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### **Nutrition for Lifelong Health**

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Nutrition plays a pivotal role in shaping the health and well-being of individuals across their lifespan. India is a land of immense diversity, with a population exceeding 1.3 billion.<sup>[1]</sup> In a country like India, marked by its diverse demography and unique health challenges, addressing nutrition is paramount. This demographic diversity extends to dietary habits, with variations in food preferences, availability, and cultural practices. Understanding these nuances is essential for tailoring effective nutrition interventions that cater to the specific needs of different populations across the country. The rapidly changing social scenario in the country is posing challenges and creating immense opportunities to protect and safeguard the health of the strongest asset of this country, healthy people.

Poor nutrition is a significant driver of the disease burden in India. Both undernutrition and overnutrition contribute significantly to morbidity and mortality. Undernutrition, which includes stunting, wasting, and micronutrient deficiencies, remains a persistent challenge, especially among children and women. Conversely, overnutrition, resulting in obesity and related non-communicable diseases (NCDs) like diabetes and cardiovascular diseases, is increasing, creating a dual burden of malnutrition. Estimates indicate that 56.4 % of India's total disease burden can be attributed to unhealthy diets. Surveys also reveal that a significant number of children exhibit early signs of non-communicable diseases (NCDs) such as diabetes and

hypertension. Moreover, the presence of altered biomarkers in over 50 % of undernourished and normal-weight children and adolescents increases significant public health concerns.<sup>[2]</sup>

To capitalize on the demographic bonus that the country is experiencing with about 65 % of the Indian population being under 35 years, it is vital and essential to promote good lifestyle and prevent diseases.<sup>[3]</sup> Ensuring proper nutrition during these formative years can significantly impact physical, mental, and social well-being, laying the groundwork for a healthy and productive life. This initiative will empower younger population to make informed dietary choices and cultivate a culture of health-conscious individuals who prioritize nutrition and wellness. By focusing on nutrition for this age group, we can ward off chronic diseases in later years and create a healthier, more productive future generation, poised to reach their full potential.

Despite the several initiatives on nutrition and NCD prevention undertaken by the Government of India across the country, India still has 74.9 million diabetics as of 2021.NCDs cause considerable loss in potentially productive years of life.<sup>[4]</sup> While, most non – communicable diseases like diabetes, hypertension, cardiovascular diseases, etc., and challenges faced before healthcare providers have their roots in hyperinsulinemia and insulin resistance, there is little that we can do to treat it with any drug or a medicine. As the lifestyle disorders tend

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to increase disproportionately, prevention is the only way. Managing insulin resistance through lifestyle changes such as a healthy diet, regular physical activity, and maintaining a healthy weight can help reduce the risk of developing these diseases and improve overall health. Prevention of such lifestyle disorders, particularly NCDs is also crucial to reducing the economic burden of these diseases and preventing out-of-pocket expenditures (OOPE) for individuals and families.

The field of nutrition is dynamic, with evolving concepts and changing evidence. Our understanding of macronutrients (proteins, carbohydrates, and fats) has undergone significant changes over the years.

It's well known that proteins are not only vital for muscle development and repair but play a much broader role in the body - enzyme function, immune health, and hormone production. The emphasis has transitioned from merely meeting protein requirements to prioritizing the quality and diversity of protein sources. Despite this, protein deficiency remains a significant issue in the general population which can impact overall health. Addressing this deficiency is crucial for improving health outcomes, and it requires promoting diverse and high - quality protein sources in the diet.

With respect to fats, they were frequently demonized as the culprits behind obesity and heart disease, prompting advocacy for low-fat diets. However, evolving concepts and understanding underscores the indispensability of fats for various bodily functions, such as hormone synthesis, cell membrane integrity, and fat-soluble vitamin absorption. Recent global reassessments of the dietheart hypothesis have determined that saturated fats do not impact cardiovascular disease, cardiovascular mortality, or overall mortality.<sup>[5]</sup> The current approach emphasizes using a diverse variety of oil seeds, nuts, and whole grains to provide a balance of all fatty acids. Refined or extracted oils to be used in moderation as they are processed products. In the past, carbohydrates were regarded as the primary energy source for the body, leading to an emphasis on consuming high-carb foods for energy. However, current understanding highlights the significant impact of carbohydrate intake on insulin resistance, especially in individuals who are predisposed to developing insulin resistance or who already have insulin resistance. High carbohydrate intake, especially from simple carbohydrates like sugars and refined grains, can contribute to insulin resistance by causing spikes in blood sugar levels and increasing the demand for insulin production.

Factors contributing to insulin resistance are extensive which includes poor diet, physical inactivity, chronic stress, inflammation, sleep disorders, hormonal imbalance, etc. Additionally, the widespread consumption of processed oils in our diet contributes to cellular mechanisms that worsen insulin resistance.

Evidence from various research emphasizes the significance of a balanced diet comprising vegetables, whole grains, fats, and lean proteins to prevent non-communicable diseases (NCDs). There is increasing evidence on benefits from ensuring adequate intake with balance of all fats and complete protein, practicing muscle resistance training, intermittent fasting, reducing intake of ultraprocessed foods, carbohydrates, reducing meal frequency, etc. Several of the benefits from adopting these interventions in the appropriate way include weight management, improved insulin sensitivity, brain health, digestive health and promote longevity.

With advancement in technology, precise biochemical tests and indicators like serum insulin levels and Homeostatic Model Assessment for Insulin Resistance (HOMA-IR) are available but not largely used in management of lifestyle related diseases. Importance of clinical signs, Body Mass Index (BMI), Waist Circumference (WC), Waist – Hip Ratio (WHR), etc are underestimated too. There is an urgent need and huge potential for young community medicine professionals to join hands with other clinicians to control and prevent lifestyle related diseases.

Health care workers, including ASHAs (Accredited Social Health Activists) and ANMs (Auxiliary Nurse Midwives), play a crucial role and their involvement in delivering nutrition interventions at the community level is instrumental in improving nutrition outcomes, especially among vulnerable populations. In our recent experience with training thousands of healthcare workers from rural and semi urban parts of Karnataka, we have realized that their diets are grossly deficient in daily protein intake and lacks dietary diversity. We noted that out of 1422 frontline workers, 49.72 % (Women - 49.02 % & Men - 72.09 %) had high Waist-To-Hip Ratio (WHR). In comparison, NFHS 5 Karnataka data reports that 45.1 % women have high WHR, and 38.9 % men have high WHR.<sup>[6]</sup> Addressing these challenges is essential not only to ensure health and well-being of healthcare workers, but also enhance their capacity to deliver effective nutrition interventions to the communities.

Even among healthcare providers, there are different schools of thought and lack of common understanding with respect to dietary practices, leading to confusion among health care providers and their patients. As specialists in community medicine our focus is largely on risk factor prevention, health promotion and dealing with the social factors that affect health. Our expertise in epidemiology, health promotion, and health system management is invaluable in designing comprehensive nutrition programs, conducting research, and advocating for policy changes that prioritize nutrition.

Our Ancient Scriptures like Bhagavad Gita have given us clear guidelines regarding diet and life style for health.

# युक्ताहारविहारस्ययुक्तचेष्टस्यकर्मसु | युक्तस्वप्नावबोधस्ययोगोभवतिदुःखहा

Chapter 6, Verse 17

Yoga becomes the destroyer of pain for him who is moderate in eating and recreation, who exercises

moderation in activities, and who is moderate in sleep and wakefulness.

We can retain the good things in our ancient Scriptures and add good things from modern Science to adopt our diet and lifestyle for lifelong health.

In this context, an opportunity is provided to IAPSM members to be part of NUTRITION FOR LIFELONG HEALTH, a part of the IAPSM presidential action plan, where you will know how to bridge the unlearn - relearn gap about nutrition, metabolism, fasting, exercises, and lifestyle changes which will aid in caring for self, caring for the team & caring for the communities.

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#### **Communication For Social And Behavior Change**

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#### Communication For Social And Behavior Change (CSBC)

Plato stated, "Human behavior flows from three main sources: desire, emotion, and knowledge." This quote encapsulates, essence of human nature, summarizing the driving forces behind our actions and decisions. At its core, it suggests that our behavior is shaped by our desires, emotions we experience and knowledge we acquire.<sup>[1]</sup> CSBC is applying the principles of communication to trigger, catalyze and sustain social and behavior change. It's a set of positive transformations, an approach to programming to address the cognitive, social and structural determinants; a field of expertise, with its workforce.<sup>[2]</sup>

Several theories emerged from individual level perception in the form of health belief model (1950), reasoned action, fear management theory, diffusion of innovation at community level (1960) to principles of social learning (1970), theory of gender and power (1995) at interpersonal and community level.<sup>[3,4]</sup> Basically, behavioural and normative beliefs-referred to as cognitive structures-influence an individual's attitudes and subjective norms.<sup>[5]</sup> Theories which explain individual behaviors are health belief model (HBM), theory of planned behavior (TPB), and trans-theoretical model (TTM) while theories which explain group behaviors are

social comparison theory, social impact theory, and social cognitive theory.<sup>[6]</sup> No theory is perfect and has certain limitations. Integrated behavioral model utilizing two or more theories operating at individual, inter-personal, and community level may yield better results.<sup>[7]</sup> Socio-ecological model acknowledges that behaviour is mediated by individual, interpersonal, community, organizational, social and global forces. It helps understanding behaviours and designing interventions (McLeroy et al, 1988); includes both individual and environmental factors that affect practice or non-practice of behaviours and acts in three strategy: advocacy, social mobilization and behaviour change communication to achieve the tipping point of change. Another framework known as Actor Network Theory (ANT) states that everything in social and natural world exists in networks of relationships that are constantly shifting. It considers objects, ideas, processes and any other relevant factors to be as important as humans in creating social situations.<sup>[5]</sup>

Globalization or affirmation of market-based economy intensified inter-connectivity through consolidation of financial, industrial, political and cultural networks. Economic and political reforms; including decentralization and advances toward liberal democracy have raised expectations about

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community/local participation and take into consideration individual along with his/her environment. It encompasses elements of social marketing and advertising, behavioural economics, social and cognitive psychology. In 1980s, researchers Daniel Kahneman and Amos Tversky, developed Prospect Theory (PT63); a Nobel-prize winning behavioral economic theory, explains decisions among alternatives under uncertainty by taking into account human psychology. Investors' value gains and losses differently; when presented with a choice, both equal, will choose the one presented in terms of gains. Prospect theory (Loss aversion theory) is a part of behavioral economics, suggesting investors to choose perceived gains, because losses cause a greater emotional impact. Certainty effect says individuals prefer certain outcomes over probable ones, while isolation effect says individuals cancel out similar information when making a decision.<sup>[8]</sup>

Another advancement, was by Richard Thaler on understanding nudges and choice architecture. As defined by Thaler and Cass Sunstein, in their book 'Nudge: Improving Decisions about Health, Wealth and Happiness (2008)' a nudge is any aspect of a choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. Nudges are not mandates or laws that can be imposed on people. Nudges gained significant attention in public policy-making; with four thematic approach i.e, behavioral interventions - efficacy and effectiveness, dietary habits, general healthcare and sustainable choices with exponential growth in publications related to health, food consumption, and diet management policies that apply nudges and choice architecture.<sup>[5,9]</sup>

Bounded rationality (BR) means when individuals make decisions, they are "bounded" or

limited because of inadequate information, cognitive limitations inherent in human mind and time constraints. Bounded rationality describes, way humans make decisions that departs from perfect economic rationality, because our rationality is limited by our thinking capacity, information that are available to us and time. Instead of making best choices, we often make satisfactory choices.<sup>[10,11]</sup> Systems Theory proposed by Kahneman in his book "Thinking Fast and Slow" states that two systems, system 1 and system 2, influence decision-making. System 1 is automatic, fast and often unconscious, requires minimal energy or attention and prone to biases. System 2 on the other hand, is effortful, slow and controlled. It cannot work without attention and can curb system 1 instincts when properly engaged.' <sup>[12,13]</sup> Because of emergence of system 2, humans can pursue their own goals rather than goals of genes.<sup>[14]</sup> Domain-general mechanisms is needed to deal with novelty, unpredictability and variability.<sup>[15,16]</sup> Human decision-making shows systematic simplifications and deviations from tenets of rationality ('heuristics') which may lead to sub-optimal decision outcomes ('cognitive biases'). Cognitive biases have three theoretical perspectives: a cognitivepsychological, an ecological and an evolutionary perspective. However, these perspectives are mainly descriptive and don't provides an explanatory framework for mechanisms of cognitive biases. Neural network framework was proposed which explains why our brain systematically tends to default to heuristic ('Type 1') decision making which is again based on four basic neural network principles: association, compatibility, retention, and focus.<sup>[17]</sup> Term social proof, coined by Robert Cialdini, in his landmark book Influence: The Psychology of Persuasion; defines social proof as "People doing what they observe other people doing". People change behaviour based on social proof bias, ex. influence from family and friends, expert social proof,

celebrity social proof, customers and users, wisdom of the crowd and certification.<sup>[18]</sup>

Future of healthcare is digital, and universal access to these innovations must be promoted to prevent them from becoming another driver for inequity as stated by Tedros Adhanom Ghebreyesus, WHO Director-General.<sup>[19]</sup> Digital adoption in India in 2023 report shows internet penetration stood at 48.7%, 32.8% social media user and 56% of new internet users were from rural India, with 1.1 billion active cellular mobile connections (77%).<sup>[20]</sup> CSBC via mobile phones proved viable and contributed to standardization and scalability.<sup>[21]</sup>

Behaviour change techniques (BCTs), component of intervention designed to alter or redirect causal processes typically have modest effects and more effective if grounded in appropriate theory.<sup>[22]</sup> Transforming quality criteria into forms, such as reliable scales or response options can be used in evaluating theories, is a complex task, needs primary research and evidence syntheses.<sup>[23]</sup> CSBC, systematic and scientific ways to use communication processes for bringing desired change in human behavior by combining theory and practice and involving multiple stakeholders, to design health program and policies by attracting attention of policy-makers to unattended health issues and for framing health issues for public debate, regulation, and resolution.<sup>[24]</sup> Poverty, discrimination, less opportunities to get education and employment, living in substandard housing and environment, and less opportunity to access primary health care are underlying assumptions of inequality in health. To achieve sustainability, health communicators should possess essential knowledge and skills of intercultural communication. Malikhao adapting from framework of Martin and Nakayama elaborates on intercultural competency in health in five aspects: First, understanding personal and contextual way of communication, second, understanding the differences and similarities between cultures, third, understand the local cultural context in which we are operating, fourth, understanding the privilege and disadvantage in the socials and fifth, history and past understanding.<sup>[25]</sup>

Three notions from constitution of WHO: that "rights to health care," "health inequality reduction," and "health for all" are essential to devise good communication strategies to achieve health goals.<sup>[25]</sup> CSBC strategies to become sustainable stakeholder analysis, recognizing and defining the public health problem, setting goals and objectives, identifying resources, and maintaining control of the problem are useful steps for participatory action research on health-related issues also known as C-planning.<sup>[26]</sup> Health communicator should possess interdisciplinary skill to create an enabling environment and influence decision making process by empowerment and advocacy along with empathy and intercultural communication skills, experience in public health, journalism, development communication, sociology, anthropology, environmental science, and management.<sup>[27]</sup> India's Human Development Index (HDI) value has increased to 0.644 in 2022, placing country 134 out of 193 in 2023/24 Human Development Report (HDR) indicating that India has a long way to go in terms of social inclusion. Digital public goods, opensource software, artificial intelligence (AI), standards and contents offer opportunities for economics and social development. Rapid development of AI, led to concerns for misinformation needing future path to be decisively shaped.<sup>[28,29]</sup> Increased penetration of cable and satellite television featured contents relevant to 'rural' populations, and presented social issues such as child marriage, female foeticide, gender-based violence, and women's empowerment, rather succinctly. Initiatives such as National Optical Fibre Network and Digital India, aim to improve

India's internet-dependent infrastructure, particularly in rural areas. Audio-visual content on smart phones provides access to immediate and constant communication.<sup>[5]</sup>

Global education development agenda reflected in Goal 4 (SDG4) of 2030 for sustainable development, adopted by India in 2015 - seeks to "ensure inclusive and equitable quality education" by 2030. CSBC skill is a perfect fit under National Education Policy (NEP-2020) to converts ideological commitment of "The Greater Common Good" into key performance indicators (KPIs ) for self and society; can be made competency-based with right mix of theory, practice, application and experience.<sup>[30]</sup>

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# Comparison of Traditional lecture and Interactive Teaching Methods in Large Group Teaching of Non Communicable Diseases: A Quasi Experimental Study

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#### Abstract:

Introduction: : Lectures as a method of teaching are very common and also under increasing criticism due to passive recipients of information with no development of thinking skills or change in attitude. **Objective:** To Compare traditional lecture method with interactive teaching methods in large groups and to assess the perceptions of students towards these methods. Method: A Quasi-Experimental Study was taken up at the Department of Community Medicine among 7<sup>th</sup> semester students of MBBS course of Medical College located at Hyderabad for a period of 4 months. Four different teaching-learning methods such as traditional, case-based, Jigsaw, and Quiz were conducted for 4 topics of Non-communicable diseases which were evaluated through objective structured questions and subjective by perceptions rated on a Likert scale(1-5). Results: Out of 100 students, 92 students regularly attended all the teaching methods of 4 topics-Hypertension, Diabetes Mellitus, Stroke, and Coronary artery disease. The highest objective structured mean score of 6.34±2.367 was obtained for case based teaching in hypertension topic, whereas for rest of the topics like Diabetes Mellitus (6.63±1.827), Coronary artery disease (6.95±1.561) and stroke (6.11±1.941), jigsaw method showed highest mean score. Subjective rating was excellent for jigsaw method in context with the topic related to Hypertension and stroke. Quiz was rated as excellent for the topics related to Diabetes mellitus and Coronary artery disease. For the overall perceptions consisting of positive and negative questions, highest score was rated for the jigsaw method of teaching. Conclusion: Objective evaluation has revealed higher scores with interactive teaching methods compared to traditional method and the jigsaw method was most preferable method and scored the highest as per feedback given by students.

**Keywords:** Competency based medical education, Interactive learning, Non Communicable diseases, Teaching-Learning Methods

#### Introduction:

Lectures as a method of teaching is very common and also under increasing criticism due to multiple reasons such as passive recipients of information with no development of thinking skills or change in attitude.<sup>[1]</sup> Thereby, Interactive teaching facilitates higher level of thinking and improves the affective domain as well as cognitive and psychomotor domains. Therefore, Interaction is always important in promoting application of knowledge with active involvement and increased attention and motivation at both ends.<sup>[2]</sup> This is

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particularly important in medical education as retention and recall of events play a crucial role in clinical practice of mere future.

Strategies for interactivity can be either technology based or can be implemented in shared real time social settings where social dynamics can be used for learning efficiently and find easy solutions to entangle the complex ones. Various methods that can be used in a large group for interactive teaching are Question Asking and inviting questions, think pair and share, brainstorming, case based examples, role playing, demonstrating, problem solving, directed listening, quiz, etc.<sup>[3,4]</sup> There are various studies supporting internationally that higher order thinking skills development through interactive teaching had delivered the significant improvement in learning.<sup>[5-7]</sup> In India, national medical council had recommended a new curriculum moving towards competency based medical education, wherein didactic lectures have been reduced to one third and rest have to be implemented in an interactive way. This has been accentuated by many studies in Indian scenario also where multiple choice questions, confusion techniques, brainstorming etc. have been the preferred methods.<sup>[8-10]</sup>

Kolbs learning theory emphasized this learning on a cycle of four stages of having a concrete experience, observation of and reflection on that experience, the formation of abstract concepts (analysis) and to test a hypothesis in future situations.<sup>[11]</sup>

This study was conducted with an objectives to compare between traditional and interactive teaching methods in large group and to assess the perceptions of students towards the 4 different teaching methods (Traditional, Quiz, Jigsaw and Case based ).

#### Method:

Quasi-experimental study, one-grouppost-test design without a control group was conducted at Department of Community Medicine, Medical College, Hyderabad for the duration of four months. Study participants were MBBS students of 7<sup>th</sup> semester. All the students were included and convenience sampling was adopted. The students who were absent for any of the classes and have not given consent were excluded from the study.

#### Study Method:

Topics included in the study were hypertension, diabetes mellitus, coronary artery diseases and stroke. Faculties involved in this were trained prior to conduct the sessions in a similar way. All the students were assessed in two ways- one is the objective assessment by marks scored using various teaching methods and second by subjective method assessing their perceptions and rating.

**Objective assessment:** Each topic was taken by 4 different methods so that all students were exposed to all the methods adopted in total of two and half hour duration. An extra class was adjusted from the other departments and replaced later. To conduct these methods, was required 1 trained faculty to conduct quiz, 3 trained faculty required to conduct case based scenario and jigsaw method.

**Traditional Lecture:** A 45-minute lecture followed by a 10 multiple-choice questions on post-test using Google Forms as multiple choice questions was conducted in the lecture hall. One mark was allotted for each question, so total was 10 marks followed by discussion of questions. This took 15 min and a total duration of one hour.

**Quiz:** Administration of a 10-question quiz using the Kahoot! app (game-based learning platform) through individual logins with real-time feedback. Questions included multiple choice, true/false, trick questions, and visuals. Ranking and the marks were awarded automatically by the app scoring one mark for each question, along with time taken to answer. So total marks allotted were 10. All the questions were explained with answers and the total time taken was 30 minutes.

**Case-Based Scenario:** A case scenario was presented in the hard copy formatin large group which consisted of short answer questions related to diagnosis, treatment, to identify risk factors, assess levels of prevention failures and treatment. Total marks allotted was 10 and total time taken was 30 minutes to complete. **Jigsaw:** Five students formed a group, in stage 1- each group(Parent group) were assigned one of five subtopics such as epidemiology, risk factors, clinical features, complications, prevention, and national health programs. In the second stage "Expert" groups were formed by taking each student from the parent groups, Here they are learning other subtopics allotted to other groups. In the third stage , students returned to their parent groups (parent group reformation) to present their subtopics by peer teaching and write individual essay questions (10 marks each). By this method students are learning by teaching twice. Faculty here were only providing guidance to each group.

**Subjective Assessment by student feed back:** Questionnaire related to perceptions of students towards various interactive teaching methods was prepared after taking valuable suggestions from medical education experts and from review of literature. This consisted 16 items of positive(14) and negative(2) questions on a Likert scale scored as strongly agree =5; agree=4; undecided=3; disagree=2; strongly disagree=1. So the maximum score was 60 and minimum score was 14. The questions were related to their understanding of topic, knowledge gained, learning environment, encouragement, doubt clarification, emphasis on key points, interesting, interactive, active learning and retention.

Along with this, the rating of each topic taught by different methods was depicted as Excellent, Good, Fair,Poor and Very Poor separately by each student in order to label the most preferred method.

**Ethical Considerations**: Institutional ethical committee clearance with number ESICMC/SNR/IEC-F0387/09-2021, V01 was obtained prior to the study and informed consent was also taken after explaining the purpose of the study.

**Data Analysis:** Data was analysed using Microsoft Excel 2019.One-sample t-tests were used to compare mean scores for objective marks obtained using different methods. Subjective perception of students was assessed by the validated questionnaire where the Cronbach's alpha value of 0.787 was obtained

after pilot study. Mean  $\pm$  Standard deviation was calculated for their perceptions. Rating for each topic and each method was depicted in percentages.

#### **Results:**

The study has included 96(96%) students who were present for the two topics included under non communicable diseases and 4(4%) were absent for the classes. The topics were taught by traditional lectures and were compared with interactive teaching methods in large group teaching. Interactive teaching methods included quiz, jigsaw method and case based scenario.

#### **Objective assessment:**

The objective marks were calculated as mean scores for the four topics by different methods tabulated in Table 1. Compared to other methods, the case-based scenario method had the highest mean score for the topic of hypertension; on the other hand, the jigsaw method had the highest mean score for the topics of diabetes mellitus, coronary artery disease, and stroke.

#### Subjective assessment:

The jigsaw method showed the highest mean scores of students' responses as compared to other teaching methods. (Table 2) As per the students perception, the most preferred method of teaching was jigsaw method followed by quiz.

On the analysis of open ended questions related to the reasons for their preference to a particular teaching learning methods, most of the students favoured for interactive teaching methods. Their reasons for preference of quiz included fun way of learning and rewarding , increases enthusiasm to learn, motivating, interactive and interesting, healthy competitive spirit was inculcated, gain more knowledge and easy to remember. Reasons for preference to jigsaw method narrated by students were; one can concentrate on slow learning areas(their weak areas) and learn easily, increases understanding, retention was increased, more interactive, creative, active learning and all concepts were covered in lesser time. Case based scenarios were also preferred for the reasons such as practical

Method of teaching	Hypertension(n=96) (Mean <u>+</u> SD)	Diabetes mellitus(n=96) (Mean <u>+</u> SD)	Coronary Artery disease(n=96) (Mean <u>+</u> SD)	Stroke(n=96) (Mean <u>+</u> SD)
Traditional	4.89±1.94	4.58±1.46	5.12±1.84	5.73±2.23
Quiz	6.23±1.93	5.76±2.16	5.51±1.93	5.45±2.24
Jigsaw	5.74±1.39	6.63±1.82	6.95±1.56	6.11±1.94
Case based scenario	6.34±2.36	5.14±1.94	6.20±1.72	5.27±1.97

#### Table 1: Objective Mean Score for all topics covered by Various Teaching Learning Methods (N=96)

p value =0.00001, Significant

 Table 2: Topic wise Mean Score of students Distribution of Mean Score of perceptions towards various teaching methods (N=96)

Topics	Subjective Mean Scores for Teaching Learning Methods			
	Traditional	Quiz	Jigsaw	Case based scenario
Hypertension	45.33±10.48	50.27±8.76	53.12±12.71	52.2± 9.68
Diabetes Mellitus	43.93+11.27	47.7±11.81	52.20±9.68	47.78±11.18
Coronary artery disease	43.94±11.27	47.85±9.52	54.85±10.33	49.74±9.78
Stroke	42.73±11.66	48.08±12.22	53.86±11.43	49.73±10.91

application, stimulates critical thinking, improvement of clinical knowledge, easy to understand, correlation of concepts with clinical cases, more gain in knowledge and more attentive. Whereas on the other end traditional lectures had mixed results reasoning as monotonous, depends on the faculty as there is amalgamation of slow and fast learners, passive learning and stresses on important points marking as exam driven. The greatest advantage with traditional teaching is its ability to cover the topic in its entirety whereas for other methods we need time and trained faculty to conduct it effectively.

#### **Discussion**:

This study compared four teaching methods traditional lecture, quiz, jigsaw, and case-based scenario - for non-communicable disease (NCD) education in large groups. The findings provide compelling evidence for the effectiveness of interactive methods in enhancing both objective knowledge acquisition and subjective student perceptions.

#### Higher Knowledge Gain:

For both hypertension and diabetes mellitus, interactive methods generally outperformed traditional lectures. Case-based scenarios yielded

the highest objective scores for hypertension, while the jigsaw method proved most effective for diabetes. These results align with Kirkpatrick's model of learning evaluation, demonstrating improvements in both cognitive domain (Level 1) and student perceptions (Level 2) with interactive approaches. Similar positive outcomes have been documented in previous research. Carpenter found significant knowledge gains with the jigsaw method compared to other methods like case studies and team projects.<sup>[12]</sup> Gupta et al<sup>[13]</sup> also observed a preference for interactive methods among students, with quizzes being the most favored followed by roleplaying, case-based scenarios, and think-pairshare.Bhutani<sup>[14]</sup> documented a 20% increase in student performance with case-based learning compared to traditional lectures, highlighting the potential of interactive methods to improve learning outcomes.

#### **Student Preferences and Reasons:**

Subjective ratings and open-ended responses further confirmed students' preference for interactive methods. The jigsaw method received the highest mean scores for student perceptions of both NCDs. Students favored quizzes for their fun, competitive, and motivating aspects, while the jigsaw method resonated for its focused learning, increased understanding, and active engagement. Case-based scenarios were appreciated for their practical application, critical thinking stimulation, and enhanced clinical knowledge relevance. Adaptive testing in the form of online quizzes can allow for more frequent practice and can be used for distributed or spaced practice which has been shown to have positive learning benefits by Dunlosky and Van der Kleij.<sup>[15,16]</sup> Quizzes can be used to reinforce learning at regularly spaced intervals providing the opportunity and prompting for distributed practice. Students are generally satisfied with adaptive quizzing by Becker-Blease and House.<sup>[17,18]</sup>

In contrast, traditional lectures received mixed reviews, often criticized for being monotonous, passive, and exam-focused. While traditional teaching methods often rely on passive information transfer, the Jigsaw method takes a different approach. By placing students in small groups with assigned roles and tasks, it emphasizes active participation and collaboration. This shift in focus has a measurable impact on student experience, as evidenced by research from Aydin and Biyikli.<sup>[19]</sup> In their study, over 30% of students reported finding assignments easier to understand and complete when using the Jigsaw method compared to other methods.

Beyond improved task perception, the Jigsaw method also appears to foster a deeper understanding of learning objectives. Qualitative research by Tarhan et al.<sup>[20]</sup> explored student perceptions of the method and found that nearly 80% felt a strong sense of accomplishment in meeting lesson goals within the Jigsaw's collaborative environment. This suggests that the method not only simplifies learning but also empowers students to take ownership of their educational journey, leading to more profound and self-directed learning. The study conducted by Vives<sup>[21]</sup> showed that the Jigsaw method had benefits in terms of academic performance only for students with low self-esteem and low working memory capacity. Thus, the fit between the complexity of the content to be taught and student ability appears to be important for avoiding problems when using the Jigsaw method and preventing negative consequences on students' achievement and relationships by Oleary et al.<sup>[22,23]</sup> For several outcomes, the duration of implementation did not appear to be a factor that could explain the significant heterogeneity observed by Drouet et al.<sup>[24]</sup>

#### Implications for Medical Education:

These findings emphasize the potential of interactive methods to transform NCD education. Tailoring specific methods to different NCDs and fostering active student engagement can foster deeper knowledge acquisition, stronger retention, and clinically relevant learning. The diverse student preferences highlighted the importance of offering a variety of interactive approaches to cater to individual learning styles and enhance overall engagement.

#### Strengths and Limitations:

Current study employed a variety of interactive methods tailored to specific topics, showcasing the adaptability of these approaches to different NCD areas. Additionally, we actively facilitated the learning process, shifting the instructor role from traditional knowledge delivery to guiding student engagement and exploration. While this approach demands more time and resources for preparation and training, the observed improvements in knowledge retention and clinical application potential suggest significant long-term benefits. However, the single-institute design limits generalizability. Future research involving larger populations and diverse institutions is needed to validate these findings on a wider scale. Additionally, long-term studies investigating the impact of interactive methods on clinical practice and student satisfaction would further strengthen the case for their widespread adoption in medical education.

#### **Conclusion:**

Objective measurement of the students has revealed higher scores with interactive teaching

methods compared to traditional method. On rating their perceptions, highest positive scoring was found for jigsaw method for the topics. Newer teaching and learning methods are essential to sustain their interest on a longer run. There is also an Urgent need for uniformity with regards to teaching specific and most important topics in different methods to improve the quality of education.

#### Declaration

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## Assessment of Adherence to Treatment among Hypertensive and Diabetic Patients attending Urban Health Centre, Chennai

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#### Abstract:

Introduction: Globally, Non communicable diseases (NCD) are the leading cause of death accounting for 63% of annual deaths. More than 40% of NCD deaths are premature deaths which is mainly due to the complication arising as a result of non- adherence to treatment. Moreover, non-adherence to treatment is a growing challenge in India which blocks the clinical outcomes and paves way for complications. Objective: To assess the treatment adherence among Diabetic and Hypertensive patients and to determine the factors influencing adherence. Method: Community based, cross sectional study was conducted among 112 patients of diabetes and hypertension diagnosed for more than 1 year, attending NCD clinic of Puliyanthope UHC during Oct-Nov 2020. Data was collected using semi structured questionnaire with socio demographic and, treatment details by interviewer. Adherence was assessed using Morisky Adherence Scale (MAS 4). Results: Among patients, 57% were female and mean age was 54 years with Standard Deviation of 4.5 years. About 39% had diabetes, 27% had hypertension and 34% suffered with both. Total of 34% patients were highly adherent and 66% were non adherent to prescribed drugs. About 64% patients monitored their blood sugar once in three months. Female patients had better adherence (51%) to medications than male(38%) but not statistically significant. About 34% of patients at least once missed their drugs due to high cost. Adherence was high among those who were aware about complications of drug discontinuation (p = 0.023). Literacy, Socioeconomic status, Number of medicines were not significant with treatment adherence (P>0.05). Conclusion: This study indicates high proportion (66%) of non-adherence to treatment among patients with hypertension and/or diabetes. Awareness of impact of discontinuation of drugs had a major impact on adherence to treatment. Common reasons behind low adherence were fear of side effects of drugs, forgetfulness and carelessness.

Keywords: Diabetes, Hypertension, Treatment Adherence

#### Introduction:

Non-communicable diseases (NCDs) kill 41 million people each year, equivalent to 74% of all deaths globally. Each year, more than 15 million people die from a NCD between the ages of 30 and 69 years; 85% of these "premature" deaths occur in lowand middle-income countries.<sup>[1]</sup> In 2015, as part of Sustainable Development Goal 3, the United Nations (UN) member states set the target of reducing premature mortality from non-communicable diseases (NCDs) by one-third by 2030. Given India's huge population, its achievements are critical to reaching these global targets.<sup>[2]</sup> India is in the midst of a rapid epidemiological transition: the estimated

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proportion of disability-adjusted life-years (DALYs) attributable to NCDs in India has risen from 31% of total DALYs in 1990 to 55% in 2016.<sup>[3]</sup> Hypertension and Diabetes are major risk factors for cardiovascular and cerebrovascular diseases.

The global epidemic of hypertension and Diabetes is largely uncontrolled. Suboptimal adherence, which includes failure to initiate pharmacotherapy, to take medications as often as prescribed, and to persist on therapy long-term, is a well-recognized factor contributing to the poor control in hypertension and Diabetes.<sup>[4]</sup> Several categories of factors including demographic, socioeconomic, concomitant medical-behavioural conditions, therapy-related, healthcare team and system-related factors, and patient factors are associated with non-adherence. Adherence is a complex process and patients' decisions about how to manage their medications are likely based on economic, physical, psychological, and social considerations.<sup>[5]</sup>

Non-adherence to prescribed drugs schedule continues to be a major problem the world and remains a public health challenge. Non-adherence to treatment leads to poor control and increases the risk of disease complications. The prevalence and factors associated with non-adherence in resource limited settings should be determined so as to lower the impact of a disease on the health systems which are already overburdened with communicable diseases. Hence, it is needed to undertake the current study to assess the treatment adherence of Diabetes and Hypertension and to determine the factors influencing adherence.

#### Methods:

#### Study design, setting, participants:

Pulianthope Urban health centre is located in the field practice area of Madras Medical College. A Cross sectional study was conducted among 112 patients of diabetes and hypertension diagnosed for more than 1 year attending NCD clinic of Puliyanthope UHC during Oct-Nov 2020.

**Inclusion Criteria:** Patients who were diagnosed with diabetes and/or hypertension for more than one year residing in Pulianthope and registered in the NCD clinic.

**Sample size and sampling:** With absolute precision as 8 and z value of 1.96, the sample size was calculated as 102. By adding 10 % non-response rate, total sample size calculated to be 112. Sampling frame was obtained from Non-Communicable Disease register of PUliyanthope health centre. From the sampling frame, a random numbers were selected from the random number table.

# Data Collection, Study Tools, and Parameters Used:

Data collected using validated semi structured questionnaire which includes the socio-demographic details, questions to assess adherence of treatment to hypertension and diabetes.

Proforma consisted details regarding socio demographic profile, personal habits like smoking, alcohol, and physical exercise, awareness on complications of disease and awareness on impact of discontinuation of drugs were asked in the questionnaire. Adherence was assessed using Morisky Adherence Scale (MAS 4), the scoring was done as below.<sup>[6]</sup>

Total score of 0- high adherence Total score of 1-2 – medium adherence Total score of 3-4 – low adherence

#### Data Analysis:

Data collected was entered in Microsoft excel 2007 spreadsheet, compiled and analyzed using SPSS 16.0.<sup>[7]</sup> Appropriate descriptive and inferential statistics was used to analyze the data.

#### **Ethical Approval:**

Permission obtained from the Institutional Ethical Committee of Madras Medical College. Written Informed consent was obtained from study participants before conducting the study.

#### **Results:**

Variables		n (%)
Age Groups (Years)	<40	18(16%)
	41-50	25 (22%)
	51-60	24 (21%)
	>60	45 (41%)
Gender	Male	64 (57.2%)
	Female	48 (42.8%)
Education	Up to middle school	30 (27%)
	Up to higher secondary	44 (39%)
	Graduate & above	38(34%)
Type of family	Nuclear	74 (66%)
	Joint	38 (34%)
Socioeconomic	Upper	10 (9%)
Status	Upper middle	24 (21%)
	Middle	30 (54%)
	Lower middle	18(16%)
Disease	Hypertension	30(27%)
	Diabetes	44 (39%)
	Both	38 (34%)
Health centers	Government	68 (60%)
from where	Private	44 (40%)
treatment is availed		
Occupation	Government service	30 (27%)
	Private Service	40 (36%)
	Selfemployed	38(34%)
	Unemployed	4(7%)
Marital status	Married	100 (89%)
	Unmarried	8(7.6%)
	Separated	2 (1.7%)
	Widowed	2(1.7%)
H/O cardiova-	Yes	26(23.2%)
scular disease	No	86 (76.7%)
H/O cerebrova-	Yes	4 (3.6%)
scular Disease	No	108 (96.4)
No of prescribed	<5	88 (78.6%)
medicines	>5	24 (21.4%)

Table 1: Socio-Demographic Details of Participants (N=112)

Majority of the participants (57%) were males. More than 73% of the participants have studied higher secondary or graduate. Around 66 % of them were living in nuclear family. Government health facilities were availed by 60 % of participants. History of cardiovascular disease and cerebrovascular disease present in 23% and 3.5% respectively. Around 79% of participants were taking less than 5 medicines on their schedule. Total 27 % of participants were suffering from Hypertension and 39 % from Diabetes whereas 34% affected with both hypertension and Diabetes. (Table 1)

#### Figure 1: Adherence of Drugs Consumption as per Morisky Scale (N=112)



High treatment adherence was found on 38 (34%) of participants, whereas 63 (56%) were having medium adherence to treatment prescribed to them. (Figure 1)

# Table 2: Proportion of Patients Adopting HealthyLifestyle (N= 112)

Life Style Changes	n (%)
Monitoring RBS (once in 3 months)	72(64%)
Regular exercises	60(53%)
Following Dietary advice	43 (38%)
Regular monitoring of Blood Pressure	41 (36%)
Avoid Alcohol consumption	92 (82%)
Avoid Smoking	94 (84%)

Regular monitoring of blood pressure and blood sugar was performed by 36% and 64 % of the participants, respectively. Around 80% participants were avoiding alcohol and smoking. (Table 2)



Figure 2: Distribution of Reasons Behind Non Adherence to treatment among participants (N= 112)

Most common reason behind non adherence to treatment was absence of any symptoms (Feeling better) among 41% participants. (Figure 2)

Table 3: Association of Treatment Adherence with Awareness about Impact of Drug
Discontinuation and Disease Complication (N=112)

Awareness	High and Medium	Low Adherence	Total	p value*
	Adherence			
Impact of drug discontinu				
Yes	74 (73%)	2 (20%)	76 (67.8%)	
No	28 (27%)	8 (80%)	36 (32.1%)	0.002
Total	102(100%)	10(100%)	112 (100%)	
Complications of Diabetes and Hypertension				
Yes	66(65%)	4 (40%)	70 (62.5%)	0.2
No	36(35%)	6 (60%)	42 (37.5%)	

\*Fisher Exact test

Patients having awareness about impact of drug discontinuation were found to have high to medium adherence to treatment, association was statistically significant. (Table 3)

#### **Discussion**:

In this study out of total 112 patients, 38 (34%) were having medium to high adherent to treatment whereas 74 (66%) were non-adherent to treatment of diabetes and hypertension. In a study done at Uganda by Joan N Kalyan et al.<sup>[8]</sup> only 25% of patients were non-adherent to treatment which is low as compared to current study (66%). In another study Conducted at Canadian province by Nandini Natarajan et al,<sup>[9]</sup> 77% of patients reported high adherence levels. Adherence to treatment was better when patients were aware on impact of discontinuation of drugs (p<0.05). This showed statistical significant association of knowledge on hypertension with drug adherence level (p<0.05).<sup>[10]</sup>

High proportion of patients (62.5%) was aware about complications of Diabetes and hypertension. However this was not statistically significant. However, in a study done at urban slums of Navi Mumbai by Sneha Pratap Kotian et al.<sup>[11]</sup> 44% of patients were not aware of complications. High proportion of patients (65%) were adherent to treatment when they were aware of complication of diabetes and hypertension. Whereas 35% of patients who were not aware of complications were adherent to treatment(p = 0.2). This shows that by increasing the knowledge level of patients, drug adherence can be raised which in turn reduce the morbidity

In current study, proportion of patients adopting healthy lifestyles, such as regular

exercises(53%), avoiding alcohol consumption (82%) and smoking (84%) were reported. In other study done at Canadian province by Nandini Natarajan et al.<sup>[9]</sup> proportion of patients adopting regular exercises were 43.3%. As per the current study findings, there is a need to improvise regular exercises through awareness or physical activity sessions. In present study the challenges faced by patients, towards adherence to treatment were fear of side effects 43(38%), high cost of medicines 38 (34%), forgetting to take medicines 23(21%), feeling better on discontinuation of medicines 46(41%) and carelessness about taking medicines 20(18%). In a study done at Navi Mumbai by Sneha Pratap Kotian et al.<sup>[11]</sup> reasons behind non adherence among hypertensive patients were forgetfulness (99.4%) and lack of money (73.8%). Forgetting and carelessness also cited as reasons by 21% and 18% persons, respectively which is similar (21.8%) to study conducted by Belayneh et al (2014).<sup>[12]</sup> Motivating the patients to enrol themselves in the government schemes like Makkalai Thedi Maruthuvam which provides free of cost medicines and counselling by women Health Volunteers at their doorsteps can improve the adherence levels.

#### **Conclusion:**

This study indicates high proportion (66%) of non-adherence to treatment among patients with hypertension and/or diabetes. The common reasons for non- adherence were feeling better on discontinuation of drugs, fearing of side effects, high cost of medicines and forgetfulness. Awareness on complications of stopping medicines found to be the significant factor influencing adherence of patients to treatment.

#### **Recommendation:**

Remedial measures can include doctors creating awareness among patients to promote better control of disease there by improving health outcome of the patients. Information Education and communication (IEC) materials regarding the complications of diabetes and hypertension and impact of discontinuation of drugs can be displayed at Non communicable disease Outpatient clinics. Enrolling the patients in the government flagship programme like Makkalai Thedi Maruthuvam(MTM) which provides free of cost medicines and counselling by women Health Volunteers at their doorsteps can be applied to improve the adherence levels.

#### **Declaration:**

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## **Original Article**

# A Cross-Sectional Study on Validity of Digital Hemoglobinometer in Estimating the Haemoglobin Level among Government School Children in Virudhunagar City, Tamil Nadu

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#### Abstract:

Introduction: Anemia is a significant public health concern, particularly among adolescents. With more than half of all adolescents living in Asia and a substantial portion in India, where adolescents make up 21% of the population, addressing anemia in this age group is vital. **Objectives:** 1.To estimate the validity of screening tool digital hemoglobinometer against the gold standard method automated analyser, 2. To estimate the prevalence of anemia among the Government middle school children in Virudhunagar district using automated analyser. Method: This cross-sectional study was conducted over a three-month period from March to May 2023 and included 357 students from government schools in Virudhunagar. Cluster random sampling was employed to select representative schools, and a semi-structured questionnaire was used to collect demographic data and information on risk factors. Haemoglobin levels were measured using both the digital hemoglobinometer and the automated analyzer. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated to assess the validity of the digital hemoglobinometer. Results: The study revealed that the digital hemoglobinometer had a sensitivity of 75.64% and a specificity of 76.70% when compared to the automated analyzer. While there was a statistically significant difference between the two methods, the digital hemoglobinometer demonstrated its effectiveness as a screening tool, particularly for identifying cases of moderate and severe anemia. The study suggests that in resource-limited settings, the digital hemoglobinometer could play a crucial role in early detection and intervention for anemia among school children. Conclusion: These findings underscore the potential of accessible digital hemoglobinometers in school health programs, where advanced laboratory equipment may not be readily available. The study also highlights the need for further research with larger sample sizes and diverse digital hemoglobinometer types to refine and expand the use of this technology in addressing anemia in school-aged children.

Keywords: Medical Students, Smoking, Tobacco

#### Introduction:

Anemia is an important public health problem. According to the World Health Organization (WHO), anemia is defined as having hemoglobin (Hb) levels lower than 12.0 g/dl in females and 13.0 g/dL in males.<sup>[1]</sup> Oxygen is carried by Haemoglobin so in anaemia there will be decreased capacity of the blood to carry oxygen to the body tissues resulting in fatigue, weakness, dizziness and shortness of breath. In India Adolescents constitute 21% of the countrys population.<sup>[2]</sup> Anemia at this stage in life has longterm impact over their health, like developmental problems, cognitive functioning, school

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performance, decreased immunity, irregular menstrual cycles, poor pregnancy effects like maternal morbidity and mortality, preterm delivery, low birth weight, and perinatal mortality infants born to anemic mothers have a greater risk of anemia in the first six months of life.<sup>[3-5]</sup> Iron deficiency, folate, and vitamin B12 deficiency are the most common cause of anemia.<sup>[6]</sup>

According to NFHS -5, in all over India, showed an upward trend in the prevalence of anemia among girls of 15-19 years - 59% (NFHS-4 -54%) and among boys of 15-19 years- 31% (NFHS-4 -29.2%). The prevalence of severe anemia among them was 2.6% and 0.3%, respectively.<sup>[7]</sup> Comprehensive National Nutrition Survey (CNNS) 20162018 done on Indian adolescents found that 28.5% of adolescents (girls: 39.6%, boys: 17.6%) were anemic and the major causes of anemia were vitamin B12 deficiency (25.6%), Iron deficiency (21.3%), dimorphic anemia (18.2%), anemia of inflammation (3.4%).<sup>[8]</sup> Various studies conducted among adolescents in various parts of India showed that the prevalence of anemia was 61.5% in Gujarat, 52.5% in Madhya Pradesh, 41.1% in Karnataka, 50% in Bihar and 56.5% in Uttar Pradesh, 88.6% in Tamilnadu (Coimbatore).<sup>[9-13]</sup>

The National Nutritional Anemia Prophylaxis program was initiated in 1970 to prevent anemia mainly targeting children and pregnant mothers. Later on, various programs like the weekly iron-folic acid supplementation (WIFS) program and the Anaemia Mukth Bharath program were initiated for the supplementation of iron tablets prophylactically to prevent anemia in adolescents. In spite of these programs, the prevalence of anemia showed an upward trend. Hence need for screening tools to measure the overall burden among adolescents. Even though, an automated analyser is a gold standard tool to measure hemoglobin level, a digital hemoglobinometer is simple and easily available, so it could be used for screening at the field level. Sahlis hemoglobinometer which is used as a current screening tool has some limitations like the chance of visual error, the color of glass standard may fade over time and it cant measure all the hemoglobins. Hence the need for this study to screen anemia and to find the burden of anemia among government middle school children in Virudhunagar district using a screening tool against the gold standard method and to estimate the validity of the digital hemoglobinometer.

#### **Objectives:**

- 1 To estimate the validity of screening tool digital hemoglobinometer against the gold standard method automated analyser.
- 2. To estimate the prevalence of anemia among the Government middle school children in Virudhunagar district using automated analyser.

#### Method:

A cross-sectional study was carried out in government schools in Virudhunagar among adolescents of class 6 to 8. The study duration was three months from March 2023 to May 2023. A study done by Shanmugam et al in Coimbatore, Tamil Nadu found that the prevalence of anemia among adolescents was 88.6%,<sup>[13]</sup> so the q value is 11.4, keeping absolute precision as 5% and design effect 2 sample size calculated using the formula  $4pq/L^2$  was 310 and by taking non-response rate as 20% final sample size calculated was 372. Cluster random sampling technique was used. All the homogenous schools in terms of proportion of students in different standards, girls & boys composition were selected. Schools with students strength of 80 and above were considered. There were totally 20 such homogenous schools. Each school was considered as a cluster. Estimated sample size was 372 and minimal strength in each school was 80. So number of clusters to be selected was calculated based on the formula;<sup>[14]</sup> estimated sample size/number of students in each cluster = 372/80 = 4.65. So approximately 5 clusters were selected randomly from the 20 homogenous clusters and all the students in those school clusters were included in the study. Total strength of five schools was 507, after applying the exclusion criteria

the final sample size arrived was 357. Non-cooperative children, those who were absent during the time of data collection, those who were suffering from any chronic medical illness were excluded from the study.

Predesigned semi-structured questionnaire was used to collect the basic demographic data and data regarding other risk factors of anemia. As per WHO expert group guidelines hemoglobin less than 12 g/dl was considered to be anemic for children from 6 to 14 vears Institutional ethical clearance was obtained. Informed consent was got from the parents or guardian. The confidentiality of the participants was maintained through-out the study Prior permission was got from the school authority. After getting consent, data was collected by the trained persons. Blood sample was collected and Hemoglobin was estimated using both the methods. Data were entered in Microsoft excel and SPSS version 16 was used for analysis. Descriptive statistics was used to find frequencies and percentages. Kappa statistics along with agreement analysis and independent sample t test was used for comparison between the readings of both the tools used. Sensitivity, specificity, positive predictive value and negative predictive value were calculated.

Sensitivity is percentage of true positives among the diseased (as estimated by automated analyser). Specificity is percentage of true negatives among the non-diseased (as estimated by automated analyser). Positive predictive value is the percentage of true positives among the total positives (as estimated by digital hemoglobinometer). Negative predictive value is the percentage of true negatives among the total negatives (as estimated by digital hemoglobinometer).<sup>[15]</sup>

Cohens Kappa was calculated using the below formula and interpretation was as follows  $^{\scriptscriptstyle [16]}$ 

Pr(a)-Pr(e)/1-Pr(e)

Pr(a) is observed agreement and Pr(e) is expected agreement

Interpretation for Cohens Kappa: 0 no agreement, 0.10 0.20 slight agreement, 0.21 0.40 fair agreement,

0.410.60 moderate agreement, 0.610.80 substantial agreement, 0.81 0.99 near perfect, 1 perfect agreement

#### **Results:**

Out of 357 students included in the study 50.4% were males and 49.6% were females. The majority of them (40.1%) were of 13 years old. Table 1 show the age and sex distribution of the study population.

Age in	Ger	Total	
years	Female Male		
	n(%)	n(%)	
10	2 (0.6%)	0 (0%)	2 (0.6%)
11	20 (5.6%)	48 (13.4%)	68 (19.0%)
12	65 (18.2%)	49 (13.7%)	114 (31.9%)
13	72 (20.2%)	71 (19.9%)	143 (40.1%)
14	21 (5.9%)	9 (2.5%)	30 (8.4%)
Total	180 (50.4%)	177 (49.6%)	357 (100.0%)

Table 1: Age and Gender distribution of the study population (N= 357)

The prevalence of anemia as estimated by the gold standard automated analyser and digital hemoglobinometer are 21.8% (Figure 1) and 34.7%, (Figure 2) respectively. Total 14.2% were mild anemic, 5.3% were moderately anemic and 2.3% were severely anemic as estimated by automated analyser. 21.4% were mild anemic,9.5% were moderately anemic and 3.8% were severely anemic.

Figure 1: Prevalence of Anemia as Estimated by Automated Analyser (N=357)



Figure: 2 Prevalence of anemia as estimated by digital hemoglobinometer (N=357)



Table 3 shows independent sample t test between hemoglobin recorded by two device p value was 0.08 showing that there is no statistically significant difference between hemoglobin recorded by two devices.

By comparing between the anemia diagnosed by screening tool, digital hemoglobinometer and gold standard automated analysesensitivity was 75.641%, specificity was 76.702%, positive predictive value was 47.5% and negative predictive value was 91.8%. (Table 4)

Pr(a) is total true positives and negatives among total screened .273 were correctly diagnosed by the screening tool among 357 screened so Pr(a) is 273/357 that is 0.76

Table 2: Categorization of	Anomia by Automator	l Analyser versus	Digital Hom	oglobinometer	(n - 357)
Table 2. Calegor Ization of A	Allellia by Automated	i Allalysel velsus	Digital Hell	logioninometer	(n - 557)

Anemia by digital	Diagnosis of Anemia by Automated Analyser					
hemoglobinometer	Non-anemic	Non-anemic Mild Moderate Severe				
	n(%)	n(%)	n(%)	n(%)	n(%)	
Non-anemic	214 (91.8%)	19 (8.2%)	0	0	233 (100%)	
Mild	44 (57.1%)	32 (41.6%)	1 (1.3%)	0	77 (100%)	
Moderate	16(47%)	0	16(47%)	2 (6 %)	34(100%)	
Severe	5(38.5%)	0	2(15.4%)	6 (46.1%)	13(100%)	
Total	279 (78.2%)	51(14.3%)	19(5.3%)	8(2.2%)	357(100%)	

% of agreement for mild anemia 82.07% with Cohens K 0.388 = Fair agreement % of agreement for moderate anemia 94.11% with Cohens K 0.57 = Moderate agreement % of agreement for severe anemia 97.47% with Cohens K 0.56 = Moderate agreement

Table 3: Mean hemoglobin values estimated by two devices (n = 357)

Device	Mean	Standard Deviation	Standard Deviation difference	Mean difference	T value	P Value
Digital	11.44	1.23	0.11	0.15	- 1.7032	0.08
hemoglobinometer						
Automated analyser	11.59	1.12				

#### Table 4: Validity of Screening tool versus gold standard test

Digital hemoglobinometer	Automate	Total		
	Positive Negative			
Positive	True positive (a) = 59	False positive (b)= 65	124	
Negative	False negative (c) =19	True negative(d) =214	233	
Total	78	279	357	
% of agreement for diagnosis of anemia 76.47% with Cohens K 0.43 = Moderate agreement				

Pr (e) is (a+b/n Xa+c/n) + (c+d/n X b+d/n) (124/357X78/357) + (233/357X279/357) = 0.59 Cohens K 0.76-0.59/0.4 = 0.43 = Moderate agreement

#### **Discussion**:

The Prevalence of anemia as estimated by the gold standard automated analyser was 21.8%. The prevalence of anemia as estimated by the digital hemoglobinometer was 34.7%. this was comparatively lower than the pooled prevalence of Indian adolescence estimated in a systemic review and meta-analysis done by estimated by Daniel et al.<sup>[17]</sup>

The mean hemoglobin estimated by the digital hemoglobinometer was 11.44 g/dl. Mean hemoglobin estimated by the automated analyzer was 11.59 g/dl. Prevalences is comparatively less and mean hemoglobin estimated by both digital hemoglobinometer and automated analyser were comparatively more than in an another study done by Yadav K et al<sup>[18]</sup> (hemoglobinometer A - prevalence of anemia 55%, mean Hb 10.9g/dl, hemoglobinometer B - prevalence of anemia 58%, mean Hb 10.8 g/dl, Automated analyser - prevalence of anemia 57%, mean Hb 10.8 g/dl) and Toppo et al<sup>[19]</sup> (hemoglobinometer- mean Hb 9.89 g/dl, Automated analyser - mean Hb -10.19g/dl).

In the present study female gender and  $8^{\text{th}}$  standard were significantly associated with anemia. The sensitivity of digital hemoglobinometer was 75.641 %, specificity was 76.702 %,positive predictive value was 47.5% and negative predictive value was 91.8 %. This is in contradictory to other studies. Study done by Toppo M. et al <sup>[19]</sup>in assessing the validity of digital hemoglobinometers compared to, automated analyser shows that Overall, sensitivity of Digital Hemoglobinometer for hemoglobin estimation was calculated to be 89.4% and specificity was 82.6% and negative predictive value was 75.8% when Compared against

Autoanalyzer. A study done by Yadav K et al<sup>[18]</sup> among ANC mothers found that device A (sensitivity: 86% and specificity: 83%) had relatively higher sensitivity and specificity compared to Device B (sensitivity: 78.9% and specificity: 81%) when compared against automated analyser which was also relatively higher than the present study.

In a study done by Khanam et al<sup>[20]</sup> to find validiy of digital hemoglobinometer among antenatal mothers in a facility setting in India found that proportion of anemia using the hemoglobinometer was 64.7% while using the hematologyanalyzer was 52.9%. Device A showed a sensitivity of 97.22%, specificity of 80.30%, and diagnostic accuracy of 86.3%, which are comparatively higher than the present study. Khanam et al<sup>[20]</sup> study also found that there was a substantial agreement between digital hemoglobinometer and automated analyser indicated by Cohen's kappa coefficient (kappa = 0.72) this in contrast to the present study where there was only a moderate agreement between two devices with Cohens Kappa coefficient estimated to be 0.43.

The findings of this study indicate that the digital hemoglobinometer have moderate agreement with automated analyzers, but false negatives were only 19. Out of that in 11 individuals hemoglobin estimated by digital hemoglobinometer was only less than 0.5g/dl than in the automated analyser and the differences in hemoglobin among the remaining 8 persons were between 0.5 to 1 g/dl. All the 19 false negative individuals were only mildly anemic. Therefore, digital hemoglobinometer did not miss any moderate or severe cases. Digital hemoglobinometer also showed more positives, false positives can be confirmed by the diagnostic test. Hence digital hemoglobinometer can be used as a screening tool.

The limitation of the study was authors tested only one type of digital hemoglobinometer but however, this study forms the base for future higher research involving a large sample size and for testing different types of digital hemoglobinometers.

#### Conclusion and recommendation:

The Digital Hemoglobinometer exhibits sensitivity of 75.641%, specificity of 76.702% and 76.47% of agreement for diagnosis of anemia with Cohens K of 0.43 (Moderate agreement) making it a valuable tool for anemia screening in educational settings. This finding is particularly significant in low-income regions where access to advanced laboratory equipment may be limited. Implementing the Digital Hemoglobinometer for routine hemoglobin assessment in school health programs can contribute to early detection and timely interventions, ultimately improving the health and well-being of school children. Future studies can be planned by lowering the hemoglobin cut-off to diagnose the anemia by digital hemoglobinometer so that sensitivity can be raised and even mild anemia cases may not be missed.

#### **Declaration**:

Funding: Nil

#### Conflict of Interest: Nil

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## Vitamin D Deficiency and Associated Parameters among Cardiovascular Patients in a Tertiary Care Institution of Southern Rajasthan

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#### Abstract:

Introduction: Cardiovascular diseases are major public health problem and leading cause of mortality. A check on each modifiable risk factor will be advantageous. Micronutrient such as vitamin D deficiency can be one such factor, since it is well known that vitamin D affects all systems of the body including cardiovascular. **Objective:** 1. To estimate vitamin D deficiency among patients with cardiovascular illnesses. 2. To determine the association between vitamin D deficiency and socio-demographic parameters, as well as selected laboratory parameters like lipid profile, random blood sugar, complete blood count in heart patients. Method: A cross sectional study was conducted over a period of one year, among 250 patients admitted at cardiology ward of MB Government Hospital, Udaipur whose socio-demographic profile, laboratory investigations like vitamin D, lipid profile, random blood sugar, CBC were observed and reports were entered in codebook. Data was analyzed using MS Excel, Open Epi v 3.01. Results: In the study 174 males and 76 females were included. Vitamin D deficiency was found in 92% of cardiovascular patients. Vitamin D deficiency was significantly associated with female gender (p value=0.01), urban residency (p value=0.0005), socio-economic status (p value= 0.004) and semi-vegetarian diet (p value < 0.01).Most common symptom was tiredness (34%); most common coexisting non-communicable disease was hypertension (74.8%) and most common past infection was COVID-19 (9.2%). Participants with vitamin D deficiency had increased BMI, increased random blood sugar, decreased haemoglobin and more incline towards dyslipidemia. **Conclusion:** Vitamin D deficiency was present in significantly large proportion of cardiovascular patients. Females, urban residents and individuals with vegetarian diet and increased BMI are at more risk. Frequent evaluations including lipid profile, blood sugar, CBC should be encouraged.

Keywords: Cardiovascular disease, Deficiency, Vitamin D

#### Introduction:

One of the major public health problems and the leading cause of mortality all over the globe are cardiovascular diseases (CVD). Many people die annually from cardiovascular diseases than from any other cause. As per World Health Organization (WHO), 44% of deaths from non-communicable diseases are due to cardiovascular diseases.<sup>[1,2]</sup> There are various risk factors linked to development of cardiovascular disease which can be broadly divided into modifiable (lifestyle, dietary) and nonmodifiable (age, sex, familial). A check on each modifiable risk factor will be advantageous. Micronutrient deficiency can be one such factor. Vitamin D is one of such micronutrients which affect all the systems of the body including cardiovascular system.

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Vitamin D deficiency leading to vascular disease is a complex mechanism. It involves raised parathyroid hormone levels leading to heightened renin-angiotensin-aldosterone system (RAAS) activity, insulin resistance and inflammation, thereby leading to atherosclerosis and cardiovascular disease. Vitamin D acts through Vitamin D Receptor (VDR) which is present in almost all the tissues of human body, including cardiovascular tissues. Cardiovascular effects of Vitamin D share the common initial steps of nuclear and plasma membrane VDR activation at the cellular level.<sup>[3]</sup>

Thus considering the fact that vitamin D affects all systems of body including cardiovascular, this study was conducted with an objective to estimate vitamin D deficiency and to determine the association between vitamin D deficiency and socio demographic profile along with various laboratory parameters like lipid profile, random blood sugar, complete blood count.

#### Method:

A cross sectional study from February 2021 to December 2021 was conducted among 250 patients admitted at cardiology ward of MB Government Hospital (MBGH) attached to RNT Medical College, Udaipur.

#### **Study Population:**

Study was conducted among patients admitted at cardiology ward of MBGH, Udaipur who fulfilled inclusion criteria, after obtaining written consent from them. Sample size was calculated on the basis of a previous study by Oberoi D et al<sup>[3]</sup>, through the formula n=  $(Z_{1-\alpha/2})^2 \times p \times q/L^2$ , where  $Z_{1-\alpha/2}$  is a constant of value 1.96, 'p' is prevalence, 'q' is 100-p, 'L' is allowable error The sample size for the study was calculated to be 235. Considering the drop-outs, the sample size was finalized to be 250.Non-probability consecutive sampling technique was used.

#### Inclusion Criteria:

• Patients admitted in the cardiology ward of MB Government Hospital, Udaipur who agreed to participate and gave written consent.

#### **Exclusion Criteria:**

- Participants with acute critical illness, chronic renal or hepatic disease, thyroid or parathyroid disease.
- Participants who were on vitamin D supplements currently or in the past 3 months.
- Participants on drugs that affect metabolism or absorption of vitamin D (e.g. oral contraceptive pills, some antibiotics such as gentamicin, neomycin; anti-seizure medications like phenobarbital, phenytoin).

#### Study Procedure:

A semi-structured questionnaire was used for socio-demographic details like age, gender, level of education, socio-economic class (according to Modified B. G. Prasad classification, year 2021)<sup>[4]</sup> and type of residence. Other details like body mass index, frequency of tobacco or alcohol consumption and dietary patterns were also recorded.

Participants were classified into three groups according to frequency of tobacco consumption<sup>[5]</sup>:

- i. Frequent or regular consumers Those who consume daily
- ii. Occasional consumers- Those who consume less than daily
- iii. Never consumers- Those who do not consume at all.

Participants were classified into three groups according to frequency of alcohol consumption<sup>[6]</sup>:

- I. Frequent consumers Those who consume more than 10 drinks in a week and hardly have any day free of alcohol.
- Occasional consumers Those who consume less than 10 drinks in a week and have 2 or more alcohol free days in a week.
- iii. Never consumers- those who have never had alcohol.

According to dietary pattern, participants were classified as follows<sup>[7]</sup>:

- i. Vegetarian- A person who does not eat meat, fish or egg, especially for religious or health reasons.
- ii. Non vegetarian- A person who is not a vegetarian i.e. someone who consumes meat or fish as a major source of protein. Person who consumes meat more than thrice a week is included in non-vegetarian diet.
- Semi-vegetarian diet Consumption of vegetarian food on most of the days of a week; occasional or less than thrice consumption of meat in a week or consumption of eggs but not meat.

Blood samples were collected for laboratory investigations like serum vitamin D, lipid profile, Random Blood Sugar (RBS) and Complete Blood Count (CBC). Serum Vitamin D level of 20-32 ng/ml was considered to be normal range and participants with levels less than 20 ng/ml were considered to be vitamin D deficient.<sup>[8]</sup> Details were entered in codebook.

#### Data Analysis:

To enter data, a codebook was prepared. Data was compiled and analyzed using MS Excel 2007 and OpenEpi v 3.01. Independent t-test and chi square tests were applied for statistical analysis of data. P-value< 0.05 was considered statistically significant.

#### **Results:**

The mean serum Vitamin D of all the 250 participants was 12.6  $\pm$ 6.3 ng/ml. Vitamin D deficiency was found in 230 (92%) participants, the mean level of serum vitamin D in them was 11.3  $\pm$  3.4 ng/ml. While the rest 20 (8%) participants had serum vitamin D in normal range with mean level of 27.3 $\pm$ 11.6 ng/ml.

Table 1 depicts socio-demographic profile of study participants. Statistically significant association was observed between vitamin D deficiency and gender, socio-economic (S.E.) class and type of residence; with deficiency being more commonly present in female gender, socio-economic class IV and participants residing in urban areas.

Vitamin D deficiency was found to be increasing with increase in Body Mass Index [BMI]. The association between vitamin D deficiency and BMI was statistically insignificant (p value=0.61). Vitamin D deficiency was most commonly seen in frequent consumers for both tobacco and alcohol, although the association in both the groups was statistically insignificant (p value=0.22 and 0.45 respectively). There was a statistically significant association between vitamin D deficiency and dietary patterns (p value < 0.01).Deficiency was maximum in semi-vegetarian participants while least in non-vegetarians. (Table 2)

Among all the participants who had vitamin D deficiency, 44.7% were symptomatic and 55.2% were asymptomatic. The most common symptom experienced by participants was tiredness (34%) followed by impaired wound healing (10%).

Participants were enquired about co-existing non-communicable diseases (NCDs). The most common NCD reported was hypertension which was present in 74.8%, followed by diabetes mellitus in 37.6% participants. Deficiency of Vitamin D was significantly associated with co-existing conditions like Hypertension and COPD with p value 0.03 and 0.002, respectively). (Table 3)

Participants with vitamin D deficiency showed a high incline towards acquiring infections. All the participants who had suffered from COVID-19 (9.2%) and tuberculosis (0.8%) were vitamin D deficient. Among the participants who had suffered from typhoid, 90% were vitamin D deficient. Most common past infection was COVID-19. Among the parameters of lipid profile, the difference in mean serum HDL level was found to be significant between both the groups, that is vitamin D deficient and sufficient (p-value 0.0002). (Table 4)

# Table 1 : Association between Vitamin D deficiency and Socio-demographic profile among studyparticipants (N=250)

		Partici	pants		
Variables	n (%)	Vitamin (N=230) D deficient	Vitamin (N=20) D sufficient	Chi-square value	p value
Age (years)					
< 40	5 (2%)	4 (80%)	1 (20%)	5.97	0.20
40-49	38 (15.2%)	33 (86.8%)	5 (13.1%)		
50-59	81 (32.4%)	76 (93.8%)	5 (6.1%)		
60-69	75 (30%)	67 (89.3%)	8 (10.6%)		
≥70	51 (20.4%)	50 (98.03%)	1 (1.9%)		
Gender					
Female	76 (30.4%)	75 (98.6%)	1(1.3%)	6.62	0.01
Male	174 (69.6%)	155 (89.08%)	19 (10.9%)		
Level of Education					
Illiterate	8 (3.2)	7 (87.5)	1 (12.5)	2.29	0.68
Primary	66 (26.4)	60 (90.9)	6 (9.09)		
Secondary	89 (35.6)	81 (91.01)	8 (8.9)		
Higher secondary	58 (23.2)	56 (96.5)	2 (3.4)		
Graduate and above	29 (11.6)	26 (89.6)	3 (10.3)		
Socio-economic Class <sup>#</sup>				•	-
Ι	51 (20.4)	43 (84.3)	8 (15.6)	15.2	0.004
II	112 (44.8)	108 (96.4)	4 (3.5)		
ш	30 (12)	27(90)	3 (10)		
IV	41 (16.4)	40 (97.5)	1 (2.4)		
V	16 (6.4)	12 (75)	4 (25)		
Type of Residence					
Rural	85 (34%)	70 (82.3%)	15 (17.6%)	16.2	0.0005
Urban	165 (66%)	160 (96.9%)	5 (3.03%)		

# As per Modified B. G. Prasad Classification

Participants with vitamin D deficiency had increased mean random blood sugar (143.35±50.95 mg/dl). While participants with vitamin D sufficiency had normal value of mean random blood sugar (130.45±48.84 mg/dl). This difference was found to be statistically insignificant (p value=0.277).

Among the parameters of Complete Blood Count (CBC) profile, the difference in haemoglobin level

was found to be significant in both the groups, that is vitamin D deficient and sufficient (p-value 0.006). No significant difference was observed in values of Total Leucocyte Count, Red Blood Cell count, platelet, Mean Corpuscular Hemoglobin Concentration and Mean Lymphocyte Volume among participants who had vitamin D deficiency and those who do not have deficiency.

		Particij	pants		
Variables	n (%)	Vitamin D deficient (N=230)	Vitamin D sufficient (N=20)	Chi-square value	p value
BMI (kg/m²)				•	
<18.50	11(4.4)	9 (81.8)	2 (18.1)	2.66	0.61
18.5-24.99	130 (52)	119 (91.5)	11 (8.4)		
25.0-29.99	88 (35.2)	83 (94.3)	5 (5.6)		
30-34.99	19 (7.6)	18 (94.7)	1 (5.2)		
35.0-39.99	2 (0.8)	2 (100)	0 (0)	-	
Frequency of tobacco co	nsumption			1	•
Frequent	75 (30)	72 (96)	3 (4)	2.98	0.22
Occasional	88 (35.2)	78 (88.6)	10 (11.3)		
Never	87 (34.8)	80 (91.9)	7 (8.04)		
Frequency of alcohol cor	sumption				•
Frequent	36 (14.4)	34 (94.4)	2 (5.5)	1.5	0.45
Occasional	121 (48.4)	113 (93.3)	8 (6.6)		
Never	93 (37.2)	83 (89.2)	10 (10.7)		
Dietary Pattern					
Vegetarian	145 (58%)	134 (92.4%)	11 (7.5%)	25.8	<0.01
Non vegetarian	14 (5.6%)	8 (57.1%)	6 (42.8%)	]	
Semivegetarian	91(36.4%)	88 (96.7%)	3 (3.2%)		

<b>Table 2: Association of Vitamin</b>	D deficiency with BMI, Addiction a	and Diet among study participants (N=250)
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#### Table 3: Association of Coexisting NCDs with Vitamin D deficiency (N=250)

Coexisting	Participants		n(%)	Chi-Square	p value
Non-Communicable	Vitamin Vitamin			value	
Disease *	D deficiency	D sufficiency			
Hypertension	176 (94.1%)	11 (5.8%)	187 (100%)	4.52	0.03
Diabetes Mellitus	85 (90.4%)	9 (9.5%)	94 (100%)	0.50	0.47
Osteoarthritis	9 (81.8%)	2 (18.1%)	11 (100%)	1.62	0.20
COPD	1 (33.3%)	2 (66.6%)	3 (100%)	14.2	0.002

\*Mutually inclusive

#### Table 4: Association of Vitamin D deficiency with Lipid profile among study participants (N=250)

		Participants			
Lipid profile	Total	Vitamin D deficient	Vitamin D sufficient	t value	p value
(mg/dl)		(N=230)	(N=20)		
Mean Serum Total cholesterol	221.03±64.3	221.6±64.8	214.3±59.3	0.48	0.62
Mean Serum TG	235.5±96.8	237.6±97.1	212.3±92.4	1.12	0.26
Mean Serum HDL	46.8±9.8	46.2±8.9	53.9±16.1	-3.42	0.0007
Mean Serum LDL	158.1±50.9	157.5±50.6	164.4±54.8	-0.58	0.56
Mean Serum VLDL	36.9±17.5	36.9±17.5	36.1±17.7	0.19	0.84

#### Discussion:

The rising prevalence of cardiovascular diseases has made it utmost important to address and control each and every modifiable risk factor to halt the progress.

In the current study, Vitamin D deficiency was found among 92% cardiovascular patients. Similar to this Lee et al<sup>[9]</sup> reported 96% patients of acute coronary syndromes to be vitamin D deficient. While Oberoi et al<sup>[3]</sup> and Raina et al<sup>[10]</sup> reported 64% and 75% prevalence respectively.

Vitamin D deficiency was seen to increase with increasing age, although there was a dip at age group 60-69 years. Similarly, Raina et al<sup>[10]</sup>, Aleksova et al<sup>[11]</sup>, Lavie et al<sup>[12]</sup> in their respective studies observed that the increasing age of the cases was inversely related to vitamin D levels. Roffe-Vazquez DN et al<sup>[13]</sup>, in contrast to our study found vitamin D deficiency more among people of younger age.

In this study no definitive pattern was seen in vitamin D deficiency with socio economic class; which was in contrast to the studies done by Oberoi et  $al^{[3]}$  and Divakar U et  $al^{[14]}$  in which vitamin D level was inversely related to financial status of subjects.

Deficiency of vitamin D was observed to be maximum in frequent consumers of tobacco (96%).Similarly Oberoi et al<sup>[3]</sup> and Polytarchou K et al <sup>[15]</sup> found inverse relation of vitamin D level and tobacco consumption.

In the current study it was observed that deficiency of vitamin D increased with increase in BMI. This was in accordance with other studies like Aleksova et al <sup>[11]</sup>, Divakar U et al<sup>[14]</sup> and Kumaratne et al<sup>[16]</sup> where direct relation between vitamin D deficiency and increase in BMI was seen. However Roffe-Vazquez DN et al <sup>[13]</sup>, in their study found no association of vitamin D levels and BMI.

Similarly, vitamin D deficiency was found to be significantly associated with presence of diabetes in a study conducted by Vacek et al.<sup>[17]</sup> Also in a study conducted by Anderson JL et al<sup>[18]</sup>, on analysing 27000

patients of vitamin D deficiency, 60% were found to be associated with highly significant increase in prevalence of diabetes mellitus and hypertension. In the present study, it was seen that the past history of infective disease was significantly higher in participants with vitamin deficiency. The most common infection reported was COVID-19 (9.2%). A study conducted by Padhi et al<sup>[19]</sup> also showed an inverse correlation between the mean level of vitamin D and SARS-CoV-2 infection rate and mortality rate.Similar results were also seen in a hospital based study conducted by Singh et al.<sup>[20]</sup> Apart from COVID-19, past history of typhoid, tuberculosis and hepatitis was also found in study participants.

The mean serum triglyceride of study participants was raised. The serum level was also higher in participants who were deficient as compared to those who had sufficient vitamin levels. Same findings were reported in studies done by Roffe-Vazquez DN et al<sup>[13]</sup> and Glueck et al.<sup>[21]</sup>

Thus, the participants of the current study who had vitamin deficiency had more dyslipidemia as compared to those with vitamin sufficiency, which is in agreement to a number of studies like Polytarchou K et al<sup>[15]</sup>, Kumaratne et al<sup>[16]</sup> and Anderson JL et al<sup>[18]</sup> where association between vitamin D deficiency and dyslipidemia was established.

The mean serum RBS was above the normal range in participants in the deficient group of vitamin D and in the normal range among the sufficient group participants of both the vitamins. Similar association between blood glucose and vitamin D deficiency was observed in studies done by Aljefree et al<sup>[22]</sup> and Divakar U et al.<sup>[14]</sup> In contrast to this study, Kumaratne et al<sup>[16]</sup> found no difference in blood sugars of patients who had vitamin D deficiency as compared to those with vitamin D sufficiency.

Soliman et al<sup>[23]</sup> conducted an interventional study and concluded no significant effect on vitamin D therapy on TLC; which was in agreement with findings of the current study. In contrast to the present study, Polytarchou K et al<sup>[15]</sup> observed TLC to be increased in the patients. Similarly, Soliman et al<sup>[23]</sup> observed no significant effect of VDD on RBC count when status was compared before and after intervention.

#### **Conclusion:**

Vitamin D deficiency was seen in large proportion of cardiovascular patients. It was found to be associated with a number of sociodemographic factors like female gender, urban residency, semivegetarian diet. Vitamin D deficient participants had increased Body Mass Index, increased random blood sugar, decreased hemoglobin and more incline toward dyslipidemia. The most common past infection seen was COVID-19 and the most common non-communicable disease reported was hypertension.

#### **Recommendations:**

Increased counselling on vitamin D intake and routine screening should be given importance especially in females, urban residents, those who consume more vegetarian food and people with increased BMI. Apart from these, investigations like lipid profile, blood sugar and complete blood count should also be conducted frequently. Increased exposure to sunlight, fortified food and supplements can be emphasized upon.

#### Limitations:

This study was done among patients of cardiovascular diseases and no comparison was made with people who had no such diseases. The patients were counselled but no interventional support in the form of vitamin supplementation was provided.

#### **Declaration:**

Funding: Nil

Conflict of Interest: Nil

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## Predictors of High risk Pregnancy at One of the Tertiary Care Centers of Jabalpur Madhya Pradesh: A cross sectional study

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#### Abstract:

Introduction: : A high-risk pregnancy is a condition in which the mother, fetus, or both are at risk for morbidity or mortality before or after delivery. Moreover, most maternal deaths could be prevented if women had timely approached appropriate health care during pregnancy, childbirth, and immediately afterward. **Objective:** 1. To estimate the prevalence of high-risk pregnancies among antenatal women. 2. To determine the sociodemographic factors influencing high-risk pregnancy among the study population. **Method:** A hospital-based cross-sectional study included 858 antenatal women attending tertiary health care center. Convenience sampling was used, data was collected using pre- tested proforma and statistical analysis was performed using SPSS version 23, employing the chi-square test/Fisher's Exact test to explore associations. **Results:** The study found a 28.6% prevalence of high-risk pregnancies. Rural women had a 2.87 times higher risk (p-value: <0.001, OR: 2.87, 95% CI: 2.118 – 3.898) compared to urban women. Similarly, women in joint families had a 3.58 times higher risk (P-value: <0.001, OR: 3.58, 95% CI: 2.478- 5.182) compared to those in nuclear families. **Conclusion:** The current study found that place of residence, type of family, and occupation had a significant association with high-risk pregnancies. The most common risk conditions for high-risk pregnancies were a Previous history of cesarean section followed by preeclampsia.

 ${\it Keywords:} {\it High-risk pregnancy, Maternal morbidity, Maternal mortality}$ 

#### Introduction:

Maternal mortality is an indicator of reproductive health of women in the area. Many women in the reproductive age group die due to complications of pregnancy mainly developing in high-risk groups. Sustainable Development Goals (SDG) target 3.1 set by the United Nations aims at reducing the global maternal mortality ratio to less than 70 per 100,000 live births. It is heartening that the Maternal Mortality Ratio in India has declined over the years to 97 in 2018-20 from 103 in 2017-19 and 130 in 2014-2016.<sup>[1]</sup> However, developing countries continue to experience disproportionately greater rates of maternal and perinatal mortality when compared to developed countries.<sup>[1]</sup>

A high-risk pregnancy is broadly defined as one in which the mother, fetus, or both are at risk for morbidity or mortality before or after delivery.<sup>[2]</sup> Risk

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factors may be pre-existing factors before or during the prenatal visit or can develop later in the current pregnancy. Nearly 50% of all maternal complications and 60% of primary cesareans from a high-risk group is clearly a great concern.<sup>[3]</sup> In a developing country like India, about 20-30% of pregnancies are high-risk which is responsible for 70–80% of perinatal mortality and morbidity.<sup>[3-4]</sup>

Most maternal deaths could be prevented if women had approached appropriate health care during pregnancy, childbirth, and immediately afterward.<sup>[5]</sup> It is essential to study high-risk pregnancies in tertiary health care where an ample number of high-risk pregnancies with various sociodemographic factors can be studied, which will be beneficial for future health planning to improve the prevention, control, and management of highrisk pregnancies. Hence the current hospital-based cross-sectional study planned to determine predictors of High-risk pregnancy among antenatal women catered by the tertiary health care center, Jabalpur.

#### Method:

A Cross-sectional study in the tertiary care hospital of NSCB Medical College, Jabalpur was undertaken during March 2021- August 2022. The hospital serves as a referral for district hospital Jabalpur and nearby districts like mandla, balaghat, seoni, chhindwara, dindori, narsinghpur and katni

#### Sample size:

Sample size estimated using formula n= 3.8  $pq/d^2$  with the assumption prevalence of high-risk pregnancy 33.64% (Jadhao et al)<sup>[6]</sup> acceptable margin of error of 10% and the level of significance of 95% comes out to be 780. Though the estimated study sample size was 780, taking 10% non-responsive candidates, the final sample size, was determined 780+78=858.

#### Study population:

All Pregnant women of reproductive age group (15-49 years) coming to Obstetric outpatient department of NSCB Medical College, Jabalpur

Inclusion Criteria – Included all Pregnant women of reproductive age group (15-49 years) coming to obstetric outpatient department directly attending and referral cases and gestational age should be >20 weeks willing to participate in the study. As per the MTP act, 1971, medical termination of pregnancy is legally permissible up to 20 weeks. So only desirable pregnancies are taken for the study.

Exclusion Criteria- Hospitalized pregnant women, women coming with health emergency conditions, pregnant women who are not mentally sound and Pregnant women not fully investigated were excluded from the study.

Data Collection- The cross-sectional study was done on pregnant women (>20 weeks) coming in the obstetric outpatient department of NSCB medical college where the referral population from nearby districts daily. Informed consent was obtained from all the study participants before the collection of data. Data were collected from 858 participants through a pre-tested, semi structured questionnaire. The questionnaire was translated into Hindi, and its content validity was checked by language and translation experts. The validity of the survey questionnaire was checked with a pilot study on 25 pregnant women, and necessary changes were made before its administration. The questionnaire included information on socio-demographic profile, relevant obstetric & medical history. Other investigations like USG reports, hemoglobin, blood sugar, thyroid test, HIV, VDRL and Rh reports findings were recorded. General and systemic examinations of pregnant women were done and parameters like weight, height and blood pressure were recorded. All the participants questions or doubts regarding the survey question were clarified. Great care was taken in terms of ethics and confidentiality; protocol approved by the NSCB Institutional Ethics Committee.

#### Study tools:

Risk factors were assessed according to the Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) Criteria for high-risk pregnancy.<sup>[7]</sup>

#### **Operational Definition:**

A high-risk pregnancy is when there is a risk to the mother or her fetus or both are at risk of developing complications during pregnancy or childbirth than in a normal pregnancy. If high-risk conditions are associated with the pregnancy, then it is listed as a high-risk pregnancy such as Syphilis, HIV positive, preeclampsia, high blood sugar, hypothyroidism, severe anemia(Hemoglobin <7gm/dl), young primigravida (less than 20 years), elderly gravida (more than 35 years), twin or multiple pregnancies, previous cesarean delivery, positive bad obstetric history (history of stillbirth, abortion, congenital malformation, obstructed labor, premature birth, etc) or history of any current systemic illness, low weight(less than or equals to 40 kilograms) and short stature (less than or equals to  $140 \,\mathrm{cm}$ ).<sup>[7]</sup>

#### Statistical Analysis:

Descriptive statistics of the main variables were computed after data cleaning and labeling. Statistical analysis was done using SPSS version 23. Cross-tabulations and frequencies were made. The chi-square test/ Fisher's Exact test was employed to explore the association.

#### **Results:**

Out of a total of 858 deliveries conducted, the mean age of females was 24.5 years. More than half of the females (52.21%) were in the age group of 20-25 years followed by 312(36.36) % in the age group of 26-30 years. The majority of the females 514(59.91%) were from urban areas whereas 344(40.09%) were from rural areas. About 828(96%) of the females were Hindu and 30(3.5%) were Muslims. More than half (64.68%) of the females belonged to joint families. The occupation status revealed that 785(91.49%) of females were homemakers. The majority (43.58%) of the study subjects had education till middle school. A majority (32.98%) of study subjects belong to the class IV socioeconomic status followed by class II (25.75%), class V(19.6%), class III(12.23%), and class I(9.32%).

Overall, the prevalence of High-risk pregnancy was 28.6%. Out of 858 deliveries conducted, 245 females were high-risk deliveries. Among 245(28.6%) high-risk deliveries, 30(12.2%) highrisk pregnancies were less than 20 years of age and 7(2.9%) were more than 35 years of age. From the viewpoint of residents,143(58.4%) of high-risk pregnancies were from rural areas whereas 102 (41.6%) were from urban areas. The majority (91.4%) of high-risk pregnancies belonged to the Hindu religion. Almost 203(82%) of the high-risk pregnancies belonged to joint families. The occupation status revealed that 211(86.1%) of highrisk pregnancies were homemakers. Almost half (46.5%) of the high-risk pregnancies had a high school education. The majority (26.1%) of high-risk pregnancies belong to the socioeconomic status class IV followed by class II (22.9%), class III (20%), class V (17.1%), and class I (13.9%).

The current study found that maternal age, place of residence, type of family, socio-economic status, and education of study subjects had a significant association with high-risk pregnancies (p-value <.001). On statistical analysis of significant variables, pregnant women in rural areas were 2.87 times at risk of developing into High-Risk pregnancy as compared to urban areas (P-value: <0.001, OR: 2.87, 95% CI: 2.118 – 3.898). Analogously pregnant women of the Joint family were 3.58 times at risk of being High-Risk as compared to the nuclear family (Pvalue: <0.001, OR: 3.58, 95% CI: 2.478- 5.182). Whereas High-Risk pregnancy was negatively associated with the Occupation of pregnant women i.e. Housewives were at less risk of developing into High-Risk as compared to working women (P-value: <0.001, OR: 0.42, 95% CI: 0.259-0.686). Analogously Hindus were at less risk of developing into High-Risk as compared to Muslim women (P-value: <0.001, OR: 0.159,95% CI: 0.072-0.352).

Among 245(28.6%) high risk deliveries, 164(19.16%) of females presented with single highrisk conditions whereas 68(7.93%) were presented with two high-risk condition and 13(1.52%) of pregnant mothers had more than three risk conditions simultaneously

Factors	High-Risk	Normal	OR (95% CI)	test value
	Pregnancy	Pregnancy		p value
	(N=245)	(N=61)		
Age (in years)	n (%)	n (%)	-	
<20	30 (100)	0 (0)		135.357
20-25	97 (21.6)	351 (78.4)		(<0.001)
26-30	72 (23)	240 (77)		
31-35	39 (63.9)	22 (36.1)		
>35	7 (100)	0 (0)		
Place of residence				
Rural	143 (41.5)	201 (58.5)	2.874 (2.118-3.898)	47.678 *
Urban	102 (19.8)	412 (80.2)		(<0.001)
Religion				
Hindu	224 (27.1)	604 (72.9)	0.159 (0.072-0.352)	26.174*
Muslim	21 (70)	09 (30)		(<0.001)
Type of Family				
Nuclear	203 (36.6)	352 (63.4)	3.584 (2.478-5.182)	49.571*
Joint	42 (13.9)	261 (86.1)		(<0.001)
Education				
Literate	22 (36.6)	38 (63.4)	-	166.654
Primary school	8 (23.5)	26 (76.5)		(<0.001)
Middle school	37 (9.8)	337 (90.2)		
High school	114 (53.2)	100 (46.8)		
Intermediate/Post	04 (8.5)	43 (91.5)		
high school diploma				
Graduate	56 (46.6)	64 (53.4)		
Postgraduate	4 (44.4)	5 (55.6)		
Husband's Education				
Literate	13 (76.5)	04 (23.5)	-	31.828
Primary school	4 (15.4)	22 (84.6)		(<0.001)
Middle school	80 (29.4)	192 (70.6)		
High school	72 (22)	256 (78)		
Intermediate/Post	16 (36.4)	28 (63.6)		
high school diploma				
Graduate	51 (34)	99 (66)		
Postgraduate	9 (42.9)	12 (57.1)		
Occupation				
Homemaker	211 (26.9)	574 (73.1)	0.422 (0.259-0.686)	12.701*
Working	34 (46.6)	39 (53.4)		(<0.001)
Socioeconomic status c	lass** <sup>[8]</sup>			
Class V (Lower)	42 (24.9)	127 (75.1)	-	31.660
Class IV (Lower middle)	64 (22.6)	219 (77.4)		(<0.001)
Class III (Middle)	49 (46.7)	56 (53.6)		
Class II (Upper middle)	56 (25.3)	165 (74.7)		
Class I (Upper)	34 (42.5)	46 (57.5)		

 Table 1: Association between Socio-demographic Factors and High-Risk Pregnancy (N=858)

\*X<sup>2</sup>=Chi-square, OR= Odds ratio, CI= Confidence interval, \*\*Modified B.G. Prasad Classification

In the present study, the maximum number of high-risk females had a history of previous cesarean section (22.17%). Pre-eclampsia was present among 51(18.82%) high-risk deliveries, followed by bad obstetric history 47(17.32%). Young primi were around 30(11.07%) whereas elderly gravida was only 7(2.58%). Hypothyroidism was found among 25(9.23%) high-risk pregnancies followed by short stature (6.27%), history of any current systemic illness (4.80%), severe anemia(1.48%), high blood

	-
Risk-factors	n (%)
Previous History of Caesarean Section	60 (22.14%)
Preeclampsia	51 (18.82%)
Bad Obstetric History	47 (17.32%)
Young primi (<20 years)	30 (11.07%)
Hypothyroidism	25 (9.23%)
Short Stature( <u>&lt;</u> 140cm)	17 (6.27%)
H/o any current systemic illness	13 (4.80%)
Elderly Gravida (>35 years)	07 (2.58%)
Severe Anaemia	04 (1.48%)
High Blood Sugar	05 (1.85%)
Low Weight(d"40kg)	04 (1.48%)
Current Twin or multiple pregnancies	04 (1.48%)
Rh-negative	04 (1.48%)
Total	271 (100%)

Table 2: Distribution of Different Risk Factors among High-Risk Pregnancy(N=271)

glucose level(1.85%), low weight(1.48%), current twin or multiple pregnancies(1.48%) and Rhnegative factor(1.48%).

#### **Discussion**:

A cross-sectional hospital-based research on high-risk pregnancy attending gynecology OPD to know predictors of high-risk pregnancy in pregnant females attending tertiary hospitals during a oneyear duration was carried out. The proportion of high-risk pregnancies in the current study was found to be 28.6% which is similar to the study done by Jadhao AR et al.<sup>[6]</sup> and Oyibo et al.<sup>[9]</sup> This may be because both these studies are conducted in a hospital setup. Other studies in India have reported a lower proportion of high-risk pregnancies in contrast to current study findings. Ravikant A. et al.<sup>[10]</sup> have reported that almost one-fifth of antenatal women had high-risk pregnancies when compared to the current study finding of 28.6%.

Various studies have already established a relation between the two Sociodemographic factors. Ramesh K et al.<sup>[11]</sup> in a study showed that the chances of a woman having a high-risk pregnancy were associated with low socioeconomic status, and age at pregnancy but our study showed an even stronger association between place of residence, type of family, occupation, religion, and high-risk pregnancy. This may probably be due to differences in regions, populations, methodologies, eligibility criteria, and level of the health care center.

In the current study, it was found that all highrisk deliveries (245) had one or more than one risk condition. Among 245(28.6%) high-risk deliveries, 164(19.16%) of females presented with single highrisk conditions whereas 68(7.93%) were presented with two high-risk conditions, and 13(1.52%) of pregnant mothers had more than three risk conditions simultaneously. A similar study conducted by Jadhao AR et al.<sup>[6]</sup> found that Only 11 (5.14%) study subjects had one risk factor, 52 (24.3%) had two risk factors and 9 (4.21%) had three risk factors.

In the current study, the majority (22.14%) of the high-risk pregnancies had a history of previous history of cesarean section followed by 51(18.82%) who had preeclampsia and 47(17.02%) who had a Bad Obstetric History. Jadhao AR et al.<sup>[6]</sup>, Omima A. Muhammeda, Nora A. Khalilb, et al.<sup>[12]</sup>, and Fereshteh Farajnezhad, Faramarz Shaahmadi et al.<sup>[13]</sup> in their study found that the most common risk condition for high-risk pregnancy was the history of the previous cesarian section. This may probably be due to less utilization of antenatal health care services resulting in complications during previous pregnancies. However, Shrestha J. et al.<sup>[14]</sup>, Mogan KA et al.<sup>[15]</sup>, and Abedin S. et al.<sup>[16]</sup> in their study revealed that elderly gravida (7.4%), anemia (31%), and shorter birth interval (31%), respectively are the most common risk factors for high-risk deliveries. The difference in most common factors may be due to different eligibility criteria for high-risk pregnancies.

#### **Conclusion:**

Study revealed significant predictors like maternal age, residence and socioeconomic class for higher occurrences risk pregnancy conditions. Knowledge of pre-existing conditions will further help in Planning for appropriate screening strategies to deal with high-risk conditions in pregnancy.

#### **Recommendations:**

All Government initiatives for safe motherhood aimed at decentralized services catering rural areas as prime focus. More high-risk pregnancy at rural places although indicates good detection of cases and referral to nearby higher setups. The low educational status of women, the early age of conception, and poor socioeconomic status are the determinants of high-risk, pregnancy, focusing the services in underprivileged populations and enhancing the educational status of the woman and policy-making regarding this can be a promising intervention in reducing high-risk pregnancy.

#### Limitations:

This study was conducted in a government tertiary care hospital, so there is a potential for bias, particularly towards lower and middle socioeconomic groups of district Jabalpur and nearby districts. Although the study centered in a government tertiary setup where most of the cases were referred from nearby hospitals so the results may not be directly implemented in the general population. Despite these limitations, the study revealed valuable information regarding high-risk pregnancy predictors which can be helpful in the planning of maternal health services, especially in timely identification and screening strategies for high-risk conditions during the antenatal period.

#### **Declaration:**

#### Funding: Nil

#### Conflict of Interest: Nil

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# Bullying and Violence in Adolescents of Jaipur City, Rajasthan: A Neglected Concept Priyanka Dobhal<sup>1</sup>, Amita Kashyap<sup>2</sup>, Shalki Mattas<sup>3</sup>, Sudiksha Rana<sup>4</sup>

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#### Abstract:

**Introduction:** Adolescent health is itself a neglected topic so as the bullying, the young fragile adolescents who are already going through physical, psychological and hormonal changes have to pay a toll by bullying and its associated violence. **Objective:** The purpose of this study is to find the proportion of school going adolescents with Bullying and Violence related behavior and its associated variables. **Method:** Total 900 students of both government and private schools having co-education facility and having all the three streams i.e., science, commerce, and arts were included. Indianized version, of YRBS questionnaire was used, the questionnaire was modified by three senior Professors of the department and made suitable for the use in Indian context. **Results:** Most of the participants were in age group 13-16 years and majorities were Hindu. Out of 900 adolescent 33.34 % belongs to high risk of Violence and bullying behaviour. Students of commerce stream (48%) break into more fight than art stream (16.80%). Approximately six percent were threatened or injured with a weapon such as gun, knife or sticks on school campus in past 12 months, majority for their self-defence only 2% did it to harm someone. Only 48 adolescents (05.30%) reported to be sexually abused and majority of abused were males (60.41%) and maximum number(68.75%) of times the Perpetrator were their dates followed by relatives. **Conclusion:** The risk of violence and bullying is relatively more in this budding generation which can be entertained by proper guidance and support by parents, teachers and friends.

Keywords: Adolescent, Bullying, Violence

#### Introduction:

Bulling and Violence are an aggressive behavior that can be defined as being the tough guy against someone.<sup>[1]</sup> It is an unnecessary, violent behavior mostly among school aged children that involves an actual or apparent power imbalance. Violence and bullying are two sides of the same coin. As adolescents and school going children are so fragile to handle their emotional, psychological, physical and mental changes, they are more prone to bullying and violence related behavior of either being a perpetrator or a victim or both. The perpetrator is a person who bullies and the victim is one who is being bullied. The impact of this, can lead to many behavioral, developmental as well as emotional disturbances, leading to stress, decreased selfesteem, anxiety, poor academic performance, depression, mood upset and even suicidal tendency. The practice of bullying is usually observed in school but places like home, workplace and even juvenile prison are not spare of such act.

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Traditionally bullying behaviors were characterized by verbal abuse, teasing, taunting, name calling, insults and threats, as well as physical aggression, such as hitting, kicking, punching, spitting and damaging the belongings of others but now day's social media had taken its place to much an extent. Unwanted use of internet and social sites are extrapolating the problem. On the other hand, it involves the use of electronic media with the purpose of causing harm, humiliation, suffering, fear and dejection for the individual who is the target of aggression, those actions can be performed via email, chat rooms, online voting booths, mobile phones and instant messaging.<sup>[2]</sup>As there was no data available at the time of conduction of study so the actual magnitude of the problem was not assessed and that makes it the need of an hour. Hence this study was conducted with an objective to determine the proportion of schoolgoing adolescents (13-19 years) of Jaipur city with Bullying and Violence related behaviour and its associated variables.

#### Method:

The cross-sectional study was conducted from  $1^{st}$  July 2015 to  $15^{th}$  February 2016 of Jaipur city. Study includes students of class  $11-12^{th}$  of those schools having co-education facility and having all the three streams i.e. science, commerce, and arts. Schools who did not give consent and whose strength was less than 100 in class  $11-12^{th}$  were excluded to make study more cost effective. Sample size required was 791 at 95% confidence and 15% relative error to verify the expected minimum 18.37% of prevalence of bullying among students.<sup>[3]</sup>This sample size had been rounded off to 900 and is adequate to cover other variables.

The permission for conducting the study and the list of schools was obtained from Chief Education Officer, Department of Education, Jaipur. The schools were broadly categorized into government and private as per the list provided. A total number of 8 schools were included for equal representation, one government and one private school were selected from each zone i.e. East, West, North and South respectively by simple random sampling. From each selected school the list of students studying in class 11-12<sup>th</sup> was procured. Students studying science, commerce and arts had equal representation from each selected school.

Total sample size calculated was 900, so 112 students from each school were included in the study from all the three streams. A consent form was emailed to the majority (67.41%) of the parents and rest were sent by the speed post. Those students whose parents had given consent were included in the study. An Indianized version of Youth Risk Behaviour Survey was used to collect the data from the selected students after sensitizing them about the purpose of the study. The students were instructed to not to write their names and drop the filled questionnaire on the drop box that was placed at the corner of the room where the process of data collection was carried out, to maintain the anonymity.

Students were asked about their age, gender, height, weight, religion, stream of study, family type, no. of family members, total family income, staying with whom, education & occupation of both the parents and their indulgence in violence and bullying related behaviour including fighting, bullying, carrying weapon, feeling unsafe to go out of home and bullied by someone. The latest version of Youth Risk Behaviour Survey Performa (2015) was used as a study tool.<sup>[4]</sup> It is a standard Performa used in many studies in India and internationally and is modified every two yearly. It collects data on - Parent's occupation and Education Score: Parental guidance is very important in constructing healthy behaviours in adolescents. Education and occupation of parents, especially of mothers has great impact hence it was decided; in consultation with three professors in the department to give more weightage to mother's occupation and education and a score was developed as follows:- Occupation wise professional degree including (doctor & engineer) and PHD professor/ lecturers were scored at 6, teacher were scored 5, big business man was scored 4, petty business and clerical was given 3, farmer was given 2, labourer was given 1 and unemployed were given 0 score. Twice the value has been assigned to mother as compared to father in the same category – for example. If father is petty business man (score 3) and mother is a PHD (score 6) lecturer then total score would be 3\*1+6\*2=15. Minimum score was 0 and maximum score was 18. Hence composite score of parent's occupations is categorized in three categories as – (0-6, 7-12, 13-18) having low influence, moderate influence and high influence in child rearing.

Median score is calculated to divide the group in to two categories having good or poor parental influence. Education wise professional degree including (Doctor & Engineer) and PHD professor/ lecturers were scored at 3, undergraduate was scored 2, up to senior secondary were scored 1 and illiterate were given 0 score. Twice the value has been assigned to mother as compared to father in the same category- for example, if father is professional (score 3) and mother is up to senior secondary (score 1) then total score would be 3\*1+1\*2 = 5. Minimum score was 0 and maximum score was 9. Hence composite impact of parent's education is categorized in three categories as -(0-3, 4-6, 7-9)having low influence, moderate influence and high influence in child rearing. Median score was calculated to divide the group in to two categories having good or poor parental influence. To assess that an adolescent is at risk, it was decided that if an adolescent broke fight for  $\geq 5$  times in last one year and even if it was less than that but was at places other than home or school or had to be treated for it; it was considered as risk, fought for revenge, he/she was threatened or got injured by a weapon, carried any sharp instrument with him or her, felt unsafe outside home, ever bullied, physically hurt by girl/ boyfriend. These components are taken from YRBS 2015.

There are 8 components (A to H) to assess overall risk regarding violence and bullying related behavior.

- A. carrying a weapon such as a gun, knife, or club
- B. carrying a weapon such as a gun, knife, or club on school property
- C. felt unsafe at school or on your way to or from school
- D. number of times someone threatened or injured you with a weapon
- E. Number of times you were in a physical fight
- F. Number of times were you in a physical fight in which you were injured and had to be treated by a doctor
- G. Number of times were you in a physical fight on school property
- H. Forced to have sexual intercourse when you did not want to.

Component 'A' had three parts (1,2 and 3) where second part (place of fight) is considered as multiplier hence overall score for component 'A' was calculated by multiplying the score of first part (frequency of fight) with second part (place of fight) and adding the sum with third part (treatment required after fight) (1\*2+3). Similarly, component 'D' was also scored by multiplying main question (carrying sharp instrument) with its compliment (reason for carrying). Overall score ranged from 0 – 33 and divided as low and high-risk behavior using median value 1.

All data collected were entered into Microsoft excel in the form of master chart. These data were classified and analysed as per the objectives. Qualitative data was expressed in terms of proportions. Quantitative data was expressed in terms of mean and standard deviation. Inferential statistics such as Chi square test and Odds ratio with confidence interval was used to find out association. The "Microsoft Excel 2007" and "Primer" was used for analysis of the Data. Privacy and confidentiality of data was ensured by asking not to write down names of the students and collection of questionnaires was done in a sealed carton with a thin slit. After the completion of study, the team of investigators had conducted a health talk addressing the common health issues of adolescents giving more emphasis on violence and bullying related behaviour in each selected school.

#### **Operational Definition:**

**Bulling and Violence:** Bulling and Violence are an aggressive behavior that can be defined as being the tough guy against someone.<sup>[1]</sup>

#### **Results:**

Most of the participants (67.56%) were in age group 13-16 years and majorities were Hindu. Almost equal proportion belongs to nuclear (50.3%) and joint (49.7%) family respectively. Sixty seven percent belong to middle-class; only 8% belong to upper class. Twenty nine percent

Table 1	: Violence and Bullying related Behaviors in relation to Socio-demographic characteris	stics (N=900)
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Variables	High (n=300)	Low (n=600)		
	n (%)	n (%)	P Value	Total
Age Group (in years)		-		_
13-16	204 (33.55)	404 (66.45)	0.900	608
17-19	96 (32.88)	196 (67.12)		292
Family Type				
Nuclear	142 (31.35)	311 (68.65)	0.229	453
Joint	158 (35.35)	289 (64.65)		447
Sex	-	-	-	
Male	175 (34.65)	330 (65.35)	0.380	505
Female	125 (31.65)	270 (68.35)		395
Socio Economic Status*		-	-	-
Upper	26 (35.13)	48 (64.86)	0.316	74
Upper Middle	101 (37.13)	171 (62.86)		272
Lower Middle	111 (33.33)	222 (66.66)		333
Upper Lower	50 (27.62)	131 (72.37)		181
Lower	12 (30.00)	28 (70.00)		40
Occupation of Parents (Influence	Score)	-		
Highly	64 (30.77)	144 (69.23)	0.339	208
Moderate	153 (35.75)	275 (64.25)		428
Low	83 (31.44)	181 (68.56)		264
Education of Parents (Influence S	core)			
High	140 (32.56)	290 (67.44)	0.852	430
Moderate	45 (35.16)	83 (64.84)		128
Low	115 (33.63)	227 (66.37)		342
Subject	•	•	-	
Science	107 (31.56)	232 (68.44)	0.590	339
Commerce	137 (33.74)	269 (66.26)		406
Arts	56 (36.13)	99 (63.87)		155
BMI	1			
Under Weight (<18.5)	123 (36.61)	213 (63.39)	0.144	336
Normal Weight (18.5-23)	121 (31.11)	268 (68.89)		389
Overweight (23-27.5)	38 (28.36)	96(71.64)		134
Obese (>27.5)	18 (43.90)	23 (56.10)		41
School Type	•			
Government	159 (32.12)	336 (67.87)	0.434	495
Private	141 (34.81)	264 (65.18)		405

\*Modified Kuppuswamy Classification 2015.

Number of times fight in last one year	Science n (%)	Commerce n (%)	Arts n (%)	P value	Total (%)
1-4 times	68 (81.92)	91 (79.82)	33 (82.50)		192 (81.02)
5-7 times	7 (8.43)	12 (10.52)	5 (12.5)		24 (10.12)
8-10 times	6 (7.22)	7 (6.14)	0 (0.00)	0.000	13 (5.48)
≥11 times	2 (2.40)	4 (3.50)	2 (5.00)		8 (3.38)
Total	83 (35.02%)	114 (48%)	40 (16.8%)		237 (100)

 Table 2 : Frequency of breaking into fight according to stream of subject (N=237)

Place of Fight	Government.	Private.	P Value	
	n (%)	n (%)		Total (%)
Ноте	26 (21.13)	32 (28.07)	0.021	58 (24.47)
School	69 (56.09)	71 (62.28)	]	140 (59.07)
Other place	28 (22.76)	11 (9.64)		39 (16.45)
Total	123 (51.89%)	114 (48.10%)		237 (100)

Table 4 : Association of place of fight according to Mother's Education (N=237)

Place of Fight	Illiterate n (%)	Senior sec and secondary n (%)	Under graduate n (%)	Postgraduate and Professional n (%)	Total n (%)	P Value
Home	9 (31.03)	9 (31.03)	9 (31.03)	9 (31.03)	9 (31.03)	
School	17 (58.62)	17 (58.62)	17 (58.62)	17 (58.62)	17 (58.62)	0.045
Other place	3 (10.34)	3 (10.34)	3 (10.34)	3 (10.34)	3 (10.34)	
Total	29 (12.23%)	29 (12.23%)	29 (12.23%)	29 (12.23%)	29 (12.23%)	

and 23% of the adolescent belong to the category of parents positioned at 'low' and 'highly positive parental influence' based on their parent's position occupation wise. Combined education score of parents depicts that majority (48%) of the study population had their parents highly positioned while 38% were at Low position.

Overall scores of Violence and bullying behavior depicts that out of 900 adolescent 33.33 % belongs to high risk. Overall risk (based on combined scores) was not associated significantly with any of the sociodemographic characteristics (Table 1). The association between BMI and violence/ bullying related behavior was insignificant although, out of 300 individuals having high score for violence and bullying, 41% were underweight and 18.6% were overweight. When individual behavior related to violence and bullying was analyzed with relevant socio demographic characteristics, it was observed that students of commerce stream break into more fights 48% vs 17% in art stream (P=0.000). It was also observed that approximately six percent (5.78%) were threatened or injured with a weapon such as gun, knife or sticks on school campus in past 12 months, majority for 1-4 times (81.02%) while 3.5% for more than 11 times (Table 2).

Adolescents of government school break into fights more frequently at places other than school and home as the difference is statistically significant (P = 0.021). Maximum fights were as school (59.07%), followed at home (24.47%) and other places (16.45%).Adolescents of government school break into fights more frequently at places other than school and home as the difference is statistically significant (P=0.021).

Maximum fights were as school (59.07%) followed at home (24.47%) and other places (16.45%). Proportion of children fighting at school and at home was similar in both private and government schools 62.28% vs. 56.09% and 28.07% vs. 21.13%, respectively. (Table 3)

Significant association was seen between mother's education and place of fight. Frequency of fight was seen less at home among the adolescents whose mothers were educated as compared to the uneducated ones (P = 0.045). (Table 4)

Males and the adolescent of younger age group (13-16 years) were more aggressive; as they fight to take revenge in higher proportions (81% males vs 18% females, Odds ratio = 3.553; 95% C.I being 1.333 to 9.468, P = 0.012 and 89% in 13-16 years vs 11% in 17-19 years, odds ratio = 3.96 95% C.I = 1.182 to 13.256) respectively.

#### Discussion:

Bullying is never seen as a serious issue and is neglected in Indian schools. In present study, overall proportion of Violence and bullying was 33.34%, it may be because bio-psychological changes are dominating other socio-demographic factors. Because of homogenous bio-psychological stage the group shows homogenous response in violence and bullying; Michelle Ralil da Costa saw similar proportion, more than double the prevalence (76%) was found by Muna Al-Saadoon as the study was done in year 2006-07 and in Oman.<sup>[1,5]</sup> This prevalence was less i.e. 1.4% in study done by Deborah Carvalho Malta due to change in location and culture.<sup>[6]</sup>

In present study maximum adolescent were bullied at school (15.56%), similar proportion was found by Alida Bouris but a larger proportion i.e 70.5% and 80% was found by Muna Al-Saadoonand Michelle Ralil da Costa.<sup>[1,5,7]</sup> In present study adolescents abused once in their life time were 5.33% whereas double the proportion (13%) was found in study done by Aravind Pillai the difference may be due to the fact that in our study its selfreported and it considered culturally bad, so adolescent might have avoided telling.<sup>[8]</sup> Proportion of adolescents who were involved in violence is 33.34% in present study, same was found by Sabanur Cavdar<sup>[9]</sup> (41%) and Subhashish Swain<sup>[3]</sup> (33.07%)</sup></sup> whereas it was one-third (10.3%) in study done by Deborah Carvalho Malta<sup>[6]</sup>, Alida Bouris<sup>[7]</sup>, Michelle Ralil<sup>[1]</sup> da Costa. Generally, bullying is considered as normal in a school environment; however, studies have reported that bullying can lead to suicidal tendency and activities.<sup>[10,11]</sup>

During past 12 months 10.4% of the adolescent carried sharp instrument with them double the proportion was present in study done by Subhashisa Swaina i.e. 25.84%, whereas similar proportion (12.6%) was found by Chitra Chatterjee where the causes were self-esteem/pride, protection from animals and protection from other human beings if assaulted upon.<sup>[3,12]</sup> Proportion of adolescent who were bullied was 24.11% (217/900) whereas Subhashisa Swaina reported that 30.32% were bullied.<sup>[3]</sup> Students being bullied tend to become depressed and rebel against the person or students and try to take revenge either in school or outside. Clustering of factors such as being the victim of violence, bullying, and carrying sharp objects to school predisposes more risk of violence behavior;

and especially among boys, aggressiveness, manliness, and peer group effect were found to play important roles.

#### **Conclusion:**

In the study it was concluded that maximum of the students who belonged to the age group of 13 -16 years, were belonged to middle class family, students from the government schools & the students who were in commerce stream were involved in bullying and vioulence.

#### **Recommendations:**

As per the present study, the adolescents were at added risk of bullying and violence in their fragile age. Taking this as a risk factor, all school should select at least 4-5 teachers of emotional quotient and communicational skills to be trained in identifying and counseling students vulnerable for risk behaviors. Teachers should select students of stable psychosocial behavior in each class and guide them to help their vulnerable peer and report names of vulnerable peer so that he or she can be counseled and this will help in reducing violence and bullying. There should be identified psychologists for each school to refer students in need of counseling and treatment.

#### Limitations:

- Although the study is a decade old but the result can be generalized to the population as the sample size was sufficient for the representation.
- 2. The study was conducted using standard protocol but the probability of error can be there as the behaviors were self-reported by the students.

#### **Declaration**:

Funding: Nil

Conflict of Interest: Nil

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### **Evaluation of Routine Immunization through Supportive Supervision in Assam** Tulika Goswami Mahanta<sup>1</sup>, Mridushman Saikia<sup>2</sup>, Swarnali Devi Baruah<sup>3</sup>

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#### Abstract:

Introduction: Supportive supervision is crucial for enhancing healthcare quality by improving internal relationships, resolving issues, and optimizing resources. Recent evidence from India shows it enhances immunization coverage and strengthens the local health system. Objective: To evaluate routine immunization services in terms of input and process through supportive supervision and to compare service delivery between two quarters. Method: This cross-sectional study, conducted between July 2021 and February 2022, assessed the delivery of routine immunization services by frontline workers (FLWs) within Village Health Sanitation and Nutrition Day (VHSND) sessions in Assam. Five districts were selected to represent each zone of the state. Micro-plans for VHSND sessions were reviewed to visit 25-30 sessions per district based on operational feasibility. Data collected by district coordinators using a standardized checklist assessed logistics and service delivery. Statistical analysis included quarterly group comparisons using Chisquare and Fisher's exact tests (p < 0.05 significance). The findings were shared in district-level review meetings to facilitate corrective actionsby all stakeholders. Results: A total of 140 VHSND sites were assessed. Paracetamol was available at 123 sites (87.9%), and updated due list was present at 120 sites (85.7%). However, Vitamin A was available at 26 sites (18.6%), ORS and Zinc were at 11 sites (7.9%) and 14 sites (10.0%), respectively. The presence of Anganwadi Workers (AWWs) at VHSND sites increased significantly from 61.2% in the first quarter to 76.7% in the second quarter (p = 0.04). Adherence to micro plans among Accredited Social Health Activists (ASHAs) was high, rising from 97.0% in the first quarter to 100% in the second quarter. Record-keeping also improved, with headcount survey documentation increasing from 83.6% in the first quarter to 95.9% in the second quarter (p = 0.01). **Conclusion:** The study highlighted improvements in logistics, documentation, and ASHA performance under supportive supervision. Continued focus on essential supplies and educational materials, alongside effective supervision and further research, is crucial for enhancing child health outcomes.

**Keywords :** Frontline workers, Routine immunization, Supportive supervision, Village Health Sanitation and Nutrition Day (VHSND)

#### Introduction:

Expanded Program on Immunization, initiated in 1978, and further propelled by the Universal Immunization Program (UIP) in 1985, markedly advanced equity in access to immunizations within India's public health system. As one of the largest global health initiatives, it targets annually to reach 3.04 crore pregnant women and 2.7 crore newborns. Through more than 1.2 crore immunization sessions, the program offers free vaccines against 12 preventable diseases under the UIP.<sup>[1]</sup> The World Health Organization (WHO) defines an effective immunization session as one where all attending children and women receive eligible vaccines receive

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the necessary vaccines, follow safety protocols, and adhere to the schedule for subsequent doses.<sup>[2]</sup> Mission Indradhanush, launched in 2014, further underscores India's commitment to this cause, aiming for 90% vaccination coverage among pregnant women and children under two years against seven preventable diseases.<sup>[3]</sup>

Despite these efforts, disparities in immunization coverage persist, influenced by individual, contextual, and systemic factors.<sup>[4]</sup> With an Infant Mortality Rate (IMR) of 28 and an underfive mortality rate (U5MR) of 32 per 1000 live births, the urgency for enhanced interventions is evident.<sup>[5]</sup> These interventions include improved microplanning, cold-chain and logistics management, monitoring and supportive supervision, and community mobilization to increase immunization services' effectiveness.<sup>[6]</sup> National Family Health Survey-5 (NFHS-5) highlights an increase in full immunization coverage, up by 14.4%, indicating progress yet also pointing out regional disparities, such as in Assam where only 66.4% of children are fully vaccinated, lower coverage compared to the national average.<sup>[1,7]</sup> The COVID-19 pandemic has likely halted global progress in routine child immunizations, with WHO and UNICEF reporting that 23 million children worldwide missed basic vaccinations in 2020.<sup>[8]</sup> Despite early pandemic guidelines from India's Ministry of Health and Family Welfare to ensure the continuity of essential services, disruptions were observed, including a drop in DTP vaccine coverage from 91% to 85%.<sup>[9,10]</sup> India's diverse health system experienced varied impacts, with some regions implementing innovative measures to sustain immunization, while others grappled with ongoing disruptions.<sup>[11]</sup>

Supportive supervision emerges as a crucial strategy to enhance healthcare quality by strengthening internal relationships, addressing issues, and optimizing resource allocation. It aims to improve communication, problem-solving, teamwork, and leadership support, empowering health providers to monitor and enhance their performance.<sup>[6]</sup> Recent evidence from India indicates that supportive supervision improves immunization coverage and strengthens the local health system.<sup>[12]</sup> Therefore, the current study is aimed to assess the effectiveness of supportive supervision for strengthening routine immunization in Assam. immunization in Assam.

#### Method:

This cross-sectional study assessed routine immunization services within VHSND sessions in five districts of Assam(Tinsukia, Jorhat, West Karbi Anglong, Cacharand Goalpara) representing different zones, between July 2021 and February 2022. The study used supportive supervision to evaluate and compare service delivery in terms of input and process between two quarters. The study population was FLWs including Auxiliary Nurse and Midwife (ANM), AWWs and ASH Asinvolved in VHSN Ddelivery, present at the session sites during the day of visit.

Sample size and sampling design: Micro-plans of VHSND sessions were obtained from the selected districts. According to guidelines, each village should hold one VHSND per month,<sup>[13]</sup> but the frequency varies across districts due to population demographics (hills, tea gardens, rural, urban). These variations were incorporated into the annual microplan. Following the micro-plan analysis, a plan was devised to conduct 25-30 sessions per district over the course of this eight-month project. As per operational plan VHSND sessions were conducted weekly on Wednesday or Saturday. Efforts were made to cover all block PHC areas. The findings from monitoring and supportive supervision visits were presented by the study investigator at district health society meetings chaired by the Deputy Commissioner in presence of Joint Director of Health Services, Chief Medical Officer, Sr. Medical & Health Officers of each Primary Health Centre, and other stakeholders to ensure comprehensive dissemination of the findings and facilitate necessary corrective actions.



**Data collection tool:** District coordinators, selected for each district were utilized for data collection after training on the tool. Checklist used was the standard format for VHSND monitoring and supervision developed by MOHFW-GOI included in the operational document.<sup>[13]</sup> The data was collected based on observations made by district coordinators regarding availability of logistics and service delivery during their VHSND visits.

**Ethical consideration**: Obtained from Institutional Ethics Committee (Human). Subject enrolment was done after taking written informed consent.

**Statistical Analysis:** Data was presented as frequencies and proportions for categorical variables. Quarterly group comparisons were made employing the chi-square test and Fisher's exact test. A p-value of less than 0.05 was considered statistically significant. Statistical analysis was performed with IBM SPSS Statistics version 21 Software.

#### **Results:**

The study involved supportive supervision across 140 VHSND sites, with 67 sites covered in the first quarter and 73 in the second quarter. Regarding pre-site preparation and logistics, the updated due list was present at 120 sites (85.7%). Paracetamol availability was noted at 123 sites (87.9%), while Vitamin A was available at 26 sites (18.6%). ORS and Zinc were available at 11 sites (7.9%) and 14 sites (10.0%), respectively. The presence of blank MCP/RI cards and counter foils for ANM was at 105 sites (75.0%) and 90 sites (64.3%), respectively. The hub cutter and anaphylaxis kit were operational at 123 sites (87.9%). Adrenaline within expiry date was available at 115 sites (82.1%). Poster Intensified Mission Indradhanush (IMI) and Banner IMI were present at 14 sites (10.0%) and 12 sites (8.6%), respectively.(Figure 1)

Regarding service delivery, mobilizers found working were ASHA - 135 (96.4%), AWW - 97 (69.3%). ASHA and AWW mobilizers aligned with the micro plan at 138 (98.6%) and 106 (75.7%) of VHSND sites, respectively. The headcount survey was present at 126 (90.0%) of sites, while updated vaccination status of beneficiaries in RCH register/records was at 123 (87.9%). The staggered approach to avoid overcrowding was at 67 (47.9%). Explanations about what vaccine(s) and disease(s) are prevented were provided at 120 (85.7%) of sites, and explanations of potential side effects following immunization were at 118 (84.3%). Advice to keep the immunization card safe and bring it for the next visit was given at 118 (84.3%) of sites. BRIDGE IPC skill training was completed for AWW at 16 (11.4%) of sites. (Figure 2)

A statistically significant improvement (p< 0.05) was observed from the 1st Quarter to the 2nd Quarter in the availability of Oral Rehydration Solution (ORS) at session sites (3.0% to 12.3%), availability of blank MCP/RI cards (62.7% to 86.3%), availability of counterfoils for ANMs to track missed doses (49.2% to 78.1%), working hub cutters (82.1% to 93.2%), availability of adrenaline within expiry date in anaphylaxis kits (71.6% to 91.8%), vaccinators and mobilizers wearing face masks/covers (70.1% to 89.0%), and display of IEC material related to routine immunization (Poster RI) (52.2% to 69.9%). (Table-1)



#### Figure 1:Pre-site preparation and logistics availability at VHSND sites (N=140)





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	5)			
Variables		1 <sup>st</sup> Quarter n (%)	2 <sup>nd</sup> Quarter n (%)	p-value (Chi-square)
Updated due list available		54 (80.6%)	66 (90.4%)	0.09
Availability at session site	Paracetamol	58 (86.6%)	65 (89.0%)	0.66
	Vitamin A	10 (14.9%)	16 (21.9%)	0.28
	ORS	2 (3.0%)	9 (12.3%)	0.04
	Zinc	6 (9.0%)	8 (11.0%)	0.69
Blank MCP/RI cardat the session		42 (62.7%)	63 (86.3%)	0.00
Counterfoil for ANM for tracking missed doses		33 (49.2%)	57 (78.1%)	0.00
Hub cutter working		55 (82.1%)	68 (93.2%)	0.04
Anaphylaxis kit		56 (83.6%)	67 (91.8%)	0.13
Adrenaline in anaphylaxis kit within expiry date	2	48 (71.6%)	67 (91.8%)	0.00
Vaccinator and all mobilizers wearing face mask	x/ face cover	47 (70.1%)	65 (89.0%)	0.00
Hand washing facility with soap and water / alcohol-based hand sanitizer		57 (85.1%)	65 (89.0%)	0.49
IEC material related to Immunization displayed Poster RI		35 (52.2%)	51 (69.9%)	0.03
	Poster IMI	6 (9.0%)	8 (11.0%)	0.69
	Banner RI	36 (53.7%)	42 (57.5%)	0.65
	Banner IMI	5 (7.5%)	7 (9.6%)	0.65

#### Table 1: Quarter wise comparison of pre-site preparation and logistics availability at VHSND sites (1<sup>st</sup> Ouarter, N=67; 2<sup>nd</sup> Ouarter, N=73)

\*RI - Routine Immunisation, IMI - Intensified Mission Indradhanush

## Table 2: Quarter wise comparison of service delivery practices at VHSND sites (1<sup>st</sup> Quarter, N=67; 2<sup>nd</sup> Quarter, N=73)

Variables		1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	p-value
		n (%)	n (%)	(Chi-square)
Mobilizers found working that day				
ASHA		64 (95.5)	71 (97.3)	0.56
AWW		41 (61.2)	56 (76.7)	0.04
Mobilizers are same as per micro plan				
ASHA		65 (97.0)	73 (100.0)	0.13
AWW		48 (71.6)	58 (79.5)	0.27
Record of headcount count survey (HCS in register/fo	rmat/paper)	56 (83.6)	70 (95.9)	0.01
Updated vaccination status of beneficiaries in RCH regis	ster / records	55 (82.1)	68 (93.2)	0.04
Staggered approach to avoid overcrowding with time	slots allotted	31 (46.3)	36 (49.3)	0.72
to beneficiaries				
Observed beneficiaries accompanied by more than on	32 (47.8)	43 (58.9)	0.18	
Explain what vaccine(s) will be given and the disease(	s) prevented	53 (79.1)	67 (91.8)	0.03
Explain potential side effects following immunization (fever/pain/swelling; etc.) and how to deal with them	56 (83.6)	62 (84.9)	0.83	
Explain when to come for the next visit		56 (83.6)	63 (86.3)	0.65
Explain to keep the immunization card safe and to bri	ng it along for	54 (80.6)	64 (87.7)	0.25
the next visit				
Asks the caregivers to wait with child for 30 min after	41 (61.2)	58 (79.5)	0.01	
BRIDGE IPC skill training	ANM	26 (38.8)	31 (42.5)	0.65
	ASHA	13 (19.4)	30 (41.1)	0.00
	AWW	6 (9.0)	10 (13.7)	0.38

\*IPC - Inter Personal Communication

There was a statistically significant improvement from the 1st quarter to the 2nd quarter in the presence of AWWs as mobilizers (61.2% to 76.7%), documentation of headcount count surveys (83.6% to 95.9%), updated vaccination status in RCH registers/records (82.1% to 93.2%), explanation of vaccines and diseases prevented (79.1% to 91.8%), and caregivers being asked to wait for 30 minutes after vaccination (61.2% to 79.5%). Notably, there was a substantial increase in BRIDGE IPC skill training among ASHAs (19.4% to 41.1%). (Table 2)

#### Discussion:

For decades, the prevailing assumption was that inadequate performance in service delivery resulted solely from a deficiency in knowledge and skills, leading to a predominant focus on training interventions, yet these yielded varied and occasionally unsatisfactory long-term outcomes.<sup>[14,15]</sup> Reviews of intervention studies conducted in low and middle income countries indicate that the combination of formal and informal training along with regular supervision and feedback tends to be more effective compared to the mere dissemination of written guidelines.<sup>[14,16]</sup> Traditional supervisory approaches have shown effectiveness but also limitations, as they often prioritize facility inspection over human capital development, and supervisors themselves may lack necessary skills and resources while being burdened with administrative tasks. Supportive supervision can independently enhance the knowledge and practices of supervisors and supervises in conducting immunization sessions.<sup>[17]</sup> Supervision remains a challenging issue for peripheral health staff tasked with delivering primary healthcare services, and the absence of experienced and proficient human resources can significantly undermine the effectiveness of health programs, including immunization efforts.<sup>[17,18]</sup>

The findings of this study underscore the role of supportive supervision in strengthening routine immunization. By addressing key challenges in presite preparation, logistics, and service delivery, supportive supervision has contributed to notable improvements in immunization during VHSND sessions and service quality across the selected districts.

A significant increase in diarrhoea cases in Assam, from 2.9% in NFHS-4 to 5.5% in NFHS-5,<sup>[7]</sup>underlines the critical need for ORS, zinc, and vitamin A to be available at VHSND events. Despite limited supplies of Vitamin A, ORS, and Zinc at VHSND events overall, there has been a positive increase in their availability during the 2<sup>nd</sup> guarter compared to the 1<sup>st</sup> quarter. Similarly, the increase in availability of blank MCP/RI cards, and counter foils for tracking missed doses indicates a positive impact of supportive supervision on ensuring adequate resources for immunization activities. Moreover, the improvement in the functionality of equipment such as the hub cutter and the inclusion of essential items like adrenaline in the anaphylaxis kit further demonstrates the effectiveness in optimizing operational readiness and emergency preparedness during vaccination sessions.

Improvements in adherence to safety protocols among vaccinators and mobilizers, including the wearing of face masks or covers indicates a heightened awareness of infection control measures, which is crucial for safeguarding the health of both healthcare workers and vaccine recipients. Furthermore, the increase in the presence of posters related to routine immunization suggests a concerted effort to enhance public awareness fostering community engagement and acceptance of immunization services. Implementation of communication strategy needs to be strengthened further with proper planning and supply of IEC materials with proper display specially during IMI execution.

Regarding service delivery, the study highlights significant enhancements in the presence and performance of frontline health workers. This increase in workforce engagement and adherence to micro-plans underscores the importance of

supportive supervision in strengthening the capacity and motivation of healthcare providers. Moreover, improvements in record-keeping practices and caregiver education signify a more comprehensive and patient-centred approach to immunization services, which is essential for ensuring the accuracy of data and promoting informed decision-making among caregivers. Additionally, supportive supervision has positively impacted the implementation of behaviour change communication strategies, such as BRIDGE IPC (Boosting Routine Immunization Demand Generation Interpersonal Communication) skill training. The significant increase in ASHAs receiving IPC training reflects an investment in building the communication and counselling skills of healthcare providers, which are vital for addressing vaccine hesitancy and promoting vaccination uptake within communities.

Given its resource-intensive nature, successful implementation of the routine immunization depends on various factors, including sufficient financing, vaccine quality, vaccination practices, and the robustness of the health system. Consequently, enhancing supportive supervision with a mentoring approach is crucial.<sup>[17]</sup>In this study, site visits for monitoring and supportive supervision were based on an existing micro-plan. Consequently, the same sites were not visited on all occasions, which can be considered a limitation. However, the analysis was conducted as a group comparison, and recommendations from various site visits were shared in monthly meetings to ensure corrective actions could be taken by all stakeholders. For better evidence generation, future implementation research and qualitative studies to assess beneficiary satisfaction levels and service providers' perspectives are recommended.

#### **Conclusion:**

Supportive supervision at VHSND sites significantly enhanced routine immunization in second quarter, leading to improved logistics, documentation, and ASHA worker performance. However, consistent availability of essential supplies like Vitamin A, ORS, and Zinc, along with increased awareness of IMI during RI campaigns, are crucial for further improvement. This study strongly supports the integration of supportive supervision into routine immunization practices to optimize child health outcomes.

#### **Recommendations:**

- Continued focus on ensuring the availability of essential supplies, such as Vitamin A, ORS, and Zinc, at all VHSND sites.
- Increased efforts to promote and display educational materials related to IMI alongside routine immunization (RI) campaigns.
- Strategies to improve the implementation of a staggered approach for beneficiary arrival to minimize overcrowding at vaccination sites.
- Further investment in BRIDGE IPC skill training for all mobilizers, including AWWs.

#### **Declaration:**

The authors of this manuscript confirm that the content within is original and does not replicate any previously published work. A related article, exploring a separate facet of this research project, has been published in a different journal.

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## A Cross-Sectional Study to Assess Relation Between Behavioural Risk Factors and Body Mass Index with Professional Stress among Staff nurses of a Tertiary care Hospital of Mumbai

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#### Abstract:

Introduction: Work-related stressors may influence ability of nurses to engage in regular exercise and maintain positive dietary behavior. Lack of time was considered as the main barrier to being physically active. This supports suggestions that work related stressors like shift work and long working hours may lead to a neglect of physical activity needs in the nursing professionand is associated with other negative health behavior. Objective: To assess relation between Behavioral risk factors and Body Mass Index with Professional Stress among staff nurses of Tertiary care Hospital having Shift duties. Method: Descriptive Cross-sectional study conducted among staff nurses of age group 25 years and above of a Tertiary cares Hospital in Mumbai. The sample size obtained through multi stage sampling was 187. Data was collected with help of pre-tested pre-designed questionnaire by interview method. Professional Stress Scale by David Fontanna (DFPS) was used for evaluating Occupational stress. Results: Mean age of staff nurses was 40.05±11.53 years. Mean score of DFPS was 14.65 ± 5.52. Out of 187 staff nurses, 65.77% were not in normal BMI range of which maximum were in pre-obese (28.34%) followed by underweight (16.04%) and overweight (16.04%) category. Associations of BMI, dietary habits, physical activity and on continuous medication for chronic diseases with professional stress among staff nurses were statistically significant (p<0.005). Conclusion: Behavioral risk factors like Body Mass Index, irregular intake of meals, lack of physical activity, continuous medications have impact on professional stress of staff nurses.

Keywords: Behavioural risk factors, Body Mass Index, Lifestyle risk factors, Professional stress, Staff Nurses

#### Introduction:

The workplace is defined as an environment in which workers and managers collaborate to promote the health and wellbeing of all workers.<sup>[1]</sup> Also, the worksite is internationally recognized as an appropriate setting for health promotion and disease prevention as this is where working individuals could spend up to 60% of their waking hours.<sup>[2,3]</sup> Employees including nurses are at increased risk of non-

communicable diseases (NCDs) like diabetes, hypertension and coronary heart diseases (CHD).<sup>[4]</sup> The main risks of NCDs are physical inactivity, unhealthy eating, smoking and alcohol abuse.<sup>[5]</sup> The World Health Organization defined health as a state of complete physical, mental, and social well-being and not merely the absence of disease.<sup>[6]</sup>

Physical health incorporates physical activity, nutrition, and recovery. While the recommendation

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of 150-300 minutes per week of moderate intensity physical activity on most days of the week is required to maintain health, it has been reported that not all health care workers are meeting this minimum requirement.<sup>[7,8]</sup> High prevalence of overweight and obesity has been reported in health care workers.<sup>[9]</sup> Work-related stressors may influence the ability of nurses to engage in regular exercise and maintain positive dietary behavior. Lack of time was considered as the main barrier to being physically active. This supports suggestions in the literature that work related stressors, such as shift work and long working hours, may lead to a neglect of physical activity needs in the nursing profession,<sup>[10-12]</sup> and this is worrying because low levels of physical activity have been associated with other negative health behavior.<sup>[13]</sup>

Poor diet and low levels of physical activity are known risk factors for overweight and obesity.<sup>[14]</sup> Reported prevalence of overweight and obesity among nurses internationally ranges between 54.5% and 79.1%.<sup>[15-18]</sup> The shift work of nurses has been found to increase their health problems. It disrupts regular sleep, eating and exercise habits, potentially making it more difficult to maintain a healthy weight.<sup>[19]</sup> Additionally, research has shown that nurses regularly consume foods that are high in fat and sugar content, which has been associated with time pressure and shift work patterns in the nursing occupation.<sup>[20-22]</sup> Therefore, the main aim of this research study was to access the relationship between the current lifestyle behaviors such as physical activity, obesity, lifelong medications for chronic diseases as important modifiable risk factors in development of professional stress among staff nurses of a Tertiary Care Hospital.

#### Method:

An Observational Descriptive study, crosssectional in design was conducted among staff nurses of age group 25 years and above as per inclusion criteria of work experience of staff nurses from a Tertiary care Hospital in a metropolitan city of Maharashtra from April 2018 to November 2019. Multistage sampling was done and calculated sample size was 187. The study subjects were divided into three groups i.e Morning shift, Evening shift and Night shift. The proportion of staff nurses in each group was 2:1:1 respectively in the field practice area. Therefore, sample size was divided into 4 parts. i.e., 186/4= 46.5. Therefore, 1 part would be 46.5 which is approximately 47. Multistage sampling was done and sample size was 187.The study subjects were divided into three groups i.e Morning shift, Evening shift and Night shift. The proportion of staff nurses in each group was 2:1:1 respectively in the field practice area.

The sample size was divided into 4 parts. i.e. 186/4= 46.5. Therefore, 1 part would be 46.5, which is approximately 47. So, the sample size would include 93 staff nurses from morning duty shift group and 47 each from evening and night duty shift groups. The study was approved by the institutional Ethics Committee. Informed consent was taken from study subjects. Staff nurses were identified based on their duty patterns, i.e. Single shift duty (morning shift only), Two shift duty (having morning and evening shifts) and Circle or three shift duty (having all morning, evening and night shifts). Staff nurses from each duty patterns were approached after seeking permission from the Matron.

The data was collected by interview method with the help of questionnaire which was designed by authors and tested by professors of psychiatry and community medicine department of the same institute. The questionnaire consisted of sociodemographic data of staff nurses along with their personal lifestyle, behavior and occupational history. Professional Stress Scale by David Fontanna (DFPS) which is validated for use in India<sup>[23]</sup> was used for evaluating Occupational stress among nurses. The DFPS scale is adapted from Managing Stress, the British Psychological Society and Routledge Ltd, Leicester, England, 1989.<sup>[24]</sup> It consists of 24 questions covering different variables like personality perception by others, optimism for life, satisfaction to self and work, adjustment with the professional environment, and so on. A total score is 60. The score is interpreted as 0-15, no stress; 16-30, moderate stress; 31-45, severe stress and 45-60 stress as major

problem and SOS action needs to be taken.<sup>[24]</sup> Data analysis was done using SPSS version.20 software and Microsoft excel software.

#### **Operational Definitions:**

- Dietary Habit: Habitual decisions and patterns related to food consumption, including what, when, and how much a person eats in a day. Regular habits will include person consuming meals at fixed times of day as per their calorie and protein requirement.
- 2. Any Physical Activity: Bodily movements produced by skeletal muscles that requires energy expenditure other than movements done for duty work and household chores. This includes a wide range of activities like walking, gardening, running to structured exercise routines and sports.
- Addiction (Any): Compulsive seeking and use of a substance or engagement in a behavior despite knowing harmful consequences of the

substance. It involves physical and psychological dependence, where the individual may experience cravings and withdrawal symptoms when the substance or behavior is not available.

#### **Results:**

Table 1 described the demographic details and professional details of study sample like years of experience, job rank and type of duty they are doing. The mean score of DFPS in the study population was 14.65  $\pm$  5.52. Of 187 nurses 102 (54.54%) had no stress while 84 (44.91%) had moderates stress and only one had severe stress. Mean age of staff nurses was 40.05  $\pm$  11.53 (24-58).

Table 2 showed association of Nutritional Status (Classification of Weight) of Staff nurses according to BMI (WHO Cut-off for Asians) with professional stress of study population.<sup>[25]</sup>It was observed that the majority of staff nurses (65.77%) did not have BMIvalues within the normal range.

Para	Mean ± S.D./ n (%)	
Age (i	n years)	40.05 ± 11.53 (24-58)
Religion	Hindu	164 (87.70%)
	Non- Hindu	23 (12.30%)
Marital Status	Married	146 (78.07%)
	Single	41 (21.92%)
	(Divorced/Separated/Unmarried)	
Type of Family	Nuclear	132 (70.6%)
	Joint	55 (29.4%)
Socio- economic class as per	Upper Class	91 (48.7%)
Modified Kuppuswami Scale	Upper Middle Class	96 (51.3%)
for Urban population		
Years of Wo	rk Experience	17.91 ± 10.86 (5-35)
Job Rank	Sister in charge	16 (8.60%)
	Senior Staff	27 (14.40%)
	Duty Staff	144 (77.0%)
Type of Duty	Circle/Three Shift Duty	98 (52.40%)
	Two Shift Duty	35 (18.71%)
	Straight/ Single Shift Duty	54 (28.87%)

Table 1: Demographic and professional details of study population (N=187)

Table 2: Association of Nutritional Status (Classification of Weight) of Staff nurses according to BMI withprofessional stress of study population (N=187)

DFPS score	Classification of Nutritional Status (Weight) of Staff Nurses according to WHO criteria for BMI cut-off for Asians					
n (%)	Underweight n (%)	Normal n (%)	Overweight n (%)	Pre-Obese n (%)	Obesity n (%)	p value
No Stress 102 (54.54%)	25 (13.36%)	31(16.58%)	15(8.02%)	29(15.51%)	02(1.07%)	v2-1972
Moderate Stress 84 (44.91%)	05 (2.67%)	33(17.65%)	15(8.02%)	23(12.30%)	08(4.28%)	χ2- 10.73,
Severe Stress 01 (0.53%)	00(0%)	00(0%)	00(0%)	01(0.53%)	00(0%)	p value= 0.0164
Total (187) 100%	30 (16.04%)	64 (34.22%)	30 (16.04%)	53 (28.34%)	10 (5.35%)	

## Table 3: Association of various Lifestyle Behavioral Risk factors with professional stress in studypopulation (N=187)

	Variables (Lifestyle Behavioral Risk factors)							
DFPS score Interpretation	Dietary Habit		Any Physical Activity		Addiction (Any)		On continuous medication for chronic disease	
	Regular n (%)	Irregular n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)
No Stress 102 (54.54%)	95(50.80%)	07(3.74%)	45(24.06%)	57(30.48%)	06(3.21%)	96(51.33%)	15(8.02%)	87(40.52%)
Moderate Stress 84 (44.91%)	62(33.15%)	22(11.74%)	20(10.69%)	64(34.22%)	04(2.14%)	80(42.78%)	27(14.43%)	57(30.48%)
Severe Stress 01 (0.53%)	01(0.53%)	00(0%)	01(0.53%)	00(0%)	00(0%)	01(0.53%)	00(0%)	01(0.53%)
Total (187) 100%	158(84.49%)	29(15.51%)	66(35.29%)	121(64.70%)	10(5.34%)	177(94.65%)	42(22.45%)	145(77.54%)
χ2 value, p value	χ2 value= 13.32, p value= 0.0012		χ2 value= 10.16, p value= 0.0062		χ2 value= 0.1711, p value= 0.9180		χ2 value= 8.333, p value= 0.01550	

Among them, most were in the pre-obese category (28.34%), followed by the underweight (16.04%) and overweight (16.04%) categories. The association between classification of weight of study subject according to their BMI was statistically significant (p=0.0164).

Table 3 shows association of various Behavioral Risk factors with professional stress in study population. It is seen that maximum (84.49%) of staff nurses were having intake of meals on regular time. Out of those having meals on irregular time 11.74% had moderate level stress at work. Association of dietary habit with professional stress was statistically highly significant (p=0.0012). Out of 187 staff nurses 121(64.71%) staff nurses were not engaged in any physical activity and of them 34.22% were having moderate level stress at work.

Association of physical activity with professional stress was statistically highly significant (p=0.0062). Only 10(5.3%) staff nurses out of all had current addiction history from them 4(2.1%) was having moderate stress at work. Association of history of current addiction with professional stress was statistically not significant (p=0.9180). 42(22.45%) out of all staff nurses were on continuous medication for chronic diseases, of them 27(14.43%) were having moderate level of stress. Association of continuous medication for chronic diseases with professional stress was statistically significant (p=0.01550).One staff nurse who had meals at regular interval, engaged in physical activity, not having any kind of addiction and was not on medications for any chronic disease was having severe stress at work.

#### **Discussion**:

The present study was carried out amongst Staff nurses of a tertiary care hospital of a metropolitan city with the objective to study the relation between behavioral risk factors and category of Weight with Professional Stress among staff nurses. Maximum study subjects 81 (43.31%) belonged to 25-35 years of age-group with mean age of 40.05 years (SD =11.53). Parul Sharma et.al.<sup>[23]</sup> found in their study that 91% staff nurses were younger than 35 years (15-25 years and 25-35 years) with a mean age of 27.41 years (SD = 7.06). These observations are quite similar to present study. Ali Mohammad et.al.<sup>[26]</sup> found in their study that, the average age of staff nurses was 34 years (SD=8.31) with the youngest 21 years and oldest 65 years. These observations are quite similar to present study.

Dal Lae Chin.et.al<sup>[27]</sup> found in their study that, 31% study population were overweight and 18% were obese; 41% engaged in regular aerobic physical activity(>150 min/week) and 57% performed regular muscle-strengthening activity (>2 days/week). Regular aerobic physical activity was significantly associated with high job demand (OR = 1.63, 95% CI: 1.062.51). Nurses with passive jobs (low job demand combined with low job control) were significantly less likely to perform aerobic physical activity (OR = 0.49, 95% CI: 0.260.93). Regular muscle-strengthening physical activity was significantly less common among nurses working on non-day shifts (OR = 0.55, 95% CI: 0.340.89). Physical workload was not associated with obesity and physical activity. These findings are similar to present study. Lindokuhle P Phiri. et. al<sup>[28]</sup> found in their study that, Night shift nurses frequently identified weight gain and living with NCDs such as hypertension as their main health concerns.

Being overweight was perceived to have a negative impact on work performance. Nurses frequently mentioned lack of time to prepare healthy meals due to long working hours and being overtired from work. The hospital environment was perceived to have a negative influence on the nurses lifestyle behaviors, including food service that offered predominantly unhealthy foods. Present study also found that shift working nurses were either overweight or underweight with intake of meals having on irregular time. Liangzhuang Miao et al.<sup>[29]</sup> found that in the normal group of BMI, the prevalence of high emotional exhaustion, high cynicism, and low personal accomplishment among nurses was 25.1%, 37.0%, and 36.0%, respectively. In the underweight group, the prevalence of high emotional exhaustion, high cynicism, and low personal accomplishment among nurses was 29.3%, 48.6%, and 27.9%, respectively. In the overweight group, the prevalence of high emotional exhaustion, high cynicism, and low personal accomplishment among nurses was 25.4%, 35.1%, and 37.8%, respectively and in the obese group, the prevalence of high emotional exhaustion, high cynicism, and low personal accomplishment among nurses was 37.9%, 46.3%, and 32.6%, respectively. The distribution of cynicism differed

significantly between the four categories of BMI (p<0.05).These findings are similar to present study. Peplonska, et al.<sup>[30]</sup> conducted a study in which they found a Cumulative night shift work showed significant associations with BMI, with BMI increasing by 0.477 kg/m<sup>2</sup> per 1000 night duties and by 0.432 kg/m<sup>2</sup> per 10000 night shift hours. Both current and cumulative night work was associated with obesity (BMI $\geq$ 30kg/m<sup>2</sup>), with OR=3.9 (95%CI:1.5-9.9), in women reporting eight or more night shifts per month. These findings are similar to present study.

#### **Conclusion:**

It is concluded from the present study that behavioral risk factors like abnormal Body Mass Index, irregular intake of meals, lack of physical activity have impact on professional stress of staff nurses. Nutritional status like under nutrition, over nutrition and obesity induces stress at work. All behavioral risk factors like physical activity, diet, addiction and regular medications are correlated with increased stress at work. There is a need for Hospital management to develop appropriate intervention programs to reduce workload, make regular shift schedules, and provide positive reinforcements at workplace.

#### **Recommendations:**

- Duty shifts time table should be made in such a way that after 5 working days, staff nurses should get compulsory 1 day holiday.
- 2. Hospitals should have a separate canteen for all health professionals who can serve nutritious food for all meals in low price.
- Compulsory Yoga sessions for 45 minutes thrice a week should kept for staff nurses and other health professionals.
- 4. Regular monitoring of lifestyle parameters like weight, BMI, Waist to Hip ratio, screening for Non communicable diseases at every 3 months interval will keep staff nurses in tract of their health status.

#### **Declaration:**

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## Awareness and Utilization of Social Security and Other Government Schemes by **Elderly Population of Budge-Budge II Block of West Bengal**

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#### Abstract:

Introduction: : Geriatric population are most vulnerable population, they suffer from various physical illness, mental issues, financial crisis etc. WHO report showed that the world's population of people aged 60 years and older will be doubled by 2050 (2.1 billion). According to census 2011report, India has 10.1% elderly population and West Bengal has 11.3%. The purpose of the study is to assess the level of awareness on social security& other government schemes, its utilization and to explore the barrier of utilization. Method: An explanatory sequential mixed methods observational study, cross-sectional in design was conducted in Budge-Budge II block of West Bengal among 150elderly population (≥ 60 years) selected by 30 cluster random sampling from March-May 2023 using a pre-designed, pre-tested, structured schedule by face-toface interview. Quantitative data was analysed by SPSS v25.0, and binary logistic regression was performed. Qualitative data was analyzed thematically with IDI guide. Results: Out of 150 elderly, mean age group of the study population was 67.5±4.24 years, 53% were male, and 87% of the study population had awareness on old age pension scheme. However, 83% showed bad utilization. Socioeconomic status [AOR 5.27 (1.98-13.97)], current employment status [AOR 6.48 (1.12-37.30)] economic dependency [AOR 7.59 (1.71-33.79)] had statistically significant higher odds of adequate awareness in the multivariable model. Current employment status, economic dependency showed significant association with good utilization and socio demographic characteristics. Conclusion: Majority of the study population were between 65 to 70 years and were aware of old age pension scheme. Old age pension scheme was maximally utilized schemes.

Keywords: Awareness, Geriatric, Pension, Social security

#### Introduction:

Now a days due to invention of modern medicine worldwide people are living for longer duration. At present most people can expect to live into their sixties and beyond and as a result every country in the world is experiencing growth in both the size and the proportion of older persons in the population.<sup>[1]</sup>

The population aged 60 years and over will increase from 1 billion in 2020 to 1.4 billion and the worlds population of people aged 60 years and older

will be doubled by 2050 (2.1 billion).<sup>[1]</sup> Persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million. Approximately 1 per 6 persons in the world will be aged 60 years or over by 2030. India has 138 million (10.1%) elderly population latest report (as no Census conducted after 2011),<sup>[2]</sup> where it was around 104 million older people (60+years) and constituting 8.6% of total population.<sup>[3]</sup>As per recent report elderly population of West Bengal was 11.3% as compared to 2011 when it was around 8.5%. As geriatric population are most

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vulnerable population, they suffer from various physical illness, mental issues, financial crisis etc., so they need some physical support, mental support as well as some financial support.<sup>[4]</sup> After retirement or not working elderly become dependent on their family, children, relatives and sometimes got neglected.

There are some studies which discussed about the different social security schemes for elderly and its awareness among them. A study conducted in Harvana by Goswami*et al*<sup>[5]</sup>showed that 85% of the elderly population were both aware and utilized at least one social security scheme. National social assistance programme (NSAP) was a welfare programme in rural as well as urban areas; and it cover vulnerable population like elderly, sickness as well as disablement. National old age pension scheme was a part of NSAP. There were schemes like Indira Gandhi National Widow Pension Scheme (IGNWPS), Indira Gandhi National Disability Pension Scheme (IGNDPS), Annapurna Scheme, Antadaya Anna Yojana.<sup>[6]</sup> This study pointed out about the awareness of different social security schemes like Indira Gandhi National Old Age Pension Scheme(IGNOAPS),<sup>[6]</sup>post-retirement benefits, tax benefits, travel concessions (bus, train, air travel) as well as NPHCE (National Programme for Health Care Elderly). IGNOAPS is a pension scheme for those who are more than 60 years; IGNWPS provide cash benefits to widow, IGNDPS provide cash benefit to disable elderly, and the amount is 1000/month for each of the above scheme. NPHCE provides dedicated facility for elderly both in indoor and outdoor of Government facility. Anta daya anna yojona provide food grain through ration card to BPL family and Annapurna scheme provide free food grains to elderly who are more than 65 years.<sup>[6]</sup>

With this background and rationale, the objective of this current study was to assess the level of awareness on social security and other government schemes by elderly population in Budge-Budge II block of West Bengal and to find out the utilization of social security and other government schemes; and to explore the barriers for availing the social security and other government schemes by the study population.

#### Method:

**Study type and design:** An observational study, cross-sectional in design with explanatory sequential mixed-methods approach was conducted.

**Study area and duration**: The study was conducted in Budge-Budge II block of South 24 Parganas, West Bengal over a period of 3 months (March-May 2023) which is the rural field practice area of IPGME & R and SSKM Hospital.

#### Study population and selection criteria:

For quantitative strand, elderly population  $(\geq 60 \text{ years})$ ,<sup>[7]</sup> permanent residents <sup>[8]</sup> (residing with family for at least last 7 year) of Budge-Budge II block of West Bengal were selected. Only one elderly individual was taken from each selected house and those who were seriously ill and refused to give informed written consent were excluded from this study.

For quantitative strand, elderly population (residing with family for at least last 1 year) of Budge-Budge II block of West Bengal were selected. Only one elderly individual was taken from each selected house and those who were seriously ill and refused to give informed written consent were excluded from this study.

Elderly people who were not getting any schemes were selected for qualitative strand to identify the barriers of utilization of the schemes.

#### Sample size and Sampling technique:

For quantitative strand, a proportion of awareness and utilization of social security scheme was taken from a study conducted by Goswami S *et al*<sup>[5]</sup> in Faridabad district of Haryana in 2019, p = 85% or 0.85. So, 1-p=1-0.85= 0.15, Confidence Interval (C.I) = 95%, Standard normal deviate ( $z_{\alpha}$ ) at 95% CI=1.96, Relative error (d)= 10% of p (8.5%), design effect= 2, applying Cochran s formula: n= $z_{1-\alpha/2}^2$ pq/(d)<sup>2</sup>

=3.84X0.85X0.15/(0.085)2=67.7≈68

= 68X Design effect (2 is for cluster sampling)

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Thirty Cluster Sampling technique was followed. Total number of villages in the block was 61.<sup>[9]</sup> Each village was considered as a cluster. Therefore, from each cluster (village)  $136/30 = 4.53 \approx 5$  elderly were be selected. So, final sample was30x5 = 150.

For selection of household, central location of the village was selected and, then the direction from the centre using a random number was selected. Walking in a selected direction of the village and visited the households till 5 elderly had given informed written consent to participate in the study.

In case of qualitative strand, elder lypopulation from different households were selected by purposive sampling technique who had not availed any services till data saturation. Thus total 5 In-Depth Interviews (IDIs) were conducted after which the data saturation was observed.

#### Study tools:

For quantitative strand, a pre-designed, pretested, structured schedule was used comprising of following details.

- a. Socio-demographic characteristics (Age, gender, religion, caste, marital status, type of family, level of education, occupation, BPL status etc.)
- Awareness and Utilization of social security b. schemes containing IGNOAPS/old age pension scheme, widow scheme, disability scheme, Annapurna scheme, and different support measures (like bus travel concession, train travel concession, air travel concession,<sup>[9]</sup>income tax benefit, increase interest in bank/post office, NPHCE etc.). For awareness there were 13 questions, total score was (those who answered yes scored 1, 0=No/dont know) For each individual total score was calculated and then median taken from all the total scores. For calculating all yes response for awareness was taken as 1, median was found 4.5. Those who scored more than median (<4.5) were considered of having adequate awareness. Similarly for utilization, those who utilized any schemes was taken as 1; So total score was 13 but

after calculating all the yes response for utilization median was found to be 1, and median utilization score was considered as good utilization.

For qualitative strand, in depth interview (IDI) guide was prepared, which were validated by experts.

#### Study technique:

Quantitative data were collected by face-to-faceinterview with the elderly using door-to-door visit of the selected households. One village was covered in a particular each day of data collection. Whether the person was aware about the schemes was ensured by document verification. In-depth interviews were conducted with the elderly who were selected from different villages of the cluster who had not utilized any schemes.

#### Study variables:

Study variables were classified into two broad groups dependent variables and independent variables.

#### Dependent variables:

- I. Awareness regarding social security schemes (like IGNOAPS<sup>[6]</sup>, / pension scheme, widow scheme, post-retirement schemes, Annapurna scheme etc.) and other government services for elderly (like travel concession, <sup>[10]</sup>bus concession, flight concession, NPHCE, bank interestrate etc.).
- ii. Utilization of social security schemes and other government services.

#### Independent variable:

Socio-demographic profile- age in completed years, gender, level of education, marital status, occupation, socio-economic status, BPL/APL (verification by available BPL Cards), type of family, present living arrangements, current employment status, economic dependency, whether still head of family or not etc.

#### Methods of data Collection:



#### Data analysis:

Quantitative data were tabulated into Microsoft Excel 2019 (Microsoft Corp, Redmond, WA, USA) and then imported to Statistical Package for the Social Sciences 25 (SPSS for Windows, version 25.0, SPSS Inc., Chicago, USA) for analysis. Data were analyzed using descriptive statistics- categorical data were represented as proportions, continuous data were represented in the form of mean or median and SD.For inferential statistics chi-square test was used to observe any statistical significance of difference between proportions. The results were considered statistically significant if p-value was less than 0.05. All independent variables having P < 0.20 in univariate regression analysis were considered biologically plausible to be included in the multivariable logistic regression model. Data were checked for multi-collinearity (Variance Inflation Factor <10) and variables with P<0.05 were considered statistically significant predictors in the final model.

Qualitative data were analyzed thematically using Codes and themes generated represented in tabular form and with help of a mind map.

#### **Operational Definition:**

**Elderly :** Elderly or senior citizens have been defined as people with age more than or equal to 60 years.<sup>[7]</sup>

**Permanent resident:** A person who is living in an area for at least 7 years.<sup>[8]</sup>

**Retired:** A person who has Currently taken Retirement from job or work.

**Non-Working**: A person, who is not employed by himself/ herself or any organization, also housewife was included here.

**Family:** A group of individual living under same roof, related by blood, marriage, adoption and sharing same kitchen.

**Ethical considerations:** Institutional Ethics Committee permission was obtained prior to start of the study. Informed written consent was obtained before each interview and all ethical principles were strictly adhered to throughout the course of the study.

#### **Results:**

Out of 150, it had been found that mean age group of the study population was 67.5 ±4.24 years. And around 53 % of the participants were male, majority of them (89%) were married. About 96% of the study participants owned a house and about 84% of them was currently living with spouse, children & grandchildren. Almost 92% of them belonged to joint family, around 49% engaged themselves in working. About 64% were from Lower Middle class as per Modified B G Prasad Scale May 2022<sup>[11]</sup> and 73% possessed BPL card. It had been found that 35% of them were still head of the family, and around 89% had Swasthya Sathi Card. (Table 1)

Socio-	demographic characteristics	n (%)
Age (Years)	60-65	61 (40.7)
	65-70	52 (34.7)
	70-75	32 (21.3)
	75 and above	5 (3.3)
Gender	Male	80 (53.3)
	Female	70 (46.7)
Marital Status	Married	134 (89.3)
	Unmarried	3 (2)
	Divorced	1 (0.7)
	Separated	1 (0.7)
	Widow/Widower	11 (7.3)
Religion	Hindu	102 (68)
	Islam	39 (26)
	Others	9(6)
Caste	General	83 (55 3)
Gubte	OBC	27 (18)
	SC SC	28 (187)
	ST ST	12 (8)
Place of stay	Own house	130 (96.6)
Thee of Stuy	Bented house	4(27)
	Old age home	1(0.7)
Present living	Alone	3(2)
arrangement	With spouse	8(53)
urrungement	With spouse children and grandchildren	126 (84)
	With children and grand children	12 (8)
	Others (specify)	1 (0.7)
Level of education	Illiterate	16 (10.7)
	Non formal education	14 (9.3)
	Primary school	66 (44)
	Middle school	41 (27.3)
	Secondary	9 (6)
	Higher secondary	3 (2)
	Graduate	1 (0.7)
Type of family	Nuclear	13 (8)
	Joint	137 (92)
Current	Retired	14 (9.3)
Employment	Working	74 (49.3)
status	Non-working*	62 (41.4)
Economic	Dependent	21 (14)
dependent	Partially dependent	41 (27.3)
	Independent	88 (58.7)
If dependent,	Family	43 (69.3)
financially	Children	57 (91.9)
depend on**	Relatives	13 (20.9)
SES	Upper	3 (2)
	Upper Middle	9 (2)
	Middle	40 (26.7)
	Lower Middle	96 (64)
	Lower	2 (1.3)
BPL	Yes	109 (72.7)
	No	41 (27.3)
Are you still head	Yes	51 (34.8)
of the family	No	99 (66 2)

Table 1: Distribution of study population	as per	
their Socio-demographic Profile (	[N=150]	

\*As housewife were not employed by any organizations and not getting any wages, they were included in non-working category in current employment status. Non-working, retired and working were the categories depending on current employment status. \*\*multiple response Everyone was eligible for IGNOAPS, travel concession, bus travel concession, train travel concession, air travel concession, high interest rates by banks/post office, and NPHCE. Only 7.3% were eligible for IGNWPS, 59.3% were eligible for Annapurna scheme, and 72.2% were eligible for Antadaya Anna yojona, 27.3% were eligible for income tax benefits. Around 86.7% were aware of old age pension scheme, 49.4% utilized this scheme and majority of them belonged to BPL category, followed by Widow pension scheme (100% knew about it and out of the eligible candidates 72.7% utilized), Antyodaya ration card (53% aware and 52% availed) and Annapurna scheme which was known to 56% and used by 12% participants. (Table 2)

Binary logistic regression showed that Socioeconomic status [AOR 5.27 (1.98-13.97)], current employment status [AOR 6.48 (1.12-37.30)] economic dependency [AOR 7.59 (1.71-33.79)] had statistically significant higher odds of adequate awareness in the multi variable model. (Table 3)

Amongst 150 participants 54.7% availed any kind of social security schemes and other services, 45.8% of them felt economically empowered and self-esteem increased for 29.2% individuals which was followed by confidence and improvement in economic status. (Figure 1)

Qualitative data was obtained from those who did not avail the service gave insight into the barriers of utilization of social schemes and other government schemes to them, were analyzed thematically. It revealed that administrative problems (document related issues, bank account related problems, etc), political issues, economic status, awareness related utilization were the factors related to non-utilization of these schemes. (Table 4)

#### **Discussion:**

Geriatric populations are growing in both the size as well as proportion and going to affect economy as well as demography of the world in future. The present study findings simulate that the study population were mainly composed of 60-75 years with mean age of 67.5 $\pm$ 4.24 years,53% were male, majority were married, predominantly Hindu, half were from general caste,96% owned a house, 92% belonged to joint family, and majority were BPL. Such profile was like the elderly profile reported by Jothi*et al*<sup>[12]</sup> at Puducherry and Kohli*et al*<sup>[13]</sup> in his study carried among elderly in a rural area in Delhi.

Awareness about IGNOAPS was higher than other social security schemes like travel concession or income tax benefits, as more than four fifth of the study population were aware of IGNOAPS as compared to about half who were aware of Annapurna scheme, & widow pension scheme and only one fifth knew about disability scheme & other post- retirement benefits. These findings were like many other previous studies.<sup>[5],[12-17]</sup>

Below poverty line (BPL) study participants were more aware about IGNOAPS and Annapurna scheme as compared to above poverty line (APL) participants in our study, urban area of Haryana study <sup>[5]</sup> and Delhi study<sup>[13]</sup> in contrast to rural area of Haryana study<sup>[5]</sup> and Dehradun study where disaggregation of data by BPL and APL revealed that the awareness level of APL elderly is higher than the BPL elderly.<sup>[14]</sup>

A significant proportion of elderly of the present study were aware (86.7%) about and utilized (49.4%) IGNOAPS whereas lesser-known scheme than IGNOAPS was Annapurna scheme, which was known to 52.7% and availed by 12% of the study population. These findings were consistent with many other previous studies.<sup>[11-16]</sup> Corresponding figures of awareness about IGNOAPS and Annapurna scheme were 79.4% and 53.6% respectively in Delhi study.<sup>[13]</sup>

In a cross-sectional study by Goswami*et al.*<sup>[5]</sup>in Faridabad district of Haryana, which was conducted in both rural and urban area showed that about 85.5% were aware of Indira Gandhi National Old Age Pension Scheme (IGNOAPS) and 41% utilized the scheme. In rural field practice area of HIMS, Dehradun a cross-sectional study was conducted by Shrivastava *al* <sup>[14]</sup> which revealed that 74.6% of the study population were aware of IGNOAPS and 45.4% utilized the scheme successfully. Study by Goswami*etal*<sup>[15]</sup> at an urban resettlement colony of

Attributes	<b>Eligible candidates</b>	Awareness	Utilization
	n (%)	n (%)	n (%)
IGNOAPS	150(100)	130 (86.7)	74 (49.4)
Widow pension scheme	11(7.3)	11(100)	8(72.7)
Disability scheme	0	0	0
Annapurna scheme	89 (59.3)	79 (52.7)	18(20.2)
Antyodaya ration card	109 (72.7)	79 (52.7)	78(71.5)
Post retirement benefits	14 (9.3)	36(24)	14(100)
NGO associated schemes	0	0	0
Bus travel concession	150 (100)	20(13.3)	10(6.7)
Train travel concession	150(100)	55 (36.7)	19(12.7)
Air travel concession	150(100)	10(6.7)	0
High interest rates by banks/post office	150(100)	8 (5.3)	1(0.7)
Income tax benefits	41 (27.3)	11(7.3)	1(2.4)
NPHCE	150 (100)	0	0

Table 2: Awareness and utilization of social security and other government schemes in the studypopulation (N=150)

Table 3: Binary Logistic I	Regression of socio-demographic fa	ictors associated with adequate awareness
(N=150)		

Socio-demographic variables		Adequate awareness (n%)	Total (n%)	OR (95% C.I)	AOR (95% C.I)	p-value
Socioeconomic status	Upper, Upper middle, middle	30 (57.7)	52 (45.2)	5.27 (1.98-13.97)	6.20 (2.01-19.19)	0.002
	Lower middle, lower	45 (45.9)	98 (65.3)	1	1	1
Type of family	Nuclear	11 (91.7)	12 (8)	12.71 (1.59-101.22)	5.53 (0.59-51.04)	0.131
	Joint	64 (46.4)	138 (92)	1	1	1
Current employment	Working	39 (52.7)	74 (49.3)	1.76 (0.889-3.50)	2.14 (0.94-4.86)	0.689
status	Retired/pensioner	12 (85.7)	14 (9.3)	9.50 (1.95-46.20)	6.48 (1.12-37.30)	0.036
	Non-working	24 (38.7)	62 (41.3)	1	1	1
Economic dependency	Dependent	14 (66.7)	21 (14)	4.62 (1.36-15.70)	7.59 (1.71-33.79)	0.008
	Independent	26 (63.4)	41 (27.3)	3.25 (1.11-9.48)	2.26 (0.65-7.82)	0.195
	Partially dependent	35 (39.8)	88 (58.6)	1	1	1
Present Living Status	With children and grandchildren	59 (46.8)	126 (84)	12.49 (1.56-99.66)	2.14 (0.94-4.86)	0.069
	With spouse, alone	5 (41.7)	12(8)	0.81 (0.24-2.693)	0.83 (0.23-2.91)	0.771
	With spouse, children and grandchildren	11 (91.7)	12 (8)	1	1	1

Delhi demonstrated that awareness about Indira Gandhi National Old Age Pension Scheme (IGNOAPS) was 97.9% whereas (40.6%) were utilizing it. Study by Begam*et al* at Telangana<sup>[16]</sup> described that 79.6% knew about IGNOAPS and 79.62% utilized it. Bartwal*et al*did another study at rural areas of Haldwani, Nainital district of Uttarakhand<sup>[16]</sup> which showed that the awareness for old age pension scheme was seen in 97.3% while only 19.7% was utilizing it. Kushwaha*etal*<sup>[18]</sup> at Bhopal found that 42.3% participants were aware of Indira Gandhi National Old Age Pension Scheme, but of those aware, 38.9% were utilizing the scheme.

When analysis has done among BPL participants who were eligible for social security schemes it was seen that 70% were aware of IGNOAPS while only


Figure 1: Attitude of the study participants after availing social security schemes (N=82)

Table 4: Thematic analysis from In-depth interviews with the residents (N=5)

Themes	Codes	Verbatims	
Administrative problems	Bank account related problems	<i>:.we don't have bank accounts'</i> <i>:.Our document sometimes mismatch'</i> <i>:.Submitted documents multiple times '</i>	
	Document related issues	'we have spelling mistake in our names in Aadhar card' 'Our document sometimes mismatch'	
	Verification related issues	"our documents are not verified properly'	
Political issues	Favourism	local leaders always give these information to them who are close to them'	
	Information	'They never provide proper information proper information.".	
Economic status	Working status	'I still work as a vendor'	
	Financial Condition	'our son works so they are not providing us"	
Awareness related	Awareness	Where to ask, whom to ask".	
utilization	Illiteracy	"We are illiterate and we don't know where to submit"	

49.4% of them were utilizing the scheme, which was in line with findings by Kohli*et al* where it was 80.3% and 50.2% respectively<sup>[12]</sup> and 45.4 % of the elderly belonging to BPL households were the beneficiaries of IGNOAPS in Dehradun.<sup>[14]</sup> Annapurna scheme was known to 69.6% subjects but only 12% were utilizing the same in our study comparable to Delhi study (62.8% and 10.3%, respectively).<sup>[13]</sup> About 56% population were aware about Indira Gandhi National Widow Pension Scheme (IGNWPS) in this study which was much lower than Haryana (68.4%),<sup>[5]</sup> Delhi (81.7%),<sup>[12]</sup> resettlement area of Delhi (66.5%)<sup>[13]</sup>and Telangana (81.64%).<sup>[16]</sup> whereas only 4.3% elderly female availing IGNWPS in Nainital study.<sup>[17]</sup>

When the study subjects were inquired whether they were aware about and utilized other measures of support provided to them by government, it was revealed that the proportion of geriatrics who were aware of concession in bus travel, railway ticket, air ticket and higher interest rates on deposits in Bank/Post office respectively was 13.3%, 36.7%, 6.7% and 5.3% which was comparable to Delhi study<sup>[12]</sup> where it was 45%, 16.1%, 2.2% and 10.2% respectively; in Dehradun awareness of concession in railway ticket and higher interest rates on deposits in Bank/Post office respectively was 34.9% and 32.9%,  $^{\scriptscriptstyle [14]}$  in Nainital  $^{\scriptscriptstyle [17]}$  it was 15.2% &11.8%; and in Bhopal<sup>[18]</sup> 17%& 44.5% respectively. Awareness about railway concession scheme was 21%in Delhi<sup>[13]</sup>, and 92.85% in Telangana<sup>[16]</sup>. In this study 7.3% were aware of income tax benefits, higher than (2.3%) Dehradun<sup>[14]</sup>, but lower than Nainital (8.6%).[17]

However, the utilization rate of train ticket concession was as low as 12.7% in recent study, 27.8% in Dehradun<sup>[14]</sup>, 2.9% at Uttarakhand<sup>[17]</sup> and 7.4% in Bhopal<sup>[18]</sup> whereas 0.7% (10.1% in Dehradun <sup>[14]</sup>, 0.4% in Nainital<sup>[17]</sup>, 12.9% in Bhopal<sup>[18]</sup>) deposited money to get higher interest in Bank/Post office. Only 27.3% were eligible for income tax benefits and less than 1% elderly utilized income tax benefits both in present study, in contrast to 9.7% in Delhi study.<sup>[13]</sup>

In Delhi study,<sup>[13]</sup> it was found that those who were male, married and belonged to BPL family more aware about the social security and other schemes; but in recent study it had been found that type of family(nuclear), present living arrangements (living with spouse, children and grandchildren), current employment status(retired/pensioner) and economic status (dependent) showed higher odds of association with adequate awareness.

In present study, it had been found out that administrative problems, problem in documents, political issues and awareness regarding utilization were the barrier to those who were unable to utilize of the schemes and in Kolhi*et al*<sup>[13]</sup> it was awareness regarding utilization (where to approach), administrative problems took the upper hand.

The hardships faced by the elderly population should be taken care of in coming future, otherwise there will be a huge burden.

#### Limitations of the study:

It was conducted in small duration of time. There is possibility of social desirability bias as some of the respondents may have given socially favourable answers.

#### **Conclusions and Recommendations:**

Majority of the study population were between 65 to 70 years, were aware of old age pension scheme and old age pension scheme was maximally utilized schemes. Administrative problems (bank account related problems, document related problems), political issues, awareness related utilization were barriers for utilization of these schemes. More than half of the beneficiaries utilized the scheme beneficiaries felt economic empowerment after availing the scheme and majority of theme felt economically empowered and self-esteem improved. Participants should visit near by administrative body for correction of documents to avail the schemes. Resubmission of documents for those who were not availing the services were recommended. Regular update of bank account every month is required to identify whether they have already gotten the schemes not. Participants was made aware about the social security schemes, and they were recommended to visit local governing body to look for availability of schemes for them and to avail the services is a dire need for them.

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#### Declaration

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Conflicts of interest: Nil

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## A Cross-Sectional Study on Clinical Profile and Factors Associated with Premenstrual Syndrome among Adolescent Girls in Goa

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#### Abstract:

Introduction: Premenstrual syndrome (PMS) is a group of physical and psychological symptoms that occur during the luteal phase of the menstrual cycle. Objective: To determine the proportion of adolescent girls suffering Premenstrual Syndrome using ACOG criteria, to describe the clinical presentations of PMS and to identify the factors associated with PMS among them. Method: A cross-sectional study included adolescent girls in XI and XII standards from selected Higher Secondary Schools in Goa. A sample size of 210 was calculated with a 95% confidence interval, p=0.73, and an absolute error of 0.06. A pre-tested questionnaire covering socio-demographic details, menstrual history, PMS symptoms, and lifestyle factors was distributed before a health talk to girls who had attained menarche, experienced at least three menstrual cycles, and were willing to participate. BMI was calculated and classified per Asian Pacific guidelines. Regular menstruation was defined as cycles averaging  $28 \pm 7$  days and 3-5 days of bleeding. PMS was assessed using ACOG criteria. Data were analyzed using Jamovi Software version 2.3.28, employing descriptive statistics and the Chi-square test to study associations between variables and PMS. Results: In a cross-sectional study among 228 adolescent girls, more than half (59.2%) of the girls reported to have PMS. The mean BMI of the participants was  $20.1 \pm 4.31 \text{ kg/m}^2$ . Irritability was reported to be the most frequent symptom in as high as 41.7% girls. Nearly two-thirds of the adolescent girls (64%) reported to have heavy flow, while the majority of the girls (91.7%) suffered from dysmenorrhea. PMS was found to be associated with age at menarche, amount of blood flow during menstruation and presence of dysmenorrhea (p < 0.05). **Conclusion:** This study revealed that 59.2% of adolescent girls reported to have PMS. Schools should foster an environment where students feel comfortable discussing PMS and other women's health issues.

Keywords: Adolescent Girls, Dysmenorrhea, Menstrual Cycle, Premenstrual Syndrome

#### Introduction:

Premenstrual syndrome (PMS) is the term used to describe a group of physical and psychological symptoms that occur during the luteal phase of the menstrual cycle and are clinically significant.<sup>[1]</sup> These symptoms can cause severe discomfort and functional impairment. Globally, the pooled prevalence of PMS-affected women in their reproductive years is 47.8%.<sup>[2]</sup> In about 5% of women the symptoms are so severe that they interfere with personal and social relationships or work, in many cases requiring pharmacological treatment.<sup>[3]</sup>

American College of Obstetrician and Gynaecologist (ACOG) put forward a criteria which

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consists of any one of the Affective symptoms (Depression, Angry outbursts, Irritability, Anxiety, Confusion and Social withdrawal) and Somatic symptoms (Breast tenderness, Abdominal bloating, Headache and Swelling of extremities).<sup>[1]</sup> These symptoms should occur in the three prior menstrual cycles during the 5 days before the onset of menses and the symptom must resolve within 4 days of onset of menses and not recur until after day 12 of the cycle.<sup>[1]</sup> The cause of PMS has remained unknown, and the research results refer to multiplicity of its causes. Women with PMS reported reduced work productivity and more work days missed for health reasons. High-school students with PMS were more likely to lack concentration and motivation and to have poorer academic performance.<sup>[4]</sup> Women with PMS often fail to go to work or school, resulting in an impaired quality of life.<sup>[5]</sup>

Since there are few published studies that have explored the magnitude of PMS, this study was conducted among adolescent girls in selected higher secondary schools of Goa. The objectives of the study were to determine the proportion of adolescent girls suffering Premenstrual Syndrome, to describe the clinical presentations of PMS among such girls and to identify the factors associated with PMS among them.

#### Method:

The present cross-sectional study was conducted among adolescent girls studying in XI and XII standards of Science, Commerce and Arts streams of selected government Higher Secondary Schools in Goa. Schools were selected using simple random sampling. A sample size of 210 was calculated by taking z=1.96, read from a standardized normal distribution table with 95% CI, p=0.73 is the proportion of most common somatic symptom as pain abdomen from a study by Kavita S Konapur, d=0.06 is the absolute error.<sup>[6]</sup>

The self-administered questionnaire was administered to the study population prior to a health talk. A total of 228 adolescent girls studying in XI and XII standards Science, Commerce and Arts streams of selected Higher Secondary Schools in Goa present for the health talk, who were  $\leq$  19 years of age, had attained menarche & had at least 3 menstrual cycles in the past and were willing to participate in the study were included. Those who were absent on the day of data collection were excluded from the study. The study was conducted over a period of one month. The questionnaire comprised information regarding the sociodemographic details, menstrual history, details regarding symptoms of premenstrual syndrome and lifestyle among the study participants.

Data was collected through in-person interviews using a pre-tested and pre-designed questionnaire. Weight and height were used to calculate body mass index (BMI) using the formula:  $BMI = weight in kg/height in m^2$ . BMI was classified into four groups based on the cutoff points recommended by Asian Pacific body mass index.<sup>[7]</sup> Pattern of menstruation was assessed by length of menstrual cycle and duration of menstruation. Cycle with an average rhythm of  $28 \pm 7$  days and 3-5 days of bleeding is a regular menstruation.<sup>[8]</sup> ACOG criteria were used for assessment of PMS. <sup>[1]</sup> It contains six affective and four somatic symptoms. Symptoms must also meet the following criteria: (i) be relieved within 4 days of the onset of menses, without recurrence until at least cycle day 13; (ii) be present in the absence of any pharmacologic therapy, hormone ingestion, or drug or alcohol use; (iii) be causing identifiable dysfunction in social or economic performance; and (iv) occur reproducibly during two cycles of prospective recording.<sup>[1]</sup>

Ethical clearance was obtained from the Institutional Ethics Committee of Goa Medical College prior to starting the study (Reference code: GMCIEC/2024/187). Written informed consent was obtained from the parents and assent was obtained from the study participants. Data was analyzed using Jamovi Software version 2.3.28 (R based program). Descriptive statistics were used to describe and present the data. Chi-square test was used to study association between study variables and PMS.

#### **Results:**

The mean age of the students was  $16.6 \pm 0.78$  (SD) years. Table 1 shows the distribution of adolescent girls according to the sociodemographic factors. The mean BMI of the participants was  $20.1 \pm$ 

Variables	Category	n (%)
Age (Years)	<u>&lt;</u> 16 years	110 (48.2)
	>17 years	118 (51.8)
BMI	Underweight	89 (39)
	Normal	95 (41.7)
	Overweight	19 (8.3)
	Obese	25 (11)
Mother's	Graduation	21 (9.2)
Educational	Higher Secondary	63 (27.6)
Status	High School	112 (49.1)
	Primary	26 (11.4)
	Illiterate	6 (2.6)
Mother's	Homemaker	162 (71.1)
Occupation	Working	66 (28.9)

Table 1: Distribution of Adolescent Girls accordingto the Socio-Demographic Factors (N=228)

4.31 (range, 12.4 - 41.6) kg/m<sup>2</sup>. Almost half (41.7%) of the study participants had normal BMI, while 39% were underweight, 8.3 % and 11% were overweight and obese respectively. Majority of the mothers of the girls were educated up to high school (49.1%), while 2.6% of them were illiterates. In majority of them, mothers were homemakers (71.1%) by occupation.

Table 2 shows association between physical factors and premenstrual syndrome. Majority of the participants (61%) had their menarche from 12-14 years of age, while 18.4% of them had their menarche after 14 years of age. Most of the study participants (86%) had regular cycles, while almost half of them (56.6%) reported to have cycles longer than 5 days. Nearly, two-third of the adolescent girls (64%) reported to have heavy flow, while the majority of the girls (91.7%) suffered from dysmenorrhea. No statistical significance was observed with regularity of the cycle and duration of cycle. However, it was found to be associated with age at menarche, amount of blood flow during menstruation and presence of dysmenorrhea (p < 0.05).

Table 2: Association between Physical Factors and Premenstr	rual Syndrome (N=228)
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Physical factors	Premenstrual Syndrome		Chi square value
	Present	Absent	p value
	n (%)	n (%)	
Age at menarche			
<u>&lt;</u> 14 years	103 (45.2)	83 (36.4)	6.15, 0.013
>14 years	32 (14)	10 (4.4)	
Regularity of the cycle		-	
Regular	115 (50.4)	81 (35.5)	0.167, 0.683
Irregular	20 (8.8)	12 (5.3)	
<b>Menstrual Bleeding</b>			
Normal or low	39 (17.1)	43 (18.9)	7.20, 0.007
Неаvy	96 (42.1)	50 (21.9)	
Duration of cycle			·
<u>&lt;</u> 5 days	56 (24.6)	43 (18.9)	0.507, 0.477
>5 days	79 (34.6)	50 (21.9)	
Dysmenorrhea		-	
Present	128 (56.1)	81 (35.5)	4.29, 0.038
Absent	7 (3.1)	12(5.3)	

Lifestyle factors	Prem	Premenstrual syndrome			Chi square value,
	Pre	esent	Abse	nt	p value
	n	%	n	%	
Exercise					
Present	31	13.6	19	8.3	0.206, 0.650
Absent	104	45.6	74	32.5	
Sleep					
Adequate	42	18.4	27	11.8	0.113, 0.737
Inadequate	93	40.8	66	28.9	
Screentime					
<6 hours	87	38.2	71	31.1	3.66, 0.056
>6 hours	48	21.1	22	9.6	
BMI					
<23 kg/m <sup>2</sup>	109	47.8	75	32.9	3.23, 0.986
$\geq$ 23 kg/m <sup>2</sup>	26	11.4	18	7.9	

Table 3: Association between Lifestyle Factors and Premenstrual Syndrome (N=228)

About 59.2% of the girls reported to have PMS. Of the affective symptoms in ACOG criteria, 19.7% reported depression. Anger was reported by 32.5% of girls. Irritability was reported to be the most frequent symptom in as high as 41.7% girls. Anxiety and confusion were reported by 11.8% and 21.10% adolescent girls. Around 32.9% experienced breast pain, while social rejection was faced by 26.3% of girls during that period. Headache was reported by almost one third of them (27.6%) and abdominal distension was reported by very few (9.2%) students. None of them reported limb swelling in the premenstrual period.

Table 3 shows the association between the lifestyle factors and PMS. No statistical significance was observed with exercise, sleep, screen time and BMI of the participants. (p < 0.05). Nearly one third of the participants (30.3%) said that the PMS symptoms interfered with their school/ work efficiency or productivity.

#### **Discussion:**

Two hundred and twenty eight adolescent girls took part in this study from selected schools in Goa. The majority of them were aged 16 years (n=110, 48.2%). In the present study, more than half (59.2%) of the girls reported to have PMS. This finding was similar to a study done by Sarkar et al. in which 61.5% of the participants reported to have PMS.<sup>[9]</sup> The variance in the prevalence of PMS amongst different research studies may result from variations in diagnostic standards, populations under study, ethnicity and culture, and data collection techniques.

Among the 228 participants, 86% had regular cycles, 56.6% had a cycle duration of more than five days, and 91.7% had dysmenorrhea. Nearly half of the participants in our study did not exercise at all (n=101, 44.3%), over half had a sleep duration of six to eight hours per day (n=129, 56.6%), and majority had menarche at the age of 12-14 years (n=139, 61%).

There were no significant relation between the incidence of premenstrual symptoms and regularity of menstrual cycle according to a study in Japan.<sup>[10]</sup> In line with the findings of our study, Tolossa and Bekele showed that there was no significant relationship between PMS and BMI.<sup>[11]</sup>

The most commonly prevalent performance impairment interfering with the daily activities of the

participants was frequent class missing (28.3%), whereas in our study, one third of the participants (30.3%) reported PMS symptoms interfering with their school efficiency or productivity.

Riya S et al. reported the most common symptom in the respondents as anger/irritability.<sup>[12]</sup> This finding is similar to the present study where 47.7% of the participants experienced irritability prior to their menses followed by breast tenderness (32.9%) and anger (32.5%). The most frequent affective symptoms included anger outbursts (97.7%), anxiety (73.3%), and irritability (68.6%), which was similar to the reported findings in this study.

Statistically significant associations were observed between age at menarche, amount of blood flow during menstruation and presence of dysmenorrhea with PMS (p < 0.05).

#### **Conclusion:**

Study revealed that 59.2% of school-going adolescent girls From a Selected School had PMS. Schools should foster an environment where students feel comfortable discussing PMS and other women's health issues. This can be achieved by encouraging open communication between students and teachers, as well as providing resources and support for students experiencing PMS symptoms. Schools can ask health professionals to give health talks about PMS and answer any questions students may have. This may help debunk myths and give reliable information about the condition.

#### Limitations:

As the present study was a school-based study, the findings cannot be extrapolated to the general population. No clinical/psychiatric diagnosis to exclude underlying mental health problems was carried out in this study.

#### **Declaration**:

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## **Reminder of Persistent Public Health Cconcerns: A Suspected Case of Adult Tetanus** Anuradha K Shah<sup>1</sup>, Gaurav R Naik<sup>2</sup>, Vijaykumar Singh<sup>3</sup>

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#### Abstract:

Tetanus, once prevalent worldwide, has become rare in developed nations since the advent of active immunization.<sup>[1]</sup> However, in India, where population density and healthcare challenges persist, the burden of adult tetanus remains largely unexplored. Here, authors present a suspected case of adult tetanus in an 18-year-old male from suburban Mumbai, highlighting the ongoing public health concern. The patient, a daily-wage worker, presented with chest pain, back spasms, and progressive muscle rigidity following trauma to his foot. Despite aggressive medical intervention, including immunoglobulin therapy and intensive care, the patient succumbed to cardiac arrest ten days post-admission. This case underscores the persistent threat of tetanus in India, even after the successful elimination of maternal and neonatal tetanus. Delayed diagnosis due to ambiguous symptoms and neglect of basic hygiene practices contribute to severe complications and mortality. Efforts to combat tetanus should focus on enhancing public awareness, promoting vaccination, and ensuring prompt wound care.

Keywords: Immunization, Public Health, Tetanus

#### Introduction:

The word tetanus comes from the Greek word "tetanos," which is derived from "teinein," meaning "to stretch." Tetanus was well known to the ancient physicians of Egypt and Greece, but since the institution of active immunization in 1940, it has become a largely forgotten disease in developed countries.<sup>[1]</sup> India has made significant progress, especially with the achievement of eliminating maternal and neonatal tetanus in 2015.<sup>[2]</sup> However, the statistics are still unknown when it comes to adult tetanus, as no population-based burden estimates of adult tetanus are available in India.<sup>[3]</sup>

#### CASE:

A case of tetanus in an 18-year-old male patient from a village in Uttar Pradesh, residing in suburban

Mumbai and working as a daily wage worker at a construction site. He studied up to the 9<sup>th</sup> standard. The patient was brought to the emergency department of a tertiary care centre attached to a medical college in Mumbai by one of his relative who stays with him. The history and other details were provided by the cousin, who is a reliable informant. Informed verbal consent was obtained from him for the furnished details and photographs.

The patient was apparently alright until he developed chest pain and back spasms one evening, after which he visited a nearby general practitioner and took medications for symptomatic relief and an injection for pain. There was no relief, and the symptoms progressed to more intense spasms in the

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Figure 1: Clinical picture of the patient with spastic posture with tracheostomy tube in situ.



back and neck, chest pain, breathlessness, and inability to open his mouth overnight. He was unable to get up and sit or stand from a lying-down position. The following day, the patient was taken to a municipal hospital where symptomatic treatment was given (details not available), and he was referred to a tertiary care medical college due to suspected tetanus. He presented to the emergency department late at night on the same day with complaints of chest pain, difficulty in breathing, inability to open his jaw, and spasms in his neck and back for the past three days. There were no aggravating or relieving factors. The patient had a history of trauma to the third toe of the right foot by a nail/piece of stone at his place of work about 48 hours before the first symptoms appeared. This was left unattended, and no treatment was taken for the same.

There was no history of any similar episodes in the past, seizure disorder, headache, vomiting, frothing from the mouth, up-rolling of eyeballs, or tongue bite. There was no history of recent infections, fever, loss of consciousness, altered sensorium, or surgery. He also denied a history of injecting any drugs in the past. Despite best efforts, the immunization history could not be confirmed by asking the relatives.

On examination at arrival, the patients general condition was poor. He was unconscious (eyeopening to deep pain only), his speech was incomprehensible, he had lockjaw and generalized rigidity with a tonic posture and arching of the back. The patient was afebrile, his pulse was 117 bpm, Blood pressure was 160/110 mmHg in the supine position, and Hemo Glucose Test(HGT) was115 mg/dl. Pupils were reactive to light. The spatula test for tetanus was positive. There was increased tone in the bilateral upper and lower limbs with extensor plantar reflexes on the right side. An emergency tracheostomy was performed due to respiratory distress (Figure 1). Arterial blood gases (ABG) were suggestive of lactic acidosis. The patient's vitals were monitored regularly. The Glasgow Coma Scale(GCS) was E1VtM1.

Injection Human Tetanus Immunoglobulin 500 IU I.M (TETGLOB) was given along with injection Tetanus toxoid 0.5 ml I.M., (No previous history of tetanus vaccination available) intravenous MgSo4, and sedatives drip (Midazolam and Vecuronium). The patient was shifted to the Medical Intensive Care Unit with isolation to avoid sensory stimuli. The relatives were informed about the prognosis of the patient. The condition of the patient deteriorated as he developed autonomic dysfunction with his blood pressure raised to 190/110 mmHg and heart rate dropped to 50 bpm, following which intravenous Nicardia was administered. The intravenous MgSo4, Vecuronium, and Midazolam, along with Metronidazole 400 mg every 8 hours, beta-blockers (intravenous Labetalol 30 mg/hour), and

intravenous antibiotics were continued to manage the episodes of autonomic dysfunction. The general consciousness of the patient remained poor, with a GCS of E1VtM1, mid-dilated pupils, and the presence of Doll's eye reflex. His condition did not improve even with continued treatment. Eventually, the patient succumbed to cardiac arrest and shock 10 days after admission.

#### **Discussion:**

Tetanus caused by C. tetani is still a public health problem in India. This case exemplifies the persistent challenge of adult tetanus in regions like India, where, despite significant public health strides such as the elimination of maternal and neonatal tetanus, adult cases continue to present.<sup>[2]</sup> The tragic outcome of this case, involving an 18-year-old male from suburban Mumbai, highlights several critical aspects of disease management and public health policy that warrant further discussion. Firstly, the incidence of tetanus in adults remains a significant concern in India, reflective of broader issues in public health infrastructure, particularly in rural and suburban populations that may lack adequate access to healthcare services and education on disease prevention. Despite the availability of effective vaccines, the case fatality rates reported in the literature, ranging from 42.2% to 53.3%, underscore the severe impact of the disease when it does occur<sup>[4]</sup>. This suggests that while vaccine coverage may be broad, there are gaps in either vaccine efficacy over time or in booster administration, which must be addressed.

Secondly, this case underscores the critical importance of timely diagnosis and management of tetanus, which is often complicated by its nonspecific early symptoms such as spasms and pain, which can easily be mistaken for other ailments. The patients initial symptoms were managed with routine pain relief, which delayed appropriate tetanus-specific interventions and may have contributed to the worsening of his condition. Efforts to combat tetanus should also focus on enhancing public awareness, promoting vaccination, and ensuring prompt and appropriate wound care. As demonstrated in this case, neglect of basic hygiene practices and wound care can lead to severe complications and mortality. Public health campaigns should be tailored to reach at-risk populations, particularly those in remote or underserved areas, and should emphasize the lifesaving potential of vaccination and proper wound management.<sup>[4,5]</sup>

#### **Conclusion:**

The efficacy of national immunization programs in developed countries is undeniable, having substantially mitigated the occurrence of tetanus cases. However, there are still a small number of cases that present with ambiguous or non-specific symptoms such as dysphagia, neck stiffness, and other oropharyngeal symptoms portraying a prodromal state of the illness, which could eventually lead to full-blown generalized tetanus. Once developed or allowed to progress, it ultimately leads to respiratory or autonomic dysfunction, necessitating long-term intensive care or even resulting in death in more severe cases. The negligence or absence of public health hygiene and wound care can lead to a serious disease that can at any time progress to fatality, as seen in this case. Therefore, as public health professionals, it is important to raise awareness regarding the spread of the disease, discuss risk elimination strategies, encourage vaccination and prompt treatment, and promote healthcare-seeking behaviour.

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#### **Declaration:**

Funding: Nil Conflict of Interest: Nil

#### Declaration of patient consent:

The authors certify that they have obtained all appropriate patient consent. The patients relative has given his consent for his images and other clinical information to be reported in the journal. They understand that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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### **INSTRUCTIONS FOR AUTHORS**

"Healthline" is a quarterly published national journal of Indian Association of Preventive and Social Medicine. "Healthline" aims to promote quality research in the field of Community Medicine and Public health. The editorial board of the journal is committed to an unbiased, independent, anonymous and confidential review of submitted articles. Manuscripts submitted to this Journal, should not have been published or under consideration for publication in any substantial form in any other publication, professional or lay. All the manuscripts once submitted to and published in the Healthline will become the property of the journal.

#### Aims and Objectives of the Journal:

The "Healthline" journal aims at promotion of high quality medical research by

- Ensuring the accessibility to novel ideas, observations and advanced knowledge for all by adopting open access policy
- Providing a platform to researches in Community Medicine and Public Health
- Improving the visibility of public health issues for concerned stake holders

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The "Heathline" journal follows double blind peer review process. Following receipt of a manuscript from the authors, the manuscript undergoes an editorial review (by editor in chief/executive editor/joint editor). If the manuscript is found appropriate for the further process following the editorial review, the blind manuscript is sent to two anonymous peer reviewers and one statistical reviewer. It is ensured that the reviewers are having qualifications of postgraduation or higher in the concerned subjects and not from the same institute where the authors belong. Upon completion of peer review, the changes suggested by the reviewers are forwarded to the authors and modifications are sought with explanations (if required). The revised manuscript is again forwarded to the concerned reviewers. If the reviewers are satisfied with the revisions from the authors, the manuscript is accepted and formative changes are done for the publication. At any stage of review, if editorial board members or reviewers find the manuscript unsuitable for the publication, the manuscript is rejected.

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Continuing Medical Education	
/Review article	4500
Original article *	3000
Shortarticle	1500
Letter to Editor	750
Book review (should not be	
sponsored by any	
company/organization)	500

\*Excluding abstract, references, tablesand images

Manuscript should be prepared using American English language. Articles exceeding the word limit for a particular category of manuscript would not be processed further. Uniform Requirements for Manuscripts (URM) submitted to Biomedical Journals should be consulted before submission of manuscript (http://www.icmje.org).

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All articles should mention how human and animal ethical aspect of the study was addressed. Mention whether informed consent was taken or not. Identifying details should be omitted if they are not essential. When reporting experiment on human subjects, authors should indicate whether the procedures followed were in accordance with the Helsinki Declaration of 1975, as revised in 2000. (http://www.wma.net).

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*Citation:* Several research studies have revealed gap between facts and beliefs of adolescent girls and showed that there is low level of awareness about menstruation among girls when they first experience it.<sup>[4]</sup>

*Journals:* Mehta MN, Mehta NJ. Serum lipids and ABO Blood group in cord blood of neonates. Indian J Pediatr.1984; 51:39-43.

*Book:* Smith GDL. Chronic ear disease. Edinburgh: Churchill Livingstone; 1980.

*Chapter in the Book:* Malhotra KC. Medicogenetics. problems of Indian tribes. In: Verma IC, editor. Medical genetics in India.vol. 2. Pondicherry: Auroma Entrprises; 1978. p. 51-55.

Papers accepted but not yet published should be included in the references followed by 'in press". Those in preparation, personal communications and unpublished observations should be referred to as such in the text only. Total number of references should not be more than 25 for an Original article.

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A descriptive legend must accompany each illustration and must define all abbreviations used therein.

#### Tables (Maximum 4):

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"Healthline" journal, the official publication of the Indian Association of Preventive and Social Medicine (IAPSM), is indexed with DOAJ, Index Copernicus, OPENJGATE, CABI, and Index Medicus-SEAR. Published quarterly, "Healthline" aims to foster quality research in the field of Community Medicine and Public Health.

The editorial board of the journal is committed to an unbiased, independent, and anonymous review of submitted articles. The published articles are freely accessible on the official website of "Healthline" journal, which authors can download at any time. Besides original manuscript, journal also publishes Review articles, Book review, Letter to editor, Short Communication and any other important information/updates relevant to Community Medicine and Public Health.

Manuscripts are invited from aspiring authors for the publication in the upcoming issue of "Healthline" journal. Authors are encouraged to submit their manuscript pertaining to field of Epidemiology, Health Promotion, Health Policy and Management, Environmental Health, Occupational Health, Maternal and Child Health, Infectious Diseases, Non-communicable Diseases, Health Informatics and recent advances in Community Medicine for publication in "Healthline" Journal. The authors may send the articles in the prescribed format available at "instructions for authors" section on the website-https://www.healthlinejournal.org/

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Editor in Chief "Healthline" Journal

## **HEALTHLINE JOURNAL**

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