ml, È'mZ\$Va `m XoemVrb gmè¶mM njm\$Mo amOH maU ^`mZH
ñdv nmV -Xbbo. ZmZmOtZr `mda EH Zo'H s ^oXH à{V{H« `m
{Xbr. Vo àhUmbo, "AmO ^maVmVrb gmao nj AJXr ^m.O.n.
Yv Z `m gîmogmRr dldlboë`m bmoH m\$À`m Qmoù`m AmhoV.'
Am{U 'J È`mZ\$Va Ho di amOH maUmgmRr '\$Sb Am`moJ Am{U
am'OÝ'^y'r ho 'wÔo bTdbo Jobo. `m XmoÝhrhr Jmoir ~amo-a
AmhoV. 'ml, amOH maUmgmRr r È`mMm dmna Z H aVm,
amOH maUmn{bH S OmD Z g'Ýd`mÀ`m ^y{Ho VyZ em\$Vvm`
'mJm©Zo ho ày gmoSdVm Ambo AgVo. la\$Va ~m-ar 'erX,
am'OÝ'^y'r `m-m-V 1857À`m ñdmV\$Í`bT çmÀ`mnydu
~m-mam'MaU Xmg Am{U AÀNVImZ `m\$Zr EH g'PmoVm
Ho bm hmoVm. `m XoemV hm Agm g'PmoVm CÚm Hw Ur H aUo ho
' ma YmoH mXm`H Amho, ho AmoilyZ 1857Z\$Va amODmohmMm
lQbm ^v Z B\$J«Om\$Zr `m XmoKm\$Zmhr 'mgmda MTdbo.

Vo Agmo AmOhr am"\$Xa VoWo ìhmdo, Ago dmQV hmoVo È`m\$Zr
Ý`m`mb`mV OmD Z Agm {ZU©` ;`md`mg hdm hmoVm. 'ml, ho
qhXyami' Amho, Ago gm\$JUme¶m\$Zr `m XoemV C^r Agbobr,
'wgb'mZm\$Mo lÔmñWmZ Agbobr dmñVy H m`Xm d emgZ ì`dñWm
PwJmv Z añÈ`mda JXu O`m H v Z CX²ÜdñV Ho br. `m XoemVrb
Aëng\$»`, AY©{e{JV, X[aDr g'mOmÀ`m ^mdZoda AmKmV
H v Z È`m\$Zm añÈ`mda AmUyZ {MaSbo. È`mVyZ 'J 'w\$-B©Vrb
ñ`moQ, 'w\$-B©Vrb X\$Jb, JmoY«mMo hÈ`mH m\$S, JwOamV X\$Jb
`mVyZ qhXyami' mgmRr hdo Agbobo Y«wdrH aU nyU© H aÈ`mV Ambo.

È`mZŠVa JmodšehÈ`m-ŠXr, Odi Jmo`mšg Amho, Ago gmšJyZ `mUgmšZm
 {MaSyZ `maUo, È`mMr gmYr MmjH erhr Z H aUo, ZmJ[aH Èd
 H m`Xm Am{U AmVm gw-«àhÈ`ñdm`r XoV Agbobr "A`moÜ`m
 Vmo PmšH s hj, H mer `Wwam ~mH s hj` `m KmofUm - `m gdm`YyZ
 gšKmbm A{^àoV Agboë`m qhXy amí`mH S È`mšMr X`Xma dmQMmb
 gvv Amho, ho Hw UrM ZmH mv eH Uma Zmhr. È`mšÀ`m ÑirZo hr
 ^Ji`m {dH mgmMr nhmQ Amho. nU `hmÈ`m JmšYtZm Am{U `m
 XoemMr gd©Y`©g`Yd` gmšJUmar gd©Y`©g`^md `mZUmar KQZm
 Á`mšZm `mhrV Amho, È`mšÀ`m `Vo "Cf:H mb hmoVm hmoVm H miamì
 Ambr` Agm hm àH ma Amho Am{U `m ^Ji`m nhmQoV H m`
 hmoVš` Vo nU Amnë`mg`moa Amho. `m XoemVrb gm`m{OH
 gØmd Zmhrgm Ho bm` Am{U gšKmbm hi`m Agboë`m
 "EH MmbH mZydVu` amÁ`H maU, ZmoQm-ŠXr, Mma VmgmV Xoei`mnr
 Qmio-ŠXr Am{U Xwgè¶m H moamoZm bmQoVbo {Tgmi {Z`moOZ Amnë`m
 g`moa Ambš`.



AZwdm{XV H {dVm

PaZm gÝ¶mb

A {¾ H b e

H mhr bŝnQ ^jH , QmoiHŝ H v Z
Z¾ gwio AZ ZImŝZr, ‘X‘ñV qPJV
‘mŝgmÀ`m EH m {SlimÀ`m qMYŝcm H aVmV,
a° aŝ{OV AmqbjZmV {VMŝ Mwŝ-Z KoD Z
a° mMm eodQMm W|~, eodQMr qH H mir MmQVmV.

CXamVyZ OÝ‘boë`m, ñVZnmo{fV AmjbmXtZr
gVV {MaSbŝ` Hy gobm.

`m ‘ŝWZmVyZ Ho di {df {Z{‘©V hmoVŝ, JmŝYmar
EH XmM H m? ^maVmÀ`m ZXr, AdH me, hdm, gmJamÀ`m
jmo^mVyZ Kmof hmoD Xo.

VwÂ`m Xw`m}YZmMm È`mJ H a
Sm|JaXè¶mVyZ nwÝhmnwÝhm ZmX`oD Xo
È`mJ H a VwÂ`m Xw`m}YZmMm

hm nwl Ooihm naVob, AmB© È`mMŝ ñdmJV H aob

nĒZr dQgm{dlrMm Cndmg Yaob
 ^mD ~rOobm ~hrU n{dl ZmVŠ Omonmgob,
 H Ý`m AmXamZo nm`m nSob.
 Hw i, Hw QwŠ~, g`mO WmoŠŠ hmXaob `m PmoVmZŠ,
 nU à`mUmZwgma emŠV hmoB©b.
 OgŠ AmYr hmoVŠ VgŠM, AJXr VgŠM.

AmVSr OiVm`oV AgmøVoÀ`m A¾rV.
 H« moY, fŠTVm
 bmMma qH H mù¶mŠÀ¶m amofmZo YaUr Xw`ŠJÊ`mMr dmŠNm
 gJiŠ Zi H aÊ`mMm Vrd« AmdoJ
 `m X-X-boë`m BÀNm Yw`gVm`oV, ApñWanUo
 H aVm`oV EH m Ádmbobm àÁd{bV
 `m Xw~©b {elobm `r H dQmiyZ gmŠ^mibŠ Amho.
 ho `mÂ`m nwTMr {nTr, VwÂ¶m hmVmV Amho gd© Xw{Z`m,
 `r Vwbm hm A¾H be dmaemV XoVo`
 Vy noQd hr AmJ.

‘yi ~ŠJmbr H {dVoMm ‘amRr AZwdmX

F {fHo e
 BŠJio

nwñVH Amoil

"VgZg'Mr
'yũŋiŋdñWm

'h|Đ H X'

AmaVrŋ B{VhmgmV Á`m XmoZ gññHŸ Vr Jobr hOmamo MmbV
Amboë`m AmhoV È`m àhUOo ~«÷U Am{U l'U gññHŸ Vr.
l'U gññHŸ Vr hr ^maVmMrM Zìho Va OJmVrb gJù`mM
XoemSMr à`wl gññHŸ Vr am{hbr Amho. H maU eoVrÀ`m emoYmVyZ
l'U gññHŸ Vr AmH mabr Amho. È`m'wio {Vbm bJSyZ Or
gññHŸ Vr AmH mabr Vr l'mer Am{U g'Voer OmoSbr Jobr
hmoVr. naSVw A{V[a° YmÝ` CĚnmXZmÀ`m JaOoVyZ hr gññHŸ Vr
nwéfġlmmH ~Zbr d È`mM A{V[a° YmÝ`gSM`mVyZ amOÝ`
ġlmm nwT gagmdè`m. È`mSZr, Amàhr Vw'Mo YmÝ` OVZ H v ,
Ago gmSJyZ CĚnmXZH È`m© eoVH ar dJm©bm CĚnPMVyZ ~mOybm
H mTyZ, hiyhiy Jwbm' Ho bo. Vr Jwbm'r Y'm©{Y{ĐV HaVmZm
~«÷U dJ© H| ĐñWmZr Ambm. È`mVyZ gaSOM'Xma Am{U nwamo{hV
ho XmoZ ġlmmYre dJ© V'ma Pmbo. È`mSZr Amnbo EoVImD nU
PmH È`mgmRr l'mSnoj m ~wŌr lođ Agè`mMo Omhra H v Z

bolH Ql'wUu, {O. gmobmnya pñWV {dÇbamd qeXo 'hm{dŪmbŋlmMo àmMmŋ©

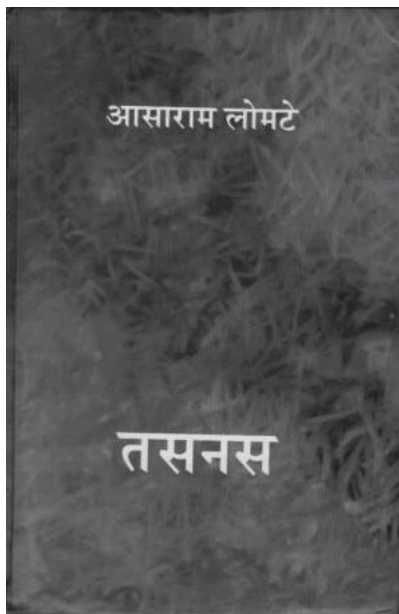
AgyZ g'rjH d H mXS-arH ma AmhoV.

B©'ob- mahendrakadam27@gmail.com

CĒnmXH dJm©bm Jwbm' Ho bo Am{U {VWyZ Ē`mÀ`m l'mMo
Ad'yē`Z gvw Pmbo.

`m Ad'yē`Zmbm hOmamo dfm`À`m ^maVr` B{VhmgmZo H m`
RiH Ho bo Amho. 'Ü`wJrZ H mblSSmV Va X{jU ^maVmV
'\$Xam\$Zm O'rZXmZ XoÊ`mÀ`m àH aUmVyZ `mbm A{YH IVnmUr
KmVbo Jobo Amho. hOmamo EH a O'rZ H i Z H aUmè`m bmoH m\$À`m
Vmā`mV Joē`mZo Y'© Am{U Xod `m\$Mm YmH XmldV nwamofhv dJ©
Ho di daH S CĒnP {'idV Jobm Am{U eoVmV am-Umè`m
bmoH m\$Mo emofU H aV Ambm. Ē`mVhr nwYhm eoVH è||m\$H SyZ
A{YH Mr dgwbr H aUmar Or '\$Sir V`ma Pmbr Vr ga\$Om`Xma
~Zbr. Ē`m\$Zrhr

Amnmnē`m narZo
eoVH è||m\$Mo emofU Ho bo.
ho Ho di `oWoM Wm\$-bo
Zmhr Va ~«÷U dJm©Zo
AmÜ`mpĒ`H kmZmMo EH
nmoH i jol {Z`m©U H v Z,
Ē`mÀ`m AÑí`
X~Xā`mImbr l'mMo
'hîd H 'r H v Z,
l'H ar dJm©bm Jwbm'
Ho bo. Ē`mMm gm'm{OH
Am{U gm\$ñH¥ {VH XOm©hr
g\$nwimV AmUbm. dñVwV:



È`mÀ`m AmYrÀ`m H mimV dji` àhUyZ Amoilè`m Joboè`m
 ì`mnme`lmbmhr H gbm XOm© ZihVm. naSVw È`mS`Zr Ooihm -mjÕ
 AmfU OjZ Y`© ñdrH mam`bm gwédmV Ho br, È`mS`Zm àMSS
 AmfW©H `XV H v Z È`m Y`m³Mm {dñVma H am`bm gwédmV
 Ho br. È`m`wio eyÐ dJ©hr `m Zi`m Y`m©H S AmH {f©V hmoD
 bmJbm. àhUyZ ^{dì`mVrb YmoH m AmoiyZ ~«÷U dJm©Zo
 dji` ì`mnme`lms`Zm Amnbogo H v Z KoVbo. ^y{`hrZ eyÐ dJm©Mr
 Va AÈ`SV ^rfU AdñWm H v Z Rodbr. AWM©V l`U naSnaobm
 bmoH m`V, -mjÕ AmfU OjZ `mSÀ`m Y`m©Mm AmfU VîdkmZmMm
 AmYma Amho. È`mS`Mo Ago EH VîdkmZ Amho, Zmhr Ago Zmhr.
 Vo VmSfîH AmfU ^mj{VH VîdkmZ Amho. naSVw MjVÝ`dmÚmS`Zr `m
 VîdkmZmMr H m`´ OSdmXr àhUyZ hoQmiUr Ho br Amho.
 OSdmXr VîdkmZ ho lao l`H è`mS`Mo VîdkmZ Amho. Vo È`mbm
 H ibo Amho, naSVw Vmo emo{fV Agè`mZo `m VîdkmZmbm `Ü`dVu
 YmaoV ñWmZ {`iV Zmhr, ho AmOMo dmñVd Amho.

`Ü`wJrZ H mimVrb O`rZXmZ àH aUmVyZ Hw `mar O{`Zr
 d{hVrlmbr Amè`m AmfU Zi`m O`rZXmamS`Mm CX` Pmbm. `m
 H mimV ~«m÷UmS`Zm O{`Zr XmZ XoÈ`mMr àWm AfYH JfV`mZ
 -Zbohr nhmd`mg {`iVo. ~«m÷UmS`Zm O`rZ XmZ XoÈ`mMo àH aU
 BVHo à`mdr -Zbo H s, gmYmaUnUo Xoe^a AZoH amOo Amnè`m
 nXar Agboè`m ~«m÷UmS`Zm AmfU nwOm`m³Zm Amnè`m ñdV:À`m
 àfVðogmRr O{`Zr XmZ XoV gwQbo. È`m KQZm BVŠ`m dmTè`m
 H s, AmRi`m eVH mÀ`m Amgnmg bmJdSrlmbÀ`m O{`ZrnjH s
 Odinmg 60% O{`Zr ~«m÷U- nwamo{hV AmfU `SfXa g{`VrÀ`m

Vmã`mV Joë`m. `mVyZ EH Zdm O`rZXma dJ© V`ma Pmbm.
 Am{U eoVH ar, dji` eyDmV TH bbm Jobm. È`m`wio AmRi`m
 eVH MÀ`m eodQr Am{U Zdi`m eVH MÀ`m 'Ü`mV ~«m÷U
 Am{U eyD ho XmoZM dU© 'moRçm à'mUmV Am{U 'moRçm g\$»`oZo
 Cabo. ~mH sÀ`m XmoZ dUm©Vrb g\$»`m AÈ`ën Pmbobr nhmd`mg
 {iVo. H maU i`mnmamMohr à'mU KQV Mmbbobo AmnUmg
 nhmd`mg {iVo. `m g\$X`m©V Ama. EZ. Xm\$SoH a {b{hVmV,

The main features of the feudal system in India may be stated to have been the following: The King granted the revenue from the land to the Brahmanas or to his officers or selected holders. He also granted land in lieu of salaries. In most cases particularly from the Gupta period onwards, the king also surrendered to the grantees police and administrative functions. Usually, grants were made only of arable land. The land was cultivated by peasants, generally Shudras, who were tied down to the land almost completely. They handed over a share to the new land holder. The appearance of a large number of such hereditary intermediaries tended to reduce many of the free peasantry to a semi servile status. According to some scholars, theoretically only the revenue from the land was granted to the feudatory, and not the land itself. A part of the revenue collected by the feudatories was sent to the king. However, the production happened to be usually at the subsistence level. Consequently there occurred a reversion to a kind of closed and self sufficient local economy, a retrogression of trade, and a preponderance of natural economy over money economy(Recent Trends in Indology, 70-71).

O`rZ XmZ àH aU Am{U H a dgwbrMm n[aUm` VÈH mbrZ

g'mOì`dñWoda 'moR çm à'mUmV Pmbobm {XgVmo. `mVyZ
gm'SVemhrMm CX` Pmbm Amho. `m-m-V {d{dY 'V-'VmSVao
Agbr Var hr gaSOM'emhr CX`mg `oÊ`mMr Or {d{dY H maUo
AmhoV, Ê`mñjH s da C,,ol Ho bobo EH H maU 'hîdmMo Amho.
amo{'bm Wmna {b{hVmV, The considerable evidence of royal

grants of land reflects an alienation of rights to land revenue, with the more powerful political authorities investing these rights in those of lesser authority. Grants to Brahmins and to officers created holding of land or villages where the recipients had the right to collect revenue but where not required to pay tax. The Grant could either be of the revenue from the land or, more commonly overtime, of both the land and its revenue. In either case the grantee appropriated the surplus produced by the peasant through rent and labour taxes. The appropriation used the rights invested in the the grantee and did not preclude coercion or the threat of force. The rights and obligations of the grantee in relation to those settled on the land were listed, together with the taxes and revenues which he could collect. In effect, the landed intermediary had immediate authority over the peasant. These changes are said to have concided with a decline in urbanism and trade during this period and up to the tenth century, reflected in the excavation of urban sites (Early India, **443**).

O'rZ XmZ Am{U H a nÕVrÀ`m ~XbÊ`m A{YH mam'wio
gm'm{OH Am{U amOH s` aMZOv ~Xb Pmbobo nhmd'mg
{iVmV. O'rZXma Am{U ~«m÷U `m\$Zm Oo A{V[a° A{YH ma
àám Pmbo, Ê`mVyZ Ê`m\$Zr Ê`m\$À`m ñdV\$ì i`dñWm {Z'm©U
Ho è`m. Ê`mVyZ 'yi amÁ`o Xw-ir ~ZV Jobr. ho O'rZXma

AWdm gm'SV ñdVšì g;Ý` -miJy bmJbo. È`mšÀ`m {ZU©`mV
amOmZo hñVjon H v Z`o, Aem YmaUm à-i -ZV Joë`m.
eoVrda A{YH H a bmXbm OmD bmJbm. 'yi amOmMm H a,
'š{XamMm H a ho Va hmoVoM; našVw È`m-amo-a ñWm{ZH gašOm'Xma
Am{U ~«m÷U È`mšÀ`m gmo`rZo Zdo H a eoVrda bmXy bmJbo.

`mVyZ EH AgšVmof Ogm {Z`m©U Pmbm; Vgm eoVrV am-Umam
'mUyg A{YH M -mhoa TH bbm Jobm. È`mbm eyĐmÀ`m ñWmZr
Omdo bmJbo. Vgm 'yiMm eyĐ A{YH -mhoa hmH bbm OmD Z
Vmo A{VeyĐ AWdm AñnÝí` -Zbm. Va È`mšÀ`mhr nbrH S
MmšSmi Jobm. MmšSmimbm JmdmV OmJm am{hbr Zmhr.

dmaH ar, 'hmZw^md `mšÀ`mhr H mimV hm MjVÝ`dmXr Am{U
OSdmXr hm gšKf© am{hbm Amho. VwH mo-mšMm gJim gšKf©
XwîH mi Am{U `m MjVÝ`dmÚmšer bTÊ`mV Jobm. {edam`mšÀ`m
ñdamÁ`mMr gšH ënZm hr l'UmÀ`m à{VõmnZoMr hmoVr. àhUyZ
È`mšÀ`m amÁ`mVbm gj{ZH hm AY©doi gj{ZH Am{U AY©doi
eoVH ar hmoVm. `m'wioM '. 'w è`mšZr C^m Ho bobo {edam` ho
Hw idmSr ^yfU AmhoV. BšJ«OmšÀ`m H mimV 'hmÈ`m 'w bo BWë`m
eoQOr, ^QOr, bmQOr i`dñWoMr {Ma' mS H v Z eoVH è`mÀ`m
emofUmMr Zo'H s {M{H Ègm H aVmV. `WmdH me Xoe ñdVšì
Pmbm. '. JmšYtÀ`m lwZmZšVa -hpVmše ~«÷U dJm©Zo Jmdo
gmoSbr. Amnë`m eoVrdmSr {dHy Z QmH è`m. Va JmdmV am{hbobo
~mH s gJio dVZXma ñdmVšì`môlma ^maVmV ghH mamÀ`m 'mÜ`mVyZ
amOH maUmV pñWa Pmbo. àhUOo 'Ü`wJrZ H mimnmgyZ Á`mšZr
O{Zr Vmã`mV KoVë`m È`mšZr Amnbm h, gmoSbm Zmhr. È`m

O{‘ZrÀ`m ~imda Zì`m ì`dñWoV gîmm ~iH mdè`m.
H moUË`mhr JmdmMm ^m;Jmo{bH ZH mem nm{hbm Va JmdmÀ`m
H SoÀ`m gJù`m gwnrH O{‘Zr àhUOo ~mJm`V ‘io ho
Hw bH Uu, OhmJraXma, nmQrb `m\$Mo am{hbo AmhoV. ‘hgwr
XáaM È`mSÀ`m Vmā`mV Agè`mZo È`mSZr øm ‘moŠ`mÀ`m O{‘Zr
~iH mdyZ Jar- eoVH è`mSZm {Oam`V O{‘ZrÀ`m v nmZo ‘yi
JmdH| ðnmngyZ bms- Rodbo. È`mSZm HemVM ‘ma dmQm {‘iy
{Xbm Zmhr. X{bVmSZm Va ZmnrH hmSH s hmSdio ~hmb Ho bo.
ho Oa ‘hîdmMo ZihVo Va ^yXmZ Midi AmH mabr ZgVr.
Hw iH m`ÚmSZr OY’ KoVbm ZgVm. H m±J«ogÀ`m v nmZo gîmoV
Ambobm dJ© H m`‘`m gJù`m KSm‘moStMm gmjrXma Am{U
bm^mWu Pmbm. eoVH ar, H iH ar, X{bV Ho di CnojoMm YZr
Pmbm.

Zohv \$À`m nmM H b`r {dH mg H m`©H« ‘mV\$J©V eoVH è`mSZm
Y`m` XoË`mgmRr ‘hmami`mV ghH mamMo Omio {Z`m©U Pmbo.
YaUo C^mabr. ~±H m C^maè`m. {Oëhm n[afXm, n\$Mm`V g{‘È`m,
‘mH} Q H {‘Qçm {Z`m©U Ho è`m. qgMZ Ambo. gîmoMo {dH| ðrH aU
Pmbo. OJÊ`mMm ñVa CSMmdÊ`mMm à`EZ Pmbm. H mhr à`mUmV
{Mì ~Xbbohr, Zmhr Ago Zmhr. nU hr gJir jolo PnmQçmZo
^«j ~ZV Jobr. ^y{‘nwîM eoVH è`m\$Mo emofU H v bmJbo.
Xaa`mZ bmoH g\$»`m dmTV Jobr. AmYrM H ‘r Agboè`m
O{‘ZrMo {d^mOZmZo A{YH VwH S Pmbo. Aën^yYmaH eoVH ar
hr ZdrM O`mV OY`mbm Ambr. XwîH mi, Zm{nH s `m`wio
ASMUrV Agboè`m eoVH è`mSZm H gè`mhr ‘mbmÀ`m ^mdmMr

h`r amøbr Zmhr. EH Va {nH V ZihVo Am{U {nH bo Va
 {dH V ZihVo. `mbmbm ^md {`iV ZihVm. AWm©V AmOhr Vmo
 {`iV Zmhr. Xadoir ñdm{`ZmWZ Am`moJmda `Vo `mJUmar
 `SSir amOH maUmV {ZdSyZ Ambr H s, Vmo Am`moJ JwSSmiyZ
 RodVmV. `mbm gJioM nj O~m~Xma AmhoV. AmSVrVrb
 i`mnmar, IV Am{U {-`mÊ`m\$Mo i`mnmar Ê`mSZm bwQV amhVmV.

`m gšnyU© emofUmbm ZH ma XoÊ`mgmRr `amRdmSçmV eoVH ar
 Midi C`r am{hbr. `m MidirZo BVŠ`m doJmZo eoVH è`mSZm
 Amnë`m H doV KoVbo H s, hr Midi `hmami`^a ngabr.
 eoVH è`mSZm Ý`m` {`idyZ XoUmar Am{U Ê`mSÀ`m àiZmbm dmMm
 `moS Ê`mgmRr añÊ`mda CValUmar, OobÀ`m dmè`m H aUmar
 MidirVbr `SSir eoVH è`mSZm Amnbm AmYma dmQm`bm
 bmJbr. Va XwgarH S o `mŠg©À`m {dMmaYmaoVyZ AmH mambm
 Ambobr H m`Jma Midi gm`mÝ` H m`Jmam\$Mo àiZ KoD Z
 `jXmZmV CVv Z g`VoMr Zdr `mSSUr H aV hmoVr. {VgarH S
 dmaH è`mSMr g`Ýd`dmXr Midi Amnë`m narZo eoVH ar,
 H iH è`mSZm Amnë`m AmñWoÀ`m i`yhmV KoD Z H mhr EH
 n[adV©Z H v nmhmV hmoVr. EH m nmVirda ~XbVo amOH maU
 Am{U Xwge`m ~mOybm `m n[adV©ZdmXr Midir `mSÀ`mVrb
 gŠKf© hm "VgZg" `m H mXS-arMm H|Đq-Xy Amho. ñdmVŠí`molma
 ^maVmVrb EH `moRm i`mnH nQ VgZg AYmoaoplV H aVmZm
 {XgVo

Amgmam` bmo`Q `mSMr eāX npābHo eZH ŠyZ àH m{eV
 Pmbobr hr H mXS-ar l`U našnaobm COMJa H arV l`mMr Zdr

n[a^mfm 'm\$SVo. eoVH ar, H iH ar MidirMm EH 'moRm nQ
 CbJSyZ XmldVo. OmJ{VH sH aUmÀ`m Qßß`mda AmH mambm
 Amboë`m eoVH ar Am{U H m'Jma MidirÀ`m Cä`m-AmSì`m
 NoXmgh È`mSÀ`m `emn`emMr {M{H Ègmhr hr H mXS-ar H aVo.
 EH m eoVH ar Am\$XmobZmdoir nmobrg Jmoir-ma H aVmV Am{U
 È`mV EH m VéUmMm 'YË'y hmoVmo, `m KQZoZo hr H mXS-ar gvw
 hmoVo. ^mñH aamd bw\$Jmao, Zm'm, am' `mSÀ`mgh eoVH ar g\$Kf©
 g{'VrÀ`m AZoH H m`©H È`m^Zm AQH hmoVo. -arM df} IQbm
 MmbVmo, g{'Vr Vmo IQbm MmbdV amhVo. nU Midi Wm\$-V
 Zmhr. Á`m ^mD gmho- 'hmOZ `mSZr hr Midi C^mabr
 hmoVr, Vo ñdV...bm {dÇb g'OyZ dmaH arv nr H m`©H È`mCÀ`m
 H mZmV Omo àmU Vo 'w\$ H VmV, È`m'wio AZoH H m`©H V} V'ma
 hmoVmV. È`m\$Mo A{YdoeZmVbo {dMma 'hîdmMo AmhoV, Vo
 àhUVmV, ElmÚm dmarbm Omd\$ BV\$`m ^{° ^mdmZo Vwàhr BW\$
 AmbmV. ^mH ar JmRrer -m\$YyZ CÝhmVmÝhmM\$ AZdmUr Am{U
 H gè`m Var AmoTrZo 'mUg\$ ' ° qXSrV `oVmV. H mb Ooìhm 'r
 'mÀ`m NmVrda eoVH ar g\$Kf© g{'VrMm {-„m bmdbm Voihm
 CamV EH A{^`mZmMr H ■ XmQyZ Ambr. AmVmhr Vw'À`m
 AZoH mSÀ`m NmVrda 'bm hm {-„m {XgVmo`. Vmo Vwàhr Ho di
 NmVrda Zmhr Va H miOmda H moabm`. Am{U Amnè`mVb\$ ho
 Oo {-ëë¶mM\$ ZmV\$ Amho Vo a° mÀ`m ZmÈ`mnojmr loð Amho.
 eoVH è`mÀ`m Xm[aĐçmMo H maU XjdmV, Z{e-mV Zmhr Va Vo
 gaH maÀ`m YmoaUmV Amho ho AmnU gm\$Jm`bm gwédmV Ho br
 Am{U gJù`m VÁkmSÀ`mhr SmoŠ`mVbm ASYma Xya Pmbm.

Amnë`m eoVH ar g\$Kf© g{‘VrMo H m`©H V} ^ë`m ^ë`m
 VÁkmSZmhr hadVrb BVŠ`m AmĚ‘{dídmgmZo -mobm`bm bmJbo.
 Á`m AmoTrZS Vwåhr BWS AmbmV, ‘bm Va dmQVS hr g‘moaMr
 gmar JXu OUy M\$D^mJoÀ`m dmid\$QmV O`m Pmbr Amho. Am{U
 Oam ^yfUmMS dmQob, AmĚ`ñVwVrMS dmQob, nU ‘bm H mhr
 jU H m hmoB©Zm...‘r {dÇb Amho. Ag\$ dmQb\$. ‘r Ajae...
 ^v Z nmdbmo Amho (30).

Aem `m {dÇbmZo C^mabobr hr Midi AZoH H m`©H Ě`m^Zr
 n[anyU© Pmbr. Ě`mSZm Amnë`m àiZmSMo ^mZ `oD bmJbo.
 "eoVH è||mÀ`m nmoamZo Zmhr Ho bm noam Va Vwåhr H m` lmb
 Yîmwam?" ñdamÁ` {‘idm`MS` AmçXm åhUyZ H ma^maUr gmoSbm`
 Y\$Xm', "Am'Mo ^mD M\$DmMr H moa, ~mH s gJio ham`lmoa'
 Aem KmofUm\$Zr OY' KoVbm. AĚUm ^mD gmR `mSÀ`mZ\$Va ho
 gaH ma Amnë`m am-Umè||mSÀ||m H ĩmda nmogbob\$ Amho, `mMo
 ^mZ `m MidirZo {Xbo. Amnë`m ñdmV\$Í`mMm Zdm gy`© Cjdvmo`
 Aer YmaUm ~i Yv bmJbr. Ě`m'wio hOmamo H m`©H V}
 Am`wî`^a añĚ`mda CVéZ eoVH è`mSÀ`m àiZmgmRr Am\$XmobZ
 H arV amhVmV. h`r^md Agmo, H O©dmQn Agmo, ~±H dgwbr
 Agmo, HŸ fr {dUmnrRmMr Ho di {ZîH« s` {Xlmdy{Jar Agmo.
 ‘mH} Q H {‘QrH SyZ hmoUmar H nmV Agmo, H mnyglaoXr Agmo,
 Xmé-\$Xr Agmo AWdm Zg-\$Xr {OWo eoVH ar àiZ {VWo ho gJio
 H m`©H V} hOa amhÿZ àiZ gmoSdĚ`mgmRr PQV amhVmV. AŸydoeZo
 KoVmV. eoVH ar, H m`Jma X{bV dJm©Mo ì`° JV àiZ
 gmoSdĚ`mgmRr PQVmV. Va éñVw` glđYa hm H m`Jma, h`mb,

X{bV àiZm\$da WoQ Am\$XmobZo H arV, H m' H aV amhVmo. {ldoUr-mB©
H sV©Z- àdMZmÀ`m 'mÜ`'mVyZ Va H Yr WoQ añÈ`mda CVv Z
{ò`m\$À`m àiZm\$Zm dmMm ' moSVo. Km'mbm Xm' 'mJy bmJV©.
Xmé-\$XrgmRr H m' AmJ«hr amhVo. Vr gVv {ò`m\$Zm -amo-a
KoD Z bTV amhVo.

ho gJio EH m {d{ei {XeoZo {ZKmbobo AgVo. H mhr àiZm\$Mr
VS bmdbr OmVo. 'w»`'šlr Agmo H s, AmUlr Hw Ur; Hw Umerhr
hr Midi XmoZ hmV H v bmJbr. È`m\$Zr Ho di h'r^md
'm{JVbm Zmhr Va KoVbobo H O© ^v gwÕm ZH m Agm A{bpIV
' VdmM H mTbm. Voihm H mhr ZmoH aXma È`m\$Zm {dMmam`Mo,
Vwähr hr H O© -wSdÈ`mMr gd` eoVH èlmbm H m bmdVm?
È`mda am' Am{U Zm'm `m\$Zr {Xbobo Cîma 'hîdmMo Amho. Zm'm
âhUVmV, H nmVrÀ`m ZmdmImbr gaH maZ\$ BVH\$ bwQ b\$`
Amâhmbm, H s, Am'MoM nigo È`m\$À`mH S\$ {ZKVMv. eoV'mbmÀ`m
-mOma^mdmV Va gaH maZ\$ Amâhmbm Ajae... ZmJd\$ Ho b\$`.
BVHo nmSyZ ^md RodboV...È`mV AmOda Am'M\$ {H Vr ZwH gmZ
Pmb\$` `mMm {dMma Ho bm` H m H Yr. Am'À`mH SyZ drO{-b
dgyb H aVm...AmR-AmR Vmg eoVmV bmB©QM ZgVo. {d{harV
nmUr AZ² {nH mMm hmVmVm|Smer Ambobm Kmg AgVmZmhr ho
nmUr XoVm `oV Zmhr. Cä`m {nH mMr amlam\$Jmoir hmoVo `mbm
O-m-Xma H moU? Am'À`m {d{hardaÀ`m 'moQam OiVmV. ZmhH
^wX³s hmoVmo. Vmo H moUr ^v Z Úm`Mm? Amâhmbm Am'M\$ gaH ma
AmUm`M\$, Á`mV Amâhr 'mbH Agy...AmO Amâhr Jwbm'
AmhmoV. Vwâhmbm dmQV\$ Zm eoVH ar H moUVmhr H a ^aV ZmhrV.

Amâhmbmhr dmQV\$ gÝ'mZmZ\$ H a ^amdm, H aXmÈ`m\$À`m `mXrV
 Amnb\$hr Zmd Agmd\$ nU AmYr CÈnP Va {Xgmd\$ Zm. CÈnP
 {Xgy bmJb\$ H s, Amâhr H a ^v . È`m'wio gaH maZ\$ AmVm
 Amâhmbm H mhr 'mJy Z`o. Am'M\$ ^b\$ H aÈ`mÀ`m Jmoir H v
 Z`oV, ' ° Am'À`m Camdv Z CRmd\$. gJir XoUr XâVamdV Z
 ImoSyZ QmH mdrV AZ² { ' Qb\$ âhUmd\$...(53). Aer {-ZVmoS
 Cîmao XoD Z hr '\$Sir AZoH m\$Zm JbH H aV AgVmV.

`m gJù`m bTçmMo ZoVYÈd ^mD gmho~ 'hmOZ Am{U
 bú'U {Zag H aV AgVmV. Va ^mñH a, Zm'm, am', éñVw',
 {IdoUr-mB@ ho H m`©H V} Amnè`m KamXmamMr ndm© Z H aVm
 l'Umè`m g'mOmgmRr àÈ`j 'jXmZmV CVv Z H m' H aV
 AgVmV. È`m H m'mV Zm'm Amnbo b³/4M {dgv Z Jobm Amho.
 am'bm eodQr VmoQçmV MmbUmar JmoXmdar qàqQJ àog -\$X
 H amdr bmJbr. h'mbm\$À`m àiZmdv Z éñVw' OrdKoÈ`m
 hëë¶mVyZ dmMVmo. {IdoUr-mB@bm Amnbo Jmd gmoSmdo bmJVo.
 hr gJir '\$Sir Amnè`m H m`m©VyZ gd©hmam bmoH m\$Mo OJUo
 COmJa H aVmZm, emñÈ`m g'mOmMo {nVi gVV CKS nmSV
 amhVo. bmoH m\$Zm Ý`m { 'idyZ XoÈ`mgmRr Vo YSnSV amhVmV.
 eoVr hm ^maVmÀ`m AW@i`dñWoMm H Um Amho. na\$Vw {VÀ`m
 àiZm\$Mr gmoSdUyH H moUr H aV Zmhr. ~Xm'amdgmalO Am'Xma
 gJù`m gñWm Amnè`m Vmā`mV RoD Z eoVH è`m\$Mo emofU
 H aVmV. È`m\$À`m 'm'mMm 'wbJm AgyZhr am' Am`wî`^a
 ~Xm'amdm\$À`m {damoYmV C^m amhÿZ eoVH è`m\$gmRr bTV amhVmo.
 H O©dgwbrbm Ambobo ~±H A{YH mar nmhÿZ H UJrV bnyZ

-gUmè`m -mnMÀ`m Smoù`mV nmhÿZ Am`wî`^a b¾ Z H aVm
 Midirbm dmhÿZ KoVbobm Zm`m `m H mXS-arV ^oQVmo. Va EH m
 Zmam`U Ywio ZmdmÀ`m EH m X{bVmZo JmdmV O`rZ {dH V
 KoVbr âhUyZ È`mMo Smoio H mTbo OmVmV. È`mbm O{`ZrMm
 H ãOm {`iy {Xbm OmV Zmhr. AmÈ`hÈ`m H aUmè`m VéU
 eoVH è`mÀ`m Hw Qw\$-mbm H gbr `XV {`iV Zmhr. AmSVrVrb
 h`mb Amnè`m h, mMo H m' `mJVMV âhUyZ È`mSZm éñVw'
 ZmdmÀ`m È`mSÀ`m ZoÈ`m\$gh H m|SyZ `mahmU Ho br OmVo. Zmam`Uamd
 YwioÀ`m KQZogSX^m©V éñVw`Zo Zm`mbm {b{hbobo nì `hîdmMo
 Amho. Vmo È`m nîmV âhUVmo, XmXm, VwÂ`m Vm|SyZ `r Zoh`rM
 EoH Vmo H s, eoVr nadSV Zmhr âhUyZ. eoVrY\$Xm àM\$S H QH QrMm
 Am{U AmV-Q²QcmMm Amho ho `bmhr `mÝ` Amho. `J ElmÚm
 Xw-ù`m `mUgmZ\$ eoVr KoVbr Va Vo ghZ H m hmoD Z`o? Vmo
 Amnè`m -amo-arMm hmoVmo` Ag\$ dmQV\$ H m `mV? O`rZ hr
 H gyZ OJÊ`mM\$ gmYZ Amho H s, à{VðoMr Jmôï? Zmam`Uamd
 Ywio `mSZm Oa Vy H Yr ^oQbmG Va Vwbm hOma B\$Jù`m Sgè`mMr
 doXZm hmoB©b Or `r gÜ`m AZw^dVmo`. OUy N\$na CSyZ Joboè`m
 Am{U AmOw-mOyZ {ZdSw\$JmM\$ ~Z Agboè`m {RH mUrM AmnU
 amhmVmo AmhmoV Aer `m Hw Qw \$-mMr ^mdZm Amho. ^rVrMm
 JmaRm ^v Z am{hbm` È`m lmonQmV. `m Hw Qw\$-mbm nwÝhm È`mM
 JmdmV gÝ`mZmZ\$ OJVm `oB©b? ghOmghOr hr `mUg\$ eoVr
 H gy XoVrb È`mSZm? Zmam`UamdM\$Mo Smoio H mTUmao AOyZhr
 `moH mQ H go? H moUmMr nmRamIU AgUma È`mSZm? nmobrg
 È`mSZm H Yr HaVrb Ooa~\$X? nwT IQbm ZrQ C^m amhrb?

AmamontZm {ejm hmoB©b? (90). `mVrb eoVr hr H gyZ OJÊ`mMr
H s, à{VðoMr JmoîQ Amho, hm Omo àiz H m`«oS éñVw' {dMmaV
Amho, Vmo AÊ`SV `hîdmMm Amho. eoVr hr Ho di OJÊ`mMo
gmYZ Zmhr Va Vr à{VðoMr ~Zdbr Jobr, Ê`mbm hOmaoH df©
Pmbr. O{`Zr `w H Q XmZ {`iÊ`mVyZ O`rZ hoM à{Vðm Am{U
gŝnîmr `moOÊ`mMo gmYZ ~Zbo Amho. Vo AmOhr ~Xbm`bm
V`ma Zmhr. âhUyZ X{bVmZo JmdmV KoVbobr eoVr AZoH mŝZm
MmbV Zmhr. Á`mŝZr Zmam`Uamd Ywiobm Jmdm-mhoa H mTbo, Vo
Amamonr ghm dfm³Mr {ejm ^moJyZ naV Amè`mda COi `mì`mZo
Jmd^a {` v Z Ê`mbm Amâhr H er Jmd-ŝXr Ho br ho gmŝJV
amhVmV. `mVyZ hr V`ma Pmbobr `Ü``wJrZ `mZ{gH Vm Amho,
Or AmOhr ~Xbm`bm V`ma Zmhr. à{Vðm Am{U eoVr Ago
EH g`rH aU ~Zdbo Joè`mZo AZoH eoVH ar H Om©noj m à{Vðo
hm` ImD ZM AmÊ`hÊ`m H aVmV. Ê`m`wio AmOÀ`m eoVH ar
AmÊ`hÊ`o`mJo Ogo l`mMo Ad`yè`Z Amho, VgoM Vo gaŝOm`r
`mZ{gH VoMohr EH H maU Amho. Ê`mŝÀ`m l`mMo `mobhr Ho bo
OmV Zmhr. Ê`mŝÀ`m OJÊ`mÀ`m VîdkmZmMr gVV qQJb Ho br
OmVo. ho {Mì AmOhr ~Xbbobo Zmhr. AZoH {gZo`m, H bm,
ImOJrVè`m Jŝnm `mŝVyZ ho {XgyZ `oVo. MjVÝ`dmŰmŝZr V`ma
H v Z R odbobr hr `mZ{gH Vm ~XbV Zmhr. Vr Ho di
CfdJu`mŝMr ~Xbbr Zmhr Ago Zmhr; Va eoVH èŵmŝMrhr Vr
~Xbbr Zmhr. `mV Vmo ^aSyZ {ZKV Amho. Á`mŝZr OrdnmnS
H i KoD Z hr Midi `moRr Ho br Ê`m bú`U, ^mñH a, am`,
Zm`m `mŝZm eodQr AdhobZm dmQçmbm `oVo. VéU eoVH èŵmŝMr

nmoaš àVrH mĒ'H AmŠXmobZ H aUmèŋm IV XwH mZXma glmam' ^mD
 YmZmoaH a, ^mJMŠX nmolaXmg, eemŠH YmZmoaH a Aem nmoemlr
 'Ü' 'dJu' MjVÝ' dmÚmŠÀ' m ZmXr bmJVmV. hr 'ŠSir Amnbm
 H moUVmhr YŠXm KmQçmV H arV ZmhrV. Ho di {Xlmdy{Jar H aV
 Ivo, ~r-{~' mUo XwßnQ ^mdmZo {dHy Z dfm©À' m eodQr CYmar
 Ho è'mMo ZmQH H arV eoVH èŋmbm bw-mSV amhVmV. hrM
 'ŠSir VéU H m' ©H Ē' m^Zm hmVmer Yv Z àXoemÜ' j bú'U
 {Zag `mŠÀ`mda ^a g^oV h,,m KSdyZ AmUVmV Am{U Midi
 hm'O'H H aĒ`mMm àĒZ H aVmV. Ē'mV Vo `ēndrhr hmoVmV.
 ZŠVaÀ'm H mimV glmam' H mnyg n[afX ^adyZ Á'm d,,^XmgZo
 éñVw`da OrdKoUm h,,m KS dyZ AmUbobm AgVmo. Ē'm
 d,,^XmgÀ'm hñVo n[afXoMo CómQZ Ho bo OmVo. hoM ^mJMŠX
 ZŠVa ^mD gmho-mšgmRr H gbm Var `k KSdyZ AmUVmV.

Aem gJù`m nmíd©^y'rda am' ~Xm'amd {déŌ
 Am'XmaH sbm C^m amhVmo, Va Ē`mbm ' ° 1800 'Vo {iVmV.
 Va {edgoZoMm ' mQH m gmdSV ZmdmMm H m' ©H Vm© ~Xm'amd {déŌ
 {ZdSyZ `oVmo. AWm©V 1995À'm Xaà`mZ {edgoZoZo 'amRdmSçmV
 Omo 'moRr 'wgŠSr 'maV àdoe Ho bm Ē`mbm {VWè`m JmoaJar-
 eoVH ar, H iH ar bmoH mšMm {'imbobm AmYma hmoVm. hr AmnbrM
 nmoaš Amnbm VmaUhma ~ZVrb Ago EH {Mì Ē`m H mimV
 {Z'm©U Pmè`mZo H m±J«ogMr nrNohmQ Pmbr. nU Vo ñdßZM
 amøbŠ. eoVH ar gŠKf© g{'VrZo Amàhr amOH maUmV CVaUma
 Zmhr Ago AmYrM Omhra Ho è`mZo am'bm 'Vo {iĒ`mMm àiZ
 ZihVm. Varhr 1800 bmoH mŠZr Amnè`mbm 'VXmZ Ho bo Amho.

Amnë`mda BVŠ`m bmoH m\$Mm {dídmg Amho, Voihm AmnU H m' H am`bm hdo, Ago 'Zmer RadyZ Zm'm Am{U am' MidirV gH«s` amhVmV.

nU Ē`m\$À`mM JmdmV EH m -jRH sV Ooihm àXoemÜ`j bú`U {Zag `m\$À`mda h,,m hmoVmo, Voihm 'mì Vo C{Ů¼ hmoVmV. Á`m nmoam\$Zr Ē`m\$À`mda hmV CMbbm Am{U ^mJMSXgma»`m 'mUgm\$Zr Á`m\$Zm nmRrer KmbyZ gnmoQ Ho bm Ē`m\$À`mda H madmB© H amdr, `m hoVyZo ho XmoKohr AmYr g\$Kf© g{`VrÁ`m àXoemÜ`jm\$Zm ^oQVmV. nU Vohr {Zame Pmbobo AgVmV. am', Zm'mMr g'OyV H mTVmZm Vo àhUVmV, dmB©Q dmQyZ KoD ZH m. ho H m` ' ° Vw`Á`mH SoM KSVŠ` Ag\$ Zmhr AZ² Amnë`m g\$Kf© g{`VrVM KSVŠ` Ag\$hr Zmhr. Aem 'mUgm\$Mm W`W`mQ Am{U àĒ`jH m' H aUmè`m 'mUgm\$Zm Ē`m\$À`mH SyZ hmoUmam Ìmg `mV ZdbH mhrM Zmhr. `mMr gJir aMZm AmYr Rabobr AgVo. Aem 'mUgm\$Zm ~i nwa{dUmar 'mUg\$hr AmnbrM AgVmV, Ē`m{edm` H m Aer lwir 'mUg\$ Z\$Jm ZmM KmBVmV. AmVm Ē`m\$Zm lwiš Var H g\$ àhUmdš. AmnU 'mì Amnbš H m' H aV amhmdš (254). `m ĈmamVyZ H m` g'Om`Mo Vo g'OyZ KoD Z Vo XmoKo `WmdH me Vo ^mD gmho~ 'hmOZ `mZm ^oQm`bm OmVmV. Xaà`mZ Vo emgH s` g{Ē`m\$Mm ' m`Xm KoD Z ~gbobo AgVmV. Ho g, XmTr dmTdyZ JmoXoMr n[aH«`m H v Z Ambobo AgVmV. ñdV... ^mD gmho~ Or {Zadm{ZadrMr ^mfM H aVmV, Vo nmhÿZ ho XmoKohr H mob`SyZ OmVmV. ^mD gmho~ àhUVmV, AmVm `r ñdV...M g{`VrVyZ A\$J H mÿZ KoVmo`. ' ° OmhranUmZo hr {ZdŸImr

Kmo{fV H aVm `oV Zmhr BVH\$ M. Vg\$ Va H YrH Yr eoVH ar
 g\$Kf© g{‘VrM {dg{O©V H amdr, ~almñV H amdr Ag\$ dmQV\$,
 nU AZoH m\$Zm Vo éMUma Zmhr. ‘mPr JaO AmVm g\$nbobr
 Amho. Á`m\$Zm H m’ H am`M\$, È`m\$Zr H amd\$ Am{U `m H m’mV Oa
 H mhr ASga `oV AgVrb Va Vo AmnUM Xya H amdoV. hr
 H mhr H\$ nZr Zmhr qH dm ‘r Hw Umbm àÈ`oH {OëømgmRr
 ’«| Mm`Or AWdm {Sbaern {Xbobr Zmhr. g{‘VrMm {~,m
 NmVrda Agbobm àÈ`oH OU Bw\$ ZoVm Amho. eoVH è`m\$À`m
 Xw...ImM\$ Oo {ZXmZ ‘bm Pmb\$ Vo ‘r Vwåhm gJù`m\$g’moa ‘m\$Sb\$.
 Ouy ‘mP\$ AdVmaH m`©M g\$nb\$ Amho, Ag\$ ‘bm dmQy bmJb\$`.
 `m {dYmZmMo {díbofU H aUmao Oo nì jragmJa d{H bm\$Zr
 Zm’mbm {bhÿZ {Xbobo hmoVo, Vo ‘ma ‘hîdmMo Amho. È`mV Vo
 àhUVmV, àXoemÜ`jm\$da Pmboë`m hëëllmda ^mD gmho~ H mhrM
 H m ~mobV ZmhrV? È`m\$À`mVè`m {dÇbmbm ~Si`m\$Zr H m|Smio
 KmVbo Amho H s, {dÇbmMrM Ver H mhr BÀNm hmoVr, `mMm
 ZrQ {dMma H am. øm ASJmZo Ooihm Zm’m {dMma H am`bm
 bmJVmo, Voihm È`mbm AZoH àiZm\$Mr Cîmao gmnSy bmJVmV.
 È`mgmRrMm nwTrb CVmam ‘hîdmMm Amho. Zm’m\$Zm nwÝhm nwÝhm
 àiZ nSy bmJVmo. ElmXm ‘mUyg BVH m H gm ~XbVmo?
 eoVH è`m\$À`m OJÊ`m’aÊ`mÀ`m àiZm\$Zm gmoSyZ WoQ AU`mÈ`mV
 H gm H m’ {ev eH Vmo? nm`r Xodi\$ hpSH V qhSy eH Vmo? ho
 H m’ Amho Zo`H\$. AmYr `m gJù`mM Jmoir `m ‘mUgmgmRr
 {’ Oyb hmoÈ`m. ho gma\$ Vwåhmbm Omù`mV ASH dÊ`mgmRr
 Amho, Vw`À`m àiZm\$nmgyZ Vwåhmbm Xya ZoUma\$ Amho. Xm[adÇmMm

àiZ gwQbm àhUOo Vwàhmbm 'mUgmgmals OJVm `oB@b. XodY'm©Mo
 H m|sdmS ho 'mUgmbm ~{Ya H aÊ`mgmRr AmhoV. AgS `m
 'mUgmZS gms{JVbS àhUyZM Va ^mD gmho~ gdm©nojm doJio
 dmQbo. H Yr H mir H aH arV AW©emó g'OmdyZ gmsJUme`m
 `m 'mUgmMS AmOMS v n {H VrVar doJiS Amho. emofUmMr
 'mSSUr HaUmao, eoVrVè`m bwQrÀ`m MmoadmQm CKS HaUmao
 ^mD gmho~ Am{U AmOMo ^mD gmho~ `mV O`rZ Añ'mZMm
 ' aH Amho. AmnbS ZmVS hmoVS Vo AmYrÀ`m ^mD gmho-mSer...AgS
 Zm'm nwÝhm nwÝhm OmoaH gnUo am`bm g'OyZ gmsJV hmoVo. am'
 àhUmbm, AmVm `r ho gJiS EoHy Z KoVbS`. 'bm nQbS` gwÕm.
 'bm ' ° BVHS M g'OmdyZ gmsJ, ~Si`mSMS H m|SmiS {dÇbm^modVr
 Amho. È`mVè`m H mhtÀ`m Hw amnVr Zoh`rgmRr gvw AgVmV
 Am{U È`m ' ° Amnè`mM ^mJmV qH dm n[agamV AmhoV
 AgŠhr Zmhr. gJirH SoM ho ~Sdo {XgyZ `oVmV. dmaH è`mSZm
 `m ~Si`mSZr Joè`m H mhr dfmªV àMSS Ìmg {Xbm`. È`mSMm
 CÀNmX dmTV AgVmZm {dÇbmZo ' ° H 'aoda hmV RoD Z 'm;Z
 H m YmaU H amdS. `m'mJMS H maU H m`?...{dÇbmMr M,
 ~Si`mSZm 'y g. àhUOo ~Si`mSÀ`m H Qmbm {dÇbmMm Amerdm©X
 ho EoHy Z gmè`m ASJmMmM XJS Pmè`mJV Zm'm {ZiMb -gbo.
 SmoŠ`mV 'wš½`mSMr amSJ Mmbbr Amho. È`m Hw RyZhr -im-im
 -mhoa nSV AmhoV. Agm ^mg Zm'mSZm Pmbm. ~Si`mSZm {dÇbmMr
 'y g Agob ho ghOmghOr 'mÝ` H am`bm 'Z V`ma hmoV
 ZihVS. Oo KSyZ JobS` Vo ñdrH mam`Mrhr 'ZmMr V`mar hmoV
 ZihVr. AgS H gS àhUVmog, AmnU OÝ`mbm KmVbobr Jmoï

Aer b`mbm OmV AgVmZm, {VMo gVam VwH S hmoV AgVmZm
 Hw Rë`m 'mUgmbm -aš dmQob? Zm'mŠZr am`bm {dMmabš. Vmo
 àhUmbm, àhUOo øm gJù`m eoVH ar gšKf© g{'VrÀ`m
 nSPSRà`m H mimV ^mD EdT {Z{d©H ma H go `mMm Vy {dMmaM
 Ho bobm {XgV Zmhr. {XgVŠ Va VgŠ nU 'r `m-m-V H Yr
 Imobda OmD Z {dMma Zmhr Ho bm. Zm'm àhUmbo. ho -K.
 -è`mMXm AmnU ElmXr Jmoï Ord bmdyZ V`ma H aVmo. Vr
 ghOmghOr Xwge`mÀ`m hmVr Úmdr dmQV Zmhr. g'Om Oo
 'bm H moUmH SyZ dmagm h, mZo {'imbš Zmhr Vo 'r Xwge`mbm
 H m Úmdš? È`mnoj Amnë`m ZOaog'moaM È`mMr g'már hmoV
 Agob Am{U H moUmH SŠM È`mMr 'mbH s OmUma Zgob Va
 -ašM` H s. Vwbm AOyZ Oam gmonš H v Z gmšJVmo. bhmZ nmoaš
 g'wD{H Zmè`mda dmiyMm {H „m V`ma H aVmV. {Xdg^a lnyZ,
 Km'mKy' hmoD Z È`mŠZr Vmo Ho bobm AgVmo. {Xdg 'mdiVmo.
 Kar Om`Mr KmB© Pmbobr AgVo. Aem doir È`m {H ëë¶mbm
 bmW 'mv Z, 'moSyZ Ka JmRUmaohr H mhr AgVmV. eoVH ar
 gšKf© g{'Vr àhUOo Vmo dmiyMm {H „m Am{U ^mD gmho~
 'hmOZ àhUOo Vmo bhar nmoaJm. Agš hmoD Z -gbš`. `mV
 AmnU {H VrhR PwaUr bmJbmo Var Cn`moJ H m` È`mMm?
 nmoambm dmQbš {Xdg^a lnyZ MmšJbm {H „m V`ma H v , È`mZš
 Ho bm. 'moSyZ QmHy dmQbm.. 'moSbm. (275-76).

Ooïhm ElmXr Midi VîdkmZ Zgboë`m ^wg^werV nm`mda
 C^r amhVo Voïhm Vr Her gšnwimV `oVo `mMo Oo {ddoMZ hr
 H mXš-ar H aVo, Vo 'ma 'hîdmMo Amho. Or Jmoï ZmH mv Z hr

Midi C^r Ho br OmVo, È`mM Jmoï tÀ`m Amhmar OmD Z
 Midi 'moSrV H mTÊ`mMr 'mZ{gH Vm hr H m` Xe@dVo, `mMm
 {dMma H v bmJVmo, Voihm nwÝhm hm MjVÝ`dmÚm\$Mm gvw Agbobm
PJS Amnë`m bjmV `oVmo. H mhrhr Pmbo Var gylø Amnë`m
 hmVr Rodm`Mr ho Oo ga\$Om`r Am{U ~«÷U gyl Amho, Vo `mhr
 MidirV H go H m` HarV hmoVo, ho ^mD gmho~, glmam',
 ^mJMSX `m\$À`m dV©ZmVyZ {XgyZ `oVo. Midi C^r H aVmZm
 XodY© ZmH maUmè¶m ^mD gmho-m\$Zr Oa ZrQnUo Amnbo VîdkmZ
 AmH mambm AmUbo AgVo Am{U È`mbm l'U na\$naoMr OmoS
 {Xbr **AgVr** Va hr Kwglmoar **Qibr AgVr** H m? Agm àiZ
 CnpñWV H am`bm OmJm Amho, nU Oa {dÇbmbmM Oa H mhr
 ZH mo Agob Va H m` H aUma? Agmhr àiZ hr H mX\$-ar C^m
 H aVmZm {XgVo.

È`mM-amo-a hr H mX\$-ar 'm\$g©À`m VîdkmZmMrhr {M{H Ègm
 H aVmZm {XgVo. Amgmam`Mr hr H mX\$-ar Ho di BWo Wm\$-V
 Zmhr, Va Vr AmOÀ`m OmJ{VH sH aUmZo gJù`mM Midir
 H em 'moSrV H mTÊ`m AmhoV. `mda ^mì` H aVmZm 'mUyg Oar
 AmYw{ZH VoÀ`m Jβnm H arV Agbm Var Vmo AmOhr 'Ü`wJmVM
 H gm dmdaV Amho, `mMmhr {dMma H aVmZm {XgVo. H moUVohr
 emofU ho dmB©QM Amho. na\$Vw È`mMo emñÈ`m g'mOmbm H mhrM
 dmQV Zmhr. CbQ È`m\$Mo emofU Ho è`m{edm` Amnhr Vw\$-Sr
 ^aV Zmhr hr ga\$Om`r 'mZ{gH Vm Oer ~«÷U dJm©V Amho,
 VerM Vr amOÝ` dJm©Vhr {QHy Z am{hbr Amho. È`m\$Zm eoVH ar,
 HiH ar àiZ OmUrndyd©H gmoSdm`Mo ZmhrV. Ho di H mhr

H mi {dH mgmMm, AmSxmobZmSMm Xolmdm H am`Mm Am{U EH m {d{ei Qßß`mda Vo gJio 'moSyZ QmH m`Mo. ^«' {Z'm©U H am`Mm. È`mVyZ 'J {XemhrZVm OÝ'mbm Kmbm`Mr. Am{U Amnbo gJio 'm`Xo {'idV amøMo, øm gyimbm hr H mXS-ar AYmoaopIV H aVmZm {XgVo.

EH 'moRm H mbnQ H doV KoD Z Amgmam'Zo eoVH ar, H iH ar g'mOmMo àiZ Va EoaUrda AmUbo AmhoVM. naSVw HÝ {f{dÚmnRmMo An`e, 'Ü`dJu` {ZîH« s`Vm, 'Ü`wJrZ 'mZ{gH Vm, à{Vð oÀ`m lmoQ çm gSH ënZm, JmdmJmdmVrb OmVr`Vm, JwSS{Jar, XheV, X{bVmSdarb AË`mMma, ghH mamVrb amOH maU Am{U ^«imMma, {XemhrZVm, i`gZmYrZVm, dJu` VUmd, eoVH ar AmË'hË`m, {ó`mSÀ`m g`ñ`m Ago AZoH àiZ KoD Z hr H mXS-ar C`r Amho. È`mM-amo-a øm H mXS-arZo Or eoVH ar MidirMr Or {M{H Ëgm Ho br Vr 'maM ^oXH Amho. 'moRm dV©`mZ H mi H doV KoD Z È`m H mimMm 'mJÀ`m 'moRçm H mimer Am{U nwTÀ`m ^{d`mer gmSYm H gm OmoSm`Mm, ho g'OyZ KoË`mgmRr "VgZg' 'hîdnyU© H bmHÝ Vr RaVo. `m AWm©Zo {VMr 'yè`mË`H Vm A{YH AW©J^© Amho.

VgZg (H mXS-ar) Amgmam' bmo'Qo, eāX npābHo eÝg, 'wS-B©, 2021, nÝ. 278 'yè¶ 485/-

nwñVH Amoil

i¶dñWoA¶m '¶m©Xm§Mm
Vmio~§X

JUoe amD V

"ñWbm§Va' ho 'w»` erf©H Am{U "Qmio-§XrVrb CbQ

ñWbm§Va Am{U 'hmami' mÀ`m {dH mgmnwTrb AmihmZo' Ago
Cnerf©H AgUmam {ddoH KmoQmio `m§Mm Aà`mg àH èn `m
Zi`m dfm©V à{gÕ Pmbm Amho. Vmo OmUH mam§A`m Smoù`mV
A§OZ KmbUmam Amho. Ahdmb dmMè`mda `oUmar AñdñWVm
QmiVm `oV Zmhr. `mMmM AW© àH èn Ahdmb `eñdr[aÈ`m
'm§Sbm Jobm Amho. àH èn Ahdmb Mm§Jbm Agbm Var 'yi
àiZ 'mì Xw:IX Amho. nU 'bm H m` È`mMo? hr Amnbr dYîmr
AmnUmg H moR ZoUma Amho? Aem AZoH àiZm§Mo Jw§Yo Ahdmb
dmMè`mda Amnè`m SmoŠ`mV {Z`m©U hmoVmV.

"X `w{ZH 'mCSSoeZ' d "gmd©O{ZH YmoaU Am{U bmoH emhr
emgZ i`dhma Aà`mg H| Đ' (gm{dir~mB© 'w bo nwUo {dUmnrR)
'm§A`m g§`w° {dU`mZo Ho boè`m Aà`mg àH ènmMm hm Ahdmb
2021'Ü`o à{gÕ Pmbm Amho. hm Ahdmb VyVm©g ImOJr

bolH QI`wUu, {O. gmobmnya pñWV {dÇbamd qeXo 'hm{dUmB¶mMo àmMm¶©

AgyZ g'rjH d H mX§-arH ma AmhoV.

B©'ob- mahendrakadam27@gmail.com

{dVaUmgmRr CnbāY Amho. hm Ahdmb "l{'H mSÀ`m OrdZ
gSKfm©g' An©U Ho bm Amho. Vo AW©dmhr Amho.

H moamoZm 'hm'mar Am{U È`mVyZ Ambobr Qmio-SXr (bm°H SmD Z
hm eāX Amnē`m OJÊ`mMm ^mJ 2020-21 nmgyZ Pmbm)
d È`mMm H m'Jma Am{U {dÚmĩ`m`da Pmbobm n[aUm', `mda
hm Aä`mg AmYm[aV Amho. `m Ahdmbmg amOoidar XoenmSS
`mSMo àmnVm{dH Amho. È`m gm{dlr-mB© 'w bo nwUo {dÚmnRmVrb
amÁ`emó d bmoH àemgZ {d^mJmV àmÜ`mnH AmhoV.
{dÚmnRmÀ`m darb gSemoYZ H| ĐmV È`m à`wl gSemoYH AmhoV.
`m AhdmbmMr ^y{'H m È`mSZr nwTrb eāXmV `mSSbr Amho.

""{dÚmnRr` gSemoYZ H| Đo Am{U gm'm{OH gSñWm-gSKQZm
`mSÀ`m nañna ghH m`m©VyZ gH g g'mOm{^`wl gSemoYZ KSy
eH Vo. VgoM È`mSÀ`mVrb gSdmXm'YyZ gmd©OZH jolmVrb
YmoaUà{H« `oV JwSVbobo {Za{Zamio nby g'moa `oVmV. YmoaU jolmVrb
hñVjonmS{df`rMo A{YH Zo'Ho {Xem {X½Xe©Z H aVm `oD
eH Vo. `m {didmgmVyZ gXa Aä`mg àH èn am-{dbm Jobm
hmoVm."

`m AhdmbmV 'hmami' mVrb gÚpñWVr, J[a-r, ñWbmSVa,
ASVJ©V ñWbmSVa `mda àH me QmH Ê`mV Ambm Amho. H moamoZm
'hm'mar hm Zdm 'wÔm dJiVm -mH s gd© 'wÔo 'hmami' mÀ`m
AmOdaÀ`m dmQMmbrVrb ^yVH mi AmhoV. `mV J[a-r,
àmXo{eH Ag'Vmob Aem {H VrVar 'wX²ÚmSMm g'mdoe Amho.
XoenmSS `mSZr Amnē`m àmnVm{dH mV Omo 'wÔm AYmoaopIV Ho bm
Amho, Vmo 'hîdmMm Amho. ""Amamo½`, amoOJma Am{U {ejU

`m VrZhr nmVù`mšda amÁ`gšñWoZo J[a-mšÀ`m dVrZo YmoalU{df`H
hñVjon H aÊ`mMr JaO H m Am{U H er Amho, `m{df`r
Smou`mV ASOZ KmBÊ`mMo H m' `m A[ai`mZo Ho bo Amho. gXa
Aä`mg àH ënmZohr `m OmUrd OmJYVrÀ`m H m'r Amnbm
hmV^ma bmdbm."

`m àmñVm{dH mZŠVa Amnbm àdoe nwTÀ`m ^mJmV hmoVmo.
nwñVH mÀ`m AŠVašJmV 5 àH aUo 'hîdmMr AmhoV.

"Aä`mg{df`, gšH ënZm, Aä`mg nŌVr' `m n{hë`mM
àH aUmV KmoQmio `mšZr Aä`mg {df`mMr MmjH Q ññi Ho br
Amho. `mnydu È`mšZr 'hmani`mVrb AmKmšmšMo amOH maU Am{U
'amRm dMŏndmMo ~XbVo AmHY Vr~šY `m {df`mšda {dÚmnrRr`
ñVamda gšemoYZ Ho bo Amho. `m gšemoYZmMm Cn`moJ È`mšZm
Pmbm Amho. VrM gšemoYZmMr MmjH Q È`mšZr gms`mibr Amho.
gšemoYH s` {eñVr'wioM hm Ahdmb H mQoH moa Am{U ~š{XñV
Pmbm Amho. ^maVmVrb ~oamoOJmarÀ`m àiZmšMr MMm© H aV
AmnU ñWbmšVa, AgšK{QV joì, CbQ ñWbmšVa ([aihgc
'm{J«oeZ) `mšMm AmTmdm KoVmo. hm Aä`mg 8 {Oëøms`Yrb
16 Jmdo, 391 H m'JmamšÀ`m 'wbmIVr, 271 {dÚmli`m^À`m
'wbmIVr Aem 15 {XdgmšÀ`m H m`m©da KoVbobm Aä`mg
Ahdmb Amho. KmoQmio `mšZr (nY.27) Aä`mgmÀ`m `m©Xm
gwŌm Zo'Ho nUmZo XmldyZ {Xboë`m AmhoV. `m 'wbmIVt'Ü`o
nwéfmsÀ`mM OmñV 'wbmIVr AmhoV, H maU KamVrb nwéfmsZr
gšgJm©À`m H maUmñVd {hbmšZm nwT `oD {Xbo Zmhr. gšgJ©
hoM H maU Agob Va {ó`mšBVH sM nwéfmsZm ^rVr Zmhr H m?

`mdv Z 'yi àdYÎmr AOyZhr {e„H AmhoM, ho bjmv `oVo. gd}jUmgmRr Z'wZm à'mU H 'r Agbo Var È'mV {d{dYVm Agè'mMo KmoQmio `m\$Zr Z'yX Ho bo Amho. H moamoZmÀ'm ^rVr'wio (n{hbm Qßnm) `m 'm©Xm nSè'm AmhoV, `mMr gdm^ZmM OmUrd Amho. nwTÀ'm H mimV 'mì A{YH 'moRçm g\$»`oZo Z'wZm à'mU KoÊ`mMr JaO Amho.

àH aU 2 "H m'Jmam\$Mo CbQ ñWbm\$Va' `mV amÁ'm\$VJ©V CbQ ñWbm\$Va, H m'Jmam\$Mr nmíd©^y'r, d'moJQ, ehar dmñVì, ì`dgm`, ì`dgm` Am{U qbJ^md, {ejU Am{U ì`dgm`, ì`dgm` Am{U gm'm{OH nmíd©^y'r, Qmio-SXrÀ'm H mimVrb g'ñ'm, Jmdr naVÊ`mMr H maUo, 'hbm H m'Jma, g' mB© H m'Jmam\$Mo CbQ ñWbm\$VamMo H 'r à'mU, ñWbm\$V[aV H m'Jma Am{U emgH s' `moOZm, H è'mUH mar `moOZm\$Mm 'm`Xm, Am{W©H KmofUm\$nmgyZ AZ{^kVm, {ed^moOZ Wmir, 'ZaoJm Aem {d{dY 'wX²Um\$Mm nam'e© KoD Z KmoQmio `m\$Zr {ZìH f© H mTbm Amho H s, H m'Jmam\$Mr ehamH S AmoT H m`'M Amho. `m AhdmbmVrb hoM àH aU gdm©V XrK© Amho. `m àH aUmV {RH {RH mUr Mm;H Qr Am{U Ambol dmnabo AmhoV. È'mMmhr {dMma H aUo H«`amá Amho.

Jmdr naV Amboè`m ñWbm\$V[aV H m'Jmam\$Ü`o n{ìM' 'hamiì', 'amRdmSm, {dX^©, H moH U `m\$Mm AmTmdm KoVbm Amho, Va H m'Jmam\$Mo JmdmVyZ ñWbm\$Va `mV n{ìM' 'hamiì', 'w\$-B©-RmUo, {dX^©, 'amRdmSm, Cîma 'hamiì' Am{U BVa amÁ' `m\$Mm AmTmdm KoVbm Amho. H m'Jmam\$À'm {ejUmMr a|O

àmW{‘H Vo nXdr, nXi`wĺman`aV
 {dMmamV KoVbr Amho. "l{‘H m\$Mo
 OmVrJQ ' `m V³Ēm‘Ü`o à‘wl
 OmVrJQm\$Mm AmTmdm KoVbm Amho.
 `mV "‘wgb‘mZ’ Agm {d^mJ
 ñdV\$Ì Xml{dbm Amho. la\$ àhUOo,
 {d{dY Y‘m^Mm EH ñdV\$Ì V° m
 H aVm Ambm AgVm. H m‘Jmam\$Mm
 Am{W©H ñVa g‘OmdyZ gm\$JVmZm



Ē`mV "eoVO{‘ZrMr ‘mbH s’ `m V³ĒmV "ˆy{‘hrZ d
 Aën^yYmaH ‘H m‘Jma à‘mU OmñV AgUma ho Amnē`mbm
 dfrn©Zwdfj ‘mhrV AmhoM. KmoQmio Vo nwYhm EH Xm AYmoaopIV
 HaVmV EdToM.

`m àH aUmVrb V° m H« ‘m\$H 16 ‘hĩdmMm Amho. Jmdr
 H go AmbmV? `m àiZmMo Ćĭma H m‘Jmam\$Zr Eg. Qr. ~g,
 lmgJr dmhZ, amOH s` njmZo CnbāY H v Z {Xbobr ~g
 Am{U BVa Aem Mma ^mJmV {Xbr Amho. amOH s` njm\$Zm hm
 àiZ hmVmiVm Ambm Zmhr, Ago CnbāY AmH Sodmardv Z
 {XgVo. la\$ àhUOo Ē`m\$Zm {H VrVar ‘moRçm à‘mUmda ‘XV
 H v Z H m‘Jmam\$Mo hmb QmiVm Ambo AgVo; na\$Vw Ē`m\$Zr Vo
 Ho bo Zmhr dm Ē`m\$Zm O‘bo Zmhr. BÀNme° sMm A^md hoM
 EH à‘wl H maU `m‘mJo AgUma. `mCbQ àemgH s` `šìUoZo
 aoeZda Vm\$Xyi-Jhy ‘moRçm à‘mUmV CnbāY H v Z {Xē`mMo
 {XgVo. aoeZ H m\$ Agmo dm Zgmo, Ē`m\$Zr YmY` CnbāY H v Z

{Xbo. {ed^moOZ Wmir `moOZoMo `e Am{U lWQr KmoQmio `mSZr
 'moOS`mM eāXmV NmZ 'mSSē`m AmhoV.

àH aU 3 - "gwnm E'Am`Srgr : EH Ho g ñQsr' `m
 erf©H mVyZM `m àH aUmV H m` Amho, `mMm ASXmO `oVmo.
 Ah'XZJa {OëømVrb nmaZoa VmbwŠ`mVrb gwnm `m
 E'Am`SrgrMm àm{V{ZYH Aä`mg `m àH aUmV 'mSSbm
 Amho. H m'JmamŠÀ`m à'mUmdv Z 'hmami' mVrb H m' H aÊ`mÀ`m
 dm Z H aÊ`mÀ`m 'mZ{gH VoMm ASXmO `oVmo. "{dÚmĩ`mªMo
 ñWbmšVa' `m àH aUmV MmSJē`m {ejUmgmRr n{ĩM' 'hmami' mV,
 {deofv... nwÊ`mV Amboë`m {dÚmĩ`mªMm Aä`mg Amho.
 {dÚmĩ`mªÀ`m AZoH àiZmšMm ChmnMoh `m àH aUmV Amho. `m
 àH aUmVrb EH m dmŠ`mMm -moY hmoV Zmhr. ""'amRm H« mŠVr
 'moMm©ZšVa 'amRm VéUmšMm AgšVmof H 'r H aÊ`mÀ`m ÑirZo
 emgZmZo gmaWr `m gšñWoMr ñWmnZm Ho br. našVw gmaWr gšñWoÀ`m
 {eî`dŸĩmrMm bm^ AmUlrhr {dÚmĩ`mªZm {iVmZm {XgV
 Zmhr." BWo "AOyZhr' ¶m AWm©Zo "AmUlrhr' eāX dmnabobm
 {XgVmo. nwTÀ¶m AmdŸĩmrV hm ~Xb hmoUo Amdĩ¶H Amho.

àH aU 5 "{ZîH f© d AmihmZo' `m àH aUmV AmVmn`aVÀ`m
 Aä`mgmMo gma 'mSSÊ`mV Ambo Amho.

CúmoJmšMo {dH| ĐrH aU, {ejUmVrb ~Xb, eharH aUmÀ`m
 'm©Xm Am{U ehar {Z`moOZmV AgšK{QV l{H mšMo ñWmZ B.
 'wX²ÚmšMr MMm© H v Z 'ZaoJmMr ^y{H m, àmXo{eH Ag'VmobmMm
 'wÔm, gj' Amnĩmr i`dñWmnZ `šĩUoMr Amdĩ`H Vm, gmd©O{ZH
 Amamo½` i`dñWm gj' H aUo, H è`mUH mar `moOZm `mSda

MmšJbm ^a {Xbm Amho. g'mamonmV emgZgšñWoMr ^y{'H m
Am{U gmd@{IH CXmgrZVm `mšMm AmT mdm KoVbm Amho.
AhdmbmÀ{m eodQ r 'amR r ^mfoVrb 14 gšX^©J«šW Am{U
BšJ«Or ^mfoVrb 17 gšX^©J«šW {mšMr {mXr {m Aä{imgmMo gšemoYZ
'yë{ AYmoao{IV H aVo.

laš àhUOo, hm {df` Am{U È`mVrb Ame`hr 'moRm
Amho. KmoQmio Am{U È`mšMo ghH mar `m {df`mbm {'Sbo,
'mVM È`mšZr AYu bT_{mB0} qOH br Amho. Aem ñdv nmMo
Aä`mg àiZ VmOo AgVmZm Ho bo H s, È`mMr Cn`w° Vm A{YH M
dmTvo. àgma'mÜ`'mšZr `m Ahdmbmbm `mo½` Vmo Ý`m` {Xbm
Var, amOH s` njmšZr `m Aä`mgmH S gmo`rñH a Xwb©j Ho è`mMo
OmUdVo dm hdr VodTr Xlb KoVbr Zmhr, Ago OmUdVo.
gÜ`mÀ`m H amoZmÀ`m Xwgè`m bmQoV laš àhUOo, bm°H SmD Z
gmalo {ZU©` KoVmZm Aem Aä`mgmMr JaO A{YH M nQVo.
Ĉm' 'wlnYð, 'mšSUR, QmB©nMm AmH ma `mš'wio Ahdmb EH m
~jRH sV dmMyZ gšñVmo, nU AZoH àiZ 'ZmV {Z'm©U H aVmo.
Ahdmb dmMè`mda AmnU H m` H aUma AmhmoV? ●

I{'H mšMo CbQ ñWbmšVa, {ddoH KmoQmioo, X {w{ZH ' mšSsoeZ, nwJo 2021,
nŸ. 278

Amnbm ihm°Q²gA°n H« 'mšH n[adV©ZmMm dmQgê šŸm
9763602612 Ÿm dmQgê šŸm ihm°QgA°n
H« 'mšH mda H idmdm. AmnëŸm gd© VH« matMr Xlb
VmVSrZo KoVbr OmB©b.

Registered

Licence to Post Without Prepayment of Postage No. WPP -37

R.N.I. No. MAHMAR/2001/09622 / Postal Regd. No. PCW/006/2021-2023

Posted at Pune PSO, GPO, Pune-411001

Published and posted on 1st and 16th of Every Month.

परिवर्तनाचा वाटसरू, १६ मे २०२१

Date of Publication & Posting : 16-5-2021

‘परिवर्तनाचा वाटसरू’चे वर्गणीचे नवीन दर

छापील अंकासाठी

वार्षिक : ६०० रु.

त्रैवार्षिक : १६०० रु.

दशवार्षिक : ५,००० रु. (डिजिटल अंकासह)

डिजिटल अंकासाठी

वार्षिक : २०० रु.

छापील + डिजिटल अंकासाठी

वार्षिक : ७०० रु.

मनी ऑर्डर, चेक किंवा डिमांड ड्राफ्टने वर्गणी पाठवावी.
‘परिवर्तनाचा वाटसरू’ या नावाने चेक/डिमांड ड्राफ्ट असावा.

गुगल पे साठीचा फोन नं. 8888708963

बँक ट्रान्सफरने वर्गणी भरण्यासाठी तपशील

बँक ऑफ इंडिया, फर्ग्युसन कॉलेज रोड शाखा, पुणे

बचत खाते : परिवर्तनाचा वाटसरू

बचत खाते क्र. : 051410110013969

आयएफएससी क्र. : BKID0000514

एमआयसीआर क्र. : 411013014

युपीआय पेमेंटसाठी पुढील बारकोड स्कॅन करावा-



‘परिवर्तनाचा वाटसरू’ हे पाक्षिक मालक-प्रकाशक अभय कांता यांनी नर्मदा ऑफसेट, नारायण पेठ, पुणे ३० येथे छापून ५९/६४, कोस्तुभ अपार्टमेंट, दुकान नं. ७ए, कसबा पेठ, पुणे ११ येथे प्रसिद्ध केले.

Feminist Thought of Dada Dharmadhikari

Jaswandi Wamburkar

The idea that feminism is not a monolithic theory is a truism. Nonetheless, feminism is an umbrella term which encompasses variety of trends such as liberal, Marxist, existentialist, radical and so on developed in various periods of time augmenting our understanding of women's issues. Feminism is an ideology as well as an analytical tool which reasons out the subordination of women and makes an effort for greater power and control for women of their lives. The liberal feminist thought (First wave feminism) developed in the 18th and 19th century mainly dealt with equal education, civil rights, voting rights and conjugal rights for women. The Marxist feminists put forth the materialist critique of women's subordination with an emphasis on class as the determining factor. They came up with the analysis of women's work and housework and demanded wages for household work for women. It was only in post-sixty periods with the emergence of the second wave of feminism, Socialist and Radical feminists developed more in-depth critique of women's subordination. The Socialist feminists perceived patriarchy and capitalism - both responsible for women's oppression whereas Radical feminists should be given the credit to come up with a comprehensive analysis of gender, sexuality and motherhood.

The third wave feminism (or alternatively called as post-colonial feminism) that irrupted in the 1990s came as a bitter reaction against the second wave feminism critiquing its limitations and failures.¹ It is widely accepted now that the feminist thought in the second wave was mainly based on the experiences of the white women in the first world nations. The Black feminist thinkers were at the centre of the third wave movement who challenged the grand narratives in the feminist theories and underlined the importance of the micro-politics. Feminist circles have gradually realized the importance of the multiple issues at local level while interrogating the women's issues of their localities. The feminist conferences held at Copenhagen in 1980 and at Nairobi in 1985 emphasized that the priorities within the various trends in the feminist movements in the different parts of the world were ought to be different. Simultaneously, they strongly put forth that the differences were due to variance into the issues and priorities of women in terms of region, class, nation, race and ethnicity and so on. Nevertheless, it was also highlighted in the conferences to have harmonious relationship among the various feminist groups and consensus about their common struggle against gender-inequality to be made more intense in the future.

Several feminist thinkers in various nations are theorizing women's issues as per the specificities of the various communities.

India has a rich tradition of feminist thinkers which can be traced back from the nineteenth century beginning from Mahatma Phule, Gopal Ganesh Aagarkar to Dr. Babasaheb Ambedkar and Mahatma Gandhi. Thinkers such as Vinoba Bhave, Acharya Dharmadhikari and Ram Manohar Lohia developed the feminist thought in India in the second half of the twentieth century which had become very significant guideline to the feminist movement in India. Hence, it would be a worthwhile exercise to bring to light the feminist thought advocated by the Indian feminist thinkers which have become a pathfinder to the feminist movements in India. The nineteenth century thinkers, Mahatma Phule and Gopal Ganesh Aagarkar both championed equal rights for women in all spheres of life. Mahatma Phule and Dr. Babasaheb Ambedkar emphasized that issues of so called lower caste women are different and more severe than the problems of the so called upper caste women. Dr. Ambedkar analysed the 'intersectionality' between the issues of caste and gender. Mahatma Gandhi critiqued patriarchy as an exploitative system and strongly supported equal rights for women in both private and public domain. He should be given the credit to bring thousands of Indian women in the Indian freedom movement. Vinoba Bhave and Dada Dharmadhikari made significant contribution in the feminist thought developed by Gandhiji. The present paper is a humble attempt to explore the Indian version of feminist thought by focusing the Gandhian feminism developed by Dada Dharmadhikari.

According to Professor Yashwant Sumant², the various feminist thinkers in India have reflected upon five main spheres of women's question:

1. Firstly, to think of woman as a human being
2. To think of woman as an essential partner in man-woman relationship within and outside the marital relationship
3. To think of woman as a social category in the caste-based social reality in India
4. To look at woman as an exploited, oppressed social group under the dominance of patriarchal system and
5. To construct the final man-woman relationship in the context of human completeness.

Shankar Trimbak Dharmadhikari³ popularly known as Dada Dharmadhikari (1899-1985) is a well-known freedom fighter, social reformer and thinker. He was born on 18th June 1899 at

Multapi, in district Baitul of Madhya Pradesh. After his education, he married Damayantibai. They both participated in the Civil Disobedience movement in 1930 and later in the Quit India movement in 1942. He was greatly influenced by the life and thought of Mahatma Gandhi, Acharya Vinoba Bhave, J. Krishnamurthy, Jamnalal Bajaj and J. Krishnamurthy. He worked at the Tilak Vidyalyaya at Nagpur as a teacher in early years. From 1935 to 1946, he was at Gandhi Seva Sangh in Bajajwadi at Wardha. He headed the Central Provinces Provisional Congress Committee, became a member of the legislative assembly and later the constituent assembly and president of *Sarvodaya* conference held at Kalady in Kerala. He worked as an editor of the journal *Sarvodaya* and Hindi weekly *Bhoodan Yadnya*. He was a good writer, preacher and orator and dedicated his entire life in studying, propagating and contributing to the Gandhian thought. He developed the feminist thought advocated by Mahatma Gandhi and it is considered as a seminal contribution in the tradition of the feminist thought in India.

Dada Dharmadhikari has expressed his thought on women's issues touching upon all the aspects as stated above by Yashwant Sumant and especially on man-woman correlation. His seminal work⁴ regarding his feminist thought is the book *Stree Purush Sahjeevan* (Marathi) which is a compilation of his lectures delivered at ShantisainikVidyalaya in Kashi during 21st to 30th December 1960.

Dada was of the opinion that women's living has become entirely dependent on men. He proclaimed, "The modern women are not modern in real sense. The majority high class and middle class women are delicate, fashionable dolls engrossed in adorning themselves as if they are plastic mannequin. Mannequin means the feminine or masculine models/figures decorated in the shop of tailor or clothes shop."⁵

Dada proposed very fundamental thought on fellowship of women and men within family and outside the family. He envisaged how woman could become independent and self-reliant as a human being and also as a person and citizen. He dreamt of a society with man-woman relationship based on companionship and equality and devoid of sexual tinge. His entire thought seemed to have originated from the question as to how woman could lead a fearless life.

Dada was of the opinion that the relationship among the animals was based on natural instincts whereas the human relations were influenced by natural as well as cultural attributes. He observed that the ancient Indian social thought reduced the man-woman relationship to the biological level i.e. to the level of

male and female. It underlined that no other relationship other than the natural male-female connection would be possible between them. Therefore, except in a marital bond, it became a rule in Indian social system to segregate men and women from each other to maintain social morality in the society which resulted in creating two different spheres for men and women. Dada stated: "The two emotional hemispheres have been reflected in our entire social life. Like in geography, these two hemispheres have been created in our homes, institutions and society -female hemisphere and male hemisphere -inner world and outer world, queen's zone and king's zone."⁶

Dada felt that this dichotomy should be transformed to modify the relationship between men and women. He was equally critical of the new moralists of modern times who firmly believed in the theory of Sigmund Freud that emphasized sexuality as a very fundamental need of human beings which if remained unsatisfied, might bring abnormalities in any person. Dada also found the conception of the new modern moral scientists to look at the man-woman relationship as primarily sexual erroneous as it established certain appalling conclusions that man-woman affiliation could not be envisioned devoid of the sexual correlation. Dada indicated that the new moralists failed to accept the importance of celibacy at the personal, family as well as at social level. And hence the new moralists advocated free sexual relationship between men and women based on mutual consent which had become a norm of the 'new morality' in the western world. In this context, Dada expressed some new thought in terms of man-woman relationship which was a kind of an extension of the thought of Mahatma Gandhi on women and celibacy.

Dada firmly believed that a woman could not become independent unless she became self-reliant and conceived her own life detached from men. Dada was a strong critic of the traditional Indian social thought constructed in the male-dominated setting which not only considered women as inferior and secondary to men but also constricted the humanness in her. As a result, women too considered themselves as objects to be protected. Dada suggested that the concept of *Ashram* (stages of life) in Hindu tradition was mainly meant for men whereas women always had only one ashram i.e. *Gruhashthashram* (domesticity). He pointed out the contradiction in Indian social thought. A woman on the one hand was considered as an obstacle in men's path towards salvation whereas on the other, she was asked to protect herself from menfolk from getting sexually assaulted. Her body was considered as 'impure' and she was glorified only in one form i.e. motherhood. Dada avowed the inner illogicality in Hindu tradition which suggested celibacy as a supreme goal for men's life while

signifying motherhood as an ultimate aim of woman's life. The Hindu tradition which didn't consider fatherhood as an essential element for manhood advocated celibacy as a path to heaven for men; nonetheless it warned women would reach hell if they would not attain motherhood. Dada condemned the way religion differentiated between men and women and asserted that the glorification of motherhood had become responsible for the enslavement of women. As women's life became husband-centric as well as men-centric, Dada strongly proclaimed that women should refrain themselves from aspiring wifedom. He championed the cause of woman's right to be an architect of her life.

Dada made a critic of Indian patriarchal system which got percolated through the social institutions and social psyche for many centuries placing its influence even on modern society. The system gave primacy to men by subordinating women. He explained how even the language expressed the gender-bias by citing examples of words like *Rashrtpati* (president) or *Gahapati* (English equivalent) which did not have any parallel words with feminine gender owing to the fact that only men were supposed to hold superior positions in the political or public sphere. Dada was of the opinion that all such norms expressing inequality should be wiped out from the system.

Dada illuminated the process of gender construction in the Indian society which upheld 'feminine' and 'masculine' as bipolar entities by ascribing timidity as a feminine quality and bravery and valour as masculine virtues. He opined that a woman sacrificing her life for nation or for friendship was never glorified while the same act was perceived as a great contribution of men. A woman who remained unmarried in her life was either considered as inferior or got ridiculed in social circles whereas men who followed celibacy had been upheld with pride. Dada genuinely put forth that if women followed celibacy in their lives, they should be equally honoured. He painstakingly established that despite having certain differences in terms of physical features in men and women, they both shared many common attributes as human beings. He had strong faith that they were equal and he dreamt of a society based on man-woman equality which according to him would make the companionship of women and men truly gratifying.

Dada conscientiously put forth in his lectures and writings that gender and motherhood both were a social construct. He asserted that women had been taught that life of a woman without attaining motherhood was futile. Dada pondered that the thought every woman wanted to become mother was a myth. He emphasized that men and women were both equal and they both had equal right to decide if they would like to have a child.

Dada had grounded his thought on women on Gandhian philosophy. He had an earnest desire that a woman should be an architect of her own life. He championed *Brahmcharya* (celibacy) for women to attain that goal. Mahatma Gandhi believed that the society had four kind of exploitative systems namely caste system, capitalist system, religion and patriarchy which predominantly exploited the Shudras and women.⁷ After recognizing women's body as a site of her exploitation, Gandhiji came up with a very different interpretation of sexuality. As women were exploited in the marital relationship, Gandhiji encouraged men to follow celibacy in marital relationship, exactly the way unmarried men were expected to follow it in *Brahmcharyashram*. He strongly put forth that women either as prostitute or as wife, were not objects fulfilling the sexual desires of men. For him, *Brahmcharya* did not mean 'suppressing' sensual desires but rather 'controlling' sexual pleasures. The thought about woman-man co-existence propounded by Vinoba Bhave as well as Dada Dharmadhikari had a significant place for celibacy. Dada observed that women had become body-centric and it's not men alone but women also considered their body as a device of the fulfillment of the sexual pleasures of men. Hence, Dada proclaimed that there should be total revolution in this thought and the beginning should be made by women themselves in this regard. He asserted that women's body or her looks should not be an object of exhibition in any magazine, advertisement or any programme of entertainment.

Dada came up with a radical critic of the marriage system in India by pointing out its defects in its various facets. He was of the opinion that the man-woman co-existence in the marital relationship should not be reduced to merely physical co-habitation. He preferred to call it rather co-death if the husband-wife were not heartily and mentally also involved in each other.⁸ Women were conceived as men's property as she became dependent on him both economically as well as physically owing to which equality could not be realized in the marital relationship. He championed the woman-man relation based on equality. For him, the nature of their relationship should not be reduced to the one either between the servant and the owner or between the object and the consumer. He condemned prostitution which forced women to sell her body to men. Similarly, he denounced men who married for dowry and the women who selected a life-partner for the richness of the bride. It was his observation that women remained engrossed beautifying their bodies and they did not seem to have any independent goal of their life. He urged women to bring the 'moral revolution' in their outlook by not considering themselves as an object of male satisfaction. Though, the initial years in marital life might be engaged with physicality, eventually it should be replaced with love so that women could live fearless

life. Dada urged that men and women therefore, should follow celibacy.

Dada did a fundamental analysis of the issue of women's sexuality. Women had always been conceived as physically weaker than men. Dada pointed out the paradox that a woman due to the potential attack from men became dependent on 'another' man which created hierarchical relationship between them as man became her protector. It also ensued in confining her life within the four walls of home leading her enslavement to men. Dada therefore, urged to change these conceptions radically to bring new relationship between men and women. He questioned if women could be self-protected. He opined that the question could not be satisfactorily answered by religion, science, communism or socialism; however spiritualism did find the solution to it. Dada firmly established the idea of *Brahmcharya* in women's lives and preached that the moral power of a woman could be her real strength. He announced: "The day when women would give *Brahmcharya* prominence in her life, she would stop considering her body as her property....Here *Brahmcharya* means the approach to control. It includes celibacy within marriage. The woman who is the mistress of her mind, the one who controls her language, her moral strength would be so intense that she would face fewer calamities and even if she experiences some such rare incidents, she would overcome them with the help of her moral strength."⁹

Similarly, certain viewpoints in the society about purity of women were questioned by Dada. He alleged that it's a misconception to presume the character of women in her bodily purity. He also expressed another very revolutionary thought - The abode of sacredness is human mind and not body. He urged women that they should not consider themselves as unchaste or fallen if they were raped. He proclaimed: "....A new thought should be recognized in the society that a woman doesn't get polluted if the body gets damaged. The offspring born out of rape would be considered as equally pure as born out of marital bond. The day when this thought receives stronghold in the society, women's lives would exalt with the splendour of self-reliance. The day when the resistance power of men and creative power of women and also striving power of men and artistry of women would combine, it would give birth to harmonious human personage."¹⁰

Dada marked that femininity and masculinity were partially biological and partially cultural. He asserted that it would be unnatural to presume femininity and masculinity as bipolar entities. He acknowledged that there were certain similarities and dissimilarities between men and women. Nonetheless, the differences were categorically reinforced whereas certain artificial

virtues were ascribed to femininity and masculinity. Dada presented the idea of *Ardhnarineshwar*. He explained that the womanly virtues such as tenderness and beauty and the manly virtues such as bravery and brightness both should be acquired by men as well as women which would give rise to accomplished personalities.

Dada also strongly asserted that women's work such as cooking, cleaning and child care should not be treated as inferior; besides there shouldn't be sexual division of labour also in the society. He asserted that it would be burdensome for women to look after home as well as work in the public sphere; hence he advocated that some arrangements should be made so that women would become economically independent. Dada did not seem to have explained on this particular aspect of women's lives. Moreover, he also suggested the idea of 'sisterhood' by expressing mutual trust and love among women for a harmonious relationship in family and society at large. Dada envisioned an active participation of women along with men in the nation-building process and in creating a new society in India based on the four principles of the Indian constitution namely freedom, equality, brotherhood and social justice.

It is remarkable that Dada Dharmadhikari in the sixties has given a feminist critique of various concepts such as gender, sexuality, motherhood which germinated in the western world only in the seventies with the upsurge of the radical and socialist feminism. Nonetheless, Dada's analyses as well as the strategies to deal with various problems related to women's lives are radically different from those expressed by the radical feminists of the West. Dada's approaches seem to be more fundamental and practical as compared to the strategies of radical feminists such as Shulamith Firestone expressed in her work *The Dialectic of Sex* (1970).¹¹ Shulamith Firestone analyzed motherhood and wifehood as the reasons of women's secondary position in the society and suggested a biological revolution in this regard by using technology to beget children and freeing women of motherhood. Nevertheless, it did not prove significant in reality in the western world neither it could gain currency among the radical feminists who believed that motherhood was one of the asset of women alone which should not be taken away from them.

There is a growing tendency among scholars¹² to present the possibility of Indian versions of feminist thought which is nowhere less in depth or significance than the feminist thought in the western world. The present paper is a humble attempt in this direction.

Endnotes and References:

¹Imelda, Whelehan, *Modern Feminist Thought: from the Second Wave to 'Post-feminism,'* Edinburgh University Press, Edinburgh, 1995.

²Yashwant Sumant, 'Agarkaranche Stree-Prashnasabandhiche Chintan,' *Bayaja*, (Marathi) Pune, January-February 1995, pp. 3-8 and 27-28.

³Tara Dharmadhikari, *Maharashtrache Shilpkar: Acharya Dada Dharmadhikari*, (Marathi) Maharashtra Rajya Sahitya Sanskruti Mandal, Mumbai, 2002.

⁴a) Dada Dharmadhikari, *Stree-Purush Sahajeevan*, (Marathi) Paramdham Prakashan, Pavnar, 1993. (Fifth Edition). (It has also been translated into English and Hindi.); b) Acharya Dada Dharmadhikari, (Translated into English by S. S. Pandharipande), *Beyond Gender Games: The Fellowship of Women and Men*, Popular Publications, Mumbai, 2003; c) Acharya Dada Dharmadhikari, *Kranti Ki Prakriya me Nariki Bhumika*, (Hindi), Mahila Charkha Samiti, Kadam Kunaa, 1970.

⁵Dada Dharmadhikari, *Stree-Purush Sahajeevan*, *op. cit.*, p. 120.

⁶*Ibid*, p. 38.

⁷Yashwant Sumant, 'Gandhi vicharatil Samata Sankalpna: Ek Punarvichar,' (Marathi) in *Mahatma Gandhinchi Vichar Shrushti: Kahi Alakshit Pailu*, Sadhana Prakashan, Pune, 2016, pp. 29-59.

⁸Dada Dharmadhikari, *Stree-Purush Sahajeevan*, *op. cit.*, p. 55.

⁹*Ibid.*, p. 131.

¹⁰*Ibid.*, p. 136.

¹¹See: 1. Shulamith Firestone, *The Dialectic of Sex*, Bantom Books, New York, 1970; 2. Rosemarie Tong, *Feminist Thought: A Comprehensive Introduction*, Unwin Hyman, London, 1989.

¹²Nishikant Kolge, 'Is Gandhian Feminism possible? Interpreting Gandhism and Feminism,' in *Gandhi Marg Quarterly*, New Delhi, July-December 2017, pp. 157-179.

परिवर्तनवादी साहित्य

संकल्पना आणि स्वरूप

संपादक
डॉ. रामकिशन दहिफळे

सहसंपादक
डॉ. शंकर विभुते
डॉ. संतोष देशमुख



डॉ. वासुदेव मुलाटे गौरव ग्रंथ

19	Face Recognition System With Face Detection: A Report On Digital Security Methods	Er. Archana Jyoti	89-97
20	नर्वनीकरण कारणे, परिणाम आणि नियंत्रण	डॉ. कळसकर सूर्यकांत नागनाथ	98-103
21	ना. घ. देशपांडे यांची कविता	डॉ राजश्री पाटील	104-109
22	लोकसंख्या शिक्षण एक प्रशासकीय अध्ययन	प्रा.डॉ.विठ्ठल स. जाधव	110-116
23	कुमारवयीन मुला - मुलींच्या मानसिक आरोग्य आणि भावनिक बुद्धिमत्ता यांच्या संबंधांचा अभ्यास	श्री. शिंदे ए.सी.	117-122
24	वडार बोलीभाषा	सौ.विजयालक्ष्मी विजय देवगोजी प्रो.डॉ.मनीषा नेसरकर	123-127
25	समसामयिक वैश्विक परिदृश्य में महात्मा गांधी व गांधीवाद की प्रासंगिकता	चन्द्रप्रकाश माली डॉ. विष्णु कुमार	128-131
26	स्वातंत्र्यवीर सावरकर यांची भारतीय स्वातंत्र्य लढयातील भूमिका (इ.स.१८८३ ते १९६६)	प्रा.डॉ.शिवाजी लक्ष्मण नागरगोजे	132-133

Relationship of Subjective wellbeing and Psychological Adjustment among students

Kranti Gawali and Chandrashekhar Gawali

ABSTRACT

Subjective well-being and psychological adjustment are complimentary to each other in the development of individuals. Subjective wellbeing is the indicator particular level of adjustment. There are individual differences noted due to justifiable reasons. But lower levels on both Subjective wellbeing and psychological adjustment hamper individuals' personal social and professional life also. Since most vulnerable, study is conducted on degree college students (n=100) to relate psychological wellbeing and adjustment. Subjective wellbeing Inventory by Nagpal & Sen and Bell's Adjustment Inventory Students-Form are used. Correlation analysis ($r = .542$) ($p < 0.001$) revealed inverse relationship between levels of Subjective wellbeing and Psychological adjustment. A 't' test was computed to see the significant difference in the SWB scores between two groups with high and low adjustment. There was a significant difference found between the two groups ($t = 5.503$, $p < 0.05$). Knowledge about wellbeing and adjustment is useful for students, educational institutions and parents. Empirical evidences will be helpful for teachers and professionals to enhance overall wellbeing.

Keywords: Psychological Well-being, Psychological Adjustment, Undergraduate students.

INTRODUCTION

Subjective well-being

The empirical science of subjective well-being, popularly referred to as happiness or satisfaction, has grown enormously in the past decade. (Diener, Oishi & Tay, 2018). Self-determination theory proposes that human beings have universal basic psychological needs for autonomy, competence, and relatedness, which when satisfied

lead to well-being. (Yu, S. & Meada, 2017).

Subjective well-being (SWB) reflects individuals' perceptions and evaluations of their own lives in terms of their affective states, psychological functioning and social functioning. Well-being researchers often use positive mental health synonymously with subjective well – being. (Diener, Lucas & Oishi, 2002) (Cited in Snyder & Lopez, 2002).

Further SWB refers to how people experience and evaluate their lives and specific domains and activities of their lives. In specific it is person's cognitive and affective evaluations of his or her life (Diener, Lucas, Oishi, 2001).

Determinants of Subjective well being

Nurul and Zamalia (2017) obtained a total of 60 articles from academic search engines and online data bases which were Google Scholar, Science Direct and Scopus during the period from September 2017 until January 2018. Only 33 articles obtained through journal indexed in Scopus and ISI were reviewed. From the review it was found that, besides personality factors, health and religion, socio-economic attributes such as income, financial and employment status are the most prominent determinants of subjective well-being in society.

Psychological Adjustment

It is the process of balancing conflicting needs or needs challenged by obstacle in the environment. It is the psychological accommodation of a person to a life altering event or transition (Anderson, Keith and Novak, 2002). In other words adjustment in psychology is the behavioural process by which humans and other animals maintain equilibrium among their needs or between their needs and the obstacles of their respective environments. Importantly a sequence of adjustment begins when a need is felt and ends when it is satisfied.

Biological concept of adaptation has been borrowed by psychologists and renamed adjustment. The psychologists are more concerned with what may be called psychological survival than physical survival. In case of biological concept of adaptation, human behaviour is interpreted as adjustment to demands and pressures.

(Lazarus, 2006). Adjustment is common observable fact wherein every individual adapts, accommodates and reconciles to bring one thing in correspondence with another. While making adjustment individual implies a modification in action and behaviour which is essential for survival and smooth functioning.

Few important definitions are referred which clarify the current focus of factors and issues of adjustment which every one needs to understand.

According to Skinner (1952), Adjustment involves the organization of personality. This organization leads to the stability that is an active adjustment of individual to his social and psychological environment. Smith (1961) stated that good adjustment is one which is both realistic and satisfying. In the long run, it reduces to the minimum frustrations, tensions, and anxieties which a person must endure. It provides the evenness of satisfaction of the whole person, rather than the satisfaction of the one intense drive at the expense of others.

Characteristics of Well adjusted persons

People who are well adjusted are high on self esteem, and contentment. They are emotionally stable, independent and responsible. They possess ability to conduct self appraisal. They are also socially stable and have realistic view of the world, Maladjustment may occur when there is inability to make normal adjustment to some need or stress in the environment around.

Determining factors of adjustment as well as maladjustment will vary from situation to situation and individual to individual. Primary institutions such as home, school and other social institutions play major role. Life experiences of an individual also equally important in development adjustment qualities. Along with this personality, ability to communicate effectively, health, changes with age and coping process are also substantial factors. In the field of psychology the relationship between SWB and adjustment is absolute. Both are concurrent to each other as human domains. Level of SWB determines the level of adjustment and adjustment is one of the major determinants of SWB.

Objective

To examine the relationship between Subjective well-being and Psychological adjustment.

Hypotheses

Subjective well-being is related to psychological adjustment

METHOD

Psychological well-being and Adjustment are interdependent. Both are the continuous variables which are complimentary to each other in the process of development. The study is co relational and examining co-impact among them.

Sample

The study is conducted on 100 degree college students from Mumbai.

Tools Used

1. Subjective Well-being Inventory developed by Nagpal and Sen (1992). It consists of 40 items. Items intend to measure individual's mental status regarding overall feeling about life. Inventory assesses eleven factorial dimensions namely, Positive affect, Expectation- Achievement congruence, Confidence in coping, Transcendence, Family – group support, Social support, Primary group concern, Inadequate mental mastery, Perceived ill health, Deficiency in social contact, General well-being negative affect. For positive items, score is 3, 2 and 1 respectively and vice-versa for negative items. The sum of all 40 items gives overall subjective well-being score. Higher score shows better subjective well-being and vice-versa. The reliability of the scale was computed and found to be 0.90 by applying the Cronbach's alpha, 0.80 using the spearman brown formula and 0.80 split half reliability.

2. Bell's Adjustment Inventory Student form revised by Dr. Ojha R.K.(1968)- The inventory comprises of 140 items. The answers to the statements can be responded with one of the options from yes, No, and Uncertain. High score indicated poor adjustment. The test is helpful in screening the poorly adjusted students who may need further psycho-diagnostic study and counseling for their adjustment problems. The reliability coefficients were determined by spilt half and test retest methods, where the reliability coefficients varied from .81 to .89 for various areas of adjustment through split half and reliability coefficients varied from .89 to .92 through test retest method for different areas of adjustment.

RESULTS

Table 1

Correlation between Subjective Well-being and Psychological Adjustment

	Subjective Well-being	Psychological Adjustment
Pearson correlation	1	- .542**
P-value		.000
N	100	100
Pearson Correlation	- .542**	1
p-value	.000	
N	100	100

** Correlation is significant at the 0''01 (2- tail)

The strength of association of two Subjective well-being and Psychological adjustment correlation value was computed using the Pearson's product-moment method. The obtained r Value - .542 is negative and significant at 0.01 level. A negative coefficient of correlation denotes an inverse relationship between variables under study.

The Subjective Wellbeing score in the high and low adjustment groups was examined.

Table 2.

Mean, SD and Standard error of mean on SWB in the high and low Adjustment groups.

Group Statistics					
	Adjustment levels	N	Mean	Std. Deviation	Std. Error Mean
SWB	Low	21	93.2857	8.96740	1.95685
	High	16	77.5625	8.32641	2.08160

The mean score of respondents was 54.70 on adjustment and the SD was 16.90. Based on this data the groups with high and low Adjustment were drawn using the points of inflexion method. Table 2 indicates that there were 21 respondents in the low Adjustment group and 16 in the high adjustment group and that the SWB mean score of the high adjustment group was 77.56 and of the low adjustment group was 93.28, suggesting that the SWB of the individuals having lesser adjustment problems was high.

Independent Samples Test

		Levene's Test for Equality of Variance		t-test for Equality of Means			
		F	Sig.	T	df	p-value	Mean Difference
Subjective Wellbeing Inventory	Equal variances assumed	.006	.941	5.447	35	.000	15.72321
	Equal variances not assumed			5.503	33.566	.000	15.72321

A 't' test was computed to see whether there is a significant difference in the SWB scores between the high adjustment and low adjustment groups. There was a significant difference found between the two groups ($t = 5.447$, $p < 0.05$).

These findings confirmed the hypothesis.

DISCUSSION

The result obtained was in line with the hypothesis, which states that subjective wellbeing will predict score on psychological adjustment. Based on the result it is concluded that, in case of degree college students as the score on wellbeing increases, the score on adjustment decreases. The obtained result is in line with the study by Hamilton & Phillips (2015) in which authors assessed Motivation, SWB and Adjustment of 184 university students, results revealed that, adjustment and motivation have significant contribution in subjective well-being.

Similar evidence was found by Wink, & Staudinger (2016) which was conducted on 168 both men and women between age range 68-77 which showed that, adjustment was positively associated with sense of wellbeing, openness and psychological mindedness among them. Thus, an adjustment as a personality component was positively associated with high level wellbeing among elderly population also which is derived from positive relations with others, self acceptance and environment mastery.

Current research also supported findings by Ghuncha (2017), who explored the relationship between specific components of social environment and PWB of migrants in an urban centre, Delhi. Total of 1230 migrants were part of the study. Standardized questionnaire was used to obtain data about the socioeconomic characteristics and mental wellbeing was assessed by using World Health Organization Well-Being Index. Influence of socioeconomic variable on mental well-being was estimated through multivariate logistic regression method. It was found that, poor housing conditions ($p < 0.001$), adjustment problem ($p < 0.001$) and feeling of insecurity ($p < 0.001$) were independent predictors of poor mental health. Further statistically significant association was found between lacking social support ($p < 0.01$), feeling of insecure ($p < 0.001$), adjustment problem ($p < 0.05$) and respondents' poor mental health. So it is clear with the findings that, lower adjustment impacts mental health negatively including subjective wellbeing, which is statistically supported by current study also.

Indian authors, Sharma and Nagle (2018) studied psychological health of children of military personnel and also tried to understand their resilience and personality in relation to psychological wellbeing. The study mainly focused personality, resilience as determinants of psychological wellbeing. The study was conducted on total of 124 children of army public school, who responded HEXACO-PI, Brief Resilience Scale

and Psychological well-being Scale. Results revealed significant association between personality variables – emotionality and agreeableness with wellbeing variable- autonomy, environmental mastery, personal relation with others and purpose of life. Children also regulated their behaviour from within, which means that adjustment mode of children will lead to good psychological well-being, similar association is established among degree college students.

Another link between SWB and adjustment can be with reference to the level of wisdom among individuals. The individuals with better adjustment are wiser in terms of their coping mechanisms and decision making. The students in the current study who are better at adjustment, have coped better with life challenges on the social, motional and personal aspects. Similar views are reported by Zacher & Staundinger (2018) by conducting review of the literature that has investigated the association between wisdom and wellbeing. Authors analysed the central constructs researched and expressed view that wisdom should be positively associated with wellbeing. Reviewers argued that, the association depends on type of definition and measurement of wisdom and wellbeing. Furthermore, distinction between two types of positive personality developments i.e adjustment and growths used to help and clarify the relationship between wisdom and both subjective and psychological wellbeing, means higher level of adjustment contributes high level of wellbeing as a whole, vice a versa.

Neff, Rude, & Kirkpatrick (2007) found that greater happiness which means high score on subjective well-being stems from feeling of warmth, interrelatedness and equilibrium which is adjustment of needs. This means more wellbeing is assured by making more and more adjustment with individual needs, which is also found in current study.

Result related to inverse relationship reported between high wellbeing and low adjustment was in agreement with findings by Wang et al.(2018). In the process of validating Scale on Positive and Negative rumination, authors conducted factor analysis of positive rumination (Enjoy happiness and positive coping) and negative rumination (suppress happiness, self deny and negative attribution). The validation study was conducted on 1671 students. Correlation analysis of above factors revealed that, positive rumination showed positive correlation with positive indicators of psychological adjustment such as life satisfaction and negative correlation with negative indicators of psychological adjustment such as depression. It could be concluded that, more score on happiness and positive coping results in effective psychological adjustment in individuals. And suppressing happiness, self deny and negative attribution is linked to failure in adjustment which will lead to lower adjustment score.

Yang et al. 2019, studied the mastery of goal orientation and subjective well-being of children. Mastery in goal orientation which referred as self regulated learning in which children make special adjustment in cognitive and behavioural engagement and try to learn. Two years longitudinal study was conducted on total of 974 Chinese elementary school children, they responded Multiple Self Report Questionnaire on four times after every 6th month for two years. Result indicated that, mastery in goal orientation i.e special plan and adjustment made by children in cognitive and behavioural engagement in school has positive relation with subjective well-being. This result is in line with the current study which visualised that, higher level of adjustment lead to higher level of subjective well-being, and lower score on adjustment will indicate lower score on subjective well-being.

There is correlation found between current study and a study done by Sonika , Shalini and Kumar Rajesh (2019), this Indian study investigated impact of coping and resilience on psychological well-being of medical students, since medical education is critical from the school level and face many challenges and have stressful life. The study was conducted on 151 MBBS students at All India institute of Medical Sciences, Rashikesh, Uttarakhand. Participants responded Resilience Scale for Adults, BRIEF-COPE (Coping, Orientation to Problems Experienced), and Ryff's Psychological Well-Being Scale. It was found that, better level of psychological wellbeing enables students to use more active coping ($P < 0.05$), positive reframing ($P < 0.05$), and adopt acceptance coping strategies ($p < 0.05$). This all are indicator restating close and complimentary relationships between individuals' adjustment and psychological wellbeing. It is also noted that higher resilience tendency enables them to use more positive coping strategies.

Present study is very much in alignment with most currently conducted by Anglim et al. 2020 , the group of researchers carried out meta analysis of the studies done on total 462 different groups. It is a comprehensive assessment to date of relations of domains and facets of Big five and HEXACO (Honesty-Humility, Emotionality, Extraversion, Conscientiousness, Openness to experiences) with self reported Wellbeing (Positive relations, Autonomy, Environmental mastery, Purpose in life, Self acceptance and Personal growth). It is first robust synthesis of facet-level correlations and incremental prediction by facets over domains in relation to SWB and PWB using four large data sets comprising, NEO-PI (n-1673), IPIP NEO (n-903), HEXACOPI-R (n- 465), Big Five aspect Scale (n-706). Meta-analytic results highlighted that, the patters on correlations between big five personality positive traits remained enhancing high level of subjective wellbeing. Extroversion found to be strongest wellbeing correlate.

CONCLUSION

Subjective well-being and psychological adjustment are strongly correlating aspects of individuals. Correlation analysis confirmed inverse relationship between levels of subjective wellbeing and psychological adjustment.

Mean values obtained on Psychological wellbeing are significantly different among students with high adjustment level and students with low adjustment level.

IMPLICATIONS

The scientific exploration of the SWB and Adjustment addresses various developmental issues such as social relationships, social support, performance and academic wellbeing (DeGarmo & Martinez, 2006). In connect with subjective and psychological wellbeing Ordonez & Limbasilva (2011) stated that, both are benefits for life long learning. Knowledge of subjective wellbeing and adjustment can help individuals to act moral, be self actualized, and develop socially acceptable expressions. Insights developed from the study will be useful for not only parents and teachers, and students, but also for curriculum planners and policy makers. The document made available in form of intervention could be used to assure integral development of individuals specifying SWB and high adjustment in community at large.

REFERENCES

- Andreson, D. M., Keith, J., and Novak, P. D. (2002) (Eds.). *Masby's Medical Dictionary (6th ed.)*. St. Louis, MO: Mosby, A Harcourt Health Science Company. https://link.springer.com/referenceworkentry/10.1007%2F978-94-007-0753-5_2316
- Anglim, J., Horwood, S., Smillie, L., D. and Marrero, R., T. (2020). Predicting Psychological and subjective wellbeing from personality: A meta analysis, *Psychological Bulletin*, 146(5), 279-323 DOI: 10.1037/bul0000226
- Baily, T., H, and Phillips, L., J. (2015). The influence of Motivation and adaptation on students' subjective well-being , meaning of life and academic performance, *Higher Education and Development*, 35 (2), 201-216. <https://doi.org/10.1080/07294360.2015.1087474>
- DeGarmo, D., S. and Martinze, C., R. (2006). A culturally informed Model of Academic Wellbeing for Latino Youth: The Importance of Discriminatory Experiences and Social support, *Family Relations; Interdisciplinary Journal of Applied family Science* .<https://doi.org/10.1111/j.1741-3729.2006.00401.x>
- Diener, E., Lucas R. E. and Oishi, S. (2002). Subjective well-being. In C. R. Snyder & S. J. Lopez (Eds). *Handbook of Positive Psychology*. pp. 63-73 OxfordUniversity Press. NY.
- Diener, E., Oishi, S., and Tay, L. (2018). Introduction by the editors.in E.Dieners, S. Oishi, & L. Tay (Eds.), *Handbook of Well-being*. Salt Lake City.UT:DFE Publisher. DOI: nobascholar.com

- Diener, E., Oishi, S., and Tay, L. (2018) Advances in Subjective Well-being Research, *Nature Human Behaviour*, 2, 253-260. DOI: nobascholar.com
- Ghuncha, F. (2017). Mental Well-being of Migrants in Urban Centre of India: Analyzing the role of social environment, *Indian Journal of psychiatry*, 59(2), 164-169. DOI: 10.4103/psychiatry.IndianJPsychiatry_272_15
- Lazarus, R. (2006). Happiness and public policy: change to the profession, *The Economic Journal*, 116, 24-33.
- Neff, K. D., Rude, S. S., and Kirkpatrick, K., L. (2007). An Examination of Self compassion in relation to positive psychological functioning and personality traits, *Journal of Research in personality*, 41, 908-916. <https://self-compassion.org/wp-content/uploads/publications/JRPbrief.pdf>
- Ordonez, T., Cochioni, M., and limbasilva, T., B. (2011). Subjective and psychological wellbeing as students of the University of the Third Age; Benefits of continuing education for psychological adjustment in the elderly, *Dementia and Neuropsychologia*, 5 (3), 216-225. DOI: 10.1590/S1980-57642011DN05030010
- Sharma, N., and Nagle, Y., K. (2018). Personality and Resilience as determinants of Psychological well-being among Military Children, *Defence Life science Journal*, 3 (4) 356-362. DOI: 10.14429/dlsj.3.13405
- Skinner, B., F. (1952). *Educational psychology* (London: Staples Press Ltd. P.102) https://shodhganga.inflibnet.ac.in/bitstream/10603/92329/8/08_chapter%202.pdf
- Smith, P., A. (1961). *Personality and Adjustment*. (New York: Mc Graw-Hill book co., p25). https://shodhganga.inflibnet.ac.in/bitstream/10603/92329/8/08_chapter%202.pdf
- Snyder, C.R. and Lopez S.J. (2002). *Positive Psychology*. Sage Publications, New Delhi, India.
- Sonika,, Shalin., and Kumar, R. (2019). Resilience, Psychological Well-being and Coping strategies in medical students, *Indian Journal of Psychiatric Nursing*, 16 (2), 92-97. DOI: 10.4103/IOPN.IOPN_22_19
- Wang, H., Y, Song, J., Lu, J., Huang, X., Zou, Z., and Pan, L. (2018). The positive and Negative rumination Scale: Development and Preliminary validation, *Current Psychology*, <https://doi.org/10.1007/s12144-018-9950-3>
- Wink, P., and Staudinger, U., M. (2016). Wisdom and Psychological functioning in later life, *Journal of Personality*, 84 (3), 306-318. <https://doi:10.1111/jopy.12160>
- Yang, H., Wang, Z., Song, J. et al. The positive and negative rumination scale: Development and preliminary validation. *Current Psychology* (2018). <https://doi.org/10.1007/s12144-018-9950-3>
- Yi, H. , Tina, L., Huebner, E., S. (2019). Mastery goal orientations and subjective wellbeing in school among elementary school students: The mediating role of school engagement, *European Journal of Psychology of Education*. DOI: 10.1007/s10212-019-00431-x

- Yu, S. and Meada, Y. (2017). General need for autonomy and Subjective Wellbeing: A Meta- analysis if studies in the US and East Asia, *Journal of Happiness Studies*, 19 (1), 1-20.
- Zacher, H., and Staudinger, U. M. (2018). Wisdom and wellbeing. In E.Diener, S., Oishi, S. and Tay, L. (Eds.), *Handbook series: Subjective Well-Being*. Salt Lake City, UT: DEF Publisher. DOI: nobascholar.com

ABOUT THE AUTHORS

Dr. Kranti Gawali, *Head* – Dept. of Psychology, Bhavan's College, Andheri-West, Mumbai.

Dr. Chadrashekhhar Gawali, *Head* – University Dept. of Human Development, SNDT Women's University, Santacruz-West, Mumbai

Reproduced with permission of copyright owner. Further reproduction
prohibited without permission.

Evaluation of Antimicrobial Peptide Isolated from Skin Mucus of Bacterial Infected Fishes

**Farhana Farooq^{1*}, Fasil Ali², Jasfeda Qadir³, Sumaria Rashid⁴,
Jaya Gade⁵, Ranu Sharma¹**

^{1*&1}Department of Zoology, Mahatma Jyoti Rao Phoole University, 302019, Jaipur, India

²Department of Studies and Research in Biochemistry, Mangalore University, India

³Department of Botany, University of Kashmir, Srinagar, India.

⁴Department of Environmental Sciences, University of Kashmir, Srinagar, India

⁵Department of Analytical Chemistry, SNDT Women's Mumbai University, Mumbai, India.

Address for correspondence: farharaina69@gmail.com

Groundwater Management by New Rainwater Harvesting Idea and Its Effect on Climate Change

Yash Raj Sahu¹, Jaya V. Gade², Reena Rawat³, Bhawana Jain^{4*}

¹*Central School, No.2, Amanaka, Raipur, 492010, Chhattisgarh, India.

²Department of Analytical Chemistry, SNDT Women's University, Mumbai 400049,
Maharashtra India

³ Department of Chemistry, Echelon Institute of Technology, Faridabad, 121101, Haryana, India

⁴*Department of Chemistry, Govt. V. Y. T. PG. Autonomous, College, Durg, Chhattisgarh,
491001, India.

Corresponding author: Dr. Bhawana Jain
.siddhachalamenvirotech1@gmail.com

**A CRITICAL ANALYSIS OF THE BIOGENIC SYNTHESIS OF
TRANSITION METAL NANOPARTICLES ALONG WITH ITS
APPLICATION AND STABILITY**

Noorafsha¹, Jaya Gade², Anil Kashyap^{1*}, Anupama Kashyap¹, Damini Vishwakarma¹, Susan
Azizi²

^{1*}Department of Chemistry, Govt. V. Y. T. PG. Autonomous, College, Durg, Chhattisgarh,
491001, India.

²Department of Analytical Chemistry. SNDT Women's University, Mumbai 400049, Maharashtra
India.

³Applied Science and Technology Education Center of Ahvaz Municipality, Ahvaz 617664343,
Iran.

A REVIEW OF NEURAL NETWORK HYPER-PARAMETERS AND APPROACHES TO HYPER-PARAMETER OPTIMIZATION

RUPAPATEL

Research Scholar, P.G. Department of Computer Science, S.N.D.T.W.U, Asst. Professor, Department
of Information Technology, Anna Leela College of Commerce and Economics, Mumbai, India

Dr. ANITA CHAWARE

P.G. Department of Computer Science, S.N.D.T. Women's University, Juhu Campus, Mumbai, India

Abstract

Deep learning is the capability of the system to acquire, learn and apply the learned knowledge to the domain specific task. It applies the learned information to handle the tasks relative to a specific domain that are generally carried out by humans. Not only designing the neural network correctly is important but training the network with proper hyper-parameter values is also crucial. If the hyper-parameter values are not selected and set properly, the deep learning model will not work the way it is intended to. This paper first introduces the hyper-parameters related to neural network structure and training, discuss their importance. Then it focuses on different approaches to hyper-parameter optimization.

Keywords: Hyper-parameter, deep learning, Optimization

1. Introduction

Artificial Neural network (ANN) is inspired by biological structure of human brains [1]. It is considered as a computational model that analyses and processes information. ANN is a multilayer architecture in which neurons are arranged in layers. Simple ANN consist of input, hidden and output layer. The input layer accept the input (may be image information), hidden layer

process the information (extract features from the data) and output layer gives the result. Neurons of each layer are connected with neurons of adjacent layers through a connections. Associated with each connection is a weight. Weight indicate the strength of the connection between the neurons.

The number of neurons in the input layer depends on the input data. If the digital image is of size 3x3 than total 9 pixels is in image. Corresponding to each pixel there will be 9 neurons in the input layer. The neurons in the input layer does not change the input data and are considered as passive. They receive single value and the same is sent to the hidden layer.

In hidden layer neurons are considered as processing units. Each input to the hidden neuron is multiplied by the relative weight. So the effective input to the neuron is the summation of all these weighted input. A constant value called bias is added to the weighted sum. Activation function convert weighted sum along with the bias into output signal. This output signal is served as input to next layer. The output layer receives the input from the hidden layer and returns the output as a prediction.

Weight and bias are the important parameter of the network, often referred to as

learnable parameters. Weight decides how much influence the input will have on the output. Bias helps the network to fit the given data. It does not influence the input signal but only influence output signal of the neuron. The proper selection of weights is important for the neural network to provide useful information from the given input data. During network training only weight and bias can change. Initially network starts with random weights and then gradually updates itself till it reaches a point where further changes would no longer improve the performance of the network.

For neural network to perform better and give accurate results, designing the structure of a network plays an important role. Hyper parameters determine the structure of the network and the way the network can be trained.

The rest of the paper is organized as follows. Neural Network Hyper parameters are discussed in section II. Different approaches for optimizing hyperparameters are discussed in section III. Finally we conclude in section IV.

II. Neural Network Hyper-parameter

Convolutional neural network (CNN) [2][5] is a specialized neural network that process grid data i.e. image data. The convolutional layer, pooling layer and fully connected layer together form CNN architecture. The image input is given through the input layer. Convolutional layer which is a core layer of the network performs convolution operation. The convolution operation is performed between the image data (feature map) and filter (kernel) using sliding window and stride value. [2] In this way different features of the image data are extracted. The number of convolutional layer changes from one CNN to another. Pooling layer reduces the size of feature maps according to pooling method (max, sum, average), stride and

filter size. The output of pooling layer or convolutional layer is flattened and given as input to fully connected layer. Fully connected layer is a feed forward network. Here the image classification results is obtained. Error value is computed using the output. Based on the error weights are updated.

Hyper parameters are the variables external to the network. They are used to either determine the structure of machine learning model or to specify the algorithm used to minimize the error value [7]. Hyper-parameters can be divided into two broad categories [8].

A. Variables that decides the structure of the network [5][8]

- i. Number of layer: How many hidden layers should be included in the network layer
- ii. Number of Kernel: Kernel are also referred as filters. They are used extract information / features from the image data.
- iii. Size of the Kernel: Size of the filter, 1x1 or 3x3 or 5x5 or 7x7.
- iv. Padding: Adding layer of zero's to the input image so that kernel can extract information more accurately.
- v. Stride: Convolution operation works with stride. It determines by how many pixel the kernel move over the image.

B. Variables that decides how network is trained [5][8][9]

- i. Learning Rate: It controls the way the model adapts and learn.
- ii. Batch Size: Number of samples used in training during one iteration. Batch size could be 32,64,128,or 256

- iii. No. of epoch : how many times a model / algorithm will pass through entire dataset
- iv. Optimizer: It is used to update the weights and other parameters to reduce the error /loss.
- v. Activation function: They generally decide whether neurons should be activated or not.

The performance of the network is greatly affected by selecting the proper combination of hyper parameter. Finding the correct combination can be considered as a search problem.

III. Approaches to Hyper-parameter Optimization

There are many search approaches to select the suitable hyper-parameter combinations to improve the performance of network. Following are the two ways to do that.

1. Manual tuning

In this method user manually set different combinations of hyperparameters. When number of hyper-parameter are more manual selection of values is a bit difficult job [10].

2. Automated tuning

In this approach algorithms are used to find optimal hyper-parameter that automates the process.

The most popular hyper-parameter tuning methods are

A. Grid Search

In this method a grid is created. It contains all the possible values of the hyper-parameter. In each iteration it tries a combination of hyper-parameters in particular order. For example if batch size = (32, 64) and learning rate = (0.0002, 0.0003)

Then grid search method will build a model for each of the following combination.

(32, 0.0002), (32, 0.0003), (64, 0.0002), (64, 0.0003)

Records the performance of model for each combination and finally it returns the best combination of hyper parameter along with the best model [4][11]. One drawback of this approach is it is expensive since it will be using brute force approach.[4][11].

B. Random Search

In this method a grid is created which contains all the possible values of the hyper-parameter. In each iteration it tries a random combination of hyper-parameter, record the best performance of the model and finally returns a combination of hyper parameter which gives good performance[4][11].

C. Bayesian optimization

This approach is based on Bayes theorem. It attempts to identify what will be choice of hyper-parameters to build a function. This function tries to estimate how good a model might be for certain combination of hyper parameter[4][11][12].

D. Gradient based optimization

E. Evolutionary optimization

Genetic algorithm is a subset of evolutionary algorithms. Genetic algorithm consists of following steps: initialization, selection, crossover, and mutation. Initialization step with respect to optimizing hyper-parameter involves generating a vector containing the hyper-parameters. Network is trained using the population and fitness value is calculated. Based on the fitness value an array is created with selected

hyperparameters (parents). Depending upon the cross-over point (one point, two point, k point or uniform) each parameter for the child is selected from the parents. In the last step parameter is randomly selected and its value is altered [4][13][14].

IV. Conclusion

The hyper-parameter are the configurable variables of the network. Selecting best hyper-parameter and their values plays an important role in building efficient machine learning model.

machines. In Computer Vision Winter Workshop (CVWW) 2015 Feb 9 (pp. 39-47).

7. Yang L, Shami A. On hyperparameter optimization of machine learning algorithms: Theoretical and practical perspectives. 2020 IEEE International Conference on Autonomic Computing and Self-Organizing Systems Companion (ACSOS-C) 2020 Aug 17 (pp. 24-29). IEEE.
8. Jafar A, Mohtasebi D. Hyperparameter Optimization for Deep Residual Learning in Image Classification. 2020 IEEE International Conference on Autonomic Computing and Self-Organizing Systems Companion (ACSOS-C) 2020 Aug 17 (pp. 24-29). IEEE.

1. Jacek M. Zurada, Introduction to Artificial Neural System, Jaico Publishing House, 1994

References

2. Goodfellow I, Bengio Y, Courville A, Bengio Y. Deep learning. Cambridge: MIT press; 2016 Nov

9. Computing and Self-Organizing Systems Companion (ACSOS-C) 2020 Aug 17 (pp. 24-29). IEEE.

Yu T, Zhu H. Hyper-parameter optimization: A review of algorithms and applications. arXiv preprint arXiv:2003.05689. 2020 Mar

10. <https://neptune.ai/blog/hyperparameter-tuning-in-python-a-complete-guide-2020>

Processing (ICINPRO), 2019, pp. 1-6, doi: 10.1109/ICINPro47689.2019.9092025.

4. Aszemi NM, Dominic PD. Hyperparameter optimization in convolutional neural network using genetic algorithms. Int. J. Adv. Comput. Sci. Appl.. 2019;10(6):269-78.

5. A. Gulcu and Z. KU^o, "Hyper-Parameter Selection in Convolutional Neural Networks Using Microcanonical Optimization Algorithm," in IEEE Access, vol. 8, pp. 52528-52540, 2020, doi: 10.1109/ACCESS.2020.2988114

International Journal of Community Medicine and Public Health

3. S. Putatunda and K. Rama, "A Modified Bayesian Optimization based Hyperparameter Tuning Approach for Extreme Gradient Boosting," 2019 Fifteenth International Conference on Information
6. Klatzer T, Poek T. Continuous hyperparameter optimization with genetic algorithms in reinforcement learning. arXiv:1012.2599v1 [cs.LG] (2010)

Raje L et al. Int J Community Med Public Health. 2020 Apr;7(4):1437-1441
<http://www.ijcmph.com>

12. A tutorial on Bayesian optimization of expensive costfunctions, with application to active user modeling and hierarchical reinforcement learning. arXiv:1012.2599v1 [cs.LG] (2010)

13. E. Bochinski, T. Senst and T. Sikora, "Hyperparameter optimization for convolutional neural network committees based on evolutionary algorithms," 2017 IEEE International Conference on Image Processing (ICIP), 2017, pp. 3924-3928, doi: 10.1109/ICIP.2017.8297018.

14. <https://heartbeat.fritz.ai/hyperparameter-optimization-with-genetic-algorithms-in-rolling-7569csaresab>
11. Feurer M, Hutter F. Hyperparameter optimization. In Automated Machine Learning 2019 (pp. 3-33). Springer, Cham.

pISSN 2394-6032 | eISSN 2394-6040

DOI: <http://dx.doi.org/10.18203/2394-6040.ijcmph20201452>

Original Research Article

Changes in body composition parameters with duration in type II diabetics: an observational study

Leena Raje¹, Pallavi Mhaskar^{2*}

Received: 19 January 2020

Revised: 08 March 2020

Accepted: 09 March 2020

***Correspondence:**

Dr. Pallavi Mhaskar,

E-mail: pallavi_200@rediffmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Diabetes mellitus being a metabolic disorder lot of alteration takes place in body composition parameters such increase in fat mass, decrease in muscle mass, increase visceral fat. With advancing age, the predominant feature develops which is more prevalent in diabetes. These changes in body composition should be monitored. The changes if monitored at an early age, can be well managed and proper interventions can be developed. The study was conducted to observe the changes taking place in the body composition parameters in individuals with type II diabetes with varied duration of the disease.

Methods: This cross-sectional study was done in 228 type II diabetic subjects from the clinics of the Mumbai and Pune. The baseline data was collected from all the subjects coming to the clinic through the general questionnaire, Anthropometric measurements and Body composition analysis was done by the BIA principle-based Analyser. Then these subjects were distributed according to the duration of the disease and then analysed. The data was analysed using SPSS version 22 and mean values p values were obtained.

Results: The results showed that there is statistically significant increase in fat mass, visceral fat and decrease in muscle mass.

Conclusions: There is change in body composition parameters like decrease in muscle mass, increase in fat and visceral fat along with the increase in the duration of the disease.

Keywords: Body composition, Type II diabetes, Sarcopenia

INTRODUCTION

In recent years, there is rapid increase of age in developing countries like India.¹ The census report of 2011 reported 5.3% percent of people are above 65 years and is projected to rise above 11.1% by 2025.² They suffer from high rate of morbidity and mortality as they are more prone to infections and chronic noncommunicable diseases.³ Diabetes and its complications take a major toll on the quality of life of the elderly population and the healthcare cost of the society. According to IDF,⁴ the global prevalence is

estimated to be 387 million adults of 20-79 years and 8.8% of these are from India.

Diabetes mellitus (DM) being a chronic metabolic disorder characterised by hyperglycaemia and caused by defects in the secretion or action of insulin, altering body composition parameters, leading to inflammation, oxidative stress, redistribution of fat, and lipid infiltrations.^{5,6} Hence, unfavourable changes are observed in DM such as, increased fat mass, visceral fat, and decrease in muscle mass.⁷ With advancing age, a predominant feature Sarcopenia (loss of muscle mass) is observed.⁸ The current prevalence of Sarcopenia is

17.5%.⁹ Sarcopenia is almost two to three times more prevalent in individuals with Type II diabetes.¹⁰ Studies conducted in India have shown changes in the body composition parameters in Type II diabetes.¹¹

If altered body composition diagnosed at an early stage, they can be well managed. In India, the studies done on changes in body composition parameters in Type II Diabetes are limited. Hence with appropriate diagnosis of pre sarcopenia and proper interventions in the diet and exercise, the development of sarcopenia can be controlled.

The study was conducted to observe the changes taking place in the body composition parameters in individuals with type II diabetes mellitus in varied duration of the diseases.

The study included 228 subjects on voluntary participation which were equally distributed according to the duration of the disease. The categories were a) 1 month to 5 years and 11 months, b) 6 to 10 years and 11 months, c) 11 to 15 years and 11 months, d) 16 to 20 years and 11 months and e) 21 years and above.

Tools used for data collection included: a) Questionnaire to collect the personal information regarding, age, sex, and duration of the disease. b) Anthropometric measurements such as weight, height and waist and hip circumferences were taken using calibrated standardised equipment like weighing scale, stadiometer and measurement tapes c) The assessment of body composition is done using calibrated body composition analyser (Tanita, Model - MA 420) which works on the principle of bio-electrical impedance. The values and measurements for body fat (%) muscle mass (Kg), fat mass (kg), fat percentage, Total body water (kg), were obtained by use of analyser.

ODS

This cross-sectional study was done in the year February to September 2016 in metro cities of India, Pune and Mumbai. The samples were collected from the clinic with diabetologists Dr. Ravindra Sethiya in Pune and Dr. Vijay Kulkarni in Thane Mumbai. The study was approved by institutional ethics committee. The data collection was done by Random selection technique. The randomly selected individuals diagnosed with type II diabetes were from the clinic setting area. The required permissions and approvals for approaching the subjects in clinics were obtained from the respective physicians or medical practitioners after discussing the proposal with them in details and obtaining their consent and willingness to cooperate. Thus, the subjects were contacted and their consent was obtained for voluntary participation.

The inclusion criteria for this observational study were the subjects with type II diabetes above the age of 45 years with higher BMI, and the exclusion criteria was those with pacemakers, having the steel rods and insulin dependent individuals were excluded.

RESULTS

The total study population comprised of 103 males and 125 females aging between 45 to 80 years with the mean age of 68.53 ± 7.82 years in males and 67.2 ± 8.4 years in females. The mean duration observed was 12.6 years and 12.1 years respectively in males and females.

Changes in anthropometric parameters

The overall study showed the mean weight of 66.9 ± 7.47 kgs and mean height of 156.9 ± 4.4 cms with average BMI of 27.89 ± 2.9 kg/m². The results obtained from the overall population showed a significant positive correlation between the weight, BMI, WHR, and duration of the disease. As age advanced there was increase in weight, BMI and WHR, also these values were statistically significant with duration of the disease (p value <0.05). When the total population was compared between males and females the results showed significant relation with WHR (<0.005).

1: The following table indicates the mean values of anthropometric measurements in males and females.

Anthropometric Measurements	Males (n=103)	P value	Females (n=125)	P value
-----------------------------	---------------	---------	-----------------	---------

Weight (kgs)	68.1 (±6.43)	0.001*	65.8 (±8.1)	0.002*
Height (cms)	158.09 (±4.65)	0.09	156.01 (±3.97)	0.1
BMI (kg/m2)	27.3 (±2.91)	0.003*	27.09 (2.89)	0.00*
Waist (cms)	98.4 (±9.1)	0.00*	98.7 (±9.81)	0.00*
Hip (cms)	113.2 (±7.9)	0.00*	113.5 (± 7.3)	0.00*
WHR	0.89 (±0.51)	0.00*	0.91 (± 0.07)	0.00*

*P<0.05.

Table 2: The following table shows the p values of the body composition parameters categorised in males and females.

Body composition parameters	Mean		P values		Std deviation		Reference values (body composition analyser)	
	n=103	n=125	n=103	n=125	n=103	n=125	Males	Females
	Males	Females	Males	Females	Males	Females	Males	Females
Fat (%)	42.4	42.4	0.90	0.48	±5.7	±6.4	14.2	25-35
Fat mass	27.07	29.07	0.69	0.72	±5.43	±6.70	8 -16.2	12-20.2
Muscle mass	18.8	19.2	-0.93	1	±7.15	±7.6	33-55	34-60
Bone mass	1.9	2.1	-0.63	0.19	±0.28	±0.24	>3.29	>2.4
Visceral fat	10.4	10.9	0.001*	0.00*	±2.8	±2.5	<10	<10

*P<0.05.

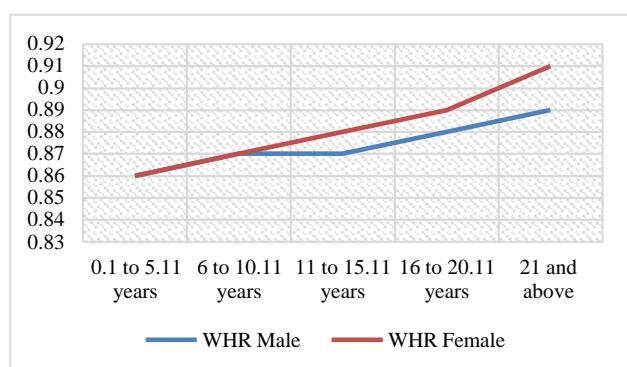


Figure 1: WHR comparison in males and females.

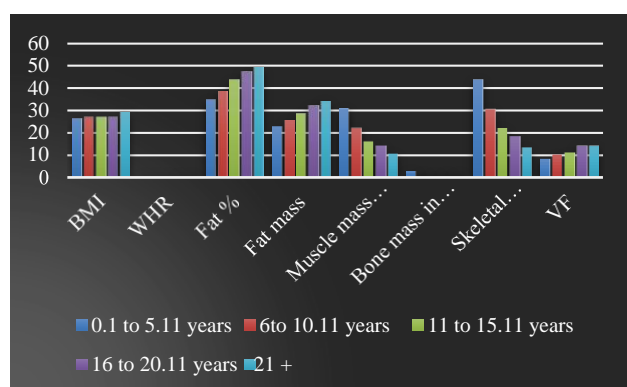


Figure 2: Changes in the body composition along with the duration of the disease.

positive significant correlation with the duration of the disease (p values less than 0.001, 0.00 and 0.00 respectively). When the total population was compared gender wise the results showed increase in the fat percentage, fat mass, visceral fat and decrease in the muscle mass and bone mass when they were compared with the reference values of the calibrated analyser.

The visceral fat values when compared gender wise were found to be statistically significant with the duration of the disease (p<0.05).

Changes in body composition parameters

Body composition parameters obtained from the analyser are fat percentage, fat mass, muscle mass, bone mass, water content and visceral fat. The total study population average values were: 42.4±6.15 % fat percentage, 28.4±6.17 kgs fat mass, fat free mass 43.6±4.04 kgs, muscle mass 19.04±7.40 kgs, bone mass 2.05±1.81kgs and visceral fat 10.7±2.69.

The data obtained showed that along with increase in age there is increase in fat percentage, fat mass, and visceral fat. These parameters also showed the statistically

The present study showed significant changes in anthropometric measurements majorly in females in weight and BMI. Similar results were stated by Olivarius in 2015 which showed the results of increase in weight and consequently BMI.¹² This increase in weight may be due to physical inactivity after the retirement. Also, the subjects mainly comprised of the postmenopausal women who had some hormonal changes which increase the inflammation and oxidative stress and this also causes increase in weight.⁷ The results also showed increase in WHR and increase in the fat percentage as the subjects had higher visceral fat in females. Increase in the inflammation leads to higher visceral fat which is reported by the present study.⁹ The overall increase in the body fat, this also increases the adipose tissues and thus there is redistribution of these adipose tissues in the abdominal areas more than in peripheral adipose tissues. This abdominal fat further increases the hyperglycaemia due to insulin resistance.^{11,13,24}

The present study shows that with advancement of age and duration of the disease there are changes in Body composition parameters. There is substantial decrease in muscle mass and increase in fat mass. Some of the other studies also reported the same results that individuals with Type II diabetes have significantly lower muscle mass than those without diabetes.¹⁷ The health, aging, and body composition (Health ABC) study also showed that older adults with type II diabetes lost their knee extensor strength more rapidly than nondiabetic subjects did.¹⁸ Another study done by Pegah in diabetic patients also

showed that there was greater decline in muscle mass and leg muscle strength, and muscle quality was poorer¹⁹ Similarly, Jang et al in 2016 also have demonstrated that leg muscle strength and gait speed is reduced in older peoples with diabetes.²⁰ The possible reasons for increase in fat mass and decrease in muscle especially in Diabetes is progression of the disease and its complications.¹⁴ Another major reason for reduction of muscle mass and strength is age, as it inevitable.¹⁰ Other possible reasons may be increased insulin resistance, inflammatory cytokines, and endocrine changes associated with Diabetes having adverse effects on muscle. As there is decline in muscle mass, the muscle mass quality is affected and hence physical performance is also affected. This in turn also affects the glycaemic control.^{8,21}

As reported by Hamasakhi et al in 2014, the possible reasons for decrease in muscle mass may be that amino acid metabolism decreases in Type II diabetes.²² Insulin resistance (IR) inhibits the mammalian target of the rapamycin pathway that leads to protein synthesis and protein degradation. IR also increases activation of the ubiquitin-proteasome pathway, that results in degradation of muscle protein. Overall, increased inflammation with insulin resistance leads to increase in fat mass and decrease in muscle mass.

CONCLUSION

Type II diabetes a metabolic disorder has a major influence on parameters of body composition. This altered body composition will lead to overall ill health and reduced physical capacity decrease the physical performance which in turn will reduce morale and overall interest of individuals towards life. Through this study we understood that there was age wise progression in altered body composition. Thus, this study will be beneficial for the community as it will create awareness about the body composition analysis at early stage which will reduce the complications like sarcopenia and frailty. The study could be done for longer duration and a greater number of people and follow up was not limited. The further study can be development of the strategies for maintaining the muscle mass and its implementation before the period of peak muscle accretion to improve muscle function and physical performance.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics committee MMP Shah college of women, Matunga Mumbai

REFERENCES

1. Mane A. Ageing in India: Some Social Challenges to Elderly Care. J Gerontol Geriatr Res. 2016;5:2.
2. Census report. Available at: <http://www.censusindia.gov.in/2011Census/pes/Pesreport.pdf>.
3. Hentati H, Salloum C, Caillet P, Lahat E, Disabato M, Levesque E, et al. Risk Factors for Mortality and

Morbidity in Elderly Patients Presenting with Digestive Surgical Emergencies. World J Surg 2018;42(7):1988-96.

4. Martin I, Collantes C, Galindo A, Gomez F. Type 2 diabetes and cardiovascular disease: Have all risk factors the same strength? World J Diabetes. 2014;5(4):444-70.
5. Available at https://www.who.int/diabetes/publications/Definition%20and%20diagnosis%20of%20diabetes_new.pdf
6. Available at: <https://www.idf.org/e-library/epidemiology-research/diabetes-atlas>.
7. Morley J, Malstrom T, Rodriguez L, Sinclair A. Frailty, sarcopenia and diabetes. J Am Med Dir Assoc 2014;15(12):853-9.
8. Solanki J, Makwana A, Mehta H, Gokhale P, Shah C. Body Composition in Type 2 Diabetes: Change in Quality and not Just Quantity that Matters. Int J Prev Med 2015;6:122.
9. Park S, Goodpaster B, Strotmeyer E, Kuller L, Broudeau R, Kammerer C, et al. Accelerated loss of skeletal muscle strength in older adults with type 2 diabetes: the health, aging, and body composition study. Health, Aging, and Body Composition Study. Diabetes Care. 2007;30(6):1507-12.
10. Umegaki H. Sarcopenia and diabetes: Hyperglycemia is a risk factor for age-associated muscle mass and functional reduction. Diabetes Investig. 2015;6(6):623-4.
11. Jentoft A, Baeyens J, Boirie Y, Cederholm T, Landi F, Martin F, et al. Sarcopenia: European consensus on definition and diagnosis: Report of the European Working Group on Sarcopenia in Older People. European Working Group on Sarcopenia in Older People. Age Ageing. 2010;39(4):412-23.
12. Olivarius FN, Siersma VD, Rasmussen KR, Heitmann BL, Waldorff FB (2015) Weight Changes following the Diagnosis of Type 2 Diabetes: The Impact of Recent and Past Weight History before Diagnosis. Results from the Danish Diabetes Care in General Practice (DCGP) Study. PLoS ONE. 10(4):0122219.
13. Tyrovolas S, Kovanagi A, Olaya B, Luis J, Mirat M, Chatterji S, et al. Factors associated with skeletal muscle mass, sarcopenia, and sarcopenic obesity in older adults: a multi-continent study. J Cachexia Sarcopenia Muscle. 2016;7(3):312-21.
14. Koo B, Roh E, Yang Y, Moon M. Difference between old and young adults in contribution of β -cell function and sarcopenia in developing diabetes mellitus. Diabetes Investig. 2016; .7(2):233-40.
15. Soniya I, Devi S, Rosemary S. Body Composition in Diabetes Mellitus. IOSR. 2014;13(1):68-70.
16. Scott D, Courten B, Ebeling P. Sarcopenia: a potential cause and consequence of type 2 diabetes in Australia's ageing population Med J Aust. 2016;3;205(7):329-33.
17. Trierweiler H, Kisielewicz G, Jonasson T, Petterle R, Moreira C, Zeghibi V, et al. Sarcopenia: a chronic

complication of type 2 diabetes mellitus Diabetol Metab Syndr. 2018;10:25.

18. Fredman L, Cauley J, Satterfield S. The Health, Aging, and Body Composition (Health ABC) Study. Arch Intern Med. 2008;168(19):2154-62.
19. Feng L, Nyunt M, Feng M, Niti M, Tan B, Chan G, et al. Nutritional, Physical, Cognitive, and Combination Interventions and Frailty Reversal Among Older Adults: A Randomized Controlled Trial. J Med. 2015;128(11):1225-36.
20. Pegah N, Inglis J, Reilly W, Kelly O, Zillich J. Aging Human Body: changes in bone, muscle and body fat with consequent changes in nutrient intake. J Endocrinology. 2017;234:37-51.
21. Jang A. Sarcopenia, Frailty, and Diabetes in Older Adults. Diabetes Metab J. 2016;40(3):182-9.
22. Coin A, Sergi G, Inelmen E, Enzi G. Pathophysiology of Body Composition Changes in Elderly People. 2006; In: Mantovani G. et al. (eds)

Cachexia and Wasting: A Modern Approach. Springer, Milano, 369-75.

23. Hamasakhi H, Kawashima Y, Sako A, Goto A, Yanai H. Association of handgrip strength with hospitalization, cardiovascular events, and mortality in Japanese patients with Type II Diabetes. Sci Rep. 2017;7(1):7041.
24. Anbalagan V, Venkatraman V, Deepa M, Anjana R, Mohan V. The prevalence of presarcopenia in Asian Indian individuals with and without type 2 diabetes. Diabetes Technol Ther. 2013;15(9):768-75.

Cite this article as: Raje L, Mhaskar P. Changes in body composition parameters with duration in type II diabetics: an observational study. Int J Community Med Public Health 2020;7:1437-41.



Impact of a behaviourally focused nutrition education intervention on attitudes and practices related to eating habits and activity levels in Indian adolescents

Panchali Moitra^{1,*} , Jagmeet Madan¹ and Preeti Verma²

¹Department of Food, Nutrition & Dietetics, Sir Vithaldas Thackersey College of Home Science (Autonomous), SNDT Women's University, Santacruz West, Mumbai 400049, India; ²Department of Special Education, SNDT Women's University, Juhu, Mumbai, India

Submitted 12 May 2020: Final revision received 23 December 2020: Accepted 14 January 2021

Abstract

Objective: To evaluate the effectiveness of a behaviourally focused nutrition education (NE) intervention based on the Health Belief Model (HBM) to improve knowledge, attitudes and practices (KAP) related to eating habits and activity levels in 10–12-year-old adolescents in Mumbai, India.

Design: School-based cluster randomised controlled trial. The experimental group (EG) received weekly NE and three parent sessions over 12 weeks; no sessions were conducted for the control group (CG). The theoretical framework of HBM and focus group discussion results guided the development of behaviour change communication strategies and NE aids. KAP were measured using a validated survey instrument, administered at baseline and endline in EG and CG. Paired and independent *t* tests determined within-group and between-group changes in pre–post scores.

Setting: Two aided and two private schools that were randomly allocated to either an EG or CG.

Participants: Adolescent boys and girls (*n* 498; EG *n* 292 and CG *n* 206).

Results: EG reported improvements in mean knowledge (39.3%), attitude (7.3%), diet (9.6%) and activity practice (9.4%) scores from pre to post intervention. No significant changes were observed in CG. Significant improvements in scores associated with perceived benefits, barriers and self-efficacy, breakfast and vegetable consumption, and moderate-to-vigorous activities were observed in EG.

Conclusions: Integrating NE into the academic curriculum and adopting evidence-based lessons that entail targeted information delivery and participatory activities can improve knowledge, foster right attitudes and facilitate better eating and activity-related practices in Indian adolescents.

Keywords
Nutrition education intervention
Adolescents
School nutrition education
Health Belief Model
Healthy eating habits
India
Physical activity

Adolescence is an opportune period of life when interventions that promote healthy behaviours and prevent the risk of lifestyle-related chronic diseases in later life gain prominence^(1–3). It is during these years that adolescents start to make their own choices and can be molded to assume responsibility for their actions and form positive habits that will improve their present and long-term health^(4,5). Lifestyle choices are often guided by misleading information and adolescents may not appreciate the links between eating habits, physical activity levels and future health consequences^(6–8). Therefore, it is prudent that health-promoting interventions for adolescents focus on the attainment of adequate knowledge, enhancement of

the right attitudes towards desired health behaviours, and building of skills and self-efficacy to take appropriate actions.

Unhealthy eating behaviours such as skipping meals, high intake of energy-dense and nutrient-deficient foods such as wafers, chocolates and sweetened beverages, frequent consumption of fast foods and inadequate intake of protective foods such as fruits and vegetables have been reported in adolescents in India, as elsewhere^(9–13). Besides changes in dietary patterns, there is evidence that a substantial proportion of adolescents do not meet the current WHO recommendations of accumulating at least 60 min of moderate-to-vigorous physical activity every

*Corresponding author: Email panchali2511@yahoo.co.in

© The Author(s), 2021. Published by Cambridge University Press on behalf of The Nutrition Society



day and limiting the daily screen time to below 2 h^(14–17). Recent studies in India have reported insufficient physical activity levels and prolonged screen time in urban school-going adolescents^(18–21). These changes in eating habits and activity levels may lead to inadequate nutrition (deficits or excess), long-term growth, development and health consequences and potentially cumulate as risk factors to trigger an early onset of metabolic derangements such as obesity and insulin resistance and other lifestyle-related non-communicable diseases in adolescents^(22–26).

A general lack of knowledge regarding nutrition and activity recommendations among adolescents, as reported in several studies^(27–31), accentuates the need to build awareness and skills as prerequisites for promoting desirable nutrition and activity behaviours. Nutrition education (NE) including physical activity promotion is an effective strategy to bring increments in knowledge and tailor adjustments to eating behaviours and activity patterns^(32–34). Schools work as perfect settings to deliver health-promoting information^(34–36), so school-based NE interventions can prove instrumental in encouraging healthy eating habits^(30,37,38) and activity practices among adolescents^(34,39,40).

While NE generally works to disseminate meaningful information, studies have observed that gains in knowledge may not necessarily translate into attitudinal and behavioural changes unless efforts are made to motivate the target group and the learning experiences are carefully focused to facilitate behavioural changes^(41–44). A systematic review observed that NE programmes with successful outcomes were more likely to be behaviourally focused and were more effective when driven by theories to develop developmentally and culturally appropriate behaviour change strategies⁽⁴⁵⁾.

The Health Belief Model (HBM) is a conceptual framework that has been used in several studies to understand health-related behaviours and guide behaviour change interventions^(46–49). The constructs of this model, namely perceived susceptibility, severity, perceived benefits and barriers, and cues to take health action, can be employed to inform content and communication strategies for NE programmes^(48,50).

The current Indian secondary school curriculum includes health and NE as a part of the science or physical education syllabus, although limited exposure to nutrition-related content and lack of relevant practical skills-based assignments to encourage positive behaviour change have been reported^(8,51). A curriculum-based NE intervention that provides relevant knowledge in a fun and interesting way⁽³²⁾, promotes attitudes and skills conducive to good health⁽⁴⁶⁾, involves parents as partners⁽⁵²⁾ and features participatory activities tailored to the needs of the target group⁽⁵³⁾ can make a significant contribution to improving diet and activity practices and thereby reducing the risk to rampant issues such as obesity among adolescents^(37,54,55).

The current study attempted to address the lacunae in the area of theory-driven NE interventions in adolescents

in India. The objectives of the current study were two-fold – first, to develop NE modules based on the key constructs of the HBM targeted at early adolescents (10–12 years) and their parents and second, to evaluate the changes in knowledge, attitudes and practices (KAP) related to eating habits and activity levels among adolescents who participated in the classroom-based, behaviourally focused NE intervention compared with those who did not.

Methods

Setting and participants

This school-based cluster randomised controlled trial was conducted among 10–12-year-old adolescents studying in grades 6 and 7 of two coeducational private and two coeducational aided schools in the metropolitan city of Mumbai in western India. While the aided schools are government-funded and typically cater to families that belong to low and low middle-class socio-economic status (SES), private schools are supported by private managements and are usually attended by students belonging to upper-middle and high SES. Out of the four selected schools, one private school and one aided school were randomly assigned to be the experimental schools by tossing a coin, and the other two schools (one private and one aided school) were designated as the control schools. Selection of schools using the cluster randomisation method ensured that there was a proportional representation from each type of school (private or aided school, used as a proxy for SES) in the control group (CG) and experimental group (EG).

All students studying in grades 6 and 7 of the selected private schools (n 366) and aided schools (n 318) were eligible to participate. Out of 684 eligible participants, 166 were excluded due to either non-receipt of signed parent consent forms (n 102), incomplete information (n 41) or absence on the baseline survey day (n 23). A total of 518 participants provided written, informed parental consent, and written assent and comprised the final sample. The detail of the selection process of participants in the study is provided in Fig. 1.

Sample size estimation

The sample size was calculated using the effect size estimates of the difference in means between two independent groups with regard to dietary practice as the primary outcome variable, considering a significance level (two-tailed) of 0.05 and a statistical power of 80%. Based on recent systematic reviews of studies aimed at determining the impact of NE interventions on nutritional knowledge and fruit, vegetable and sugar consumption among adolescents^(38,56,57), we estimated the effect size of 0.3 as a measure of treatment effect. Using the simplified formula, $n = 16/\delta^2$, where δ represents the standardised effect size^(57,58), the required sample size was calculated as 178 in each

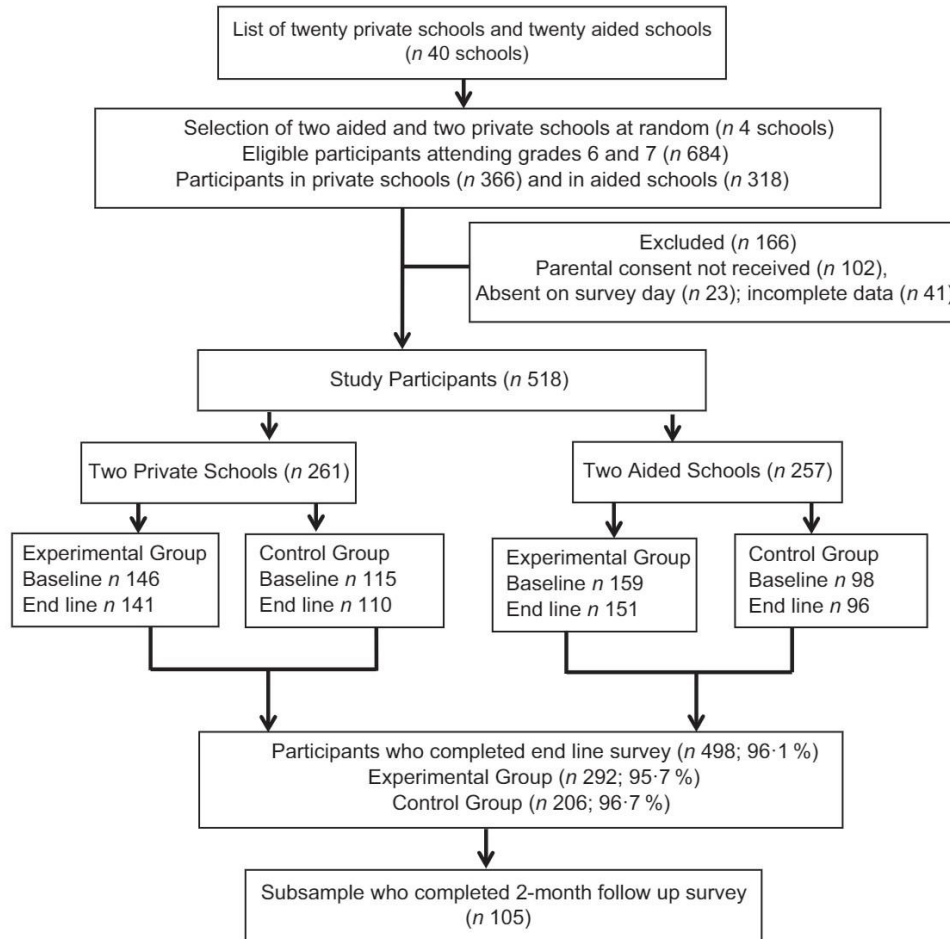


Fig. 1 Method of selection of study participants

comparison group. Considering a non-response rate of 20 %, as indicated in previous studies^(33,59,60), the total sample size for the study was estimated as 214 (EG) + 214 (CG) = 428.

Study phases

The study was conducted in three phases – the first phase involved conducting a series of focus group discussions with key stakeholders – adolescents, parents and teachers as formative research to understand the attitudes and perceptions towards healthy eating and physical activity levels among adolescents and to get insights regarding the development of NE aids and messages for the education intervention. The detailed description of the focus group results is described elsewhere⁽⁶¹⁾. The second phase involved the development of a survey instrument measuring KAP and testing the validity and reliability using a cross-sectional study design⁽⁶²⁾. The third phase involved designing NE lesson plans, education materials and teaching aids followed by recruitment and randomisation of schools into experimental and control schools, implementation of the NE intervention in experimental schools and pre- to post-intervention assessments.

Data collection instrument and measures

An eighty-four-item self-designed and validated survey instrument was used to measure KAP at baseline and after 12 weeks in the EG and CG. The questions in the knowledge scale of the instrument included knowledge regarding food groups and nutrients, healthy eating guidelines, risk factors of obesity, diabetes and heart diseases, recommended physical activity levels and allowed daily screen time. Each correct knowledge item was scored +1 and incorrect/do not know responses were scored 0.

Attitude items included statements that evaluated the HBM constructs-perceived susceptibility and severity to adverse consequences of unhealthy eating habits and physical inactivity, perceived barriers and benefits of healthy behaviours, readiness to change and self-efficacy to adopt these desired behaviour changes. The responses were assessed on a four-point Likert scale (strongly disagree to strongly agree, numeric scores 0 to 3). Dietary practice items evaluated adolescents' eating habits (meal skipping, breakfast consumption, and frequency and type of foods carried in the lunch box to school), family dietary habits (weekly frequency of eating out, ordering take-aways, eating while watching television and eating family



meals together) and weekly consumption of fruits, vegetables and foods high in salt, sugar and fat using a 24-item FFQ. The response options of 'none', '1–2 d', '3–4 d', '5–6 d' and 'every day' were scored from 0 to 4 for fruit and vegetable items and from 4 to 0 for unhealthy snack items to ensure that the higher scores indicated healthier food consumption patterns. Furthermore, we converted the weekly frequencies of consumption of each food item to a daily equivalent in grams using conversion factors as reported in previous studies^(11,63).

Similarly, the practices related to activity levels were measured by recording the weekly frequency of performing moderate-to-vigorous physical activity and sedentary activities. Adolescents were asked *In the last 7 days, how many days did you engage in any of the following activities?* and the scores obtained for each moderate-to-vigorous physical activity and sedentary activity practice item were combined to derive 'overall physical activity' and 'overall sedentary activity' scores, respectively.

The psychometric properties of the instrument were evaluated using face validity, expert content validity (item content validity indices were calculated), construct validity (using principal axis method of exploratory factor analysis), internal consistency (Cronbach α value > 0.7) and test-retest reliability (intraclass correlation coefficient values > 0.75). Item difficulty and discrimination index were also calculated for knowledge items. The instrument showed good internal consistency and acceptable to good test-retest reliability; the item content validity indices for clarity and relevance were also satisfactory.

To evaluate the participants' rating of education materials and instruction effectiveness, a brief six-item feedback questionnaire was administered at the end of 12 weeks in EG. The items measured participant satisfaction, the experience of the lesson contents and teaching methods, instructor's personal and professional attributes, and participants' confidence in adopting desired behaviours. The responses were assessed on a five-point Likert scale from 'strongly disagree' to 'strongly agree'. Two open-ended questions seeking suggestions for topics that could have been done better and the activities that they enjoyed the most were also included in the questionnaire.

Nutrition education materials and lesson plans

Participants in EG received sessions as part of the school-based NE and behaviour change programme referred to as *Health Eating and Activity Program for Schoolchildren* or in short HEAPS. The theoretical framework of the HBM, results of focus group discussions and dietary guidelines provided by the National Institute of Nutrition, India⁽⁶⁴⁾ guided the development of behaviour change goals and education materials. An activity book, *'Eat Right and Move More: A Workbook'*, was developed as a resource guide to reinforce the importance of healthy eating and being active in adolescents.

The book included twelve chapters, namely *Give me 5* (about food groups and balanced diet guidelines), *Meet the Biggies* (about macronutrients), *ABC of Vitamins and Minerals* (about key vitamins and minerals required for a growing child), *How Healthy are my Eating Habits* (related to perceived susceptibility and benefits), *Am I at Risk* and *Break the Barrier* (related to perceived severity and barriers), *Power Pack your Day* (about ways to create simple healthy lunch boxes), *Be a Smart Snacker* (about the concept of traffic light foods and tips to plan right snacks at right times for right activities), *Diet and Diseases* (introduction to diabetes and obesity – risk factors, symptoms and health consequences), *Hearty Habits for a Healthy Heart* (what are heart diseases, why do we get them and how to avoid them), *Hop, Run, Dance & Play* (regarding the benefits of being active) and more. All participants in EG received a copy of the book, as a part of the intervention programme.

To increase engagement and interest among participants, a variety of interactive educational materials such as posters, presentations, videos, games and crossword puzzles and participatory activities such as recipe competitions, lunch box monitor, *Be an Ambassador* (hands-on activity to be a spokesperson for nutrition and fitness), *Be Food Wise* (nutrition label sleuth), *Rate the Plate* and more were developed and implemented. Lessons were also planned to improve knowledge and attitudes towards physical activity levels using infographics on the benefits of being active, worksheets on the recommended guidelines for sedentary and moderate-to-vigorous physical activity levels, activity pyramids to suggest strategies to sneak in physical activities and role-play skits to show how to beat inactivity (sedentary behaviour and excess screen time-related modules). Three structured physical activity sessions such as 20-m shuttle runs or beep tests during PE classes were conducted and various hands-on assignments such as activity diary, and competitions like *Be a Fitness Guru* and *Recess Activity Cop* were included to facilitate improvements in KAP related to activity patterns in adolescents.

Besides taking classes with adolescents, three monthly sessions were conducted for the parents at each experimental school to improve their knowledge about healthy eating behaviours and activity recommendations, to suggest ways to incorporate simple changes in their child's diet and activity routine and to foster a supportive home nutrition environment.

Intervention

Participants in the experimental schools received weekly classroom-based NE and three parent education sessions over 12 weeks. The NE classes were conducted as part of the academic curriculum (one class of 50–60 min every week) for all students, including those who had not provided parental consent or completed the pre-intervention survey. However, these students were excluded from data collection. No NE sessions were conducted for the control school participants. All



eligible participants completed a KAP questionnaire at baseline and after 12 weeks. A subgroup of 105 participants (fifty-eight from the private school and forty-seven attending aided school) from experimental schools completed the same KAP questionnaire after 2 months of completion of the education sessions.

The details of the NE intervention based on the constructs of the HBM are provided in online supplementary material, Supplemental Table 1.

Statistical analysis

Data were analysed using the IBM SPSS Statistics for Windows version 21.0 software. The initial normality test was carried out using Kolmogorov–Smirnov statistics. The demographic characteristics of the EG and CG were compared at baseline using χ^2 tests and the results were described as mean and SD for continuous variables and as number and percentages for categorical variables. Within-group and between-group changes in mean KAP scores and mean KAP subscale scores from baseline to 12-week follow-up were assessed using paired and independent *t* tests, respectively. The tests were two-tailed and a *P*-value of < 0.05 was considered statistically significant. Repeated measures ANOVA was used to report changes in mean KAP scores from baseline to 12 weeks and 2-month follow-up in EG. Results of participant feedbacks and teacher experiences were derived using content analysis and are reported as anecdotes, quotes and frequency responses.

Results

Sample characteristics

A total of 518 adolescents, aged 10–12 years, participated in the baseline survey. Ninety-six percentage of the participants (*n* 498; 292 from experimental schools and 206 from control schools) completed the post-intervention survey and comprised the final sample for pre–post comparisons. The mean age of the participants was 11.2 (SD 1.1) years, 48% were girls and 49.6% attended aided schools. EG (*n* 292) comprised of girls (*n* 140) and boys (*n* 152) and CG (*n* 206) included 101 boys and 105 girls. No significant differences were observed in baseline demographic variables between EG and CG except in the characteristics – religion and father's occupation (Table 1).

Assessment of pre-intervention knowledge, attitude and practice scores

The proportion of adolescents responding correctly to the knowledge items related to the required servings of fruits and vegetables (33.6%), allowed sugar consumption (15.6%), food pyramid (20.7%), simple and complex carbohydrates (23%) and recommended daily screen time (27.8%) were considerably low. Perceived susceptibility to risk of developing diseases was also

observed to be low as 71 and 62% reported being *little worried* about getting diabetes and heart diseases, respectively, and 49% agreed that *it is difficult to eat two fruits every day*. The responses to perceived barriers to physical activity indicated that 30 and 36% agreed that they *don't get time to exercise* and *find exercises to be boring*, respectively. The majority of participants (72%) reported carrying lunch boxes to school at least 3–4 times a week, 31% were skipping breakfast every day and 69% purchased foods and beverages from their school canteens more than 2–3 times a week. Only 14% were engaging in any sports such as football, cricket and basketball daily and 71% reported their daily screen time to be more than 2 h.

Effect of Health Eating and Activity Program for Schoolchildren intervention on knowledge, attitudes and practices scores

The changes in overall KAP scores from baseline to 12-week follow-up in EG and CG are presented in Table 2. At baseline, no significant differences were observed in the mean knowledge, attitude, dietary and activity-related practice scores between EG and CG. At 12-week follow up, between-group analysis showed that the improvements in knowledge, attitude dietary and physical activity practice scores were significantly higher in EG as compared with CG. The effect sizes (Hedges' *g*) of 0.455, 0.334 and 0.241 were obtained for attitude, dietary practice and activity-related practices, respectively.

The impact of HEAPS intervention was compared between EG participants who attended aided schools (*n* 151) and those who were from private schools (*n* 141). Within EG, a significantly higher mean change was observed in attitude (3.38 (SD 5.33) in aided *v.* 2.01 (SD 5.12) in private schools; *P* = 0.026) and physical activity practice (2.30 (SD 1.99) in aided *v.* 1.41 (SD 1.77) in private schools; *P* < 0.001) scores in aided school participants as compared with private school participants. The mean pre to post changes in KAP scores were also compared between genders in EG. We observed girls (*n* 140) reporting a significantly higher improvement in total knowledge (7.83 (SD 2.7) *v.* 4.32 (SD 2.1) in boys; *P* < 0.001) and dietary practice scores (5.32 (SD 1.1) *v.* 4.96 (SD 1.4) in boys; *P* = 0.016) as compared with boys (*n* 152).

Effect of intervention on knowledge, attitudes and practices subscale scores

Table 3 shows the mean pre to post changes in KAP subscale scores between the EG and CG. EG reported a significant improvement in all KAP subscales in the post-intervention assessment as compared with CG, except in the attitude sub-scale of readiness to change, dietary practice subscales of consumption of fruits, high fat foods and high salt foods, and the activity practice subscale related to sedentary activities. The mean KAP

**Table 1** Demographic characteristics of adolescents in the behaviourally focused nutrition education intervention study in Mumbai, India (*n* 518)

Characteristics	Overall (<i>n</i> 518)		Experimental group (<i>n</i> 305†)		Control group (<i>n</i> 213†)		<i>P</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Gender							
Boys	269	51.9	165	54.1	104	48.8	0.237
Girls	249	48.1	140	45.9	109	51.2	
Type of school attended							
Aided	257	49.6	159	52.1	98	46.0	0.17
Private	261	50.4	146	47.9	115	54.0	
Grade in which studying							
Sixth	262	50.6	146	47.9	116	54.5	0.14
Seventh	256	49.4	159	52.1	97	45.5	
Religion							
Hindu	366	70.7	192	63	174	81.7	< 0.001**
Muslim	116	22.4	81	26.6	35	16.4	
Christian	13	2.5	11	3.6	2	0.9	
Others	23	3.3	21	4.9	2	0.9	
Father's occupation							
Service	184	35.5	118	38.6	66	31.0	< 0.001**
Business	175	33.8	114	37.4	61	28.6	
Professional (doctor/lawyer)	38	7.3	12	3.9	26	12.2	
Menial jobs (plumber/painter)	94	18.1	57	18.7	37	17.4	
Self-employed	9	1.7	1	0.3	8	3.8	
No response	18	3.5	3	0.9	15	7.0	
Mother's working status							
Does not work	314	61.1	184	61.1	130	61.0	0.083
Part time	76	14.8	52	17.3	24	11.3	
Full time	124	24.1	65	21.6	59	27.7	

†Data are presented as number and percentages.

Significant at *P* value < 0.001.Table 2** Changes in the mean knowledge, attitude and practice scores after 12 weeks in the experimental and control group participants (*n* 498)

Variables	Survey period	Experimental group (<i>n</i> 292)		Control group (<i>n</i> 206)		<i>P</i> †
		Mean	SD	Mean	SD	
Knowledge	Pre-intervention	15.29	4.61	15.36	5.07	0.802
	Post-intervention	21.38	6.03	14.55	4.18	< 0.001**
	% Change	39.80 %		−5.30 %		
	<i>P</i> value‡	< 0.001**		0.077		
Attitude	Pre-intervention	39.59	7.38	37.49	7.21	0.516
	Post-intervention	42.47	10.05	38.18	8.45	< 0.001**
	% Change	7.30 %		1.80 %		
	<i>P</i> value‡	< 0.001**		0.373		
Dietary practice	Pre-intervention	53.95	9.89	55.85	6.41	0.332
	Post-intervention	59.13	14.46	54.64	11.84	0.004*
	% Change	9.60 %		−2.20 %		
	<i>P</i> value‡	< 0.001**		0.021*		
Activity practice	Pre-intervention	18.44	5.08	19.48	3.94	0.291
	Post-intervention	20.17	5.63	18.88	4.89	0.008*
	% Change	9.40 %		−3.10 %		
	<i>P</i> value‡	< 0.001**		0.171		

P*-value < 0.05; *P*-value < 0.001.†Significance level was tested using independent *t* tests.‡Significance level was tested using paired *t* tests.

scores at 2-month follow-up showed significant improvements in knowledge (28.5 %; *P* < 0.001), attitude (6.3 %; *P* = 0.014), dietary practice (4.4 %; *P* = 0.041) and activity practice (5.7 %; *P* = 0.049) scores as compared with the pre-intervention mean KAP scores.

Effect of intervention on the consumption of healthy and unhealthy foods

At baseline in EG, the mean daily intakes of fruits, green leafy vegetables, chocolates, wafers and carbonated beverages were 18.2 (SD 8.9) g, 40.5 (SD 23.2) g, 20.9 (SD 11.8) g,

**Table 3** Mean change in sub-scale scores of knowledge, attitude and practice in the experimental and control group participants

Variable	Experimental group (n 292)					Control group (n 206)				
	Pre		Post		P	Pre		Post		P
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Knowledge										
Food groups	1.15	0.8	1.58	0.7	< 0.001***	1.10	0.8	1.14	0.7	0.589
Balanced diet and food pyramid	1.12	0.4	1.53	0.3	< 0.001***	1.18	0.4	1.19	0.4	0.799
Nutrients	1.72	1.1	2.72	0.9	< 0.001***	2.08	1.1	1.94	0.8	0.140
Healthy eating habits	1.67	0.8	2.41	0.7	< 0.001***	1.81	0.8	1.73	0.7	0.281
Unhealthy eating habits	2.52	1.4	3.84	0.9	< 0.001***	2.59	1.4	2.64	1.1	0.687
Non communicable diseases	1.75	1.1	1.98	0.9	0.006**	1.28	0.9	1.35	0.6	0.353
Physical activity pattern	5.32	2.5	6.15	1.8	< 0.001***	5.29	2.6	4.98	2.1	0.183
Attitude										
Perceived severity	2.91	1.6	4.12	1.1	< 0.001***	2.78	1.5	2.72	1.2	0.654
Perceived susceptibility	4.92	2.6	5.61	2.8	< 0.001***	5.21	3.1	5.18	2.8	0.918
Perceived benefits	8.75	2.8	9.62	2.6	< 0.001***	8.55	2.5	8.88	2.1	0.148
Perceived barriers	8.80	2.8	10.64	3.1	< 0.001***	8.99	2.1	8.45	1.8	0.078
Readiness to change	4.08	1.4	4.19	1.3	0.325	4.54	1.1	4.66	0.9	0.226
Self-efficacy	8.99	2.1	9.43	2.2	0.014**	8.65	1.9	8.52	1.6	0.453
Dietary practice										
Breakfast	3.47	1.8	3.92	1.8	0.002**	3.46	1.7	3.51	1.6	0.758
Carrying lunch to school	1.6	0.6	3.33	0.8	< 0.001***	1.51	0.7	1.42	0.8	0.225
Family dietary habits	7.02	1.9	7.44	1.7	0.005**	6.88	1.8	6.56	1.8	0.072
Fruits‡	4.18	2.8	4.13	2.2	0.811	4.25	2.4	4.21	2.2	0.861
Vegetables§	5.98	2.5	7.56	2.3	< 0.001***	6.22	2.3	6.34	2.2	0.564
High fat foods	8.89	3.2	8.85	3.1	0.878	9.12	1.3	9.35	1.2	0.815
High sugar foods¶	11.28	3.7	11.96	2.9	0.014**	11.98	3.3	11.67	2.9	0.621
High salt foods†	10.94	2.7	11.11	2.6	0.434	11.34	2.9	11.58	1.9	0.718
Physical activity practice										
Moderate-to-vigorous activity	5.97	3.8	6.71	3.6	0.017**	6.38	2.8	6.12	2.9	0.355
Sedentary activity	12.46	3.9	12.16	2.9	0.292	12.98	3.1	12.71	2.8	0.354

P < 0.05 *P < 0.001.

†Wafers, *farsan* (deep fried gram flour based salty snack), *Frankie* (wraps prepared with refined flour and stuffed with potatoes and vegetables), fried rice, hakka noodles, *Maggi* noodles.

‡Banana, apple, berries, citrus, papaya and melons.

§Carrot, green leafy vegetables, cauliflower/cabbage, salad.

||Popular Indian snacks such as *samosa*, *vada pav* and *pav bhaji* and burger and pizza.

¶Biscuit, cake, chocolates, carbonated beverages.

27.5 (SD 22.8) g, and 98.3 (SD 41.1) ml, respectively. Significant improvements were reported in the mean daily intake of green leafy vegetables (58.9 (SD 18.4) g, $P < 0.001$), chocolates (18.6 (SD 8.2) g, $P = 0.006$) and carbonated beverages (84.4 (SD 23.1), $P < 0.001$) in EG but not in CG during post-intervention assessments. In EG, the daily consumption of Indian fried snacks, namely *samosa* and *vada pav* was 10.2 and 13.1 % lower after 12 weeks of educational intervention as compared with CG. However, these improvements were not statistically significant.

Participant ratings of instruction and teacher feedback

A total of 276 participants in EG (145 from aided and 131 from private school) and seven teachers (four from aided and three from private school) completed the post-intervention feedback questionnaire. The majority reported 'strongly agreeing' to the statements such as 'I enjoyed learning about healthy eating habits and activity levels' (81 %), 'activities were fun and assignments were interesting' (73 %), 'teacher explained

key concepts in detail' (76 %) and 'teacher was friendly and responded to all questions enthusiastically' (82 %). While 62 % of participants from the aided school agreed that 'I am confident that I will be able to follow most of the healthy habits learned'; 77 % of participants from the private school agreed that 'I am satisfied with the lessons and happy to be part of this program'. Teachers mentioned *materials were informative, the catchy phrases and jingles made learning fun and speaking to parents was much needed*. Suggestions included *add dance or yoga sessions to the program, repeat sessions in the next academic year, conduct the same program for primary children and translate materials into other languages*.

Discussion

The current study evaluated the impact of a behaviourally focused NE programme, referred to as HEAPS, on healthy eating habits and physical activity-related KAP among



adolescents, aged 10–12 years. Significant improvements in the mean KAP scores were observed in EG but not in CG. These findings are in agreement with the results obtained from similar studies that reported significant improvements in NE intervention schools as compared with control schools^(33,34,37,65). Changes in attitudinal attributes beyond improvements in cognitive variables are documented to be important determinants of bringing changes in behaviours and practices^(30,41,43). The results of the current study indicated that the intervention was effective in improving knowledge regarding food groups, nutrients, non-communicable diseases and physical activity recommendations and changing the perceptions towards susceptibility and severity of the adverse consequences, perceived benefits, barriers and self-efficacy to adopt healthy eating habits and activity patterns.

The positive impact of the intervention on knowledge and attitudes can be explained by the active and interactive teaching approach that was employed in combination with an experiential learning method, facilitated through practical assignments and hands-on activities⁽⁴⁰⁾. Each EG participant was provided with an activity book; this might have influenced the comprehension of key messages and led to enhanced motivations to learn. These results corroborate the findings of previous theory-based NE intervention studies that reported improvements in perceived benefits and self-efficacy of adolescents^(38,47,50,55).

The intervention led to improvements in eating habits such as frequency of breakfast and vegetable consumption, bringing lunch boxes to school, and mean scores of family dietary habits. The daily intake of green leafy vegetables increased and the consumption of chocolates and carbonated beverages reduced in EG. Item scores related to moderate-to-vigorous physical activities also showed improvements as compared with the CG. However, the within-group analysis showed that the post-intervention changes in certain dietary practices such as consumption of fruits and foods that are high in fat and salt content and practice items related to sedentary behaviours were not statistically significant. A systematic review of NE interventions indicated that changing dietary practices will require longer duration interventions (>1 year) and modifications in foodservice policies to support a better provision of healthy foods in schools⁽⁴²⁾. This can explain the unchanged variables in our study – a comparatively brief period of intervention and follow-up (<6 months) and limited modifications employed in the school and home food environments of adolescents. Similar results of improvements in knowledge and attitude scores but minimal changes in dietary practices related to fruit and vegetable consumption have been reported in previous studies^(31,53). A systematic review observed that adolescents who had better knowledge had a better attitude, but improved attitude did not always lend to better practices related to physical activity⁽⁴³⁾. Likewise, another large-scale obesity

prevention intervention, *eat well be active*, reported limited improvements in indicators of attitudes and practices, although significant improvements were observed in teachers' skills and knowledge and learners' learning environments⁽⁶⁶⁾.

Clearly, greater efforts are needed to motivate adolescents to adopt healthy eating behaviours and activity patterns in daily life. A systematic review of interventions aimed at improving physical activity levels and preventing excessive sedentary behaviours in school settings concluded that multi-level interventions that are behaviourally focused and introduce lifestyle education into regular school activities may bring significant improvements in the activity levels of adolescents⁽¹⁷⁾. These findings of previous studies and the results of our study indicate that bringing a change in diet and activity practices is difficult but possible through targeted behaviour change communication strategies and tailoring messages to the needs of the learning group.

Several studies have established that relevant NE should be provided early in life to influence present dietary choices and activity levels, to promote lifelong healthy behaviours and to reduce the burden of chronic diseases in adulthood^(31,38,55). In our study, the participants were 10–12 years old, a vulnerable but critical stage of early adolescence when autonomy in terms of food preferences and activity choices is progressively gained and the influences of peers and media start to become pronounced⁽⁶⁷⁾. While chronic diseases may take years to develop, the typical habits and behaviours that increase the risk of these diseases are initiated and established during adolescence⁽⁶⁸⁾. Therefore, NE interventions that build on key messages around nutrition, regular physical activity and reduced sedentary activity and foster positive attitudes and self-efficacy become increasingly important during early adolescence.

Given the amount of time spent in schools by adolescents, implementing NE in schools presents an expedient and tactical way of positively influencing knowledge and attitudes and promoting healthy behaviours. The current nutrition and health education curriculum in secondary schools in India is minimal^(51,69). An outline of nutrition and healthy lifestyle-related learning objectives and structured guidance on how these topics should be taught and presented to the students, as part of the existing curriculum, is required to encourage positive attitudes and to improve the present and future health outcomes of adolescents in India.

It is evident from various school-based intervention studies that an adolescent's physical and social environment can act as important facilitators for supporting sustainable and significant behaviour changes^(70,71). Therefore, a concerted effort of policymakers to bring necessary changes in the school food environments and introduce curriculum-based and teacher delivered nutrition lessons



at schools is warranted. Parents impart key influences on eating behaviours and activity choices of adolescents, so a greater involvement of parents will work as a catalyst to multiply the impact of interventions aimed at building skills and behaviours conducive to health promotion. Fostering better home food environments and involving peer leaders as change agents can further improve the outcomes of a NE programme^(52,72). Besides education tools and aids, the positive personal attributes of instructors may facilitate a caring relationship with participants and contribute to an improved programme impact.

To our knowledge, this NE programme is the first to investigate changes in nutrition and activity behaviours among adolescents in a school setting in Mumbai, India. NE interventions have been conducted in India^(37,73); however, few have included elaborate formative research to guide the intervention protocol or employed behaviour change theories to implement and evaluate the impact of education interventions. There are several strengths to the current study. We conducted a needs assessment to identify knowledge gaps and perceived barriers and facilitators to adopting desirable dietary and activity practices in adolescents. This was followed by formulating behaviour change objectives, selection of the appropriate theoretical framework to guide methods and subsequent development of the intervention protocol. The underlying theoretical framework of the HBM was employed to plan and implement the intervention programme, evidence-based behaviour change communication strategies, and innovative teaching aids and activities were included and a validated KAP survey was used to measure the changes from baseline to 12 weeks in the EG and CG. Also, the selection of the participants was done from private and aided schools to ensure that low and middle to high SES were represented in both EG and CG and the cluster randomised controlled study design contributed to the robustness of the study. Furthermore, participant experiences were explored to evaluate the perceived benefits of the intervention and a 2-month follow-up in a subsample of adolescents helped establish the sustainability of the impact of the intervention.

There are a few limitations too. The effectiveness of the education intervention described in the current study is based on self-reported responses to items measuring KAP. Although several measures of validity and reliability were evaluated to test the psychometric properties of the survey instrument, the continued interaction of the EG participants with the researchers may have inclined them to report what they learned and perceived to be favourable responses. However, it must be noted that social desirability bias is reported to be more common in interviews than survey modes of data collection. The finding that the positive impact of the intervention remained during the 2-month follow-up survey may also mitigate this limitation. Future research may adapt the study designs to include objective assessments of variables such as physical activity and sedentary behaviours and evaluate the influence of school and home food environments in

modifying practices and behaviours of adolescents. The role of peer-led and teacher delivered NE sessions can also be explored in further studies.

In conclusion, the desirable changes in KAP related to eating habits and activity levels reflect the effectiveness of a theory-driven intervention in providing instructions that first improves knowledge and builds skills through interactive teaching methods and collaborative activities and then goes on to influence attitudes and practices. Since schools play a significant role in shaping the attitudes and practices of adolescents, relevant modifications in the school food environment such as improved availability of healthy foods and reduced accessibility to nutrient-poor and energy-dense snacks at school canteens are needed. The involvement of teachers and peer leaders in schools and the active support and participation of parents are also needed to initiate behaviour change towards healthy dietary habits, reduced sedentary behaviours and improved physical activity levels in adolescents in India.

The current study showed that adding 50 min per week of NE into the academic timetables can have positive effects on the knowledge, attitudes and health behaviours of adolescents. Integrating NE into a normal school day for adolescents in secondary education, adopting evidence-based lessons that entail discussions, critical thinking and activities and a fairly flexible curriculum that allows a customised information delivery method can improve knowledge, foster right attitudes and facilitate better eating and activity-related practices in Indian adolescents. An investment made to build positive attitudes towards health during adolescence may prove to be an investment that will reap rich dividends throughout the lifetime.

Acknowledgements

Acknowledgements: The authors would like to acknowledge the efforts of Dr. Jagdish Sharma for his assistance with statistical analysis and the field research team, Niki Shah, Tanvi Chipkar, Sonal Patil and Sharvari Gaikwad for their hard work. Our appreciation is also due to the principals of the institutes who provided permission to conduct the study and the homeroom/class teachers of grade 6 and grade 7 for their constant assistance. The authors acknowledge the valuable inputs and cooperation provided by the participants during the study. **Financial support:** This research received no specific grant from any funding agency, commercial or not-for-profit sectors. **Conflict of interest:** The authors declare no potential conflict of interest. **Authorship:** P.M. and J.M. formulated the research questions and designed the study; P.M. and P.V. supervised fieldwork. P.M. was responsible for data management, data analysis and drafting of the first draft of the manuscript. The



draft was reviewed by J.M. and P.V. and the final revised manuscript was approved by all authors. *Ethics of human subject participation*: The current study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Intersystem Biomedica Ethics Committee, Vile Parle West, Mumbai, India (version 2, dated 19 February 2019). Written informed consent was obtained from parents and written informed assent was obtained from the participants.

Supplementary material

For supplementary material accompanying this paper visit <https://doi.org/10.1017/S1368980021000203>

References

1. Sivagurunathan C, Umadevi R, Rama R *et al.* (2015) Adolescent health: present status and its related programmes in India. Are we in the right direction? *J Clin Diagnostic Res* **9**, LE01.
2. World Health Organization (2015) *WHO Global Action Plan for the Prevention and Control of NCDs 2013–2020*. Geneva: World Health Organization.
3. Kumar S & Kelly AS (2017) Review of childhood obesity: from epidemiology, etiology, and comorbidities to clinical assessment and treatment. *Mayo Clin Proc* **92**, 251–265.
4. Craigie AM, Lake AA, Kelly SA *et al.* (2011) Tracking of obesity-related behaviours from childhood to adulthood: a systematic review. *Maturitas* **70**, 266–284.
5. Marks J, Barnett LM, Strugnell C *et al.* (2015) Changing from primary to secondary school highlights opportunities for school environment interventions aiming to increase physical activity and reduce sedentary behaviour: a longitudinal cohort study. *Int J Behav Nutr Phys Act* **12**, 59.
6. Bailey C, Garg V, Kapoor D *et al.* (2018) Food choice drivers in the context of the nutrition transition in Delhi, India. *J Nutr Educ Behav* **50**, 675–686.
7. Shayo FK (2019) Co-occurrence of risk factors for non-communicable diseases among in-school adolescents in Tanzania: an example of a low-income setting of sub-Saharan Africa for adolescence health policy actions. *BMC Public Health* **19**, 1–8.
8. Rath N, Riddell L & Worsley A (2018) Parents' and teachers' views of food environments and policies in Indian private secondary schools. *Int J Environ Res Public Health* **15**, 1532.
9. Jayawardena R, Ranasinghe P, Wijayabandara M *et al.* (2016) Nutrition transition and obesity among teenagers and young adults in South Asia. *Curr Diabetes Rev* **13**, 444–451.
10. Misra A, Singhal N, Sivakumar B *et al.* (2011) Nutrition transition in India: secular trends in dietary intake and their relationship to diet-related non-communicable diseases. *J Diabetes* **3**, 278–292.
11. Rath N, Riddell L & Worsley A (2018) Urban Indian adolescents practise unhealthy dietary behaviors. *Br Food J* **120**, 1657–1665.
12. Mehta K, Mazumdar V, Patel SV *et al.* (2014) Dietary pattern of schoolgoing adolescents in Urban Baroda, India. *J Heal Popul Nutr* **31**, 490.
13. Moreno LA, Rodríguez G, Fleta J *et al.* (2010) Trends of dietary habits in adolescents. *Crit Rev Food Sci Nutr* **50**, 106–112.
14. Wolfenden L, Nathan NK, Sutherland R *et al.* (2017) Strategies for enhancing the implementation of school-based policies or practices targeting risk factors for chronic disease. *Cochrane Database Syst Rev*. Published online: 29 November 2017. doi: 10.1002/14651858.CD011677.
15. Twisk JWR (2001) Physical activity guidelines for children and adolescents a critical review. *Sport Med* **31**, 617–627.
16. Must A & Tybor DJ (2005) Physical activity and sedentary behavior: a review of longitudinal studies of weight and adiposity in youth. *Int J Obes* **29**, S84–S96.
17. Biddle SJH, Pearson N, Ross GM *et al.* (2010) Tracking of sedentary behaviours of young people: a systematic review. *Prev Med* **51**, 345–351.
18. Craggs C, Corder K, Van Sluijs EMF *et al.* (2011) Determinants of change in physical activity in children and adolescents: a systematic review. *Am J Prev Med* **40**, 645–658.
19. Singh AK, Maheshwari A, Sharma N *et al.* (2006) Lifestyle associated risk factors in adolescents. *Indian J Pediatr* **73**, 901–906.
20. Esht V, Midha D, Chatterjee S *et al.* (2018) A preliminary report on physical activity patterns among children aged 8–14 years to predict risk of cardiovascular diseases in Malwa region of Punjab. *Indian Heart J* **70**, 777–782.
21. Swaminathan S & Vaz M (2013) Childhood physical activity, sports and exercise and noncommunicable disease: a special focus on India. *Indian J Pediatr* **80**, 63–70.
22. Jagadesan S, Harish R, Miranda P *et al.* (2014) Prevalence of overweight and obesity among school children and adolescents in Chennai. *INDIAN Pediatr* **51**, 544–549.
23. Branca F, Lartey A, Oenema S *et al.* (2019) Transforming the food system to fight non-communicable diseases. *BMJ* **364**, 1296.
24. Popkin BM, Adair LS & Ng SW (2012) Global nutrition transition and the pandemic of obesity in developing countries. *Nutr Rev* **70**, 3–21.
25. Ranjani H, Mehreen TS, Pradeepa R *et al.* (2016) Epidemiology of childhood overweight & obesity in India: a systematic review. *Indian J Med Res* **143**, 160.
26. Poti JM, Duffey KJ & Popkin BM (2014) The association of fast food consumption with poor dietary outcomes and obesity among children: Is it the fast food or the remainder of the diet? *Am J Clin Nutr* **99**, 162–171.
27. Kumar S, Ray S, Roy D *et al.* (2017) Exercise and eating habits among urban adolescents: a cross-sectional study in Kolkata, India. *BMC Public Health* **17**, 468.
28. Kigaru DMD, Loechl C, Moleah T *et al.* (2015) Nutrition knowledge, attitude and practices among urban primary school children in Nairobi City, Kenya: a KAP study. *BMC Nutr* **1**, 1–8.
29. Swaminathan S, Thomas T, Kurpad AV *et al.* (2009) Perceptions of healthy eating: a qualitative study of school-going children in south India. *Health Educ J* **68**, 94–110.
30. Cown MH, Grossman BM & Giraudo SQ (2017) Nutrition education intervention to improve nutrition-related knowledge, attitudes, and behaviors for Hispanic children. *Ecol Food Nutr* **56**, 493–513.
31. Mamba NPS, Napoles L & Mwaka NM (2019) Nutrition knowledge, attitudes and practices of primary school children in Tshwane Metropole, South Africa. *African J Prim Heal Care Fam Med* **11**, 1–7.
32. Kupolati MD, MacIntyre UE, Gericke GJ *et al.* (2019) A contextual nutrition education program improves nutrition knowledge and attitudes of South African teachers and learners. *Front Public Heal* **7**, 258.
33. Friel S, Kelleher C, Campbell P *et al.* (1999) Evaluation of the Nutrition Education at Primary School (NEAPS) programme. *Public Health Nutr* **2**, 549–555.
34. Shilts MK, Lamp C, Horowitz M *et al.* (2009) Pilot Study: EatFit impacts sixth graders' academic performance on achievement of mathematics and English education standards. *J Nutr Educ Behav* **41**, 127–131.
35. Pérez-Rodrigo C & Aranceta J (2003) Nutrition education in schools: experiences and challenges. *Eur J Clin Nutr* **57**, S82–S85.



36. Meiklejohn S, Ryan L & Palermo C (2016) A systematic review of the impact of multi-strategy nutrition education programs on health and nutrition of adolescents. *J Nutr Educ Behav* **48**, 631–646.e1.
37. Singhal N, Misra A, Shah P *et al.* (2010) Effects of controlled school-based multi-component model of nutrition and lifestyle interventions on behavior modification, anthropometry and metabolic risk profile of urban Asian Indian adolescents in North India. *Eur J Clin Nutr* **64**, 364–373.
38. Silveira JAC, Taddei JAAC, Guerra PH *et al.* (2011) Effectiveness of school-based nutrition education interventions to prevent and reduce excessive weight gain in children and adolescents: a systematic review. *J Pediatr* **87**, 382–392.
39. Lawlor DA, Kipping RR, Anderson EL *et al.* (2016) Active for Life Year 5: a cluster randomised controlled trial of a primary school-based intervention to increase levels of physical activity, decrease sedentary behaviour and improve diet. *Public Heal Res* **4**, 1–156.
40. Dudley DA, Cotton WG & Peralta LR (2015) Teaching approaches and strategies that promote healthy eating in primary school children: a systematic review and meta-analysis. *Int J Behav Nutr Phys Act* **12**, 1–26.
41. Worsley A (2002) Nutrition knowledge and food consumption: can nutrition knowledge change food behaviour? *Asia Pac J Clin Nutr* **11**, Suppl. 3, S579–S585.
42. Ashton LM, Sharkey T, Whatnall MC *et al.* (2019) Effectiveness of interventions and behaviour change techniques for improving dietary intake in young adults: a systematic review and meta-analysis of RCTs. *Nutrients* **11**, 825.
43. Samdal GB, Eide GE, Barth T *et al.* (2017) Effective behaviour change techniques for physical activity and healthy eating in overweight and obese adults: systematic review and meta-regression analyses. *Int J Behav Nutr Phys Act* **14**, 42.
44. Michie S, Carey RN, Johnston M *et al.* (2018) From theory-inspired to theory-based interventions: A protocol for developing and testing a methodology for linking behaviour change techniques to theoretical mechanisms of action. *Ann Behav Med* **52**, 501–512.
45. Contento I (1995) The effectiveness of nutrition education and implications for nutrition education policy, programs and research; a review of research: Special issue. *J Nutr Educ Series* **27**(6), 284–418.
46. Ghaffari M, Esmailzadeh A, Tavassoli E *et al.* (2012) Effect of health belief model based intervention on promoting nutritional behaviors about osteoporosis prevention among students of female middle schools in Isfahan, Iran. *J Educ Health Promot* **1**, 14.
47. Keshani P, Hossein Kaveh M, Faghih S *et al.* (2019) Improving diet quality among adolescents, using health belief model in a collaborative learning context: a randomized field trial study. *Health Educ Res* **34**, 279–288.
48. Naghashpour M, Shakerinejad G, Lourizadeh MR *et al.* (2014) Nutrition education based on health belief model improves dietary calcium intake among female students of junior high schools. *J Heal Popul Nutr* **32**, 420–429.
49. Glanz K & Bishop DB (2010) The role of behavioral science theory in development and implementation of public health interventions. *Annu Rev Public Health* **31**, 399–418.
50. Salem GM & Said RM (2018) Effect of health belief model based nutrition education on dietary habits of secondary school adolescent girls in Sharkia Governorate. *Egypt J Commun Med* **36**, 35–47.
51. Rath N, Riddell L & Worsley A (2017) Secondary school students' views of food and nutrition education in Kolkata, India. *Health Educ* **117**, 310–322.
52. Pearson N, Griffiths P, Biddle SJH *et al.* (2017) Individual, behavioural and home environmental factors associated with eating behaviours in young adolescents. *Appetite* **112**, 35–43.
53. Scherr RE, Linnell JD, Dharmar M *et al.* (2017) A multi-component, school-based intervention, the shaping healthy choices program, improves nutrition-related outcomes. *J Nutr Educ Behav* **49**, 368–379.e1.
54. Karki A, Shrestha A & Subedi N (2019) Prevalence and associated factors of childhood overweight/obesity among primary school children in urban Nepal. *BMC Public Health* **19**, 1055.
55. Tilles-Tirkkonen T, Nuutinen O, Sinikallio S *et al.* (2018) Theory-informed nutrition education curriculum Tools For Feeling Good promotes healthy eating patterns among fifth grade pupils: cross-sectional study. *J Hum Nutr Diet* **31**, 647–657.
56. Murimi MW, Moyeda-Carabaza AF, Nguyen B *et al.* (2018) Factors that contribute to effective nutrition education interventions in children: a systematic review. *Nutr Rev* **76**, 553–580.
57. Diep CS, Chen TA, Davies VF *et al.* (2014) Influence of behavioral theory on fruit and vegetable intervention effectiveness among children: a meta-analysis. *J Nutr Educ Behav* **46**, 506–546.
58. Sullivan GM & Feinn R (2012) Using effect size: or why the P value is not enough. *J Grad Med Educ* **4**, 279–282.
59. Teo CH, Chin YS, Lim PY *et al.* (2019) School-based intervention that integrates nutrition education and supportive healthy school food environment among Malaysian primary school children: a study protocol. *BMC Public Health* **19**, 1427.
60. Saraf DS, Gupta SK, Pandav CS *et al.* (2015) Effectiveness of a school based intervention for prevention of non-communicable diseases in middle school children of rural north India: a randomized controlled trial. *Indian J Pediatr* **82**, 354–362.
61. Moitra P & Madan J (2020) Perceived barriers and facilitators of healthy eating and physical activity: focus groups with children, parents and teachers in Mumbai, India. *Int J Community Med Public Heal* **7**, 2363.
62. Moitra P, Verma P & Madan J (2021) Development and validation of a questionnaire measuring knowledge, attitudes, and practices (KAP) to healthy eating and activity patterns in school children (HEAPS). *Nutr Healthb*. doi: 10.1177/026106020982356.
63. Shaikh NI, Patil SS, Halli S *et al.* (2016) Going global: Indian adolescents' eating patterns. *Public Health Nutr* **19**, 2799–2807.
64. National Institute of Nutrition (2011) Dietary Guidelines for Indians: a Manual. <https://www.nin.res.in/downloads/DietaryGuidelinesforNINwebsite.pdf> (accessed May 2020).
65. Kupolati MD, MacIntyre UE, Gericke GJ *et al.* (2019) A contextual nutrition education program improves nutrition knowledge and attitudes of South African teachers and learners. *Front Public Heal* **7**, 258.
66. Magarey AM, Pettman TL, Wilson A *et al.* (2013) Changes in primary school children's behaviour, knowledge, attitudes, and environments related to nutrition and physical activity. *ISRN Obes* **2013**, 1–10.
67. Koehn S, Gillison F, Standage M *et al.* (2016) Life transitions and relevance of healthy living in late adolescence. *J Health Psychol* **21**, 1085–1095.
68. Ssewanyana D, Abubakar A, van Baar A *et al.* (2018) Perspectives on underlying factors for unhealthy diet and sedentary lifestyle of adolescents at a Kenyan Coastal setting. *Front Public Heal* **6**, 11.
69. Rath N, Riddell L & Worsley A (2019) Parents' and teachers' critique of nutrition education in Indian secondary schools. *Health Educ* **119**, 150–164.
70. Welker E, Lott M & Story M (2016) The school food environment and obesity prevention: progress over the last decade. *Curr Obes Rep* **5**, 145–155.



71. He M, Tucker P, Gilliland J *et al.* (2012) The influence of local food environments on adolescents' food purchasing behaviors. *Int J Environ Res Public Health* **9**, 1458–1471.
72. Story M, Lytle LA, Birnbaum AS *et al.* (2002) Peer-led, school-based nutrition education for young adolescents: feasibility and process evaluation of the TEENS study. *J Sch Health* **72**, 121–127.
73. Raghunatha Rao D, Vijayapushpam T, Subba Rao GM *et al.* (2007) Dietary habits and effect of two different educational tools on nutrition knowledge of school going adolescent girls in Hyderabad, India. *Eur J Clin Nutr* **61**, 1081–1085.

Development and validation of a questionnaire measuring knowledge, attitudes, and practices (KAP) to healthy eating and activity patterns in school children(HEAPS)

Nutrition and Health
2021, Vol. 27(2) 199-209
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/0260106020982356
journals.sagepub.com/home/nah


Moitra¹, Preeti Verma² and Jagmeet Madan³

Abstract

Background: Development of culturally appropriate and psychometrically sound instruments that measure knowledge and health behaviors of children will help to inform appropriate interventions. **Aim:** To develop and test the validity and reliability of a questionnaire measuring knowledge, attitudes, and practices to healthy eating and activity patterns in school children in India. **Methods:** Review of literature, focus-group discussions, and theoretical constructs of the Health Belief Model guided the development of an item pool. Face and content validity were assessed by children and a panel of experts and the item content validity, item difficulty, and discrimination indices were calculated. Construct validity was determined using the principal axis method of exploratory factor analysis among a cross-sectional sample of children ($n=252$). Internal consistency (Cronbach's α values >0.7) and test-retest reliability (intraclass correlation coefficient values >0.75) were estimated. **Results:** Item content validity index for clarity and relevance were satisfactory (>0.80) and internal consistency for knowledge (Kuder-Richardson 20 $\frac{1}{4}$ 0.832), attitude (Cronbach's α $\frac{1}{4}$ 0.912), and practice items (Cronbach's α $\frac{1}{4}$ 0.769) were good. Four factors (children's eating habits, family dietary practices, and consumption of healthy and unhealthy foods) and two factors (moderate to vigorous activities and sedentary activities) explained 67.7% and 48.2% of the total variance in practice items. Intraclass correlation coefficient estimates ranged from good to excellent (0.72-0.99). **Conclusions:** The results of the validity and reliability of the 84-item knowledge, attitudes, and practices to healthy eating and activity patterns in schoolchildren questionnaire were promising. The detailed description of the methodology employed may prove useful to researchers conducting similar studies in children.

Keywords

Knowledge attitude practice, KAP survey, healthy eating, activity, patterns, development and validation, school children, eating habits, India, validity and reliability, health belief model

tion

Unhealthy dietary habits of children (Beena et al., 2013; Mehta et al., 2014; Shaikh et al., 2016; Rath, Riddell, and Worsley, 2018), inadequate levels of physical activity (Qidwai et al., 2010; Esht et al., 2018), and excessive sedentary behaviors (Biddle et al., 2010; Gupta et al., 2012; Esht et al., 2018) pose public health challenges in India as elsewhere (Shridhar et al., 2016; Karki, Shrestha, and Subedi, 2019). Recent studies indicate an increase in obesity rates not just among children belonging to higher socio-

economic backgrounds but also in lower-income groups where being underweight remains a major problem (Ranjani et al., 2016; Kumar and Kelly, 2017; Mehara et al., 2017). Adiposity during childhood is associated with impaired

¹ Department of Food, Nutrition & Dietetics, Sir Vithaldas Thackersey College of Home Science (Autonomous), Shreemati Nathibai Damodar Thackersey Women's University, Mumbai, India

² Department of Special Education, Associate Dean, Interdisciplinary Studies, Shreemati Nathibai Damodar Thackersey Women's University, Mumbai, India

³ Department of Food, Nutrition & Dietetics, Sir Vithaldas Thackersey College of Home Science (Autonomous), Shreemati Nathibai Damodar Thackersey Women's University, Mumbai, India

Corresponding author:

Ms. Panchali Moitra, Department of Food, Nutrition & Dietetics, Sir Vithaldas Thackersey College of Home Science (Autonomous), Shreemati Nathibai Damodar Thackersey Women's University, Santacruz West, Mumbai 400049, India.

Email: panchali2511@yahoo.co.in

glucose tolerance (Misra et al., 2011; Musaiger and Al-Hazzaa, 2012; Ranjani et al., 2016; Kumar and Kelly, 2017), and cardiovascular risk clustering (Boutayeb, 2006; Kao and Sabin, 2016; Branca et al., 2019), thus triggering adverse health consequences tracking into adulthood.

To address these challenges, effective interventions are needed (Sivagurunathan et al., 2015; Vaz et al., 2016) and to design these interventions, the determinants of diet and activity-related behaviors among children, such as the knowledge and attitudes to healthy eating and activity levels and motivations or readiness to change unhealthy practices, must be better understood (Murang, Tuah, and Naing, 2017). Assessment of these attributes will require the development of age and culturally appropriate instruments with sound psychometric properties; such instruments will also provide suitable formats to monitor the impact of relevant interventions (Trakman et al., 2017). Studies exploring the knowledge, attitudes, and practices (KAP) of children to healthy eating and physical activity patterns are limited in India, and fewer studies have evaluated the psychometric properties of the instruments used to measure knowledge or health-related behaviors among children.

Health behavior theories are useful to examine the factors influencing health behaviors in any population (Glanz and Bishop, 2010; Teixeira and Marques, 2017). The Health Belief Model (HBM) is one of the most widely recognized theoretical frameworks used to assess health and nutrition-related behaviors (Kim, Ahn, and No, 2012; Naghashpour et al., 2014; Tavassoli et al., 2017). The key constructs of HBM include perceived susceptibility and perceived severity (people's belief that they are susceptible to the negative consequences of their unhealthy behaviors), perceived benefits and barriers (the perception that benefits associated with desired behaviors outweigh the barriers involved), cues to action and self-efficacy (the belief that they are capable of adopting the change to achieve desired results). Understanding these specific perceptions can help to predict attitudes and motivations of behavior change and develop key messages aimed at encouraging healthy eating habits and adequate activity-related practices in children.

The purpose of this paper is to describe the development and evaluation of the psychometric properties of a questionnaire that measures knowledge regarding healthy eating and activity levels, attitudes and perceptions related to nutrition and activity patterns (perceived susceptibility, benefits, barriers, readiness to change, and self-efficacy) and practices associated with eating habits such as consumption of breakfast, fruits, vegetables, and energy-dense snacks, and specific physical activity and sedentary behaviors among 10–12 years old children in Mumbai, India.

The development and validation of the questionnaire assessing the KAP to healthy eating and activity patterns in school children (HEAPS) were conducted in two phases.

First, we developed a test plan and generated an item pool, and then conducted a cross-sectional study to test the validity and reliability of the developed instrument. The steps involved are provided in Figure 1.

Study sites and participants

The study was carried out at four purposively selected coeducational aided and private schools in Mumbai, India. Aided schools are financially supported by the state government and are typically attended by children of low and low-middle socioeconomic status (SES) and the private schools are run by private managements, usually catering to children belonging to upper-middle and upper SES families. These schools cater to children aged 6–15 years, studying in grades 1–10. In this study, children were selected from both aided and private schools (used as a proxy for SES) to ensure proportional representation across socioeconomic backgrounds. We randomly selected eight classes (a class each from grades six and seven of the four selected schools), each comprising approximately 35–45 students, as the participating classes. All children attending these classes ($n=323$) were verbally explained the study protocol, and the information sheets and consent forms were sent home for parental consent. A total of 295 children, aged 10–12 years, provided written parental consent and were selected as the study sample. Of these, 28 children participated in the face validity exercise, 15 were not present on the survey day, 252 completed the KAP-HEAPS questionnaire for testing validity and internal consistency reliability, and a subsample ($n=132$) participated in the test-retest reliability exercise. Ethics approval was obtained and written and informed assent was received from children before data collection.

Phase 1: Development of the KAP-HEAPS questionnaire

Item Development: The item pool was generated after a detailed review of relevant literature and existing instruments. Computerized searches of scholarly databases, Google Scholar and PubMed, were conducted using the keywords, “eating habits” and “activity patterns” in combination with search terms, “knowledge in children,” “attitudes,” “perceptions to health,” “barriers and facilitators,” “children in India,” “Health Belief Model,” and “sedentary activity in children.” The results were carefully evaluated by the authors and subjected to eligibility criteria—relevance to the study objectives, year of publication (<5 years), access to the full article, the inclusion of children or middle-school students as the sample, and discussion on the methodological description of validity and reliability of the instruments. After evaluation, six studies (Strauss and Smith, 2009; Glanz and Bishop, 2010; Hiew et al., 2015; Kigaru et al., 2015; Amiri et al., 2017; Oli

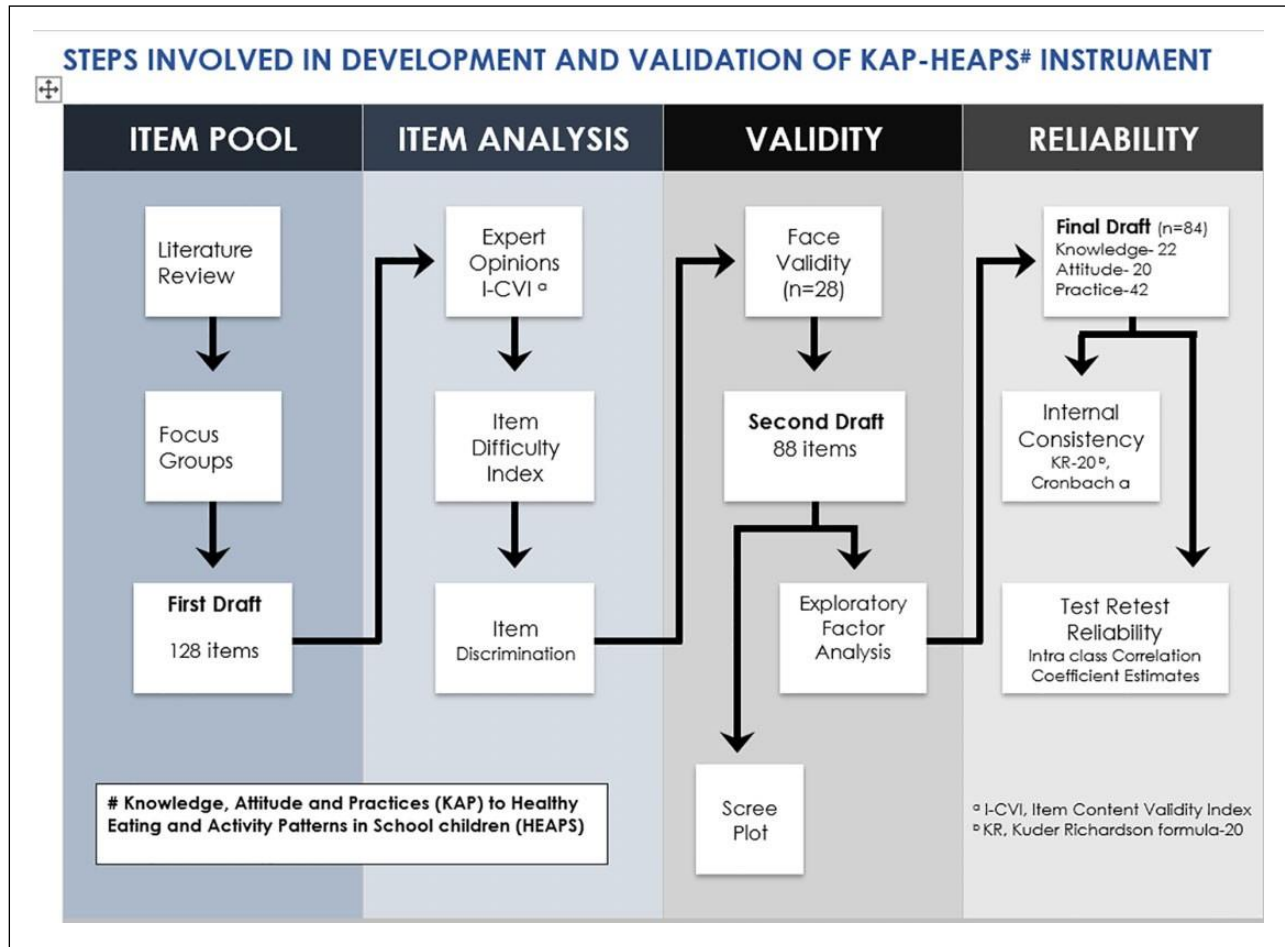


Figure 1. Steps involved in development and validation of knowledge, attitudes, and practice (KAP) to healthy eating and activity patterns in schoolchildren (HEAPS) questionnaire.

development. Any disagreements between authors were resolved via consensus.

To explore attitudes and diet and activity-related practices of children, 14 focus group discussions were conducted with children ($n/42$), parents ($n/22$), and teachers ($n/9$). Participants were selected from six aided and private coeducational schools in Mumbai. Thematic analysis was performed and the recurrent themes and quotes were reviewed to develop statements measuring attitudes and practices related to healthy eating and activity levels in children. The detailed results of these discussions are described elsewhere (Moitra and Madan, 2020).

Based on the initial analysis, the draft instrument was developed, including participant demographic characteristics such as sex, date of birth, type of school attended (private school or aided school), class, and division of studying and questions assessing the KAP related to healthy eating and activity levels.

Initial draft of the instrument: In the first draft, the knowledge items included 48 multiple-choice questions assessing children's knowledge of food groups, balanced diet and food pyramids, macronutrients and specific

micronutrients, healthy and unhealthy eating habits, risk factors of non-communicable diseases such as obesity, diabetes, and heart diseases, and the recommended daily activity levels. Each correct response was given one point and incorrect responses, "do not know," and "not sure" received zero points. The attitude statements were developed based on the focus group results and HBM constructs of perceived susceptibility, severity, benefits, barriers, readiness to change, and self-efficacy. All items were rated on a four-point Likert scale from "strongly agree" to "strongly disagree," with numeric scores zero to three. For negatively phrased statements (such as perceived barrier items), the scores were re-coded as three, two, one, and zero with the response "strongly disagree" receiving a score of three.

Practice items evaluated children's eating habits and food consumption patterns and their physical activity levels and sedentary behaviors. Dietary practice questions included children's weekly frequency of consuming breakfast, skipping meals, and bringing healthy snacks to school, family dietary habits such as frequency of eating out in restaurants, ordering takeaways, having family

meals together, and watching television while eating food at home, and a 35-item food frequency questionnaire that measured children's weekly consumption of fruit, vegetables, and energy-dense snacks. Activity-related practices were assessed by asking "In the last 7 days, how many days did you perform the following activities?" The listed moderate to vigorous physical activities (MVPA) were sports such as football and basketball, cycling, dancing, jogging or running, swimming, martial arts, and skipping or jumping rope, and sedentary activities (SA) included watching television, playing or studying on the computer, chatting with friends on the phone, listening to music or reading, playing board games with friends, and sitting in class.

The list of food items and the MVPA and SA-related practices included in the first draft was based on the results of focus group discussions and previous studies in Indian children (Mehta et al., 2014; Bailey et al., 2018; Esht et al., 2018; Griffiths and Bentley, 2018; Rath, Riddell, and Worsley, 2018). Responses for all practice items were assessed on a five-point Likert scale, scored zero to four (from "never" to "more than once a day"). Reverse scoring was done for the consumption of unhealthy snacks and performing SA to ensure that the higher scores indicated healthier practices.

At the end of this phase, the 128-item KAP instrument included 48 knowledge, 25 attitude, 35 dietary practice, 12 MVPA, and eight SA-related questions. The next step was to evaluate the psychometric properties of the instrument.

number of experts (Zamanzadeh et al., 2015). Based on the

Phase II: Validity and reliability of the questionnaire

Face validity: A sample of 28 children (aided schools $n=12$ and private schools $n=16$) evaluated the face validity. Children were encouraged to ask for clarification, to provide remarks, and identify questions or instructions they found difficult to understand. The remarks obtained were evaluated and appropriate modifications related to language, the order of questions, and wording of items were made. Response latency to identify questions requiring further explanations and the approximate time needed to complete the questionnaire were noted.

Content validity: Content validity was tested by a team of professionals (two dietitians, an educationist, and a researcher who had previous experience of conducting a validation study) and experiential experts (two parents with children aged 10 and 11 years, a teacher supervisor of grade six in a private school, and a science teacher of grade seven in an aided school). These experts ($n=8$) reviewed the questionnaire individually, and rated each item for relevancy and clarity on a four-point ordinal scale (0, not relevant/unclear; 1, item needs revision; 2, relevant/clear with minor revisions; and 3, very relevant/very clear). The item-wise content validity index (I-CVI) was calculated by dividing the number of experts (who gave a score of two or three to each item for relevancy and clarity) by the total

I-CVI, ~~the items~~ ^{Moitra et al.} were retained, revised, or deleted. To further establish content validity, we assessed item difficulty by reviewing the proportion of children ($n = 252$) who responded correctly to the knowledge items and calculating the item discrimination index to determine whether a specific item was an indicator of good knowledge. Items that were correctly answered by more than 80% or less than 20% of participants were reviewed, and decisions related to the retention of these items were taken. (Trakman et al., 2017)

Construct validity: The underlying constructs of attitude and practice items were determined using the principal-axis method of exploratory factor analysis. Varimax rotation with Kaiser normalizations presented each factor in a more meaningful manner and factor loadings were estimated. The number of factors to remain was determined by considering the eigenvalues >1 and factor loadings >0.4 (Hiew et al., 2015). Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure established sample adequacy for performing factor analysis (Strauss and Smith, 2009; Lachat et al., 2012; Ratti et al., 2017).

Reliability: Internal consistency of the items in attitude and practice scale (interval scale) was evaluated using the Cronbach α value >0.7 (Hiew et al., 2015; Amiri et al., 2017) and for the dichotomous items in the knowledge scale (scored as zero or one) using Kuder-Richardson 20 (KR-20) >0.7 (Salkind, 2012). As suggested in previous studies, we used the intraclass correlation coefficient (ICC) to determine the correlation and degree of agreement between the variables measured in the test and retest of the survey instrument (Cullen, Watson, and Zakeri, 2008; Koo and Li, 2016).

Statistical analyses

Data were analyzed using SPSS version 22 (SPSS, Chicago, USA); frequency and percentages for categorical variables and mean and standard deviation values for continuous variables were calculated. Variables were compared according to sex and the type of school attended by the participants using chi-square and t -tests; the level of significance was set at $p < 0.05$. As suggested in similar studies, we used I-CVIs of 0.7 or higher to determine the content validity, an item difficulty index range 0.2–0.8 for retention of items based on item difficulty, and point-biserial correlation coefficient values of 0.2–0.3 to discriminate items in the knowledge scale (Zamanzadeh et al., 2015; Trakman et al., 2017; Kovacic, 2018). Exploratory factor analysis using the principal axis factoring method and varimax rotation determined the construct validity.

Internal consistency of the knowledge scale was evaluated using KR-20 >0.7 (Amiri et al., 2017) and for attitude and practice items, we used Cronbach's α values >0.7 (Glanz and Steffen, 2008). Test-retest reliability was analyzed using a single-measurement, absolute-agreement, two-way mixed-effects model and interpreted based on 95% confidence interval (CI) estimates of ICC values

Table 1. Demographic characteristics of participants in the knowledge, attitudes, and practices (KAP) to healthy eating and activity patterns in schoolchildren (HEAPS) study ($n=4252$).

Characteristics	Number	Percentage
Sex		
Boys	121	48.0
Girls	131	52.0
Type of school		
Aided	122	48.4
Private	130	51.6
Sixth grade	128	50.8
Seventh grade	124	49.2
Religion		
Hindu	179	71.1
Muslim	46	18.3
Christian	10	3.9
Parsi	12	4.8
Other	5	1.9
Father's occupation		
Service	89	35.3
Business	68	26.9
Professional (doctor/lawyer/CA)	32	12.7
Menial jobs (driver/plumber/painter)	43	17.1
Self employed	9	3.6
No response/does not know	11	4.4
Mother's working status		
Does not work	140	55.5
Part time	38	15.1
Full time	74	29.4

CA, chartered accountant.

>0.75 as good and with > 0.9 as excellent reliability (Cullen, Watson, and Zakeri, 2008; Koo and Li, 2016).

Overall, 252 children completed the survey to determine the construct validity, internal consistency, and test-retest reliability. The mean age of participants was 11.5 (1.2) years, 48% were boys, 52% were studying in private schools, 56% reported that their mothers were not working outside the home, and more than three quarters ascribed to the Hindu religion. The demographic characteristics of the participants are provided in Table 1.

The overall I-CVI scores for clarity and relevance in the instrument were 0.910 and 0.828, respectively, whereas it ranged from 0.812 to 1.00 for knowledge items, from 0.866 to 0.987 for items in the attitude scale, and from 0.782 to 0.856 for practice items. Out of 48 knowledge items in the first draft, 18 questions were removed based on I-CVI <0.7, four questions were reworded post face validity to improve clarity and comprehension, and an additional eight items were excluded based on item difficulty index <0.2 or >0.8. Similar revisions were made for attitude and practice items. At the end of the content and face validity exercise, the 88-item KAP-HEAPS instrument comprised 22 knowledge, 22

attitude, and 44 practice questions (32 dietary practice and 12 MVPA and SA practice). The average time to complete the survey was 25–40 minutes.

To conduct exploratory factor analysis, we tested the assumptions using Bartlett's test of sphericity and KMO measures of sampling adequacy; Bartlett's test of sphericity was observed to be significant at <0.0001, and KMO was adequate for attitude items (KMO 0.890) and practice items (KMO 0.730). Next, the principal axis-factoring method was used to extract factors keeping the minimum eigenvalue as 1; this method extracted four dimensions in the attitude scale with the first, second, and third dimensions explaining 15.3%, 11.3%, and 8.6% of the variance in the scores, respectively. All items in this analysis had primary loadings over 0.5. Dimension 1 of the attitude scale included five items that measured "perceived susceptibility and severity" to adverse health consequences of unhealthy eating habits and activity levels. Dimension 2 was named "perceived benefits" and included six items measuring the perceived benefits of indulging in healthy eating practices and being active, whereas dimension 3 and dimension 4 assessed "perceived barriers" (six items) and "readiness to change and self-efficacy" (three items), respectively.

From the factor analysis and scree plot, four factors (individual eating habits, family eating habits, and consumption of healthy and unhealthy foods) explained 67.7% variance in dietary practice and two factors explained 48.2% of the total variance in the activity practice items. In the final analysis model, 22 knowledge, 20 attitude, 30 dietary practice, and 12 activity (six MVPA and six SA) practice items were retained (Table 2).

Supplementary Table 1 and 2 provide the results of the exploratory factor analysis.

The total KR-20 for the knowledge subscale was 0.832 and Cronbach's α values for the attitude and practice scales were 0.892 and 0.810, respectively. As all items had Cronbach α values >0.7, the instrument was considered to have good internal consistency. The final 84-item KAP-HEAPS survey was administered twice to a sub-sample of children ($n=132$), with the median duration between tests as 19 days. Out of these children, 54.2% were from a private school, 52.2% were girls, and 48.5% studied in grade six. For knowledge items, ICC estimates ranged from 0.72 (unhealthy eating habits) to 0.99 (food groups and nutrients, mean 0.87). ICC estimates were excellent for majority of the attitude items (range 0.92–0.99), except for perceived susceptibility (ICC, 0.78; 95% CI, 0.60–0.88); the levels of reliability in practice items were good (fruit consumption, ICC, 0.83; 95% CI, 0.78–0.87) to excellent (SA, ICC, 0.95; 95% CI, 0.91–0.99), except in dietary practice related to unhealthy food consumption (ICC, 0.68; 95% CI, 0.62–0.73).

The number of items and examples of questions in each subscale of the KAP-HEAPS questionnaire and the mean and SD values for KAP scales, KR-20, and Cronbach α values for internal consistency and ICC values with 95% CI

Table 2. Summary of dimensions, eigen values, percentage variance, and range of factor loadings extracted using principal axis-factoring method for attitude and practice items in knowledge, attitude, and practice (KAP) to healthy eating and activity patterns in school children (HEAPS) study.

Factors/dimensions	Initial eigenvalues			Extraction sums of squared loadings			Range of factor loadings
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	
Attitude items							
1 Perceived susceptibility and severity	3.042	15.290	15.290	3.042	15.209	15.209	0.519–0.646
2 Perceived benefits	2.249	11.287	26.577	2.249	11.247	26.456	0.525–0.675
3 Perceived barriers	1.721	8.604	35.181	1.721	8.604	35.060	0.519–0.632
4 Readiness to change and self-efficacy	1.567	7.837	43.018	1.567	7.837	42.897	0.584–0.767
Dietary and activity practice items							
1 Personal eating habits	6.130	21.322	23.322	8.130	21.322	23.322	0.695–0.761
2 Family dietary habits	4.643	18.525	41.847	6.643	18.525	41.847	0.526–0.757
3 Consumption of healthy foods	3.011	14.486	56.334	4.011	14.486	56.334	0.552–0.675
4 Consumption of unhealthy foods	2.664	11.367	67.701	2.664	11.367	67.701	0.507–0.691
Activity 1. Moderate to vigorous physical activity	7.834	28.282	28.282	7.834	28.282	28.282	0.519–0.724
Activity 2. Sedentary activity	4.547	19.891	48.173	4.547	19.891	48.173	0.489–0.706

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.

of ICC estimates for test-retest reliability are presented in Table 3.

habits and physical inactivity in the sample. Only 61%,

KAP related to healthy eating and activity levels

The mean knowledge, attitude, dietary practice, and physical activity scores were 16.62 (2.2), 36.54 (6.2), 73.64 (28.7), and 28.86 (4.5), respectively. There were no significant differences in the mean knowledge, attitude, and dietary practice scores between girls and boys, although the mean physical activity scores were significantly higher among boys (33.30 vs 24.42 in girls; $p=0.032$). Participants from private schools reported significantly higher mean knowledge (17.55 vs 14.06 in aided schools, $p<0.001$), attitude (40.07 vs 34.31 in aided schools, $p<0.001$), and dietary practice scores (78.90 vs 71.33 in aided schools, p value <0.001).

Most children (>70%) reported “good” knowledge (scores above 50%) about healthy and unhealthy eating habits and the benefits of being active but “poor” knowledge about the healthy eating plate (29%), portions and serving sizes (33%), risk factors of non-communicable diseases (38%), and examples of moderate to vigorous activity (42%). Participants disagreed with the statements “I am worried about becoming obese” (32%), “I am worried about getting diabetes” (37%), and “I am worried about getting heart disease” (42%). Less than one third (28%) agreed that “I will get diseases if I don’t eat healthily” and only 22% strongly agreed to the statement “I will feel tired if I am physically inactive.” These results indicated low perceived susceptibility and perceived severity of the adverse consequences of unhealthy eating

n

In this study, several measures of validity such as the face, content, and construct validity and measures of reliability such as internal consistency and test-retest reliability were employed to develop the KAP-HEAPS questionnaire. Although we could not find any similar studies that had described the methods of validating KAP instruments among school children in India, several studies conducted outside India used similar methods to evaluate the psychometric properties of questionnaires. A study conducted to develop and determine the reliability of KAP towards wholegrains among Malaysian primary school children assessed construct validity using exploratory factor analysis (Hiew et al., 2015), another study reported the use of internal consistency α values and test-retest reliability coefficient values to examine the reliability of the instrument (Vereecken et al., 2009), and another assessed the psychosocial constructs associated with calcium intake in adolescent girls based on the key constructs of a health-behavior theory (Glanz and Steffen, 2008). The attitude items in our study were based on the constructs of the HBM, a theoretical framework that is often used to understand health-related behaviors (Ghaffari et al., 2012; Rahmati-Najarkolaei et al., 2015; Tavassoli et al., 2017).

Similar to previous studies (Murang, Tuah, and Naing, 2017; Scherr et al., 2017; Mamba, Napoles, and Mwaka, 2019), we observed inadequate knowledge regarding

Table 3. Description of the items, mean scores, internal consistency, and intraclass correlation coefficient values of items in knowledge, attitudes, and practices (KAP) to healthy eating and activity patterns in school children (HEAPS) survey in Mumbai (n¼252).

Scale/ subscale	Items	Questions	Response scoring	Mean (SD)	KR-20 or α	ICC (95% CI)
Knowledge						
Food groups and nutrients	6	Food group that should take most space on your plate. Recommended daily servings of fruit and vegetables for children. Food items at the top of the food pyramid. Sources of simple carbohydrates in diet. Sources of healthy fats in diet. Foods high in fiber content.	Each correct response $\frac{1}{4}$ 1 Incorrect response/ don't know/ not sure $\frac{1}{4}$ 0 Maximum possible scores $\frac{1}{4}$ 25	4.18 (1.2)	0.832	0.961** (0.92–0.99)
Eating habits	6	Components of healthy eating plan. Healthy breakfast choices. Identify nutritious afterschool snack. Allowed daily consumption of sugar. Identify unhealthy eating habits. ^a Effect of consuming too many junk foods. Healthy alternatives to SSBs.		5.44 (2.3)		
NCDs	5	Modifiable risk factors of NCDs. ^a Symptoms related to diabetes. Foods for healthy heart. Ways to prevent NCDs. Health problems associated with obesity.		3.10 (1.8)		
Activity patterns	5	Identify moderate to vigorous activities. ^a Benefits of being active. How often should you indulge in MVPA? How long should you watch TV or play on a computer every day? Consequences of physical inactivity.		3.82 (2.1)		
Attitude						
Perceived susceptibility and severity	5	I will get diseases if I don't eat healthily. I will feel tired if I am physically inactive. I am worried about getting diabetes. I am worried about getting heart diseases. I am worried about overweight/obesity.	For all items except perceived barriers Strongly agree $\frac{1}{4}$ 3 Agree $\frac{1}{4}$ 2 Disagree $\frac{1}{4}$ 1 Strongly disagree $\frac{1}{4}$ 0	7.23 (3.4)	0.892	0.752* (0.687–0.826)
Perceived benefits	6	Healthy eating can reduce risk of diseases. Fruit can fight infections. Eating vegetables can help you lose weight. Regular breakfast helps improve alertness. Exercising is good for my muscles and bones. Being physically active will increase my energy levels and improve my moods.	For perceived barrier items Strongly agree $\frac{1}{4}$ 0 Agree $\frac{1}{4}$ 1 Disagree $\frac{1}{4}$ 2 Strongly disagree $\frac{1}{4}$ 3 Maximum possible scores $\frac{1}{4}$ 60	12.28 (6.2)		
Perceived barriers	6	It is difficult to eat two pieces of fruit a day. I am not sure what and how much should I eat. I have trouble choosing healthy foods when eating out or with friends. I find exercise boring. I don't get time to exercise. Playing on the computer is more fun than playing outside with friends.		8.69 (2.8)		
Readiness to change and self-efficacy	3	I try to eat breakfast every day. I try to eat fruit every day. I want to improve my eating habits.		7.38 (4.7)		

(continued)

Table 3. (continued)

Scale/ subscale	Items	Questions	Response scoring	Mean (SD)	KR-20 or a	ICC (95% CI)
Dietary practice						
Personal eating habits	3	How often do you have breakfast? How often do you carry tiffin to school? How often do you skip a meal?	For healthy eating habits and consumption of healthy foods Never ¼ 0 1-2 times ¼ 1 3-4 times ¼ 2	8.54 (3.6)	0.768	0.923** (0.89-0.95)
Family dietary habits	3	How often did your family eat a meal together, eat a meal in front of TV, eat out at restaurants/ order takeaways?	1-2 times ¼ 1 3-4 times ¼ 2	9.10 (4.1)		0.956** (0.92- 0.98)
Consumption of fruits and vegetables (healthy foods)	12	How often did you consume bananas, citrus fruits, apples, grapes, other fruits, 100% fruit juice? How often did you consume potatoes, carrots, tomatoes, cauliflower, cabbage, green leafy vegetables, salad, other vegetables?	Every day ¼ 3 > once/day ¼ 4 For unhealthy eating habits and consumption of unhealthy foods Never ¼ 4 1-2 times ¼ 3 3-4 times ¼ 2 6-7 times ¼ 1 >once /day ¼ 0 Maximum possible scores ¼ 120	19.42 (12.0)		Fruits 0.838* (0.78-0.87) Vegetables 0.88* (0.86-0.91) 0.682* (0.62-0.73)
Consumption of foods high in fat, sugar and salt (unhealthy foods)	12	How often did you consume biscuits, chocolates, cakes/pastries, Cola-Cola/ Pepsi? How often did you consume vada pav, samosa, burger/pizza, pav bhaji? How often did you consume wafers, Frankie, fried rice/noodles, Maggi noodles?	1-2 times ¼ 3 3-4 times ¼ 2 6-7 times ¼ 1 >once /day ¼ 0 Maximum possible scores ¼ 120	36.45 (14.6)		
Activity MVPA	6	In the last 7 days, how often did you play football/basketball, martial arts, cycling/dancing, cricket/badminton, running/jogging, jumping rope?	Never ¼ 0 1-2 times ¼ 1 3-4 times ¼ 2 6-7 times ¼ 3 >once a day ¼ 4 Maximum possible scores ¼ 24	15.5 (8.3)	0.881	0.968** (0.94-0.99)
Sedentary activity	6	In the last 7 days, how often did you watch TV, play/study on computers, chat with friends/social media, read/listen to music, sit in lessons?	Never ¼ 4 1-2 times ¼ 3 3-4 times ¼ 2 6-7 times ¼ 1 >once/day ¼ 0 Maximum possible score ¼ 24	12.8 (4.5)	0.920	0.954** (0.91-0.99)

a, Cronbach alpha; 95% CI, 95% confidence interval; ICC, intraclass correlation coefficient; KR-20, Kuder-Richardson 20; MVPA, moderate to vigorous physical activity; NCD, non-communicable diseases; SSB, sugar-sweetened beverages.

*Correlation is significant at $p < 0.05$ level; ** $p < 0.001$ (one tailed).

recommended daily servings of fruit and vegetables, guidelines related to the required duration of physical activity and daily limits of SAs. Poor perceived susceptibility and severity of adverse health consequences of non-communicable diseases were also observed. These findings suggest that efforts are necessary to improve the nutritional knowledge of children, but an acknowledgment of the interplay between perceptions and attitudinal variables, such as perceived susceptibility to diseases and perceived benefits and barriers to adopting healthy lifestyle habits, and practices related to diet and activity patterns of children is also needed.

There are several strengths to this study—first, a valid and reliable instrument was developed to measure KAP related to healthy eating and activity levels in Indian children. Second, this study was conducted in Mumbai city, an economic hub that is undergoing rapid urbanization (Yedla, 2003) and associated changes in lifestyle practices and food accessibility and consumption patterns (Cuevas García-Dorado et al., 2019). Considering that children are often at the forefront of these sociocultural changes (Jayawardena et al., 2016; Bailey et al., 2018) and are more likely to be tempted to adopt unhealthy food choices and lifestyle practices (Popkin, Adair, and Ng, 2012; Griffiths and Bentley, 2018), the brief 84-item KAP instrument developed in this study can be used as a pre-intervention assessment tool to examine possible mediating attributes of knowledge and attitudes to healthy-eating habits and activity patterns in urban children. This instrument can also be used to evaluate before and after comparisons of intervention programs, designed to improve awareness and foster positive attitudes among school children in India. Third, the selection of participants from aided and private schools (using the type of school attended as a proxy for socioeconomic status) ensured representation across socioeconomic backgrounds. Finally, the participants in this study were in the stage of early adolescence (10–12 years), an impressionable age when autonomy in decisions over lifestyle habits, including diet and activity patterns, is being formed and an understanding of their knowledge and attitude to healthy eating and activity levels may prove to be a future investment.

However, it must be noted that our study has the limitations of generalizability due to the use of a purposive-sampling method and selection of an urban setting to evaluate the psychometric properties of the instrument. Further studies with larger samples and diverse settings are needed for validation of this instrument and to understand how children learn and use health-related knowledge and translate them into better lifestyle practices.

Conclusions

The results of this study are promising. The measures of validity determined the extent to which the KAP-HEAPS instrument measured what it intended to, and the reliability testing established the temporal ability. The detailed

description of the methodology employed to develop and evaluate the psychometric properties of the questionnaire may prove useful to researchers who are developing nutritional knowledge and health behavior-related instruments or conducting similar measurement studies in children. Considering that studies evaluating the reliability and validity of instruments measuring KAP to healthy eating and activity levels among children in India are limited, conducting descriptive methodological studies in the future is warranted. Measuring these attributes is crucial to provide further direction to address nutrition and physical inactivity-related health issues among children.

Acknowledgments

The authors would like to acknowledge Mr. Jagdish Sharma for his assistance with statistical analysis, the field research team for their hard work, and the heads of the institutes who provided permission to conduct the study. The authors appreciate the valuable inputs and cooperation provided by the study participants.

Author contributions

PM and JM formulated the research questions and designed the study. PM and PV supervised fieldwork and PM was responsible for data analysis and management. PM drafted the manuscript and JM and PV critically reviewed the manuscript; the final draft was approved by all authors.

Data accessibility

Research data included in Supplementary files are the authors' content. Additional datasets used and/or analyzed during the present study are available from the corresponding author on reasonable request.

Declaration of conflicting interests


The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical statement

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Intersystem Biomedica Ethics Committee, Mumbai, India (version 2, dated 19 February 2019). Written informed consent was obtained from parents and written informed assent was obtained from the participants.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Panchali Moitra  <https://orcid.org/0000-0002-3630-2794>

Supplemental material

Supplemental material for this article is available online.

References

- Amiri P, Asghari G, Sadrosadat H, et al. (2017) Psychometric properties of a developed questionnaire to assess knowledge, attitude and practice regarding vitamin D (D-KAP-38). *Nutrients* 9(5): 1–13. DOI: 10.3390/nu9050471.
- Bailey C, Garg V, Kapoor D, et al. (2018) Food choice drivers in the context of the nutrition transition in Delhi, India. *Journal of Nutrition Education and Behavior*. DOI: 10.1016/j.jneb.2018.03.013.
- Beena S, et al. (2013) Nutrient intake among school going adolescent girls in Lucknow district, India. *Journal of Biomedical and Pharmaceutical Research*.
- Biddle SJH, et al. (2010) Tracking of sedentary behaviours of young people: A systematic review. *Preventive Medicine* 345–351.
- Boutayeb A (2006) The double burden of communicable and non-communicable diseases in developing countries. *Transactions of the Royal Society of Tropical Medicine and Hygiene*.
- Branca F, et al. (2019) Transforming the food system to fight non-communicable diseases. *BMJ (Online)* 364.
- Cullen KW, Watson K, and Zakeri I (2008) Relative reliability and validity of the block kids questionnaire among youth aged 10 to 17 years. *Journal of the American Dietetic Association* 108(5): 862–866.
- Dorado S, Cornselsen L, Smith R, et al. (2019) Economic globalization, nutrition and health: a review of quantitative evidence. *Globalization and Health* 15(1): 15. DOI: 10.1186/s12992-019-0456-z.
- Esht V, et al. (2018) A preliminary report on physical activity patterns among children aged 8–14 years to predict risk of cardiovascular diseases in Malwa region of Punjab. *Indian Heart Journal* 70(6): 777–782.
- Ghaffari M, et al. (2012) Effect of Health Belief Model based intervention on promoting nutritional behaviors about osteoporosis prevention among students of female middle schools in Isfahan, Iran. *Journal of Education and Health Promotion* 1(1): 14.
- Glanz K and Bishop DB (2010) The role of behavioral science theory in development and implementation of public health interventions. *Annual Review of Public Health* 31(1): 399–418.
- Glanz K and Steffen A (2008) Development and reliability testing for measures of psychosocial constructs associated with adolescent girls' calcium intake. *Journal of the American Dietetic Association* 108(5): 857–861.
- Griffiths PL and Bentley ME (2018) The nutrition transition is underway in India. *The Journal of Nutrition*.
- Gupta N, et al. (2012) Childhood obesity in developing countries: Epidemiology, determinants, and prevention. *Endocrine Reviews* 48–70.
- Hiew CC, et al. (2015) Development and validation of knowledge, attitude and practice on healthy lifestyle questionnaire (KAP-HLQ) for Malaysian adolescents. *Journal of Nutrition and Health Sciences* 2(4).
- Jayawardena R, et al. (2016) Nutrition transition and obesity among teenagers and young adults in South Asia. *Current Diabetes Reviews*.
- Kao KT and Sabin MA (2016) Type 2 diabetes mellitus in children and adolescents. *Australian Family Physician*.
- Karki A, Shrestha A, and Subedi N (2019) Prevalence and associated factors of childhood overweight/obesity among primary school children in urban Nepal. *BMC Public Health* 19(1): 1055.
- Kigaru DMD, et al. (2015) Nutrition knowledge, attitude and practices among urban primary school children in Nairobi City, Kenya: A KAP study. *BMC Nutrition* 1(1): 44.
- Kim HS, Ahn J and No JK (2012) Applying the health belief model to college students' health behavior. *Nutrition Research and Practice* 6(6): 551–558.
- Koo TK and Li MY (2016) A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine* 15(2): 155–163.
- Kovacic D (2018) Using the content validity index to determine content validity of an instrument assessing health care providers' general knowledge of human trafficking. *Journal of Human Trafficking* 4(4): 327–335.
- Kumar S and Kelly AS (2017) Review of childhood obesity: From epidemiology, etiology, and comorbidities to clinical assessment and treatment. *Mayo Clinic Proceedings*.
- Lachat C, et al. (2012) Eating out of home and its association with dietary intake: A systematic review of the evidence. *Obesity Reviews*.
- Mamba NPS, Napoles L, and Mwaka NM (2019) Nutrition knowledge, attitudes and practices of primary school children in Tshwane Metropole, South Africa. *African Journal of Primary Health Care and Family Medicine* 11(1).
- Meharda B, et al. (2017) Overweight and obesity: A rising problem in India. *International Journal of Community Medicine And Public Health*.
- Mehta K, et al. (2014) Dietary pattern of schoolgoing adolescents in Urban Baroda, India. *Journal of Health, Population and Nutrition*.
- Misra A, et al. (2011) Nutrition transition in India: Secular trends in dietary intake and their relationship to diet-related non-communicable diseases. *Journal of Diabetes*.
- Moitra P and Madan J (2020) Perceived barriers and facilitators of healthy eating and physical activity: Focus groups with children, parents and teachers in Mumbai, India. *International Journal of Community Medicine And Public Health* 7(6): 2363.
- Murang ZR, Tuah N, and Naing L (2017) Knowledge, attitude and practice towards eating and physical activity among primary school children in Brunei: A cross-sectional study. *International Journal of Adolescent Medicine and Health*.
- Musaiger AO and Al-Hazzaa HM (2012) Prevalence and risk factors associated with nutrition-related noncommunicable diseases in the Eastern Mediterranean region. *International Journal of General Medicine*.
- Naghashpour M, et al. (2014) Nutrition education based on health belief model improves dietary calcium intake among female students of junior high schools. *Journal of Health, Population and Nutrition*. 32(3): 420–429.
- Oli N, et al. (2018) Knowledge, attitude and practice on diet and physical activity among mothers with young children in the Jhaukhel-Duwakot Health Demographic Surveillance Site, Nepal. *PLoS ONE* 13(7).
- Popkin BM, Adair LS, and Ng SW (2012) Global nutrition transition and the pandemic of obesity in developing countries. *Nutrition Reviews* 70(1): 3–21.
- Qidwai W, et al. (2010) Adolescent lifestyle and behaviour: A survey from a developing country. *PLoS ONE*.
- Rahmati-Najarkolaei F, et al. (2015) Factors predicting nutrition and physical activity behaviors due to cardiovascular disease in Tehran university students: Application of health belief model. *Iranian Red Crescent Medical Journal* 17(3): 1–6.

- Epidemiology of childhood overweight & obesity in India: A systematic review. *Indian Journal of Medical Research*.
- Rathi N, Riddell L and Worsley A (2018) Urban Indian adolescents practise unhealthy dietary behaviours. *British Food Journal*.
- Ratti V, et al. (2017) An exploratory factor analysis and construct validity of the resident choice assessment scale with paid carers of adults with intellectual disabilities and challenging behavior in community settings. *Journal of Mental Health Research in Intellectual Disabilities* 10(3): 198–216.
- Salkind N. (2012) ‘KR-20’. In *Encyclopedia of Research Design*. SAGE Publications, Inc. DOI: 10.4135/9781412961288.n205.
- Scherr RE, et al. (2017) A multicomponent, school-based intervention, the shaping healthy choices program, improves nutrition-related outcomes. *Journal of Nutrition Education and Behavior* 49(5): 368–379.e1.
- Shaikh NI, et al. (2016) Going global: Indian adolescents’ eating patterns. *Public Health Nutrition* 19(15): 2799–2807.
- Shridhar K, et al. (2016) Prevalence and correlates of achieving recommended physical activity levels among children living in rural South Asia: A multi-centre study. *BMC Public Health* 16(1). Sivagurunathan C, et al. (2015) Adolescent health: Present status and its related programmes in India. Are we in the
- Strauss ME and Smith GT (2009) Construct validity: Advances in theory and methodology. *Annual Review of Clinical Psychology* 5(1): 1–25.
- Tavassoli E, Reisi M, Javadzad SH, et al. (2013) The effect of the health belief model-based education & improvement of consumption of fruits and vegetables: An interventional study. *Journal of Health in the Field* 1(2).
- Teixeira PJ and Marques MM (2017) Health behavior change for obesity management. *Obesity Facts* 10(6): 666–673.
- Trakman GL, et al. (2017) Developing and validating a nutrition knowledge questionnaire: Key methods and considerations. *Public Health Nutrition* (15): 2670–2679.
- Vaz M, et al. (2016) The nutrition transition in India. *South African Journal of Clinical Nutrition*.
- Vereecken C, et al. (2009) Reliability and validity of a healthy diet determinants questionnaire for adolescents. *Public Health Nutrition* 12(10): 1830–1838.
- Yedla S. (2003) *Urban environmental evolution: The case of Mumbai*. Report prepared for Institute for Global Environmental Strategy (IGES), Japan.
- Zamanzadeh V, et al. (2015) Design and implementation content validity study: Development of an instrument for measuring patient-centered communication. *Journal of Caring Sciences* 4(2): 165–178.

OPEN ACCESS

Proceedings of the Nutrition Society

Winter Conference Live 2020,

Using the intervention to evaluate effectiveness

¹Department of Food, Nutrition and Dietetics, Wipro

²Department of Interdisciplinary

³Department of Food, Nutrition and Dietetics, Wipro

Unhealthy eating behaviours such as consumption of vegetables are common in children. Interventions must also focus on fostering right food consumption in children⁽¹⁾.

We used the systematic approach of intervention, implementing and evaluating the effectiveness of the program.

The steps of IM were employed to inform the methods for developing the intervention, parents and teachers to communicate strategies and effectiveness of the program.

Children (n = 518), studying in government or control group (CG) using school education (NE) and three parents were evaluated using a validated knowledge questionnaire. The weekly frequencies of consumption and the intakes were averaged between-group changes were compared.

The mean age of the participants was 10.5 years. Significant changes were observed in mean knowledge (39.3%) and habits such as frequency of breakfast, chocolates and carbonated drinks.

A structured intervention mapping approach was used to tailor the learning experiences to foster healthy food consumption in children.

Acknowledgments

The authors would like to acknowledge the support of N. Shukla, T. Chindan, S. Datta, and S. Datta.

Edited by: Maria Hassapidou, International Hellenic University, Greece

Reviewed by: Costas A. Anastasiou, Harokopio University, Greece Vibeke H. Telle-Hansen, Oslo Metropolitan University, Norway

*Correspondence:

Soumik Kalitasoumik.kalita@famphy.com

Specialty section: This article was submitted to Nutrition and Metabolism, a section of the journal *Frontiers in Nutrition*

Received: 16 February 2021

Accepted: 31 May 2021

Published: 24 June 2021

Citation:

Madan J, Desai S, Moitra P, Salis S, Agashe S, Battalwar R, Mehta A, Kamble R, Kalita S, Phatak AG, Udipi SA, Vaidya RA and Vaidya AB (2021) Effect of Almond Consumption on Metabolic Risk Factors—Glucose Metabolism, Hyperinsulinemia, Selected Markers of Inflammation: A Randomized Controlled Trial in Adolescents and Young Adults. *Front. Nutr.* 8:668622. doi: 10.3389/fnut.2021.668622

Glucose Metabolism, Hyperinsulinemia, Selected Markers of Inflammation: A Randomized Controlled Trial in Adolescents and Young Adults

Jagmeet Madan¹, Sharvari Desai¹, Panchali Moitra¹, Sheryl Salis², Shubhada Agashe³, Rekha Battalwar¹, Anushree Mehta⁴, Rachana Kamble⁴, Soumik Kalita^{5*}, Ajay Gajanan Phatak⁶, Shobha A. Udipi^{4,7}, Rama A. Vaidya⁸ and Ashok B. Vaidya⁴

¹ Sir Vithaldas Thackersey College of Home Science (Autonomous), Shreemati Nathibai Damodar Thackersey (SNDT) Women's University, Mumbai, India, ² Nurture Health Solutions, Mumbai, India, ³ Clinical and Endocrine Laboratory, Kasturba Health Society Medical Research Centre, Mumbai, India, ⁴ Kasturba Health Society Medical Research Centre, Mumbai, India, ⁵ FamPhy, Gurgaon, India, ⁶ Charutar Arogya Maifal, Karamsad, India, ⁷ Department of Food Science and Nutrition, Shreemati Nathibai Damodar Thackersey (SNDT) Women's University, Mumbai, India, ⁸ Division of Endocrine and Metabolic Disorders, Kasturba Health Society Medical Research Centre, Mumbai, India

A large percentage of the Indian population has diabetes or is at risk of pre-diabetes. Almond consumption has shown benefits on cardiometabolic risk factors in adults. This study explored the effect of almond consumption on determinants of metabolic dysfunction—blood glucose, lipids, insulin and selected inflammatory markers in adolescents and young adults aged 16–25 years from Mumbai city. This randomized controlled trial was conducted for a period of 90 days on individuals with impaired levels of fasting glucose levels between 100–125 mg/dL (5.6–6.9 mmol/L) and 2-h post-glucose value 140–199 mg/dL (7.8–11.0 mmol/L) and/or fasting insulin (≥ 15 mIU/ml)/stimulated insulin (≥ 80 mIU/ml). Of 1,313 individuals screened, 421 met the inclusion criteria, of which 275 consented to participate and 219 completed the trial. The trial was registered with Clinical Trials Registry India (CTRI) CTRI/2018/02/011927. The almonds group ($n = 107$) consumed 56 g almonds daily, the control group ($n = 112$) was provided an iso-caloric cereal-pulse based snack. At baseline and endline, blood glucose, insulin, HbA_{1c}, LDL-c, HDL-c, total and ox-cholesterol, triglycerides, hs-CRP, IL-6, TNF- α , adiponectin, leptin were measured and HOMA-IR and FG:FI ratios were calculated. Dietary intakes were assessed. The anthropometric measurements, biochemical markers as well as macronutrient intakes did not differ significantly between the two groups at baseline. Almond consumption significantly decreased HbA_{1c}, total cholesterol and LDL-c. Stimulated insulin decreased post-intervention in both groups, but the decrease



was greater in the almonds group. Fasting glucose was reduced post intervention in the controls with no change in the almonds group. FG:FI ratio decreased in the almonds group. TNF- α and IL-6 decreased in the almonds group, while it increased

**Effect
of
Almond
Consumption
on
Metabolic Risk
Factors**

in the control group. Our results showed that almonds reduced HbA1c, LDL-c and total cholesterol levels in just 12 weeks of consumption in these adolescents and young adults who were at risk for developing diabetes. Almonds can be considered as part of food-based strategies for preventing pre-diabetes.

Clinical Trial Registration: ClinicalTrials.gov, identifier: CTRI/2018/02/011927.

Keywords: almonds, prediabetes, IL-6, LDL-C, HbA1c, hyperinsulinemia

INTRODUCTION

whole food that can be included by persons prone to poor metabolic health (14, 15). They represent one of the healthiest snacking options as a food-based strategy to achieve better metabolic health in terms of

The International Diabetes Federation (1) estimates that the number of people with diabetes is likely to be 153 million in the next two decades (1). According to a large study done on 57,117 individuals above 20 years of age in 14 states of India, the prevalence of diabetes in India was 7.3% whereas that of prediabetes was 10.3% (2). India presently ranks, fourth in the world for the number of adults (20–79 years of age) with impaired glucose tolerance and by 2,045 it is predicted that it will rank third in the world (1). In a large study comprising 1,519 boys and girls in the age group of 6–19 years in an urban center in South India, the prevalence of glucose intolerance was found to be 3.7% with an increase from 4.2 to 12.7% in girls who were found to have abdominal obesity (3). The fact that India has a young population and children in the age group of 6–19 years comprising nearly 30% of the 1.3 billion Indians, the number of children with glucose intolerance is expected to be very large. Indians have the highest per annum progression from pre-diabetes to type 2 diabetes which is around 14–18% (4–8).

Indians in comparison to their Caucasian counterparts have higher body fat as well as visceral fat percentages at similar BMIs which is characterized by the “thin-fat” Indian diabetes phenotype. This particular phenotype may lead to an early onset of diabetes mellitus and metabolic syndrome in Indians in comparison to their Caucasian counterparts (9). Lack of physical activity and unhealthy dietary choices are the major drivers for pre-diabetes. Lifestyle intervention which includes nutritional interventions and physical activity targeted at adolescents as well as young adults is important to help halt the progression from pre-diabetes to type 2 diabetes.

The nutrition transition in India and the replacement of whole grains and traditional wholesome diets with refined carbohydrate, sugar, energy dense, and nutrient poor foods has contributed considerably to this problem (10–12). In a study conducted among 1,026 adolescents, it was found that 70% of the participants reported the consumption of 3 or more servings of energy-dense snacks and 47% reported the consumption of 3 or more servings of energy-dense drinks in a single day (13). There are no studies that have looked at targeted nutritional interventions for adolescents or young adults in India, where snacking is a very common phenomenon and therefore there is a need to explore the same to help them have healthy snacking choices. Tree nuts with their unique composition offer a natural choice as a

insulin sensitivity, reduced inflammation, and lipid profile (16). Almonds alone or in combination with carbohydrate rich foods have been found to significantly reduce postprandial glucose, insulin response, fasting glucose, and glycosylated hemoglobin in adults (16–20). Most of the studies looking at the effect of almonds on glucose metabolism have been done in the western population, few studies have been conducted in Asian Indians and none have been conducted on adolescents and young Indian adults who have a proclivity for insulin resistance and Type 2 diabetes. In this context, the present randomized controlled trial was undertaken to examine the effect of almond consumption on glucose metabolism, hyperinsulinemia, selected markers of inflammation, and lipid profile in young adults and adolescents residing in urban Mumbai, India.

RESULTS AND METHODS

Study Design

This was a randomized controlled, open-label, parallel arm study conducted on community living adolescents and young adults (16–25 years of age) in Mumbai, India. The inclusion criteria were participants in the age group of 16–25 years of age, with impaired fasting glucose levels between 100 and 125 mg/dL (5.6–6.9 mmol/L) and 2-h post-glucose value 140–199 mg/dL (7.8–11.0 mmol/L) (21) and/or fasting hyperinsulinemia (≥ 15 mIU/ml) or glucose challenge hyperinsulinemia (≥ 80 mIU/ml) (22, 23). The exclusion criteria included the presence of any known chronic disease, known history of food allergies with nuts, on prescribed medications like steroids, state of pregnancy and/or lactation.

The study was conducted from September 2017 to February 2019.

The study was approved by the Intersystem Biomedical Ethics Committee, Mumbai, India (ISBEC version 2 dated 12th August, 2017) and conducted according to Good Clinical Practices and the Declaration of Helsinki. Informed written consent was taken from each institution, each participant and each guardian/parent for participants who were between 16 and 18 years of age; both before screening and prior to participant enrolment for the trial. The trial was registered with Clinical Trials Registry India (CTRI) CTRI/2018/02/011927 (24) and therefore has been registered in the International Clinical Trials Registry Platform (ICTRP) (25).

Sample size estimation: Fasting blood glucose was considered a primary outcome for sample size calculations. In the absence of reliable regional data, an effect size of 0.4 was assumed. With this effect size, a sample of about 112 participants per group was required allowing for 5% alpha (type I) error and to achieve

85% power. Assuming 20% dropouts, an evaluable sample size of about 270 participants was required. The design of the trial is illustrated in **Figure 1**.

Participants were those attending various academic institutions in Mumbai city. Twenty-four academic institutions in Mumbai city were contacted and the study objectives and protocol were explained to the administration/authorities. Of these, 11 provided their consent to recruit and conduct the study. All consenting participants ($n = 1,313$) gave blood samples for measurement of fasting glucose as well as stimulated glucose (2 h after consumption of 75 g of glucose) and fasting, stimulated insulin. Anthropometric measurements were also recorded for each participant during this time.

Randomization and Treatment

Among the 1,313 participants who were screened, 421 participants (males 88, females 333) were eligible because they had elevated fasting/stimulated blood glucose [fasting glucose (100–125 mg/dl), 2h post-glucose (140–199 mg/dl)] and/or insulin [fasting insulin (≥ 15 mIU/ml)/stimulated insulin (≥ 80 mIU/ml)]. Among these 421 individuals, 146 did not provide consent to participate in the intervention. Thus, 275 consenting individuals (males 59, females 216) participated in the study. Baseline assessment was done for fasting blood glucose, fasting insulin, stimulated (2-h post 75 g glucose administration) blood glucose, stimulated insulin, glycosylated hemoglobin (HbA1c), lipid profile, oxidized LDL, adiponectin, leptin, inflammatory markers -IL-6 and TNF- α . Cluster randomization within each institution was used to then assign the individuals either to the almonds group or the control group. Almonds were supplied by the Almonds Board of California, USA. They were stored at 10–15°C in sealed polyethylene bags which were then hygienically packaged and sealed in cardboard cartons. The participation by females was higher as compared to males in the study.

Intervention

Participants in the almonds group received 56 g of raw almonds daily (providing ~20% of the daily energy intake i.e., 340 kcal/d) which was distributed in 2 packets that were to be consumed as snacks in a day. Each day's supply was packaged individually in polyethylene re-sealable bags.

Participants in the control group received commonly consumed isocaloric (as provided by 56 g of raw almonds) Indian savory snacks of 2 varieties to prevent taste fatigue. The control snack was prepared using whole wheat flour, chickpea flour, salt, and Indian spices (nutrient composition of control snack is provided in **Supplementary Table 1**). The snack was selected based on a pre-screening survey of snacking patterns in the age group of the study subjects. The control snacks were packaged in laminated sealed pouches. The nutritional composition of the control snacks was compared to those of the almonds provided to the intervention group to decide on the portion size and on

average the control snack weighed 61–65 g. The entire week's supply for the almonds or the control snacks was provided twice a week to the participants of the respective groups. Participants were instructed to continue with their regular diets

Compliance to Intervention

and lifestyle including exercise patterns. Weekly monitoring was done for each participant by the supervising physician for any adverse effects.

Measurements

Each participant underwent a clinical examination that was conducted by a physician to assess the general health status at screening, baseline as well as at the end of the study. Anthropometric measurements i.e., weight, height, waist circumference, and hip circumference were assessed by trained research assistants using valid and established procedures ensuring that they wore light clothing and no shoes. Body composition was measured using a TANITA body composition analyzer (Model MC 780 MA).

Each participant was contacted over the phone every 2 days to check for the consumption of either almonds or the control product. Participants were instructed to return the unused portions twice a week that were weighed to estimate the intake during a 7-day period.

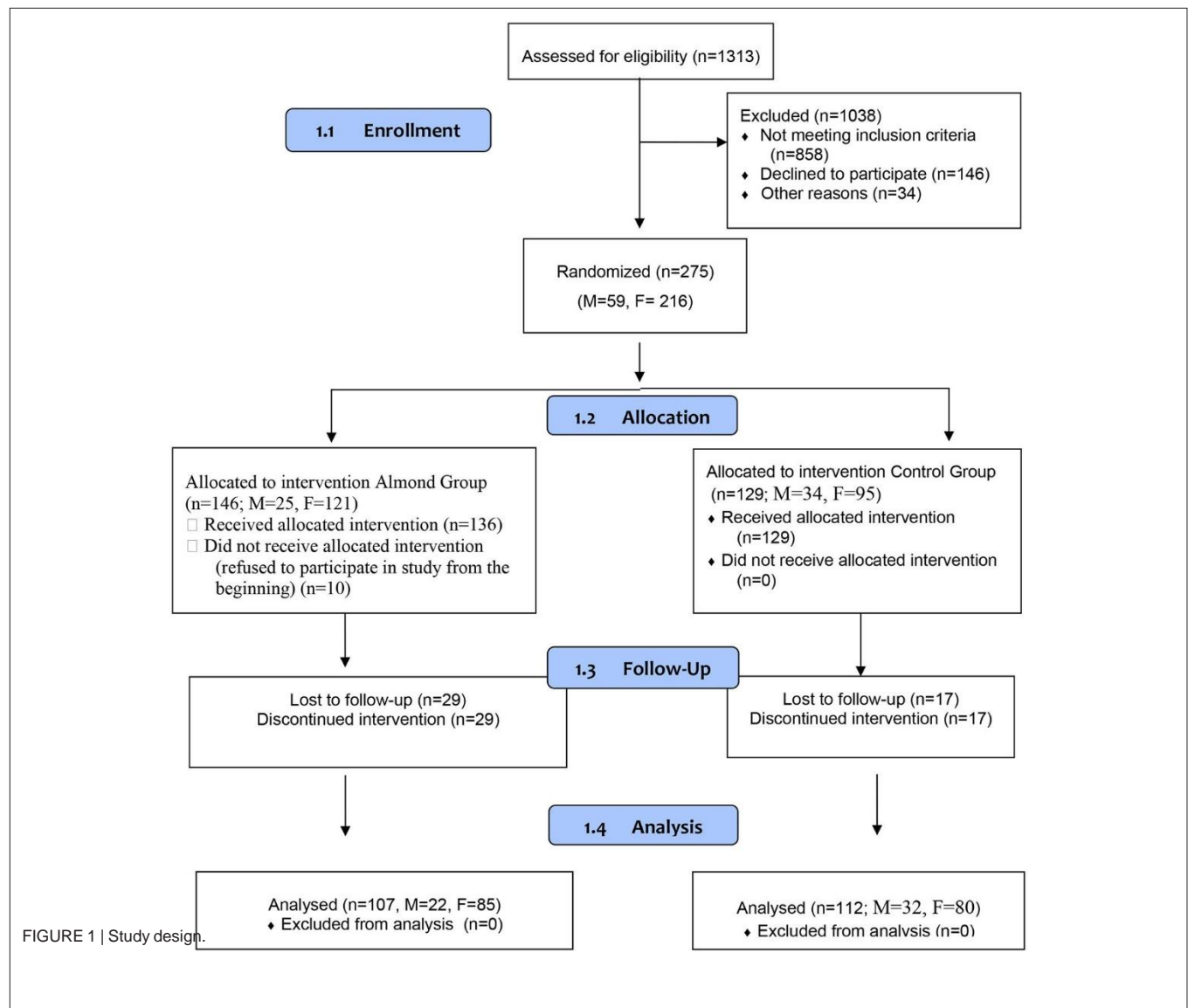
Cal Samples, Collection, Storage, and Biochemical Measurements

Participants were asked to report after fasting overnight for at least 12 h. At time points indicated under methodology, a trained phlebotomist collected fasting blood samples at each individual site/institute. Whole blood was analyzed for complete blood count including hemoglobin, White Blood Cells (WBC), Red Blood Cells (RBC), platelets, Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), and Mean Corpuscular Hemoglobin Concentration (MCHC). Serum was separated by centrifugation, divided into aliquots and stored at -70°C until analyses.

Glucose tolerance test (2-h post 75-g glucose administration) was conducted at screening, at baseline and at the end of the study; glucose was measured spectrophotometrically by the Glucose oxidase (GOD), Peroxidase (POD), method (Accurex Biomedical Pvt Ltd.).

Insulin was measured by radioimmunoassay using a Beckman Coulter Counter. Glycosylated hemoglobin (HbA1c) was measured using Nycocard reader (Alere Technologies, Norway). HOMA-IR was calculated according to the formula: fasting serum insulin ($\mu\text{U/ml}$) \times fasting plasma glucose (mmol/l)/22.5. The fasting glucose to fasting insulin ratio (FG:FI) was also calculated.

Lipid profile was also measured at baseline and end of the study using kits: cholesterol (Accurex Biomedical Pvt Ltd.), triglycerides (Accurex Biomedical Pvt Ltd.), High density lipoprotein cholesterol (HDL-c) (Coral Clinical Systems) were measured. Low density lipoprotein cholesterol (LDL-c) was calculated using the Friedewald formula (26) in those subjects whose triglyceride levels were <400 mg/dl. Oxidized LDL was measured by ELISA method with kits from ELab Science Biotechnology Inc., USA. Adiponectin, leptin, $\text{TNF-}\alpha$ and IL-6 were measured by the ELISA kits provided by DIA source, Belgium.



Assessment

treat

At baseline and the end of the intervention, dietary intakes were estimated by trained research assistants using 1 day 24-h diet recall. Standard measuring cups, glasses, spoons, as well as food models, were used to improve the accuracy of estimation. Nutrient analysis of the dietary data was done using “DietCal” Version 8.0 (27) software by Profound Tech Solutions which is based on values from Indian Food Composition Tables 2017.

Statistical Analyses

Descriptive statistics [Mean \pm SD, Frequency (%)] were used to present the socio-demographic and baseline clinical profile of the participants. Paired-*t* test was used to assess the impact of the intervention (if any) from baseline to endline, within each group. To adjust for any baseline differences, an independent sample *t*-test on difference (delta) was used to compare the magnitude of the impact across groups. Both intent-to-

(ITT) and per-protocol (PP) approaches were used for statistical analysis. ITT analysis included all randomized participants for whom baseline data were available. The PP analysis excluded those participants who did not attend the last visit and for whom baseline data were not available or who consumed <80% of the almonds/control snacks. The data indicated no difference between participants who completed the study protocol and who discontinued the study/ lost to follow up. Albeit the variables involved were checked for normality, considering the large sample size; parametric tests were performed as suggested by Norman (28). The analysis was performed using STATA (14.2). Significance was defined as $p < 0.05$.

RESULTS

The baseline characteristics of participants in the almond group did not differ significantly from those in the control group

for any of the anthropometric and biochemical measurements. There was no significant change observed post-intervention in anthropometric measurements as well as body composition, within each group in comparison to baseline.

Table 1 shows the changes after intervention in the anthropometry and biochemical parameters in comparison to baseline in both groups.

DISCUSSION

of Intervention on Glucose Metabolism

The mean glycosylated hemoglobin levels (HbA1c) levels showed a significant reduction in the almond group in comparison to the control group (**Table 1**). There was no significant difference in HOMA-IR at the end of the study compared to baseline between the two groups and within each group. There was a decrease in the fasting blood glucose to fasting insulin ratio (FG:FI) in the almond group in comparison to the control group but was not statistically significant. The fasting blood glucose levels were significantly reduced in the control as compared to the almond group. The other biomarkers for glucose metabolism showed no significant difference between the almond and the control groups at the end of the study in comparison to baseline (**Table 1**).

of Intervention on Lipid Profile

There was a significant reduction in the total cholesterol and LDL-c levels in the almond group in comparison to the control group. There was an increase in the HDL-c levels, a decrease in the triglyceride levels as well as a decrease in the VLDL-c levels in the almond group in comparison to the control group but was not statistically significant (**Table 1**).

of Intervention on Inflammatory Markers

There was a decrease in the inflammatory marker, IL-6 in the almond group in comparison the control group which was not statistically significant ($p = 0.07$) (**Table 1**).

bility

The participants were monitored by the supervising physicians to observe if they had any gastro-intestinal disturbances during the study. In the almonds group, one participant complained of transient gastric irritation and one had diarrhea, another participant had skin eruptions and both were withdrawn from the study. There was another participant who complained about a rash on cheeks, itching and a sense of heaviness. This participant was also withdrawn from the study

and was treated with an anti-allergic medication for 5 days which managed his symptoms. His blood sample was tested for IgE level which was 159 IU/ml which confirmed it was an allergic reaction. The participant was followed up for a month and was observed to be asymptomatic. All the adverse events were reported to the Ethics Committee.

Consumption of unhealthy snacks made from refined foods has increased in India, often replacing meals and traditional whole foods, resulting in compromised nutrient intakes (29). This may unfavorably influence metabolic health and increase

the risk for the development of obesity as well as obesity associated non-communicable diseases (NCDs). One of the possible ways to improve metabolic health and reduce the risk of NCDs is by introducing healthy snacks (30). Snacking is a common phenomenon in India especially in the young. This study looked at a healthy alternative snack that can help replace unhealthy snacks, particularly in the Indian market. Hectic lifestyle especially in the young population makes them reach out for snacks and therefore it is important to find healthy alternatives to popular snacks. The present study looked at whether almonds could influence glycemic and lipid markers if it is consumed as a replacement for popular snacks, in this part of the world.

Almonds have the potential not only to replace unhealthy snacks but have been shown to improve several metabolic parameters. Several researchers have studied the effect of almond intake on blood glucose and insulin levels (31–35). There has been no study done to look for the effects of almond consumption on different parameters of metabolic health in adolescents and young adults who are predisposed to diabetes. This study has been able to demonstrate the effect of almonds on reducing important parameters of glucose metabolism like HbA1c which is a measure of the average blood glucose levels over the past 2–3 months. The results of this randomized controlled clinical trial showed that almonds have the potential to reduce hyperinsulinemia to help improve insulin resistance prior to pre-diabetes stage. Almonds have been shown to influence insulin and HOMA IR. The monounsaturated fatty acid content of almonds may play a favorable role in insulin resistance (34, 36).

Although fasting glucose is used in clinical settings to assess metabolic health, it has limitations as a biomarker. HbA1c measurement is a more reliable marker than either fasting or post prandial blood glucose levels. It not only equals the assessment of hundreds (virtually thousands) of fasting glucose levels but also captures postprandial glucose peak which is an important marker for insulin resistance (37). Most of the participants in the present study did not have either impaired fasting or high post prandial glucose levels and were included in the study as they were found to be insulin resistant. This may be regarded as one of the strengths of the present study, where participants were studied at an earlier stage of disturbance in metabolic health, much before blood glucose levels became elevated.

Several studies in literature have reported that almonds reduced LDL-c, non HDL-c, and central adiposity while maintaining HDL-c concentrations (38–44). A similar trend was observed in the present study with this young age group wherein, LDL-c levels were significantly reduced in the almonds group. The total cholesterol levels were also reduced significantly in the almond group. In a recent systematic review on tree nut, Altamimi et al. (45) reported that almonds lowered LDL- c and that effects were observed with the consumption of even 20 g of the nut. The beneficial effects of almonds could be attributed to the fact that our participants were asked to consume raw almonds with skin. Also, almonds contain a significant amount of monounsaturated fatty acids (46). A study reported that flow-mediated dilation and soluble vascular cell adhesion molecules were reduced in overweight persons with the intake of almonds wherein, the almond diet provided 7.6% of

TABLE 1 | Mean baseline and change in anthropometric indices, glucose, insulin, lipid profile, inflammatory markers, and oxidized LDL in control and almonds groups.

Characteristics	Almond group (<i>n</i> = 107)		Control group (<i>n</i> = 112)		Treatment effect <i>P</i>
	Mean ± SD (95% CI)		Mean ± SD (95% CI)		
	Baseline	Change	Baseline	Change	
Weight (kg)	59.6 ± 15.1 (56.7, 62.5)	0.92 ± 1.65 (0.60, 1.24)	56.6 ± 13.6 (54.0, 59.1)	0.52 ± 4.17 (−0.25, 1.30)	0.35
BMI (kg/m²)	23.7 ± 5.4 (22.67, 24.72)	0.35 ± 0.66 (0.22, 0.47)	22.4 ± 4.8 (21.55, 23.34)	0.19 ± 1.77 (−0.13, 0.53)	0.40
Waist-to-hip ratio	0.79 ± 0.08 (0.78, 0.81)	0.01 ± 0.05 (0.00, 0.02)	0.80 ± 0.06 (0.78, 0.81)	0.00 ± 0.0 (−0.00, 0.10)	0.11
Waist-to-height ratio	0.47 ± 0.08 (0.46, 0.49)	0.01 ± 0.03 (0.00, 0.01)	0.46 ± 0.07 (0.45–0.47)	0.01 ± 0.03 (0.00, 0.01)	0.94
Percent body fat (%)	30.3 ± 8.7 (29.3, 32.6)	0.87 ± 2.12 (0.46, 1.27)	27.5 ± 8.5 (26.3, 29.6)	3.26 ± 18.07 (−0.12, 6.64)	0.17
Visceral fat	5.02 ± 3.45 (4.34, 5.70)	0.11 ± 0.94 (−0.07, 0.29)	4.29 ± 3.24 (3.66, 4.93)	0.12 ± 1.08 (−0.08, 0.34)	0.91
Fasting glucose (mg/dL)	80.62 ± 7.14 (79.16, 81.93)	0.02 ± 12.0 (−2.27, 2.31)	84.90 ± 11.16 (82.60, 86.68)	−5.5 ± 14.6 (−8.24, −2.75)	0.01
2 h glucose (mg/dL)	102.97 ± 21.41 (98.54, 106.72)	−8.3 ± 22.3 (−12.59, −4.03)	106.84 ± 23.17 (102.14, 110.77)	−12.1 ± 26.5 (−17.05, −7.12)	0.25
Fasting insulin (mIU/L)	11.24 ± 6.34 (10.03, 12.46)	1.6 ± 13.4 (−0.93, 4.18)	11.60 ± 5.36 (10.60, 12.63)	−0.3 ± 5.5 (−1.35, 0.68)	0.15
Stimulated insulin (mIU/L)	138.42 ± 78.60 (124.46, 154.50)	−29.7 ± 83.7 (−45.7, −13.6)	121.77 ± 52.91 (111.82, 131.73)	−20.3 ± 78.3 (−35, −5.6)	0.39
HbA1c (%)	5.38 ± 0.35 (5.35, 5.55)	−0.04 ± 0.44 (−0.12, 0.04)	5.33 ± 0.27 (5.27, 5.38)	0.09 ± 0.40 (0.01, 0.16)	0.02
HOMA-IR	2.25 ± 1.34 (1.99, 2.51)	0.61 ± 5.53 (−0.44, 1.67)	2.45 ± 1.25 (2.21, 2.68)	−0.19 ± 1.29 (−0.43, 0.04)	0.13
FG:FI	9.04 ± 4.22 (8.22, 9.85)	−0.55 ± 4.22 (−1.35, 0.26)	9.00 ± 4.82 (8.09, 9.90)	0.22 ± 5.49 (−0.80, 1.25)	0.24
Total cholesterol (mg/dL)	151.40 ± 31.19 (145.76, 157.74)	−5.70 ± 24.63 (−10.42, −0.98)	138.46 ± 23.73 (134.05, 142.93)	13.35 ± 94.74 (−4.38, 31.09)	0.04
Triglycerides (mg/dL)	75.54 ± 37.99 (68.37, 83.06)	−2.74 ± 34.87 (−9.42, 3.94)	75.12 ± 35.53 (68.47, 81.77)	1.7 ± 31.81 (−4.25, 7.65)	0.32
HDL-c (mg/dL)	43.60 ± 14.39 (40.84, 46.37)	−1.07 ± 13.25 (−3.61, 1.46)	42.66 ± 9.58 (40.91, 44.50)	−0.55 ± 9.07 (−2.25, 1.13)	0.73
LDL-c (mg/dL)	93.33 ± 28.04 (87.93, 98.73)	−4.27 ± 24.85 (−9.05, 0.51)	80.68 ± 21.10 (76.74, 84.64)	5.93 ± 21.26 (1.95, 9.91)	0.01
VLDL-c (mg/dL)	15.27 ± 7.81 (13.77, 16.79)	−0.70 ± 7.21 (−2.08, 0.68)	15.01 ± 7.12 (13.67, 16.34)	0.35 ± 6.38 (−0.84, 1.54)	0.25
hs-CRP (mg/L)	3.94 ± 6.52 (2.69, 5.19)	0.17 ± 6.16 (−1.01, 1.35)	2.75 ± 4.11 (1.98, 3.52)	0.04 ± 4.73 (−0.84, 0.92)	0.85
Adiponectin (μg/mL)	7.23 ± 4.06 (6.43, 8.00)	−0.04 ± 1.93 (−0.41, 0.32)	7.90 ± 4.06 (7.14, 8.66)	0.03 ± 2.28 (−0.39, 0.45)	0.78
Leptin (ng/mL)	13.17 ± 7.86 (11.50, 14.43)	1.28 ± 4.21 (0.47, 2.09)	11.22 ± 7.93 (9.74, 12.71)	0.67 ± 3.47 (0.02, 1.33)	0.24
IL-6 (pg/ml)	61.54 ± 192.87 (24.81, 99.42)	−36.12 ± 188.60 (−72.27, 0.02)	35.34 ± 62.34 (23.68, 47.02)	−2.25 ± 58.59 (−13.22, 8.71)	0.07
TNF Alpha (pg/ml)	22.17 ± 30.68 (16.28, 28.15)	−0.28 ± 38.06 (−7.57, 7.01)	17.21 ± 22.52 (13.00, 21.44)	2.64 ± 41.09 (−5.04, 10.34)	0.58
Ox LDL (pg/ml)	249,076 ± 72,406 (235,139, 262,768)	12218.9 ± 57935.7 (1,115, 23,323)	234,870 ± 66,163 (222,481, 247,258)	7012.6 ± 46855.5 (−1,760, 15,786)	0.46

All values are means (95% CI). Intragroup analysis was assessed by the paired Student *t*-test. Significant difference (*p*, 0.05) between baseline and end of an intervention period.

polyunsaturated fatty acids that have a beneficial effect in terms of reducing LDL-c and either maintaining or increasing HDL-c (47). Almonds have also been found to have good antioxidant capacity and to protect DNA from oxidative damage (48). Studies have shown that the consumption of almonds helped reduce inflammatory markers like IL-6 (49, 50). In the present study there was a reduction in inflammatory markers like IL-6, but it did not attain the statistical level of significance ($p = 0.07$).

Snacks like cookies, muffins, bars etc. that are popular in this

age group could lead to a significant increase in blood glucose and insulin, followed by a rapid drop in blood glucose because of the increase in insulin levels, leading to the individual feeling hungry again (35, 38, 43, 51). The snack given to the control group in the present study was carefully planned to ensure that it contained complex carbohydrates and no added sugar. One of the strengths of the present investigation is that a younger age group was studied without a change in their lifestyle or diet, indicating the potential for preventing progression into further metabolic dysfunction precipitating them to risk of prediabetes and further into the development of Type 2 diabetes. The intervention was the inclusion of almonds versus the control snack eaten in two divided doses rather than the substitution of a snack in their daily meals. We believe therefore that the intervention effected the quality of the diet through addition of almonds in a defined amount per day. Thus, the inclusion of almonds in a balanced diet has the potential to be a nutritious natural food-based strategy rather than use of a nutraceutical to help reverse the risk for prediabetes. However, it may be worthwhile to conduct a long-term study that would examine the effect of almonds along with dietary counseling and/or physical exercise.

A limitation of this study similar to many food-based trials is that participants could not be blinded, although clustered randomization was done to overcome this and to avoid contamination between groups. Further, a nutritional intervention study can also trigger behavioral changes both in the intervention group as well as in the control group as participants are made aware of their risk during the recruitment process, therefore became more conscious about their health and the lifestyle modification to be made.

Extraneous variables such as culturally relevant periodic fasting which is not uncommon may have also had some influence on the outcome of the trial.

In an incidental finding, participants who had reported having acne at the start of the trial reported better skin texture after the trial, especially in the almond group. Although acne was not studied as an outcome in this study, it can be a subject of a future trial in adolescents and young adults as it has been shown to correlate with metabolic syndrome (52). There is a close interplay between metabolic and hemodynamic derangements that include oxidative stress, inflammation and advanced glycation end products that are involved in the etiopathogenesis of poor metabolic health, prediabetes and finally Type 2 diabetes.

Overall, in the present study, almonds were shown to have an effect on glucose metabolism by reducing HbA1c levels in just 12 weeks of consumption in adolescents and

young adults. The study has also shown that almonds when included as a snack can help manage dyslipidemia by reducing LDL-c and

total cholesterol in the same population. Almonds can be a good healthy snack that can replace regular snacks and can be considered as a part of the food-based strategy to help prevent prediabetes especially in the young.

ACKNOWLEDGMENTS

The authors thank the investigators, coordinators, and young participants who participated in this trial.

AVAILABILITY OF SUPPLEMENTARY MATERIAL STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Materials**, further inquiries can be directed to the corresponding author.

The Supplementary Material for this article can be found online at:

<https://www.frontiersin.org/articles/10.3389/fnut.2021.668622/full#supplementary-material>

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Intersystem Biomedical Ethics Committee, Mumbai, India (ISBEC version 2 dated 12th August, 2017). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

CONFLICT OF INTEREST

An abstract of this article was selected as an oral communication at the Nutrition 2020 Live Online—a symposium of American Society of Nutrition 2020 held on June 1st to June 4th 2020, USA.

AUTHOR CONTRIBUTIONS

JM, RV, SU, and AV were responsible for the design of this clinical trial, obtaining funding, and executing it. JM was a PI, RV and SU were co PI's who contributed to writing of paper. SK oversaw the execution of study and critically revised the manuscript for important content. SD was the data manager and SA did all the laboratory analysis. PM, SS, and RB were coordinators for day to day implementation, data collection, and recruitment of subjects from different institutions. AM and RK were the physicians responsible for supervising and monitoring health of the participants throughout the trial. AP was the statistician and analyzed the data. All authors provided administrative, technical, or material support. JM, RV, SU, AV, and SK had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

GRANTS

This study was done with a research grant from the Almond Board of California.

REFERENCES

- International Diabetes Federation. *Prevalence of Diabetes (20–79 Years)*, 2019. *Diabetes Atlas*. 9th ed (2019). Available online at: https://www.diabetesatlas.org/upload/resources/material/20191218_144626_sea_factsheet_en.pdf
- Anjana RM, Mohan D, Rajendra P, Mahanta J, Narain K, Das HK, et al. Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR–INDIAB population-based cross-sectional study. *Lancet Diabetes Endocrinol*. (2017) 5:585–96. doi: 10.1016/S2213-8587(17)30174-2
- Ranjani H, Sonya J, Anjana RM, Mohan V. Prevalence of glucose intolerance among children and adolescents in urban South India (ORANGE-2). *Diabetes Technol Ther*. (2013) 15:13–9. doi: 10.1089/dia.2012.0236
- Dutta D, Mondal SA, Kumar M, Hasanooor Reza AH, Biswas D, Singh P, et al. Serum fetuin-A concentration predicts glycaemic outcomes in people with prediabetes: a prospective study from Eastern India. *Diabet Med*. (2014) 12:1594–9. doi: 10.1111/dme.12539
- Anjana RM, Shanthi Rani CS, Deepa M, Pradeepa R, Sudha V, Nair HD, et al. Incidence of diabetes and prediabetes and predictors of progression among Asian Indians: 10-year follow-up of the Chennai urban rural epidemiology study (CURES). *Diabetes Care*. (2015) 38:1441–8. doi: 10.2337/dc14-2814
- Dutta D, Mukhopadhyay S. Intervening at prediabetes stage is critical to controlling the diabetes epidemic among Asian Indians. *Indian J Med Res*. (2016) 143:401–4. doi: 10.4103/0971-5916.184281
- Unnikrishnan R, Gupta PK, Mohan V. Diabetes in South Asians: phenotype, clinical presentation and natural history. *Curr Diabetes Rep*. (2018) 18:30. doi: 10.1007/s11892-018-1002-8
- Dutta D, Ghosh S. Young-onset diabetes: an Indian perspective. *Indian J Med Res*. (2019) 149:441–2. doi: 10.4103/ijmr.IJMR_1938_18
- Yajnik CS. Early life origins of insulin resistance and type 2 diabetes in India and other Asian countries. *J Nutr*. (2004) 134:205–10. doi: 10.1093/jn/134.1.205
- Popkin BM. The nutrition transition and obesity in the developing world. *J Nutr*. (2001) 131:871S–3. doi: 10.1093/jn/131.3.871S
- Gupta N, Shah P, Goel K, Misra A, Rastogi K, Vikram NK, et al. Imbalanced dietary profile, anthropometry, and lipids in urban Asian Indian adolescents and young adults. *J Am Coll Nutr*. (2010) 29:81–91. doi: 10.1080/07315724.2010.10719820
- Misra A, Singhal N, Sivakumar B, Bhagat N, Jaiswal A, Khurana L. Nutrition transition in India: secular trends in dietary intake and their relationship to diet-related non-communicable diseases. *J Diabetes*. (2011) 3:278–92. doi: 10.1111/j.1753-0407.2011.00139.x
- Rathi N, Riddell L, Worsley A. Food consumption patterns of adolescents aged 14–16 years in Kolkata, India. *Nutr J*. (2017) 16:50. doi: 10.1186/s12937-017-0272-3
- Blanco Mejia S, Kendall CWC, Vigiouliou E, Augustin LS, Ha V, Cozma AI, et al. Effect of tree nuts on metabolic syndrome criteria: a systematic review and meta-analysis of randomised controlled trials. *BMJ Open*. (2014) 4:e004660. doi: 10.1136/bmjopen-2013-004660
- O’Neil CE, Fulgoni VL, Nicklas TA. Tree nut consumption is associated with better adiposity measures and cardiovascular and metabolic syndrome health risk factors in U.S. Adults: NHANES 2005–2010. *Nutr J*. (2015) 14:64. doi: 10.1186/s12937-015-0052-x
- Jenkins DJA, Kendall CWC, Lamarche B, Banach MS, Srichaikul K, Vidgen E, et al. Nuts as a replacement for carbohydrates in the diabetic diet: a reanalysis of a randomised controlled trial. *Diabetologia*. (2018) 61:1734–47. doi: 10.1007/s00125-018-4628-9
- Kendall CWC, Esfahani A, Truan J, Srichaikul K, Jenkins DJA. Health benefits of nuts in prevention and management of diabetes. *Asia Pacific J Clin Nutr*. (2010) 19:110–6. doi: 10.3390/nu2070652
- Cohen AE, Johnston CS. Almond ingestion at mealtime reduces postprandial glycemia and chronic ingestion reduces hemoglobin A(1c) in individuals with well controlled type 2 diabetes mellitus. *Metabolism*. (2011) 60:1312–7. doi: 10.1016/j.metabol.2011.01.017
- Tan SY, Mattes RD. Appetitive, dietary and health effects of almonds consumed with meals or as snacks: a randomized, controlled trial. *Eur J Clin Nutr*. (2013) 67:1205–14. doi: 10.1038/ejcn.2013.184
- Vigiouliou E, Kendall CW, Blanco Mejia S, Cozma AI, Ha V, Mirrahimi A, et al. Effect of tree nuts on glycemic control in diabetes: a systematic review and meta-analysis of randomized controlled dietary trials. *PLoS ONE*. (2014) 9:e103376. doi: 10.1371/journal.pone.0103376
- American Diabetes Association (ADA). American Diabetic Association standards of medical care in diabetes. *Diabetes Care*. (2017) 40.
- Shringi M, Vaidya RA, Vaidya AB. Insulin resistance in polycystic ovarian syndrome: a study of 90 patients. *J Endocrinol Metab*. (2003) 1:19–23.
- Sujith KR, Kiran RH. A cross sectional study of fasting and post prandial insulin level as a predictor of insulin resistance with hyperinsulinemia with HOMA-IR >2.5 among overweight and obese prepubertal children in a tertiary care Hospital of Bangalore, India. *Int J Contemporary Pediatrics*. (2018) 5:1382–7. doi: 10.18203/2349-3291.ijcp20182532
- Clinical Trials Registry-India (CTRI) (2018). Available online at: <http://ctri.nic.in/Clinicaltrials/showallp.php?mid1=22407&EncHid=&userName=CTRI/2018/02/011927>
- WHO, International Clinical Trials Registry Platform (ICTRP) (2018). Available online at: <https://apps.who.int/trialsearch/Trial2.aspx?TrialID=CTRI/2018/02/011927>
- Krishnaveni P, Gowda VM. Assessing the validity of friedewald’s formula and anandraj’s formula for serum LDL-cholesterol calculation. *J Clin Diagn Res*. (2015) 9:BC01–4. doi: 10.7860/JCDR/2015/16850.6870
- ‘DietCal’ Version 8.0. *Profound Tech Solutions*. (2015). Available online at: <http://dietcal.in>
- Norman G. Likert scales, levels of measurement and the “laws” of statistics. *Adv Health Sci Educ*. (2010) 15:625–32. doi: 10.1007/s10459-010-9222-y
- Mithra P, Unnikrishnan B, Thapar R, Kumar N, Hegde S, Kamat AM, et al. Snacking behaviour and its determinants among college-going students in coastal South India. *J Nutr Metab*. (2018) 1:1–6. doi: 10.1155/2018/6785741
- Njike VY, Smith TM, Shuval O, Shuval K, Edshteyn I, Kalantari V, et al. Snack food, satiety, and weight. *Adv Nutr*. (2016) 7:866–78. doi: 10.3945/an.115.009340
- Wien M, Bleich D, Raghuvanshi M, Gould-Forgerite S, Gomes J, Monahan-Couch L, et al. Almond consumption and cardiovascular risk factors in adults with prediabetes. *J Am Coll Nutr*. (2010) 29:189–97. doi: 10.1080/07315724.2010.10719833
- Martins IM, Chen Q, Oliver Chen CY. Emerging functional foods derived from almonds. In: Ferreira ICFR, Morales P, Barros L, editors. *Wild Plants, Mushrooms and Nuts: Functional Food Properties and Applications*. Wiley (2016). doi: 10.1002/9781118944653.ch14
- Tindall AM, Johnston EA, Kris-Etherton PM, Petersen KS. The effect of nuts on markers of glycemic control: a systematic review and meta-analysis of randomized controlled trials. *Am J Clin Nutr*. (2019) 109:297–314. doi: 10.1093/ajcn/nqy236
- Palacios OM, Maki KC, Xiao D, Wilcox ML, Dicklin MR, Kramer M, et al. Effects of consuming almonds on insulin sensitivity and other cardiometabolic health markers in adults with prediabetes. *J Am Coll Nutr*. (2020) 39:397–406. doi: 10.1080/07315724.2019.1660929
- Coates AM, Morgillo S, Yandell C, Scholey A, Buckley JD, Dyer KA, et al. Effect of a 12-week almond-enriched diet on biomarkers of cognitive performance, mood, and cardiometabolic health in older overweight adults. *Nutrients*. (2020) 12:1180. doi: 10.3390/nu12041180
- Rajaram S, Connell KM, Sabaté J. Effect of almond-enriched high-monounsaturated fat diet on selected markers of inflammation: a randomised, controlled, crossover study. *Br J Nutr*. (2010) 103:907–12. doi: 10.1017/S0007114509992480
- Bonora E, Tuomilehto J. The pros and cons of diagnosing diabetes with A1c. *Diabetes Care*. (2011) 34:S184–90. doi: 10.2337/dc11-s216
- Berryman CE, West SG, Fleming JA, Bordini PL, Kris-Etherton PM. Effects of daily almond consumption on cardiometabolic risk and abdominal adiposity in healthy adults with elevated LDL-cholesterol: a randomized controlled trial. *J Am Heart Assoc*. (2015) 4:e000993. doi: 10.1161/JAHA.114.009993
- Lopes LL, Peluzio MCG, Hermsdorff HHM. Monounsaturated fatty acid intake and lipid metabolism. *J Vasc Bras*. (2016) 15:52–60. doi: 10.1590/1677-5449.008515
- Musa-Veloso K, Paulonis L, Poon T, Lee HY. The effects of almond consumption on fasting blood lipid levels: a systematic review and meta-analysis of randomised controlled trials. *J Nutr Sci*. (2016) 5:e34. doi: 10.1017/jns.2016.19

41. Kalita S, Khandelwal S, Madan J, Pandya H, Sesikeran B, Krishnaswamy K. Almonds and cardiovascular health: a review. *Nutrients*. (2018) 10:468. doi: 10.3390/nu10040468
42. Lee-Bravatti MA, Wang J, Avendano EE, King L, Johnson EJ, Raman G. Almond consumption and risk factors for cardiovascular disease: a systematic review and meta-analysis of randomized controlled trials. *Adv Nutr*. (2019) 10:1076–88. doi: 10.1093/advances/nmz043
43. Liu Y, Hwang HJ, Kim HS, Park H. Time and intervention effects of daily almond intake on the changes of lipid profile and body composition among free-living healthy adults. *J Med Food*. (2018) 21:340–7. doi: 10.1089/jmf.2017.3976
44. Dikariyanto V, Smith L, Francis L, Robertson M, Kusanlan E, O'Callaghan Latham M, et al. Snacking on whole almonds for 6 weeks improves endothelial function and lowers LDL cholesterol but does not affect liverfat and other cardiometabolic risk factors in healthy adults: the ATTIS study, a randomized controlled trial. *Am J Clin Nutr*. (2020) 111:1178–89. doi: 10.1093/ajcn/nqaa100
45. Altamimi M, Zidan S, Badrasawi M. Effect of tree nuts consumption on serum lipid profile in hyperlipidemic individuals: a systematic review. *Nutr Metab Insights*. (2020) 13:1178638820926521. doi: 10.1177/1178638820926521
46. Hyson DA, Schneeman BO, Davis PA. Almonds and almond oil have similar effects on plasma lipids and LDL oxidation in healthy men and women. *J Nutr*. (2002) 132:703–7. doi: 10.1093/jn/132.4.703
47. Bhardwaj R, Dod H, Sandhu MS, Bedi R, Dod S, Konat G, et al. Acute effects of diets rich in almonds and walnuts on endothelial function. *Indian Heart J*. (2018) 70:497–501. doi: 10.1016/j.ihj.2018.01.030
48. Bolling BW, Chen CY, McKay DL, Blumberg JB. The phytochemical composition and antioxidant action of tree nuts. *Asia Pacific*

- J Clin Nutr.* (2010) 19:117–23. doi: 10.6133/APJCN.2010.19.1.16
49. Liu JF, Liu YH, Chen CM, Chang WH, Chen CY. The effect of almonds on inflammation and oxidative stress in Chinese patients with type 2 diabetes mellitus: a randomized crossover controlled feeding trial. *Eur J.* (2013) 52:927–35. doi: 10.1007/s00394-012-0400-y
50. Jung H, Chen CO, Blumberg JB, Kwak HK. The effect of almonds on vitamin E status and cardiovascular risk factors in Korean adults: a randomized clinical trial. *Eur J Nutr.* (2018) 57:2069–79. doi: 10.1007/s00394-017-1480-5
51. Bowen J, Luscombe-Marsh ND, Stonehouse W, Tran C, Rogers GB, Johnson N, et al. Effects of almond consumption on metabolic function and liver fat in overweight and obese adults with elevated fasting blood glucose: a randomised controlled trial. *Clin Nutr ESPEN.* (2019) 30:10–8. doi: 10.1016/j.clnesp.2018.12.088
52. Biagi LG, Sañudo A, Bagatin E. Severe acne and metabolic syndrome: a possible correlation. *Dermatology.* (2019) 235:456–62. doi: 10.1159/000501986

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2021 Madan, Desai, Moitra, Salis, Agashe, Battalwar, Mehta, Kamble, Kalita, Phatak, Udipi, Vaidya and Vaidya. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.