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Correspondence

Editor in Chief, Healthline Journal, Community Medicine Department, GCS Medical College, Hospital and Research Center, Opp. DRM Office, Nr. Chamunda Bridge, Naroda Road, Ahmedabad-380025, Gujarat. Telephone: 07966048000 Ext. No. 8351, Email: editorhealthline@gmail.com.

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India's response to combat Rabies

Viral Dave[1], Venu Shah[2], Margi Sheth[3]

[1]Professor and Head, [2]Professor, [3]Assistant Professor, Community Medicine Department, GCS Medical College, Ahmedabad, Gujarat, India

Correspondence: : Dr. Venu Shah, Email: drvenushah@gmail.com

Rabies is one of the oldest known diseases, caused by the virus belonging to Rhabdoviridae family. It primarily spreads through the saliva of infected animals, most commonly via bites, leading to viral encephalitis, which is often fatal without prompt treatment. Historically, rabies was a uniformly fatal disease. With development of Pasteur's rabies vaccine in 1885, fatalities were drastically reduced especially in developed countries. In contrast, less developed regions continue to face significant challenges due to inadequate access to prevention and treatment.

Rabies is prevalent in more than 150 countries and territories. India accounts for 35% of the global mortality rate from rabies.[1] Dog-bites remain a significant public health concern which contributes up to 99% of all rabies transmission in humans[2], particularly in areas with limited public awareness about rabies prevention. The socio-cultural belief deeply enrooted in lifestyles of citizens in Indian sub-continent is harmful when it comes to animal-friendly traits. There is a benevolent belief of feeding animals as a part of spiritual longing and people, especially children are used to play with street/stray dogs at rural and urban slum areas. On the other hand, a few citizens from higher economic class are gratifying them selves by entertaining dogs of extraneous breed as pets at their homes. The either cohort mentioned above, are lacking first-hand adequate knowledge of necessities of animal vaccination and consequences in absence of same. The political leadership and judiciary do respect socio-cultural belief of the people against "dog-population control measures" which is creating a setback against on-going tasks of anti-rabies activities in country. Addressing these gaps is crucial for reducing the risk of rabies which is 100 % preventable disease.

In India under the 11th Five Year Plan, National Rabies Control Programme (NRCP) was implemented by National Center for Disease Control in five cities; Delhi, Ahmedabad, Pune, Bangalore and Madurai; project began from January 2008 and continued till 2012. During the 12th Five-year plan, from 2014 to 2017, a pilot was undertaken to test the strategy of animal Health Components in Haryana and Chennai through Animal Welfare Board of India (AWBI) under the aegis of The Ministry of Environment, Forests and Climate Change (MoEF&CC), Government of India. With the lessons learnt in the pilot, in 12th Five Year Plan, NRCP was rolled out in entire country. Human health component of the NRCP program was successfully implemented by all States/UTs.

In 2015, the global goal of "Zero human deaths from dog-mediated rabies by 2030" was set, with countries like the US, Mexico, and Japan achieving it through the One Health approach.[3] India's commitment to this goal is reflected in the National Rabies Control Program (NRCP), which aims to

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prevent rabies deaths in humans and progressively achieve the global target by 2030 through the One Health approach. State-level activities have been implemented through the National Health Mission since 2019-20, and the program has been approved under the State Finance Commission for 2021-26 under Scheme E of the NCDC umbrella.[4]

Components of NRCP under One Health Approach:

1. Capacity Building of States and district level manpower for prevention and control of rabies
2. Promote of cost effective Intra-dermal rabies vaccines for Rabies Post Exposure Prophylaxis.
3. Strengthen rabies diagnostics
4. Strengthening Surveillance of animal bites and rabies cases
5. Information, Education & Communication
6. Intersectional coordination
7. Operational Research

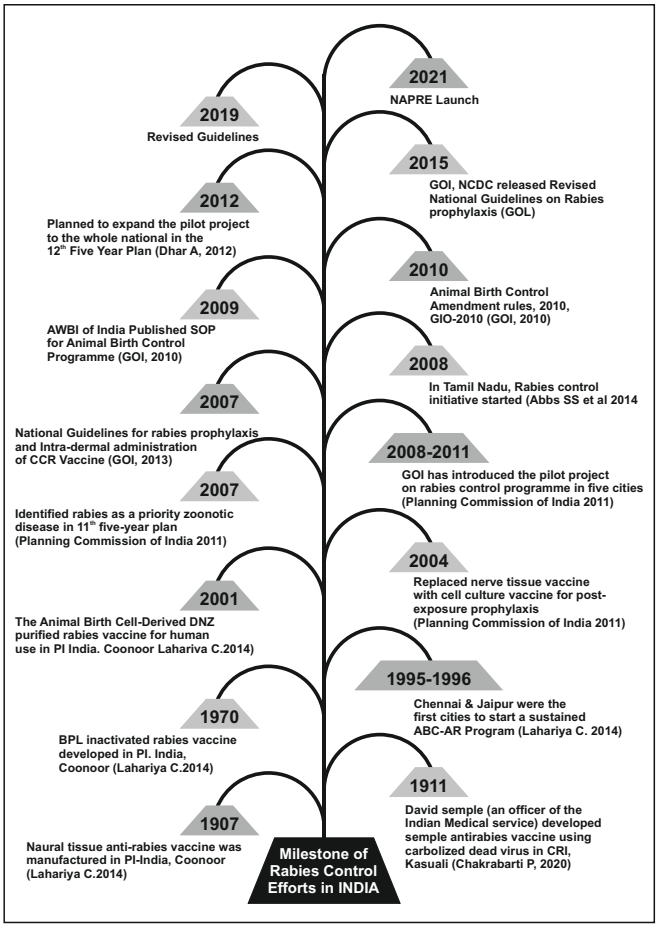
Recently, veterinary public health component is added in the "National Action Plan for dog mediated Rabies Elimination from India by 2030" (NAPRE).[3]

Components of the NAPRE are;

1. Estimating the population of dogs,
2. Identification of Rabies risk zones for rabies,
3. Planning & implementing strategic mass dog vaccination programme,
4. Assessment of Post vaccination coverage
5. Dog Population Management (DPM)
6. To promote responsible dog ownership
7. Solid waste management (SWM)
8. Community involvement
9. Confinement and containment
10. Operational research

The endorsement of the NAPRE has been led by six ministers encompassing a diverse range of portfolios: Health and Family Welfare; Fisheries, Animal Husbandry, and Dairying; Environment, Forests, and Climate Change; Housing and Urban Affairs; Agriculture and Farmers Welfare; and Rural Development and Panchayati Raj. Despite the varied objectives and resource priorities of different ministries and departments, it is encouraging to see a broad political consensus and commitment towards the common goal.

Figure 1: Milestones in Rabies Control in India[4]



Successful implementation of One Health Approach has led Goa to become the first Indian state to be declared a Rabies Controlled Area under the Prevention and Control of Infectious and Contagious Diseases in Animals Act, 2009, ensuring legislation to maintain rabies control activities and setting a precedent for other states.[5]

SWOT analysis of Rabies control activities in India:

Strengths: Government of India has started the rabies control efforts with the national focus on rabies elimination by 2030 through initiatives like the National Rabies Control Programme (NRCP). The National Action Plan for Dog-Mediated Rabies Elimination incorporates strategies that emphasize intersectoral coordination to enhance rabies prevention activities. The uninterrupted availability

of post-exposure prophylaxis (PEP) in healthcare facilities further enhances the strength.

Weaknesses: It includes limited public awareness regarding rabies prevention and control, particularly in rural areas. Inadequate and poorly supervised implementation of stray animal population control measures[6] and dog vaccination programs may hinder the elimination goal. Quality checks per taining to the stray animal population control activities by appropriate district/municipal health authorities are need of time. Additionally, the judicial system shall suggest necessary reforms, particularly in establishing norms for responsible pet ownership.

Opportunities: The awareness campaign can be reinforced through a complex web matrix of existing stakeholders of public-health, including healthcare professionals, grassroot-level workers and community health volunteers. Frontline workers, who have direct access to families and community leaders, can play a vital role in spreading awareness at household level. Even the opportunity can be grabbed while parents approach health-clinics for routine vaccination of under-five children. Coordinating with local NGOs, municipal authorities, community/media influencers and veterinary services, a cohesive message on rabies prevention can reach deeper into rural and urban communities.

Threats: Growing trend of pet ownership without necessary knowledge of animal vaccination and self-care, a large stray-dog population, and social customs including widespread feeding of stray animals poses a big threat for on-going program. The lack of strict enforcement/existence of animal control legislations further exacerbates the situation. Additionally, the emergence of rabies cases among vaccinated individuals in India is an impending threat that needs urgent attention.[7]

Way Foreword:

Eliminating rabies is not just a goal; it's an urgent necessity. With thousands of lives lost annually to this preventable disease, the time to act is overdue. The urgency of the situation demands decisive action, concerted efforts, and unwavering commitment from all stakeholders. Innovations in technology and research offer promising avenues for augmenting rabies control efforts in India. Advances in surveillance techniques, including the use of geographic information systems (GIS) and smart phone applications for reporting and tracking rabies cases, can help identify hotspots and target interventions more effectively. Additionally, research into novel vaccine formulations, such as oral vaccines for wildlife and long-acting vaccines for dogs, holds the potential to revolutionize rabies control strategies. Collaboration between government agencies, NGOs, academia, and the private sector is essential for maximizing the impact of rabies control efforts. Every moment counts in this collective endeavour to rid the world of rabies and ensure a safer, healthier future for all.

Declaration:

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Conflict of Interest: Nil

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A Mixed-Method Study on Iron-Folic Acid Adherence and its Determinants among Pregnant Women in Puducherry, India

Poosarla Saimaa[1], Mathiyalagen Prakash[2], Jayabal Pandiamunian[3], Pulavarthi Sabita[4], Kanagasabapathy Sivagami[5], Mausumi Basu[6]

[1]MBBS student, Indira Gandhi Medical College & Research Institute, Puducherry, India
[2]Associate Professor, Department of Community Medicine, Indira Gandhi Medical College Research Institute, Puducherry, India
[3]Assistant Professor, Department of Pharmacology, Indira Gandhi Medical College & Research Institute, Puducherry, India
[4]Professor and Head, Department of Obstetrics and Gynaecology, Indira Gandhi Medical College &Research Institute, Puducherry, India
[5]WHO consultant, Coimbatore, India
[6]Professor and Head of Department, Department of Community Medicine, Institute of Post Graduate Medical Education and Research, Kolkata, India
Correspondence: Dr. Mausumi Basu, Email: basu.mausumi544@gmail.com

Abstract:

Introduction: Anaemia poses a significant risk to maternal health, contributing to preventable morbidity and mortality among pregnant women. Iron-folic acid (IFA) supplements are provided free of charge to meet the pregnancy's nutritional needs; however, consumption and adherence remains suboptimal. **Objectives:** To assess the compliance and associated factors for IFA supplementation and to explore the perceptions and barriers among pregnant women attending antenatal clinic. **Method:** The authors conducted a sequential explanatory mixed-method study at a tertiary care hospital, involving 219 pregnant women in the third trimester seeking antenatal care. The participants were selected through systematic random sampling during the study period of two months. Quantitative data were collected using a pre-tested interview schedule and the Morisky Green Levine Medication Adherence Scale. Qualitative data were obtained through focus group discussions, analyzed using content analysis. **Results:** Among the participants, 64.4% (95% CI: 57.7%-70.7%) were adherent to IFA during pregnancy. Factors significantly associated with adherence included higher monthly income, increase the number of antenatal check ups and absence of anemia. Common reasons for non-adherence were forgetfulness (62.8%), unawareness (26.9%), side-effects (25.6%), inadequate counseling (23.1%) and tablet taste (3.8%). Qualitative analysis revealed two themes and eight categories. The categories identified under knowledge regarding anaemia were causes, symptoms, complications, treatment options and places for procuring IFA supplements and the categories under barriers to adherence were patient factors, medication factors and health system factors. **Conclusion:** Approximately one-third of pregnant women did not adhere to IFA supplementation. Findings underscore the importance of consistent nutrition counseling during ante-natal visits, with a special focus on addressing side effects. These results have implications for maternal health programs and policies aimed at improving adherence to essential supplements during pregnancy.

Keywords: Adherence, Anaemia, Haemoglobin, Pregnant women.

Introduction:

Anaemia is a major public health problem worldwide. In pregnancy, anaemia is typically defined as hemoglobin level below 11g/dl at sea level[1] The global prevalence of anaemia among pregnant women is 36% and in India it reaches as high as 50%.[2] In Puducherry, according to the 2019 National Family Health Survey (NFHS-5), the

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prevalence of anaemia among pregnant women stands at 42.5%, marking a concerning increase from 26% reported in the previous NFHS-4 survey.[3] Anaemia reduces the oxygen carrying capacity of hemoglobin, which has an effect on all the organs. It poses a dual threat to both the mother and the fetus. Maternal anaemia increases the risk of pre-eclampsia, peri-natal infection and hemorrhage, whereas in the offspring, it is associated with low birth weight, prematurity and impaired growth and development.[4]

To address the pervasive issue of anaemia among pregnant women, India has launched various national health programs since 1970s, including the National Nutrition Anaemia Control Program (NNACP), National Iron Plus Initiative (NIPI), Weekly Iron Folic acid Supplementation (WIFS) and Anemia Mukt Bharat (AMB)/ Intensified National Iron Plus Initiative (INIPI). Under AMB, antenatal mothers are provided with 60 mg of elemental iron and 500 mcg of folic acid for 180 days before and after child birth.[5] However, despite these initiatives, the adherence to iron-folic acid (IFA) supplementation remains notably low.[6] Iron is considered as the one-way element as it is rarely excreted through kidneys in healthy individuals.[7] Oral iron absorption is tightly regulated according to the body's requirements, rendering excess iron inaccessible for absorption in the gastrointestinal tract. The accumulation of excess iron, as seen in repeated transfusions, can have detrimental effects on endocrine organs, the heart and the liver due to generation of free hydroxyl radicals through the Fenton reaction.[8] Therefore, unless medically warranted, parenteral forms of iron should be avoided.

Numerous studies[9-10] have examined the prevalence of adherence to IFA supplementation but a standard tool has not been consistently employed. In the present study four-item Morisky Green Levine scale (MGLS) was employed, which demonstrates moderate internal consistency reliability with Cronbach's α=0.651.[11] This scale offers the advantage of brevity, making it suitable for assessing IFA adherence during busy outpatient department (OPD) consultations. This study adopts a mixed method approach encompassing both quantitative and qualitative components. This approach allows to gain insight into participants' perspectives, encourages scholarly interaction, offers methodological flexibility, and yields rich and comprehensive data.

Previous research by Manasa et al[12] in 2017 assessing the compliance to IFA supplementation in pregnancy at a tertiary care center in Mysore, considered individuals who had taken 100 tablets as compliant, revealing a compliance rate of 71%. Reasons for non-compliance included inadequate counselling by health care worker, side effects, tablet cost, ignorance and fear of side effects. Similarly, Kumar et al.'s[10] study in 2018, conducted in a primary health center in Tamil Nadu, found that 69% of pregnant females were compliant with IFA supplementation. Reasons for non-compliance included the tablet's color and taste, side-effects, negligence and loss of tablets. Another hospital based cross sectional study conducted in the antenatal clinic of a tertiary care hospital in Deoghar Jharkhand and revealed that the proportion of compliance to IFA among antenatal mothers was 58.8%, and the reason for noncompliance in the majority was forgetfulness (46.7%) followed by "side effects".[13] Given the aforementioned factors, the present study aims to determine the proportion of compliance to IFA supplementation and identify the determinants of non-compliance among pregnant women attending an antenatal clinic in a tertiary care center.

Method:

Study Design

This sequential explanatory mixed-method design was carried out at the Obstetrics and Gynaecology (OG) OPD of a tertiary care teaching hospital in Puducherry, India between September

2021 and October 2021. Quantitative part using descriptive cross-sectional study design was followed by qualitative part in the form of focus group discussion. The tertiary care hospital was catering the population of Union territory of Puducherry and also the nearby districts of Tamil Nadu.

Quantitative component

Study population

Every day, 70 antenatal mothers were be registered and provided antenatal care services at the Obstetrics and Gynaecology OPD. Pregnant women aged 18-45 years, in their third trimester (after completing 27 weeks), attending the clinic for the first time during the study period and who gave informed written consent were included in the study upon giving consent. Study participants who were not comprehensive for data collection, those with known haemoglobinopathies and those in whom iron supplementation was contraindicated were excluded from the study.

Sample size

The sample size was calculated by considering the proportion of pregnant women compliant to IFA supplementation as 85.7%[12] with absolute error of margin as 5% and alpha error as 5% and it was estimated to be 189 using the formula, $N=Z^2_{(1-\alpha/2)}PQ/d^2$[14] The final adjusted sample size by adding a non-response rate of 10% was estimated to be 210 using the formula, $N_f= N/1-q$.[15]

Sampling technique

In the study setting, every day 20 to 25 eligible pregnant women were attending out of the 60 to 70 antenatal mothers registered in the antenatal OPD. Since the registration was completed in the beginning of the day (around one hour), the sampling frame from this register was used for systematic random sampling. The study participants were determined by using the formula: $k=N/n$[16] where N represents the total number of eligible pregnant women expected to attend the OPD during the study period of two months, estimated at 1050 as recorded by the Medical Registration Department for the previous two months, and 'n' represents the sample size, (k=1050/210=5). Every fifth registered person was selected as a study participant daily until the sample size was achieved.

Data collection

A pre-designed, pre-tested, semi-structured interview schedule was used for face to face interview with study participants which has the following parts: Part 1 - Socio-demographic details, brief antenatal history, personal history, details on iron and folic acid supplementation (knowledge on how many tablets used per day, for how many days, the side effects etc.); Part 2- Morisky Green Levine Medication Adherence Scale (MGLS)[17], Self-reporting adherence[18] measure; Part 3- Examination to look for pallor, Haemoglobin status- latest report if available/blood examination by automated methods.

Data analysis

Data capturing was done using Epicollect 5 and analysis was done using SPSS Version 22 and Open Epi Version 3.01. Descriptive statistical analysis was done to represent the frequency, percentage, mean, standard deviation and median with inter-quartile range. Shapiro-Wilk test was used to assess the normality of the data. Categorical variables using chi-square test and continuous variables using either student's unpaired t test or Mann-Whitney U test were analyzed. Multi-collinearity was assessed using Tolerance (<0.1) and Variance Inflation Factor (>10) to remove the variables. Variables with p value $\leq$0.25 in the univariate analysis were subjected to binary logistic regression, after meeting assumptions, to derive adjusted odds ratio. P value <0.05 was considered as significant.

Operational definition

MGLS has four questions/ items with yes or no options. Levels of medication adherence can be categorized as high (0 point), medium (1-2 points) and low (3-4 points). A dichotomous categorization with 0 point for adherence and 1 or more points for

non-adherence is also widely used.[19] In self-report adherence measure[18] the patients are considered to be adherent, If they have consumed IFA tablets for more than four days in a week. Haemoglobin level less than 11gm/dl is defined as anaemia in pregnancy.[1]

Qualitative component

Sampling technique and sample size

Purposive sampling technique was adopted to select the pregnant women attending the OPD who were vocal and willing to participate. Ten antenatal mothers were included for the focus group discussion (FGD) and the data was collected till the point of saturation (two FGDs).

Data collection

FGD was done among antenatal mothers attending the OPD in a common place near the OG OPD. The discussion was facilitated by a female medical under-graduate student under the guidance of a trained faculty in qualitative research, using a topic guide to explore the knowledge related to anaemia, anaemia in pregnancy, complications of anaemia in pregnancy, treatment options for anaemia, iron and folic acid supplementation and reasons for non-compliance to iron and folic acid. After explaining the purpose of the study and informing about the audio recording the discussion, consent was obtained from all the participants. Initially, the members were welcomed and after a brief explanation the session was started. The FGD was carried out in the local language, Tamil and the discussion took about 45 minutes. COVID appropriate behavior was followed during the entire process of FGD. Summary of the discussion was read in front of the participants from the field notes for validation. Refreshments were provided to the study participants at the end of the FGD.

Data analysis

Verbatim transcription was carried out from the audio-recordings. Translation and back translation were done by two different authors to ensure the consistency of the meaning while translating from Tamil to English. The final version of English transcript was checked with audio-recording and field notes for accuracy of the data. Descriptive contentanalysis was done manually.

Ethical considerations

The Institute Ethics Committee approval (No. 281/IEC-30/IGMC&RI/PP/2020 dated 28.07.2021) was obtained before starting the data collection. Written informed consent was obtained from the study participants. COVID appropriate behavior was advocated and followed during the entire study period.

Results:

Quantitative component

Socio-demographic characters associated with adherence to iron and folic acid supplementation among pregnant women are shown in Table 1. The mean age of the participants was 25.4±3.84 years. Higher adherence to IFA was observed among women having graduate and post-graduate education (OR: 1.785; 95% CI: 1.021, 3.123; p value=0.0414) compared to education up to higher secondary level. Similarly those with higher monthly income (>10,000INR) (OR: 2.17; 95% CI: 1.234, 3.814; p value=0.0067) had higher adherence compared to those with lower monthly income. There was no statistically significant association between adherence and other socio-demographic variable like age, occupation and type of family.

Obstetric care related characters associated with adherence to iron and folic acid supplementation among pregnant women is shown

Table 1: Socio-demographic Determinants IFA Adherence (N=219)

Factors	Total (N=219) n (%)	Adherent (N=141) n (%)	Non-adherent (N=78) n (%)	p value	Odds Ratio (95% CI)
Age, mean (SD)	25.4 (3.84)	25.5 (3.73)	25.2 (4.04)	0.567*	-
Age category					
≤20 years	22 (10.0)	13 (59.1)	9 (40.9)	0.821	0.77 (0.31-1.89)
21-30 years	176 (80.4)	115 (65.3)	61 (34.7)		1
≥31 years	21 (9.6)	13 (61.9)	8 (38.1)		0.86 (0.34-2.19)
Education					
Up to High school	44 (20.1)	25 (56.8)	19 (43.2)	0.054	1
Higher secondary	51 (23.3)	29 (56.9)	22 (43.1)		1.00 (0.44-2.26)
Graduate	101 (46.1)	67 (66.3)	34 (33.7)		1.50 (0.73-3.09)
Post graduate	23 (10.5)	20 (87.0)	3 (13.0)		5.07 (1.31-19.59)
Occupation					
Employed	37 (16.9)	22 (59.5)	15 (40.5)	0.493	0.78 (0.38-1.60)
Un employed	182 (83.1)	119 (65.4)	63 (34.6)		1
Monthly income					
≤10000 INR	105 (47.9)	58 (41.1)	47 (60.3)	0.012	0.38 (0.20-0.72)
10001-20000 INR	77 (35.2)	59 (41.8)	18 (23.1)		1
>20000 INR	37 (16.9)	24 (17.0)	13 (16.7)		0.56 (0.24-1.33)
Monthly income, Median (IQR)	12000 (11500)	15000 (10000)	10000 (8000)	0.004#	-
Type of family	115 (52.5)	76 (66.1)	39 (33.9)	0.580	1.17 (0.67-2.03)
Joint Nuclear	104 (47.5)	65 (62.5)	39 (37.5)		1

Chi-square test,*Un-paired t-test, #Mann-Whitney U test

in Table 2. Higher adherence to IFA was observed among women having more no. of ante-natal visit (≥4) (OR: 2.629; 95% CI: 1.192, 5.798; p value=0.0141), longer health facility distance (>3km) (OR: 1.862; 95% CI: 1.052, 3.298; p value=0.0320), no history of anemia (OR: 5.514; 95% CI: 2.645, 11.49; p value<0.001), weekly doses (≥4 doses IFA consumption) (OR: 19.69; 95% CI: 9.399, 41.26; p value<0.001), absence of pallor (OR: 13.03; 95% CI: 6.558, 25.87; p value<0.001) and non-anemic HB category (OR: 2.51; 95% CI: 1.386, 4.543; p value=0.0021). Overall the mean Hb level was 10.56 (1.44). Those who were adherent had higher mean Hb level than non-adherent participants [10.86 (1.33) versus 10.03 (1.50)].

Table 3 shows that majority of the patients said forgetfulness as the reason for non-adherence followed by ignorance, side-effects and inadequate counselling. Few patients said taste, fear and colour were also some of the reasons for non-adherence.

Binary logistic regression analysis was done using Enter method to determine the effects of education, income, ANC visits, anemic history and health facility distance on the likelihood that the pregnant women was adherent to IFA. The results showed that pregnant women, who had higher monthly income, had 2 times higher odds of adherence to IFA (aOR: 2.039; 95% CI: 1.095, 3.777; p value=0.025) than their counterpart. Women, who visited ANC more than four times, had 3 times higher odds of adherence to IFA (aOR: 3.143; 95% CI: 1.281, 7.714; p value=0.012) and women, who had no history of anaemia, had 6 times higher odds of adherence to IFA (aOR: 6.129; 95% CI: 2.775, 13.538; p value<0.001).

Table 2: Obstetric Care Related Determinant of IFA Adherence Antenatal (N=219)

Factors	Total n (%)	Adherent n=141 (%)	Non-adherent n=78 (%)	p value*	Odds Ratio (95% CI)
Gravida					
Primigravida	101 (46.1)	66 (65.3)	35 (34.7)	0.783	1.08 (0.62-1.88)
Multigravida	118 (53.9)	75 (63.6)	43 (36.4)		1
Antenatal visit					
≥ 4	45 (20.5)	36 (80.0)	9 (20.0)	0.014	2.63 (1.19-5.80)
< 4	174 (79.5)	105 (60.3)	69 (39.7)		1
Health facility distance category					
≤ 3 km	122 (55.7)	71 (58.2)	51 (41.8)	0.059	0.39 (0.17-0.89)
3-6 km	56 (25.6)	38 (67.9)	18 (32.1)		0.59 (0.24-1.50)
>6 km	41 (18.7)	32 (78.0)	9 (22.0)		1
IFA taken for past pregnancy(n=118)					
No	8 (6.8)	2 (25.0)	6 (75.0)	0.050	0.17 (0.03-0.88)
Yes	110 (93.2)	73 (66.4)	37 (33.6)		1
Place for procurement of IFA					
Private	41 (18.7)	26 (63.4)	15 (36.6)	0.886	0.95 (0.47-1.92)
Public	178 (81.3)	115 (64.6)	63 (35.4)		1
Current history of anemia					
No	178 (81.3)	128 (71.9)	50 (28.1)	<0.001	5.51 (2.65-11.49)
Yes	41 (18.7)	13 (31.7)	28 (68.3)		1
Health Care Worker home visit					
No	164 (74.9)	109 (66.5)	55 (33.5)	0.267	1.42 (0.76-2.66)
Yes	55 (25.1)	32 (58.2)	23 (41.8)		1
Weekly doses of IFA					
<4	65 (29.7)	13 (20.0)	52 (80.0)	<0.001	1
≥4	154 (70.3)	128 (83.1)	26 (16.9)		19.69 (9.40-41.26)
Presence of Pallor					
Absent	152 (69.4)	124 (81.6)	28 (18.4)	<0.001	13.03 (6.56-25.87)
Present	67 (30.6)	17 (25.4)	50 (74.6)		1
Hb category					
Non-anemic	92 (42.0)	70 (76.1)	22 (23.9)	<0.001	1
Mild	72 (32.9)	47 (65.3)	25 (34.7)		0.59 (0.30-1.17)
Moderate	53 (24.2)	24 (45.3)	29 (54.7)		0.26 (0.13-0.54)
Severe	2 (0.9)	0 (0.0)	2 (100.0)		NA

*Chi-square test, Women, OR-Odds Ratio, CI- Confidence Interval

Table 3: Reasons for Non-Compliance for IFA among Pregnant (N=78)

Reasons	Frequency*	Percentage	95%CI
Forgetfulness	49	62.8	51.13-73.50
Not aware (ignorance)	21	26.9	17.50-38.16
Side effects	20	25.6	16.42-36.79
Inadequate counseling	18	23.1	14.29-34.00
Taste of the tablet	3	3.8	0.01-10.83
Fear	2	2.6	0.01-8.96
Color of the tablet	1	1.3	0.01-6.94

*Multiple response

Table 4: Summary of the Qualitative Research Findings and Suggestions for IFA Adherence

Theme	Category	Descriptors
Knowledge about anemia during pregnancy	Causative factors for anemia	• Poor nutrition • Not taking the IFA supplements • Due to pregnancy • Hookworm infestation • Blood loss during delivery • Operative procedures • Tiredness
	Symptoms due to anemia	• Breathlessness • Giddiness • Iron and folic acid tablets
	Treatment options for anemia	• Blood transfusion • Iron sucrose injection • Iron rich food items • Low birth weight of baby • Blood loss after delivery
	Complications of anemia	• Decreased Hb for the child • Primary health care centers • Government hospitals
	Places for procurement of IFA supplements	• Tertiary health care centers • From healthcare workers • Private hospitals
Reasons for IFA non-adherence	Patient factors	• Unplanned pregnancy • Forgetfulness • Taking iron rich foods instead of tablet • Nausea and Vomiting
	Medication factors	• Loose stools • Stomach ache • Size and taste of tablet
	Health facility factors	• Crowded OPD
Suggested measures for better IFA adherence	Patient factors	• Drug reminder SMS daily • Seeking help for side effects • Family support • More ANC visits • Clarifying myths • Palatable IFA
	Medication factors	• Alternative Iron • Adequate stock • IFA with least side effects • Assess side effects and manage
	Health system factors	• Early detection of anemia • Nutrition counselors • Home visits by ANM

Hb: Hemoglobin; ANM: Auxiliary Nurse Midwife; OPD: Out-patient department; IFA: Iron and folic acid; ANC: Antenatal care.

Qualitative component

One FGD was conducted among 10 participants to know their perception regarding the importance of IFA supplementation and the barriers to IFA adherence. The minimum age group was 22 years and maximum age group was 30 years. The discussion lasted for about 45 minutes. Content analysis of the FGD was done using a deductive approach. Two predetermined themes were analyzed namely knowledge regarding anaemia and barriers to non-adherence. Through this analysis, eight categories and 30 codes were generated as shown in the Table 4. The categories identified under knowledge regarding anaemia were causes, symptoms, complications, treatment options and places for procuring IFA supplements and the categories under barriers to adherence were patient factors, medication factors and health system factors.

Causes of anaemia

Pregnant women believed that decreased intake of iron rich foods, blood loss during delivery and hookworm infestation were the causes of anaemia.

Participant 1 said *"If we do not eat foods rich in iron and if the iron and folic acid tablets are not taken correctly every day, it will lead to decrease in haemoglobin level."*

Participant 2 said *"Haemoglobin level decreases in pregnancy and also hookworm infestation will lead to anaemia."*

Participant 5 said *"Due to blood loss during delivery and operation like C- section can also lead to reduction in haemoglobin level."*

Symptoms of anaemia

The symptoms of anaemia perceived and told by pregnant women were tiredness, breathlessness, giddiness.

Participant 7 said *"I used to feel very tired and breathless. So, I got a blood test done and found out that my haemoglobin level was 8.2g/dL."*

Participant 10 said *"I used to feel giddy very often and I had to take a lot of rest compared to the usual."*

Treatment of anaemia

Pregnant women highlighted that IFA tablets, blood transfusion, iron-sucrose injection were the treatment options available for anaemia. They also believed the importance of consuming iron rich foods like drumstick leaves, beetroot etcalong with the above treatments.

Participant 2 said *"Iron and folic acid tablets are available and should be used daily during pregnancy and that it should be continued after delivery also."*

Participant 3 said *"I didn't want to continue my pregnancy, so I stopped taking iron and folic acid tablets, but my haemoglobin level was 7.2g/dL. So, I had to get a blood transfusion done and iron sucrose injection was also given to me."*

Participant 5 said *"Along with iron tablets we should include iron rich foods such as drumstick leaves, beetroot, fruit or vegetable juices with lemon, food preparations containing jaggery like rice cakes, peanut bars, and non-vegetarian foods."*

Complications of anaemia

The complications mentioned by those women due to anaemia in pregnancy were low birth weight, reduced levels of Hb in the new-born and increased blood loss during delivery.

Participant 2 said *"It can lead to low birth weight of born child and also leads to blood loss after delivery."*

Participant 6 said *"It will lead to decreased haemoglobin level for the child also."*

Places for procurement of IFA supplements

The pregnant women were aware that IFA supplements can be procured from government PHCs and also from private hospitals.

Participant 7 said *"I got my tablets from PHC which was near my house. Also, from healthcare workers who came to check."*

Participant 10 said *"I got my tablets from a private hospital and if they were not available there, I used to get from government hospital."*

Patient factors responsible for non-adherence

The factors that were barriers to adherence of IFA were unplanned pregnancy and forgetfulness of the mothers.

Participant 3 said *"This was an unplanned pregnancy. I didn't want to continue it, so I stopped taking iron and folic acid tablets, but it was past time for abortion, so I had to continue the pregnancy."*

Participant 9 said *"I forget to take my tablets very frequently and even if I remember later in the day, I skip that day's tablet.*

Factors related to the medication responsible for non-adherence

According to pregnant women, certain side effects of the IFA tablets like nausea, vomiting, loose stools and abdominal pain prevented them from continuing the medications. They also responded that the size of the tablet supplied in the government hospitals were big which made it inconvenient for them to swallow and the taste of the tablet also acted as a factor which increased the non-adherence to the medications.

Participant 7 said *"I had nausea and vomiting for many days. So, I stopped taking the iron and folic acid tablets."*

Participant 8 said *"I had loose stools and stomach ache while using the tablets. I substituted the tablets by taking iron rich foods."*

Participant 9 said *"The tablets provided by the government are bigger in size and the taste is also not good. So, I don't like to take the tablets."*

Discussion:

Adherence to IFA supplementation is a key strategy for the prevention of anaemia in pregnancy. The study observed that 64.4% of third trimester antenatal mothers were adherent to IFA, which is similar to the study done by Lavanya et al [20] (63.8%) in South India. Nevertheless, 35.6% non-adherencerate highlights the need for remedial measures.

Adherence rate is varying across studies: Debi et al[21] (81.74%), Manasa et al[12] (71%) and Kumar et al[10] (69%) observed higher rates of adherence, where as Choudhuri P et al[22] (52.5%), Kamau et al[23] (32.7%), Felipe-Dimog et al[24] (25.8%) and Agegnehu et al[25] (28.7%) reported lower rates. This varying prevalence could be attributed to the difference in socio-demographic characteristics, study setting and operational definitions for adherence.

The present study revealed several associated factors for IFA adherence. Pregnant women with higher educational status had 78% higher odds of adherence, which is consistent with studies done by Debi et al[21], Dutta et al[26], Sendeku et al.[27] Education is more likely to improve the awareness on the outcome of anemia and the significance of IFA consumption.

The current study observed that higher monthly income was associated with 2 times higher odds of adherence, corroborating with the findings of Agegnehu et al[25] and Kamau et al[23] but no association was observed by Choudhuri et al[22] This association is linked to better education and awareness among higher income groups.

More frequent antenatal visits were associated with 3 times higher odds of adherence in multi variate analysis. Similar associations were mentioned by Sendeku et al[12], Dutta et al[26] and Manasa et al.[22] Increased antenatal visits provided more opportunities for the healthcare providers to motivate the mothers to take IFA supplementation. Non anaemic pregnant women had 6 times higher odds of adherence to IFA multivariate analysis. This finding was supported by the studies done by Deori et al[28], Yadav et al[29] and Chikakuda et al.[30] Adherence to IFA is more likely to have increased the haemoglobin status.

Forgetfulness, ignorance, side-effects, inadequate counseling, taste and colour of the tablet and fear were the reasons for non-adherence. This is consistent with the findings by Deori et al[28], Debi et al[21], Choudhuri et al[22] and Manasa et al.[12] To address forgetfulness, remainders from the family members and digital technologies could be utilized. Tinago et al[31] reported that compliance could be increased by educating risks and benefits, and highlighting the negative health implications towards non utilization of IFA.

The side effects associated with IFA are chest pains, constipation, severe stomach pains, diarrhea, nausea, blue color lips and fingernails, vomiting, black stool, stomach cramps and clumsy skin.[17, 32, 33] Health care providers should explain the possible side effects associated and management strategies to the pregnant women.[23] Hyder et al[33] reported better compliance with weekly supplementation compared to daily supplementation. Behavior change communication as mentioned in the AMB, should be utilized to improve knowledge about anaemia and IFA supplementation among pregnant mothers, involving community leaders, ASHAs and health care providers.[5]

Study limitations include the cross-sectional design preventing causal inferences, potential recall bias and limited generalizablility due to facility-based study setting. Strengths include the mixed method design, exploring the participant's perceptions in their own words and usage of standard MGL scale for assessing IFA adherence.

Conclusion:

This study showed that almost one third of the pregnant women were not compliant to IFA supplementation. The adherence was more among the pregnant women having higher education, higher income, more antenatal visits and non-anaemic status. The common reasons for non-adherence were forgetfulness followed by unawareness, side-effects, inadequate counseling and taste of the tablets. Improve awareness and counseling about need of IFA supplementation is need of the hour.

Declaration:

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Conflicts of interest: Nil

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Descriptive Analysis of Undergraduate Community Medicine Question Papers and Blueprint Preparation: A Study from West Bengal

Sukesh Das[1], Abhishek Ingole[2], Santanu Ghosh[3], Supantha Chatterjee[3], Samir Dasgupta[4]

[1]Associate Professor, Community Medicine Dept., Malda Medical College, Malda, India
[2]Professor, Community Medicine Dept., Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, India
[3]Associate Professor, Community Medicine Dept., College of Medicine and Sagore Dutta Hospital, Kamarhati, Kolkata, India
[4]Professor, Community Medicine Dept., KPC Medical College & Hospital, Kolkata, India
Correspondence: Dr. Supantha Chatterjee, Email: supanthachat@gmail.com

Abstract:

Introduction: Periodic review of Question papers is needed to ensure validity of student assessment. Blueprint is an effective tool to guide Paper setters. **Objectives:** To assess coverage and weightage of content areas in last 10 years (2012-2021) UG Community Medicine Question papers in West Bengal and to prepare a Blueprint of teaching and assessment in Theory Examination for the above subject. **Method:** Secondary data analysis was done on University Question papers (40 in number). For Blueprinting, inputs of 13 Faculty members were considered. The duration of the study was one year (Nov 2021-Oct 2022). **Results:** Overall, Basic and Disease Epidemiology were given maximum weightage (10.2%+23.8%= 34.0%) followed by Maternal and child health (MCH) (14.2%). Poor coverage and weightage was seen in Social & Behavioural sciences, Health planning and management, Geriatric health problems and Genetic diseases, which were allotted only 4.2% marks combined. There was cross-over of topics between two Papers (averaging 4.3% to Paper I and 8.4% to Paper II) in all the years with wide range across the period (2012 - 2021). The Blueprint suggested decrease in weightage of Epidemiology (28.4% vs 34.0%) and Health care delivery (5.0% vs 7.8%) whereas increase of weightage of 'Others' (24.2% vs 14.8%) compared to Question papers. **Conclusion:** There was inconsistency in coverage and weightage to different topics across the years. This review, along with the Blueprint prepared, would be helpful to improve teaching and assessment in the above subject.

Keywords: Community Medicine, Curriculum, Faculty, Undergraduate Students

Introduction:

Assessment of students is an essential part of any educational system viz. MBBS course. The assessment should be aligned to learning objectives and teaching-learning methods of that course.[1] Since 'Assessment drives learning' as quoted by George Miller, is well accepted fact, valid assessment is sine qua non for fulfilling learning objectives of any educational course. In India, question paper setting in written examinations of Undergraduate (UG) medical subjects is often not done in desired way, resulting in inappropriate assessment of students.[2-5] Regular review of Question papers is needed to ensure validity and reliability of student assessment. Also, to be remembered that, Blueprint is an effective tool to ensure content validity of Question papers and ultimately to achieve learning objectives.

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Competency Based Medical Education (CBME) has been launched in India in 2019 to standardize and improve teaching-learning as well as assessment in UG curriculum. But, there is paucity of studies in India on student assessment especially of UG Community Medicine subject. Also, there is no Blueprint for teaching or assessment for the above subject at central or state level. With this backdrop, a study was undertaken for descriptive analysis of UG Community Medicine Question papers set by The West Bengal University of Health Sciences (WBUHS) and preparing a Blueprint for teaching and assessment in Theory Exam for the same subject.

Method:

It was a descriptive study. Secondary data analysis was done for Question papers and cross-sectional design was used for preparing the Blueprint. Study period was one year (Nov 2021- Oct 2022).

Study tools:

1. UG Community Medicine Question papers of 3rd Prof MBBS Part I Exam of WBUHS for 2012—2021.
2. A Structured checklist for review of Question papers which was prepared by the investigators with the help of WBUHS and MCI guidelines.[6,7]
3. A proforma for Blueprinting of teaching and assessment in Theory Exam

Proforma was prepared by the investigators with the help of guidelines of WBUHS and MCI, and GMER, 2019.[6-8] For teaching, large group teaching i.e. Lecture as well as Small group learning (SGL) and Self-directed learning(SDL) were incorporated in the proforma.[8] For assessment, the elements were - weightage of topics, marks for each topic per Paper and weightage of level of competency (Knows/Knows how) for each topic. A single proforma was prepared, rather than separately for Paper I and Paper II, to get a comprehensive and holistic Blueprint.

The checklist and proforma for Blueprinting were shared with five faculty members of the rank of Professor in the subject of Community Medicine of West Bengal for validation. Their inputs were considered and necessary modifications made. Both the tools were finalised after consensus was reached.

Operational definition:

Weightage: It means percentage of marks allotted to topic(s) in Question paper.[9]

Coverage: It means whether a topic was represented in Question paper or not.[9]

Data collection method:

For Question paper review, all 40 Question papers during the period of 2012—2021 were collected (two Papers for each of Regular as well as Supplementary Exams, each year). Each Question paper was studied and structured checklist was filled up for each of them.

For Blueprinting, 20 faculty members (Professors and Associate Professors) of Community Medicine of West Bengal were considered. They were selected purposively on the basis of their knowledge of the subject and understanding of Medical Education and excluding those who validated the above-mentioned tools. The proforma for Blueprinting was sent to them via mail. They were requested to give voluntary informed consent and fill up the proforma and send it back within stipulated time of two weeks. They were reminded for the same twice via phone call and mail. Thirteen faculty members returned the filled-up proforma whereas seven faculty members cited busy schedule for non-participation. For validation of the Blueprint, it was shared with them via mail after compilation of the data. Their inputs were incorporated, and the Blueprint was again sent to them. They agreed and thus the final, validated Blueprint was prepared. So, the spirit of Delphi technique was followed for preparing the Blueprint.[10]

Data Analysis:

Data was collected in the checklist for Question papers review and in the proforma for Blueprinting. The collected data was entered into Microsoft Excel spreadsheet. The data were analysed and were

expressed in frequency, percentage, Mean (SD) and Range as applicable. Data were further analysed graphically using Line diagram and Bar diagram.

Ethical Consideration:

Before initiating the study, approval was obtained from Institutional Ethics Committee (IEC) (No. CMSDH/IEC/278/03-2022 dated 05.03.2022). Voluntary informed consent was taken from the Faculty of Community Medicine for participating in preparation of the Blueprint. Four principles of ethics i.e., autonomy, beneficence, non-maleficence and justice were obeyed. Anonymity and confidentiality were ensured.

Results:

Overall, Basic and Disease Epidemiology were given maximum weightage (10.2% + 23.8% = 34.0% of total marks) followed by Maternal and child health (MCH) (14.2%). Poor weightage was seen in the topics of Social & Behavioural sciences, Health planning and management, Geriatric health problems and Genetic diseases, which were allotted only 4.2% marks combined, over last 10 years (2012-2021). Poor coverage i.e. not represented in all the years, was seen for Health planning &management, Geriatric health problems and Genetic diseases. There were variations in weightage to different content areas across the years, especially Nutrition, Health information and Biostatistics and Concept of health and disease. (Table 1, Figure 1)

Others include - Concepts of Health and Disease, Health information and Biostatistics, Disaster management, Social & Behavioural sciences, Geriatric health problems, Health planning and management, Health education & communication and Genetics diseases

There was cross-over of topics especially Epidemiology (Basic and Diseases), Biostatistics, Disaster management, Nutrition and Health care delivery in between Paper I & Paper II in all the years with wide Range across the period, averaging (Mean) 4.3% to Paper I and 8.4% to Paper II. (Table 2)

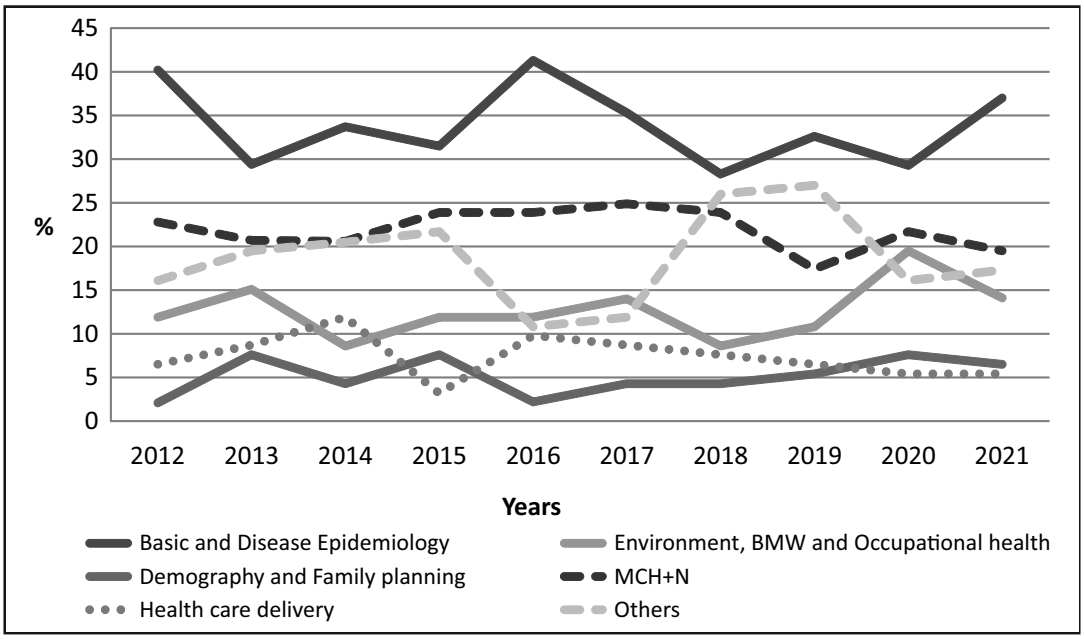
Regarding Blueprint of teaching, Epidemiology of Communicable diseases was emphasized most i.e. 14 hrs (17.5%) and 15 hrs (10.9%) for Lecture and Small-group learning (SGL)/Self-directed learning (SDL) respectively in Paper I whereas in Paper II,

Table 1: Summary findings of Coverage and Weightage of different topics in 10-year UG Community Medicine Question papers (2012-2021) (N=40)

Topics	Mean (SD)	Range
Concepts of Health and Disease	4.4 (2.4)	0 - 7.6
Basic Epidemiology	10.2 (2.6)	6.5 - 14.1
Epidemiology of diseases·	23.8 (3.8)	20.7 - 30.5
● Epidemiology of Communicable diseases	33.7 (7.2)	23.9 - 47.8
● Epidemiology of Non-Communicable diseases	14.0 (6.2	8.7 - 28.3
Health information and Biostatistics	2.8 (1.9)	0 - 5.4
Environmental health and BMW	7.3 (2.5)	3.2 - 10.8
Disaster management	3.3 (1.8)	1.1 - 6.5
Demography and Population dynamics	5.3 (2.0)	2.1 - 7.6
Maternal & child health	14.2 (3.2)	6.5 - 18.5
Nutrition and health	7.8 (4.2)	1.1 - 15.2
Occupational health	5.4 (2.1)	1.1 - 8.7
Health education and communication	3.5 (2.2)	1.1 - 6.5
Health care delivery	7.7 (2.6)	3.2 - 11.9
Others *	4.2 (1.6)	2.1 - 7.6

*Others include Social & Behavioural sciences, Health planning and management, Geriatric health problems and Genetic diseases

Figure 1: Line diagram showing variations of Weightage to topics in 10-year UG Community Medicine Question papers (2012-2021)



MCH+N= Maternal & child health plus Nutrition; BMW= Bio Medical Waste

Table 2: Summary estimates of Cross-over of topics in UG Community Medicine Question Papers during 2012-2021[6,7] (N=40)

Characteristics in Question Papers	Mean (SD)	Range
Cross-over to		
Paper I	4.3 (5.8)	0 - 17.3
Paper II	8.4 (7.2)	0 - 26.0

Maternal, child and adolescent health was given maximum importance i.e. 11 hrs (13.7%) and 25 hrs (18.2%) for Lecture and SGL/SDL respectively. There were differences in weightage of topics in the Blueprint for Theory exam as suggested by the subject experts compared to the average of weightage in University Question papers. The Blueprint suggested decrease in weightage of Epidemiology (28.4% vs 34.0%) and Health care delivery (5.0% vs 7.8%) whereas increase of 'Others' compared to University Question Papers (24.2% vs 14.8%). (Table 3,Table 4, Figure 2)

*As per GMER 2019, Total teaching hours (80 hrs, Lecture) and (117 hrs, SGL+20 hrs, SDL = 137 hrs) were considered unifiedly, rather than separately for Paper I & Paper II.[8] Similar principle was followed for considering Total weightage of 100% in Theory Exam.

'Others' include-Introduction to Community Medicine, Concept of Health and Disease, Health information and Biostatistics, Social & Behavioural sciences, Health planning & management, Health education & communication, Geriatric health problems, Essential Medicine, Genetic diseases, International health and Recent advances in Community Medicine.

Discussion:

The current study showed that there was good content coverage except a few topics, but no consistency in coverage of entire syllabus over last ten years. No uniform weightage to different content areas was given in question papers across the years. In the current study, maximum weightage was given to Epidemiology (34.0%) followed by MCH (14.2%), similar to a study from Karnataka, which reported 26 plus 44 marks (Median values) for Basic and Disease

Table 3: Blueprint of teaching and assessment in Theory Exam for UG Community Medicine subject for Paper I.[6-8]

Topics	Lecture Hours (%)	SGL+ SDL Hours (%)	Weightage of Topics (in %)	Marks for topic / Paper	Weightage for level of competency/ Topic^(%)
1. Introduction to Community Medicine	1 (1.2)	0 (0.0)	0.3	01	1=94
					2=06
2. Concept of Health and Disease	4 (5.0)	4 (2.9)	4.4	08	1=67
					2=33
3. Epidemiology	8 (10.0)	10 (7.3)	8.1	16	1=49
					2=51
4. Epidemiology of CDs# (including relevant National programmes)	14 (17.5)	15 (10.9)	10.3	21	1=52
					2=48
5. Epidemiology of NCDs# including Mental health plus Geriatric services (including relevant National programmes)	8 (10.0)	13 (9.5)	9.9	20	1=63
					2=37
6. Environmental Health Problems plus Hospital waste management and Disaster Management	7 (8.7)	15 (10.9)	11.1	22	1=56
					2=44
7. Health information system (Vital statistics)	1 (1.2)	5 (3.6)	2.5	05	1=59
					2=41
8. Basic statistics and its applications	2 (2.5)	10 (7.3)	3.6	07	1=34
					2=66
Total*	45 hrs	72 hrs	50.2%	100	NA

NB: Blueprint prepared taking average (Mean) of responses from Faculty members; teaching hours of column 2 & 3 and contents of column 5 & 6 have been rounded off to integer for obvious reasons.

#CD= Communicable disease; NCD= Non-Communicable disease. ^In column 6, 1= Knows, 2= Knows how.

epidemiology respectively and 21 marks (Median value) for Reproductive and child health (RCH) out of total of 100 marks.[9] Another study from Puducherry also reported similar pattern of weightage, 20% marks for General and Disease epidemiology each, followed by 11% marks for RCH.[5] In consistent with the current study, the study from Puducherry found that certain topics like Occupational health, Sociology, Concepts in health, School health, Mental health etc were poorly represented in Question papers.[5] The current study reviewed University Question papers of old curriculum with no visible changes in Question Paper setting over the period of 2012 - 2021. In the current study, relevant content areas e.g., Health information and Biostatistics, Social & Behavioural sciences, Health planning and management, Geriatric health problems etc, which were poorly represented in Question papers, were given more emphasis in the Blueprint.

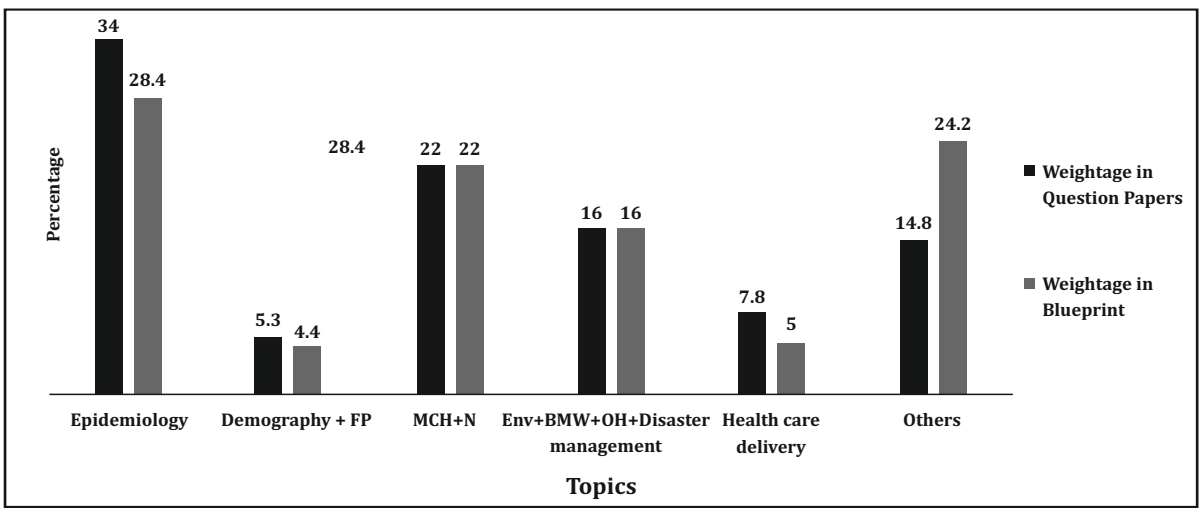
One difficulty arose during allocation of certain applied questions overlapping more than one topics into certain content areas. For this, dominant theme was chosen to include in the particular topic. For example, Essay type question in 2014 (Supplementary, Paper I), 'Prepare an action plan to conduct an IEC campaign in your block to reduce anaemia among pregnant women' was recorded under MCH chapter. The study would have been more robust if greater number of responses from faculty members could be included for preparing the Blueprint.

Table 4: Blueprint of teaching and assessment in Theory Exam for UG Community Medicine subject for Paper II.[6-8]

Topics	Lecture Hours (%)	SGL+ SDL Hours (%)	Weightage of Topics (in %)	Marks for topic / Paper	Weightage for level of competency/ Topic^(%)
1. Demography and (population dynamics)	3 (3.7)	7 (5.1)	4.5	09	1=52
					2=48
2. Maternal and adolescent health	7 (8.7)	15 (10.9)	9.0	18	1=55
					2=45
3. Child health	4 (5.0)	10 (7.3)	6.3	12	1=48
					2=52
4. Nutrition	5 (6.2)	10 (7,3)	6.7	14	1=59
					2=41
5. Relationship of social and behavioural to health and disease	2 (2.5)	3 (2.2)	3.6	07	1=52
					2=48
6. Principles of health promotion and education ^	3 (3.7)	5 (3.6)	4.3	09	1=54
					2=46
7. Occupational Health	3 (3.7)	5 (3.6)	4.9	10	1=66
					2=34
8. Health planning and management	3 (3.7)	2 (1.4)	3.5	07	1=41
					2=59
9. Health care of the community	3 (3.7)	6 (4.4)	5.0	10	1=73
					2=27
10. Genetic disorders	1 (1.2)	0 (0.0)	0.8	02	1=97
					2=03
11. Essential Medicine	0 (0.0)	1 (0.7)	0.5	01	1=86
					2=14
12. Recent advances in Community Medicine	1 (1.2)	1 (0.7)	0.7	01	1=100
					2=00
Total	35 hrs	65 hrs	49.8%	100	NA

NB: ^In column 6, 1=Knows, 2=Knows how.

Figure 2: Comparison of weightage of topics in UG Community Medicine Question Papers (2012—2021) and the Blueprint



Blueprinting helps to establish uniformity and standardization in teaching and assessment. But, unfortunately, this important tool is missing in West Bengal, like many other states. The endeavour to prepare a Blueprint in this study is the initial steps for discussion and preparation of a more comprehensive Blueprint for the same subject in future.

Conclusion:

The study revealed inconsistency in coverage and weightage to different topics in Question papers across the years. There was cross-over of topics in between two Papers as well. Lack of specific guidelines e.g. Blueprint, might be responsible for such lacunae. This review of Question papers, along with the Blueprint prepared, would be useful for teaching and assessment uniformly and objectively in the above subject.

Limitations of the study:

This study is based on theory assessment only, not including practical assessment which also addresses some of the important domains and levels of competency. Another limitation is that due to time-frame of the current study, it could evaluate question papers of old curriculum only, missing review of question papers of new CBME curriculum, which brought major changes in student assessment. Also, the Blueprint would have been more robust if greater number of responses from faculty members could be included.

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Assessment of Empathy among Health Professional Students in a Government Medical College in South India

Bhavani R[1], Sneha Simon[2], Fathima Shoukath Ali[3], Rudrakshala Divyasri[4]

[1]Senior Resident, [3]Junior Resident, Community Medicine Department, Kakatiya Medical College, Warangal, Telangana, India
[2]Assistant Professor, Community Medicine Department , Sri Venkateshwaraa Medical College and Research Centre, Ariyur, Pondicherry, India
[4]Senior Resident, Community Medicine Department, Gandhi Medical College, Secunderabad, Telangana, India

Correspondence: Dr. Bhavani R, Email: bhavaniirt@gmail.com

Abstract:

Introduction: Doctor-patient relationship is highly influenced by empathy which is a vital quality among medical students. **Objective:** To assess the empathy level in the medical students and the socio-demographic factors influencing it. **Methods:** A cross-sectional study was conducted among the undergraduates of a Government Medical College in Telangana during February 2024. Total of 309 students participated in the study. Data were collected with a semi structured questionnaire and the empathy was assessed with the help of Jefferson Scale of Empathy - Student Version. Descriptive statistics were used for demographic data and Student t test and One-way ANOVA were used for comparing semesters. **Results:** The mean empathy score in the current study was 100.20 ± 15.23. Final MBBS part I students were more empathic (103.27±13.04) compared to second phase students and interns. Female students and the students who made the independent decision to pursue MBBS had significantly higher empathy scores than the others. The empathy score was not significantly associated with the choice of speciality. **Conclusion:** The mean empathy score was 100.20 (maximum score – 140) among the medical students in South India. The age, gender and the phase of the students were significantly associated with empathy. There was no relation between the empathy scores and choice of speciality.

Keywords: Empathy, Jefferson scale, Medical Students

Introduction:

The Greek word empathy has its origin from 'empatheia' meaning affection or passion with a quality of suffering.[1] Empathy is defined in the context of health professions education and patient care as "a predominantly cognitive (rather than an affective or emotional) attribute that involves understanding (rather than feeling) of the patient's experiences, concerns, and perspectives, combined with a capacity to communicate this understanding, and an intention to help".[2]

Empathy is very important component for a healthy doctor-patient relationship. The communication between doctors and patients when added with empathy builds trust among the patients.[3] In addition, empathic communication results in a bidirectional outcome. It gives an accurate diagnosis to doctors and better treatment adherence

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to patients. Learning effective communication is a vital element to improve the professionalism in medicine.[4] As a result, it improves the effectiveness of treatment and at the same time the standard of care will be improved.[5] Empathy always contributes to personal development of physicians, career fulfilment in physicians, and the best possible clinical outcomes in the patients.[2,6]

Empathy among the medical students usually varies depending on their age, gender, year of medical education, future specialty choice, burn out, quality of life, personality trait, emotional intelligence and mental health.[7,8]

Presently, empathy is accepted as a vital quality in the medical students and there is a need to assess the level of empathy at any point in their five years of medical education.[4,9] Given the varying scores of empathy globally, it is necessary to assess the empathy levels among medical students in India.[10] With this background, the current study aimed to assess the empathy level of medical students in Telangana. The secondary objective of the study was to determine, whether age, gender of the students, the phase of the students and the choice of speciality in future has any association with empathy.

Method:

A cross-sectional study was conducted in the one of the medical colleges of Telangana during the month of February 2024. The study included second phase students who recently started their clinical postings, final MBBS part I who were in the middle of the MBBS course and interns who were about to finish their course. The students of first phase who didn't start their clinical postings and the Final MBBS part II who were busy with their exams were not included in the study. All the students from three phases were included in the study. Those who were not willing to participate and didn't give consent were excluded from the study. Among the total strength of 450 undergraduates (150 from second phase, 150 from final MBBS part I and 150 interns), 309 students participated totally. Remaining 141 were either absent or not willing to participate. Institutional Ethical Committee permission (ECR/840/Inst/TG/2016/RR/20/51) was taken from the Institution before the start of the study.

Total of three lecture classes, one for each semester were chosen. Firstly, the students were briefly explained about the essence of the study and the consent was taken for the same. Then, the questionnaire was provided to the students. The questionnaire was self-administered, pretested, semi structured with two parts. Part I consists of questions related to socio demographic details, native place, current place of living, decision to join MBBS (own or forced), career satisfaction and the future career (speciality) choice. The effect of specialization on empathy was assessed by grouping the choice of subjects of students into technologically oriented (Pathology, Surgery and surgical subspecialties, Radiology, Radiation Oncology, Anaesthesiology, Preventive and Social Medicine, Otorhinolaryngology); people oriented (Internal medicine, Family medicine, Paediatrics, Neurology, Rehabilitation medicine, Psychiatry, Emergency medicine, Obstetrics and gynaecology, Ophthalmology & Dermatology) as done by Hojat et al.[2,11,12] Those who chose any other subject or were undecided were classified as others. Part II consists of Jefferson Scale of Empathy – Student version (JSE-S), designed specially to assess the empathy level among medical students.

The scale (JSE-S) used in the current study is psychometrically validated, which consists of 20 statements of which 10 were positively worded and 10 were negatively worded. The students can express their agreement level to each statement using seven-point Likert Scale.[13] This scale being wide range, allows the students for selecting from a wide range and with more discrimination. The ten positive statements were focussed on "perspective taking"

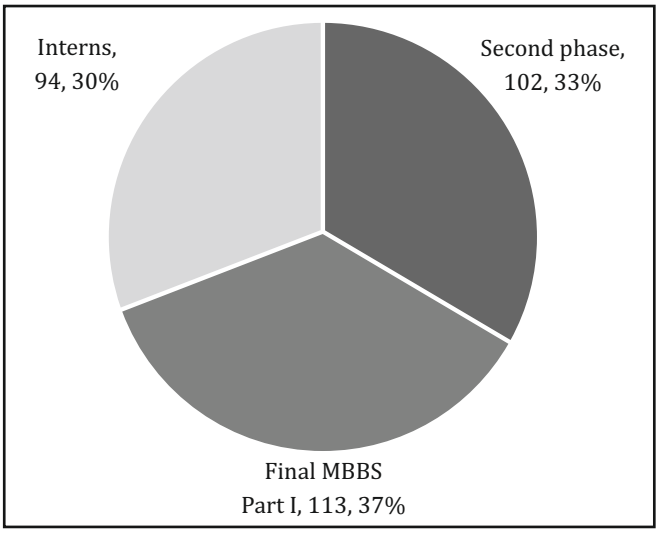
(the physician's view of a patient's perspectives) and they were scored directly (1=strongly disagree, 7=strongly agree). The remaining ten negative statements were reversely scored (1=strongly agree, 7=strongly disagree). Out of ten, eight statements were focused on "compassionate care" (understanding patient's experiences) and two statements were focused on "standing in the patient's shoes" (thinking like the patient). Thus, the total score ranges from 20 to 140. The level of empathy in the students will be directly proportional to the empathy score measured using JSE-S.[14,15] The validity and the reliability of the JSE-S scale has been well proved. The Cronbach's alpha internal consistency estimate for the 20 items was 0.76.[16,17] JSE-S scale had been widely used globally and translated in 59 local languages to assess the empathy among medical students, paramedics and practising doctors as well. The English version of the JSE-S was used for the study.

The collected data were entered in the Excel sheet and imported to SPSS. The data imported were analysed using software statistical package IBM SPSS Version 20 (Chicago, USA). Descriptive statistics were used for socio demographic details and JSE scores. Bivariate analysis with the Independent Sample t test and ANOVA were done to discover the relationship between empathy score and its determinants. Only those variables which were found to be significant were analysed by multiple linear regression model. Statistical significance for the tests of significance was set at P-value<0.05.

Results:

Total 309 students (68.66%) participated in the study out of a total 450 students. The mean age of the students was 21.69±1.35 years which ranged from 19 to 25 years. Interns participation (30.4%) were comparatively lower compared to other phases, as they had busy clinical postings on the study day (Figure 1). There was female preponderance (64.7%) in the study population. The bulk of participants were urban natives; however, they were currently staying in hostels (Table 1).

Figure 1: Distribution of study participants (N=309).



Students in the final MBBS Part I had higher empathy scores than others. The mean scores among the different phases varied and the difference was found to be statistically significant. Female students had higher empathy scores compared to male students. Similarly, the students with urban nativity, students currently living in homes along with parents and the students who made the independent decision to pursue MBBS were found with significantly higher empathy scores (Table 1).

The mean±SD empathy score of the study participants was 100.20±15.23. Minimum score recorded was 53 and the maximum score ranged till 134. Line graph showing mean empathy score of the study participants according to their phases (Figure 2).

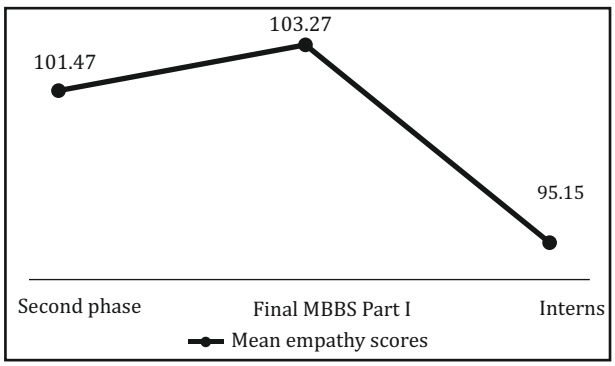
Linear regression multivariate model was run to predict the effect of different phases, age, gender, nativity, current residence and decision to join MBBS on the empathy scores. Considering the collinearity statistics, variance inflation factor value of all the

Table 1: Distribution of the study participants according to their baseline characteristics and empathy scores (N=309)

Variable		Frequency (%)	Empathy score (Mean ± SD)	P value
Age (in years)	≤22	218 (70.6%)	103.17±14.33	<0.001*
	>22	91 (29.4%)	93.11±15.03	
Phases*	Second phase	102 (33%)	101.47±17.1	<0.001*
	Final MBBS Part I	113 (36.6%)	103.27±13.0	
	Interns	94 (30.4%)	95.15±14.4	
Gender#	Male	109 (35.3%)	94.92±15.0	<0.001*
	Female	200 (64.7%)	103.09±14.6	
Native place#	Urban	224 (72.5%)	101.59±14.9	0.009*
	Rural	85 (27.5%)	96.55±15.5	
Current residence#	Home	81 (26.2%)	105.01±13.7	0.001*
	Hostel	228 (73.8%)	98.50±15.4	
Decision to join MBBS*	Own	270 (87.4%)	101.33±14.9	0.002*
	Parents	31 (10%)	92.84±16.6	
	Others	8 (2.6%)	90.63±8.7	
Having career satisfaction#	Yes	245 (79.3%)	100.30±14.8	0.825
	No	64 (20.7%)	99.83±16.8	
Future career choice*	People oriented	142 (46%)	99.51±14.7	0.738
	Technology oriented	108 (35%)	101.01±15.5	
	Others	59 (19.1)	100.41±15.5	

*P value ⩽0.05 is considered significant. *Anova, #Independent t-test

Figure 2: The mean empathy score of study participants (N=309)



independent variables were well below 3. Durbin Watson value of 1.78 indicated independence of observations. No pattern found in the histogram ensured homoscedasticity, while cook's distance range of 0.00-0.46 (mean=0.003) nullifies the chance of an influencing outlier. Age, Gender, current residence and decision to join MBBS were significant predictors of empathy score adjusted with each other (Table 2).

Table 2: Multiple linear regression analysis showing predictors of empathy of the study participants (N=309)

Variables	Unstandardized coefficients		T value	P value	95% CI for B	
	B	SE			Lower bound	Upper bound
Age (>22)	-2.921	0.927	-3.149	0.002*	-4.74	-1.09
Phases (second phase)	0.359	2.64	0.13	0.89	-4.83	5.55
Gender (female)	5.87	1.74	3.37	0.001*	2.44	9.29
Native place (rural)	-3.56	1.90	-1.87	0.062	-7.30	0.17
Currently living in (hostel)	-4.55	1.90	-2.39	0.017*	-8.30	-0.81
Decision to join MBBS (parents)	-5.15	2.49	-2.07	0.039*	-10.05	-0.25

*P value ⩽ 0.05 is considered significant. B-Unstandardized Beta, SE-Standard Error, CI-Confidence Interval

Discussion:

Female students were more empathic than male students and the result was also significantly associated in this study. This finding was consistent with many other studies.[3,10,17,18] The gender difference with the increase in empathic score in females can be explained due to the built in factors (e.g., biological characteristics peculiar to each gender) as well as exogenous factors (e.g., differences in caring, socialization, and gender role expectations).[19]

The mean score of empathy in this study was 100.20 which is similar to the studies by Chatterjee et al[17] (96.01), Mirani et al[18] (98.11) and GC Krishna Behadur et al[19] (97.28). But the score was lower when compared to the study conducted in USA by Hojat et al[9] and in some western countries.[21] Approximately, an 18-year-old adolescent after completing the school education enters directly into the medical college and spends the five and half years towards under graduation. In the meantime, these school students usually found no time for extracurricular activities or for the development of the skills required for "professionalism" as they were busy reading for entering into medical college. This could be considered as one of the reasons for the reduced baseline scores in India compared to the Western countries. Even the curriculum in medical colleges in India is different when compared to the developed countries like Japan, US and Mexico where the students were exposed to subjects such as literature, other sciences, economy and philosophy.[10]

While comparing the phases in the current study, the students in the final MBBS Part I were more empathic than the second phase students and the interns. The decreased empathic score among the second phase students was consistent with the study done by Chatterjee et al,[17] but with the time, with the increase in the phases, the empathic score increased similar to the current study. Both studies being cross sectional studies, the temporal inferences drawn cannot be taken into consideration and further studies are recommended to dive in and explore the possible causes. The increase in empathic score in the final MBBS Part I could be attributed to the positive effects of Community Medicine and AETCOM too. But again, the score decreased with increase in college days. This finding was similar to other studies,[18,22] where the empathy was declining with increasing semesters. The factors that could explain the declining empathy score with increasing semesters could be the academic stress in final years, duties responsibilities during internship, long shifts, no proper sleep and no quality family time.

In the current study, people coming from urban native had higher empathy scores than rural people. This was in contrast to the study by Biswas et al[3] where people having origin from rural native were empathic compared to urban people. Over-representation of the urban students in the current study might be one of the reasons for this empathic score difference. This could have resulted in the higher empathic scores among the students with urban nativity.

The students living in the homes along with the family members were more empathic than the students living in the hostel. Similar finding was found in the Kolkata study.[3] The explanation could be, the moral and the psychological support received by the students from the family members could have helped to reduce their stress on academics, which in turn reflected on giving better patient care. Students who were satisfied with the career were more empathic than the students who were not satisfied with the career. It was convincing that the dissatisfied students with the career would experience anything from frustration to distress. Due to this they might have scored less on empathy scale.

In the current study, there was no statistically significant difference (P=0.738) in the empathy score among the students choosing different specialities in future. In the current study, students who wanted to pursue technology-oriented specialities were empathy than others. This finding is contrast to the studies,[3,17] where students chosen people-oriented speciality were empathic. The possible explanation could be the academic stress in the students who wish to choose people-oriented specialities as they were the top branches in India. However, the change in medical students' knowledge and perspectives about specialities, may influence their choice in the future. So, evaluating the empathy based on the choice of specialties in future could be a bias.

Strengths and Limitations:

The current study was one of the few studies conducted in India to evaluate the medical students' empathy and the factors influencing them. Some of the limitations of this study are as follows: Firstly, though the response rate in the study is fairly high, the students who didn't participate would have been significantly different from the students who Participated. Secondly, the first phase students and the final MBBS part II students were not involved in the study. Thirdly, the medical students' social desirability could lead them to over-report empathic scores. Lastly, other important determinants of empathy like psychological morbidities of the students were not considered in the study.

Conclusion:

Empathy being a vital component of doctor-patient relationship was quite low (mean 100.20±15.23) in the current study. Age, gender of students, current residence and decision to join MBBS were some of the vital determinants influencing empathy. The result suggests that choice of speciality doesn't influence the empathic levels in the students. Longitudinal studies with larger sample size incorporating more medical colleges could provide better insights to see how the empathy evolves over the phases of students. In addition, the medical education system should focus on encouraging humanity and the empathy among the medical college students. By this way, patient care can be even more improved in the near future.

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Assessment of Knowledge and Preventive Practices on Latent Tuberculosis Infection among Nursing staff at a Tertiary Care Centre at Goa

AswinV.C.[1], Vanita .G. Pinto Da Silva[2], Sandeep Patnaik[3], Apoorva Hallur[3], Yamesh Vidyadhar Tari[3]

[1]Postgraduate, [2]Associate Professor, Department of Community Medicine, Goa Medical College and Hospital, Bambolim, Goa, India

[3]MBBS student, Goa Medical College and Hospital, Bambolim, Goa, India

Correspondence: Dr. Aswin V.C, Email:aswinvc1995@gmail.com

Abstract:

Introduction: Latent tuberculosis infection presents with no symptoms. All nursing staff who work closely with patients must possess the appropriate knowledge and follow the right preventive practices to avoid latent tuberculosis infection. This study was carried out to assess knowledge and preventive practices on latent TB which will help in making recommendations for the control of TB infection among nursing staffs. **Objective:** To assess knowledge and preventive practices regarding latent Tuberculosis infection and to assess infection controlpractices among the nursing staff. **Method:** This was a facility based cross sectional study conducted among nurses who works in Outpatient departments and wards of tertiary care centre. A complete list of the participants was made, and data from all nurses employed in every ward and outpatient department of the hospital was collected using a semi-structured self-administered questionnaire. A sample size of 384 nurses was calculated using Cochrane formula with p=50% and simple random sampling was used. **Results:** Out of 384 nurses, 376 (97.9%) were females and 8 (2.1%) were males. Regarding prevention of latent tuberculosis, 327 (85.1%) nurses answered wearing of mask, followed by regular sterilisation of hospitals which was 281 (73.1%) nurses. Out of 384 nurses, 298 (77.6%) of them wear a mask while dealing with coughing patients. In this, 242 (81.3%) reported usage of a surgical mask while N95 mask is only used by 56 (18.7%) of them. **Conclusion:** Overall knowledge regarding latent tuberculosis was satisfactory among the nurses. Practice on infection control was not satisfactory.

Keywords: Infection control, Knowledge, Latent tuberculosis, Nurses, Practice

Introduction:

Tuberculosis (TB) is a major public health problem.[1] The spread of TB within medical institutions, or nosocomial TB transmission, is a major global concern for healthcare workers (HCWs) especially nursing staffs. Health care workers have a greater frequency of TB disease than the general population, and there is well-documented evidence of an increased risk of nosocomial TB transmission among them.[2] Latent tuberculosis infections do not cause symptoms and do not spread. The percentage of individuals who contract TB and develop TB disease and symptoms is quite low. Children and babies are more vulnerable.

In 2022, TB claimed the lives of 1.3 million people, including 1,67,000 HIV-positive individuals.[3] Every age group and nation have some form of tuberculosis.

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The National Strategic Plan's four main pillars Detect, Treat, Prevent, and Buildare being carried out through strategic interventions.[4] In order to significantly lower the incidence, mortality, and treatment costs that TB patients must bear, as well as to strengthen health systems, tuberculosis infection control is a crucial part of the WHO Stop TB strategy.[5] A three-level hierarchy of control measures, comprising the following, should form the foundation of the TB infection control program: 1. Administrative control, 2. Environmental control, 3. Respiratory protection. There is a significant danger of tuberculosis for any member of the medical staff who treats people with the disease. To preserve health and stop the spread of the disease, it is imperative that all healthcare professionals especially nurses, who spend a great deal of time with these patients have the appropriate knowledge and skills about workplace safety measures.[6]

Health Care Workers frequently lack awareness about Tuberculosis Infection Control and are practicing without receiving proper Infection Control (IC) training. This probably adds to the higher risk of nosocomial tuberculosis transmission.[7] Data on nurses' understanding and usage of TB IC can serve as a crucial foundation for National Tuberculosis Elimination Programme efforts to address TB IC. As a result, the study evaluated nurses practices and knowledge on TB infection control. This study is aimed to assess knowledge and preventive practices regarding latent Tuberculosis and infection control among the nurses.

Method:

Study design, setting, and population

This was a hospital based Cross sectional study conducted among nurses who works in Outpatient departments and wards of Goa Medical College. Nurses were of 20-60 years of age. The study site was a tertiary care hospital providing treatment and other services for patients which is situated at Bambolim, Goa, India.

Inclusion criteria: All nursing staffs working in all OPDs and wards with minimum 1 year of experience.

Exclusion criteria: Nursing staffs working in Casualties, Intensive care units, nursing staffs on long leaves were excluded from the study.

Sampling method and Sample size

A list of 738 nursing staffs was obtained from matrons office. From this, a sample size of 384 was calculated taking prevalence as 50% using the Cochrane formula($n=Z^2pq/d^2$). Simple random sampling was carried out. Each individual in the nursing staff list was assigned a unique identifier (ID number) from 1 to 738. A random number generator was used to randomly select 384 numbers corresponding to the nursing staff IDs.

Data collection tool

A semi structured questionnaire was administered by face-to-face interview to collect sociodemographic data, and their knowledge and preventive practice regarding latent Tuberculosis infection. A pilot study Was conducted among 30 nursing staffs using the same questionnaire. The questionnaire was made with reference to A guide to developing knowledge, attitude and practice surveys by WHO.[8]

Data collection procedure

The study was carried out after ethical clearance of the research proposal by the Institutional Ethics Committee of Goa medical college. Data were collected in March 2023. Before data collection, the participants were explained the purpose and nature of the study. They were informed that they had full authority to withdraw from the study without fear and explanation at any time during data collection. Then, informed written consent was obtained from the nurses and face to face interview was carried out using the semi structured questionnaire. The filled questionnaire was kept confidential using code to link the respondent to the questionnaire and the records were kept confidential. The data obtained were used only for research purposes.

Data analysis

Data was entered in Microsoft Excel and analyzed using SPSS software version 22. The result was expressed in frequency and percentage.

Operational definitions

1) **Latent TB infection:** Latent tuberculosis infection (LTBI) is defined as a state of persistent immune response to stimulation by *Mycobacterium tuberculosis* antigens without evidence of clinically manifested active tuberculosis (TB) disease.[9]

2) **Administrative control:** Administrative controls for TB IPC are interventions through institutional policies, protocols, education, and oversight to reduce or prevent both exposure and transmission of TB within a facility.[10]

3) **Environmental control:** Environmental controls are aimed at reducing the concentration of infectious droplet nuclei in the air.[11]

4) **Respiratory protection:** Reduces the risk of exposure in specific areas and circumstances.[12]

Results:

Demographic information

In Table 1, it was observed that among 384 nurses, 376 (97.9%) were females and 8 (2.1%) were males. In this study, 243 (63.2%) were of 20-39 age group and 141 (36.8%) were of 40 years and above. Duration of employment of the nurses ranged from less than 1 year to 10 years (192;50%), 10-19 years (122;31.7%) and 20 years and more (70;18.3%). Among the participants, 115 (30%) were unmarried and 269 (70%) were married. 204 (53.1%) nurses lives in urban area and 180 (46.9%) lives in rural area.

Discussion:

The study showed that overall knowledge and practices of nursing staffs on Tuberculosis Infection

Table 1: Sociodemographic Characteristics of Nurses (N=384)

Variables		n (%)
Age (years)	20-39	243 (63.2)
	≥ 40	141 (36.8)
Gender	Male	8 (2.1)
	Female	376 (97.9)
Marital status	Unmarried	115 (30)
	Married	269 (70)
Residence	Urban	204 (53.1)
	Rural	180 (46.9)
Years of work	Less than 10	192 (50)
	10-19	122 (31.7)
	≥20	70 (18.3)

Table 2: Knowledge of latent Tuberculosis Infection and Infection Control (N=384)

Knowledge questions	Correct response n (%)
Symptoms of latent TB	293 (76.3)
Investigations for latent TB	224 (58.3)
Treatment for latent TB	210 (54.6)
Progression of latent TB to active TB	305 (79.4)
What Infection Control measures can prevent LTBI	
Cough etiquette	202 (52.6)
Regular changing of bedsheets	142 (36.9)
Regular sterilisation of hospital	281 (73.1)
Wearing of mask	327 (85.1)

Table 3: Practices on Infection Control of Tuberculosis (N=384)

Practices	n (%)
IC measures practiced in hospital	
Administrative controls	311 (80.9)
Environmental controls	227 (59.1)
Personal respiratory protection	380 (98.9)
Wear mask while dealing with coughing patients	
Yes	298 (77.6)
No	86 (22.4)
Type of mask used	
N95	72 (18.7)
Surgical mask	312 (81.3)

Control were satisfactory which is contradictory with the study done by Shrestha et al[7] in Nepal. Latent Tuberculosis was well understood among nurses as the majority of them were aware of signs and symptoms oflatent TB, and its transmission. Treatment of latent tuberculosis was well understood by less nurses.

In this study only 77.6% respondents reported using a mask while dealing with coughing patients whereas in a study conducted by Baral et al, all the nurses reported using a mask while dealing with coughing patients.[13]

The majority of respondents knew that separating coughing and non-coughing patients in the facility would help to prevent the spread of Tuberculosis. Knowledge regarding Personal protective equipment were reportedly better than administrative measures and environmental infection control. The majority of respondents indicated cough etiquette as the main measure for Tuberculosis Infection Control.

Majority of the respondents practiced wearing of surgical masks or N95 masks while dealing with patients compared to a study by Baral MA et al[13] where nurses used cloth mask while dealing with patients.

Limitation of the study:

The study was conducted in a single setting so cannot be generalized. The responses to the knowledge questionnaire are based on the recall of learned facts and information, so there is a chance of recall bias.

Conclusion:

Overall knowledge regarding Latent Tuberculosis was adequate among nurses. Knowledge on Tuberculosis Infection Control were also adequate among the nurses but practices regarding infection control for Tuberculosis needs improvement.

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Declaration:

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Conflict of Interest: Nil

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Needle Stick Injuries among Healthcare Workers in a Tertiary Care Hospital of Lucknow

Prabhat K Pandey[1], Rajesh Kunwar[2], Mili Sengar[3], Ginic Gupta[4], Rama Saini[5]

[1]Junior resident, [2]Professor and Head, [3]Associate Professor, [4]Assistant Professor, [5]Medical Social Worker, Department of Community Medicine, TS Misra Medical College, Lucknow, Uttar Pradesh, India

Correspondence: Dr. Mili Sengar, Email: drmili85@gmail.com

Abstract:

Introduction: In healthcare settings, needle stick injuries (NSIs) pose a serious risk to occupational health. They often go unreported, which exposes a crucial weakness in workplace safety procedures. Research on needle stick injuries is crucial for enhancing the safety and well-being of healthcare workers, improving healthcare delivery, and ensuring that healthcare environments are as safe and effective as possible. **Objectives:** To determine the prevalence and associated factors of needle stick injuries among Healthcare workers in a Tertiary Care Hospital in Lucknow. **Method:** A cross-sectional study was conducted from April 2024 to June 2024 in a tertiary care hospital, Lucknow, Uttar Pradesh among 213 Health Care Workers (HCWs) i.e., physicians (consultants, specialists, and residents), nurses, other healthcare workers, and class IV employee working for a period of more than one year. A pre designed and pre tested structured questionnaire was developed for the study. Data regarding injuries by needle stick was collected. All needle stick injuries occurring between the period April 2023 and March 2024 was recorded. **Results:** The prevalence of needle stick injuries among healthcare workers was found to be 11.7% (25 out of 213) in the period of April 2023 to March 2024. Fingers (88%) were the most common site of NSI, followed by palm (8%) and hands (4%). The most common place of occurrence of NSI was wards (40%) and majority of the injuries were superficial (84%). The most common sharp causing NSI was needle (72%), followed by glass items (20%) and scalpel (4%). There was a statistically significant association between NSI and gender, years of experience, dissembling of needles by hand and working shift of health care workers (p=0.000). **Conclusion:** Prevalence of NSI was found to be higher among medical and paramedical staff who were working during day shift, working more than 7 hours a day and had an experience of less than 3 years.

Keywords: Healthcare Workers, Injuries, Needle

Introduction:

In every hospital setting, injuries from needlesticks and other sharp objects pose a major risk. Healthcare personnel may come into contact with blood through contaminated needles, scalpels, shattered glass, and other sharp objects. This poses a serious and perhaps fatal risk.[1] Among healthcare workers, NSIs are one of the most avoidable occupational dangers in the industry.[2]

The incidence of NSIs varies by healthcare setting, job role; with nurses, doctors, and laboratory technicians being among the most frequently

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affected. Factors contributing to NSIs include high workload, lack of proper training, inadequate use of protective equipment, and non-compliance with safety protocols. Furthermore, understaffing, long working hours, and emergency situations can exacerbate the likelihood of such injuries.[3]

Evidence exists for best practices that need to be adhered to in order to prevent NSIs. Nonetheless, there appears to be relatively little awareness of them and their application among medical professionals. Although India lacks government reporting mechanisms for NSIs, an investigation revealed that approximately 63% of the 3–6 billion injections administered annually are dangerous. [4]

NSIs may have a direct or indirect impact on the healthcare system. The number of available doctors and nurses is less in developing nations with low health-related human resources. The amount of workdays missed as a result of injuries and the emotional anguish that NSIs and other health-related occupational injuries cause to healthcare professionals have an impact on the health services that are offered. [5]

This research aims to determine the frequency of NSIs among HCWs working in a tertiary care hospital in Lucknow, Uttar Pradesh and to study the factors that associated with occurrence of NSIs.

Method:

A cross-sectional study was conducted from April 2024 to June 2024 in a tertiary care hospital of Lucknow, Uttar Pradesh among Health Care Workers (HCWs) i.e., doctors (consultants, specialists, and residents), nurses, other healthcare workers, and class IV employee.

Sample size: There were total 363 healthcare workers in the hospital, 256 of these have been working for a period of more than one year. Out of these 213 healthcare workers, who gave consent for participation, were selected by using convenience sampling method.

Data collection: A pre-designed and pre-tested structured questionnaire was developed for the study. Pretesting was done among 30 respondents and relevant changes were done. The questionnaire was administered in their vernacular language through interview among all the healthcare providers working in the hospital in various locations of the hospital, namely, wards, operation theatres, outpatient of various departments, intensive care units (ICUs), and sample collection center. Healthcare workers included the physicians, staff nurses, operation theater workers and other support staff.

Every six months, a one-day training program on biomedical waste management guidelines is held for all healthcare personnel. It is mandatory for each HCW to attended the training once every year. The site trainers who have recently received the training, led each training session. Lectures, workshops, discussions, site inspections, and policy and guideline reviews are all part of a training program. The following subjects are covered in the training curriculum: post-exposure follow-up, conducting a health care workplace assessment, prevention and control strategies, introduction to the hierarchy of controls, including safe medical devices, and the epidemiology of bloodborne infections. During the practical component, HCWs visit several healthcare facilities under the supervision of trainers in order to identify risks and dangers.

Data regarding injuries by needle stick injuries including sharps such as cannulas, broken vials, and splashes on cuts, and mucous membranes by potentially infectious materials such as blood and other body fluids was collected. All needle stick injuries occurring between the period April 2023 and March 2024 was recorded.

The Questionnaire used in the study consisted of two parts:- Part I included the socio-demographic details of the study subject viz. age, gender, marital status, religion, education level and monthly income.

Part II included individuals' work related information like their appointment, place of working, years of experience etc. It also included the details of NSI sustained by the individual including number of times NSI occurred, where the injury occurred (place and site), type of item which caused NSI, reporting protocol and guidelines for working environment in hospital.

Operational Definitions:

Needle stick injury: defined by the United States National Institute of Occupational Safety and Health are injuries caused by needles such as hypodermic needles, blood collection needles, intravenous (IV) stylets, and needles used to connect parts of IV delivery systems.[1]

Superficial injury: Scratches with a minute or no blood oozing following the NSI.[6]

Deep injury: injuries penetrating through the skin or leading to bleeding wound.[6]

Data Analysis: Data was entered into MS Excel and analyzed using SPSS software. Frequencies, percentages, and measures of central tendency to describe the prevalence and distribution of needlestick injuries were calculated. Chi square test was applied to test the association between variables and Odds Ratio to test the strength of association. P value less than 0.05 was considered significant.

Ethical Approval: Institutional Ethical Committee approval was taken before the start of the study. (TSMMC&H/IEC/2024/113(05))

Results:

The study was conducted among 213 healthcare workers. Age of the participants ranged from 20 to 59 years with mean (SD) of 32.34 (9.18)

Table 1 shows the age and gender wise distribution of study participants. The most common age group of healthcare workers was less than 30 years (55.87%) with total females being more than males.

Table 1: Age and Gender wise Distribution of Study Participants (N=213)

Age group (in years)	Male n (%)	Female n (%)	Total
<30	44 (56.41 %)	75 (55.56%)	119 (55.87%)
31-40	16 (20.51%)	46 (34.07%)	62 (29.11%)
41-50	5 (6.41%)	14 (10.37%)	19 (8.91%)
>51	13 (16.67%)	0 (0%)	13 (6.11%)
Total	78 (36.62 %)	135 (63.38 %)	213
Mean	34.24	31.24	32.34
S.D.	11.72	7.15	9.18

Table 2: Job characteristics of the Study Participants (N=213)

Variable	n (%)
Number of working hours per day	
Upto 7 hours	61 (28.6%)
More than 7 hours	152 (71.4%)
Shift as on day of interview	
Day	189 (88.8%)
Evening	12 (5.6%)
Night	12 (5.6%)

Around 50% of participants were married, 47.5% unmarried, 0.9% widowed and 0.9% divorced. Majority of the participants i.e, 90.6% were Hindu by religion. Most of the participants were either graduate (45.6%) or post-graduate (45.1%). Majority of the participants i.e, 97 (45.5%) were Resident doctors, 54 (25.4%) were consultants and the rest were paramedical and hospital support staff.

Table 2 shows the job characteristics of study participants. Majority of the study participants were working for more than 7 hours a day (71.4%) and in day shift (88.8%).

The prevalence of needle stick injuries among healthcare workers was found to be 11.7% (25 out of 213). Fingers (22 out of 25, i.e 88%) were the most common site of NSI, followed by palm (8%) and hands (4%). Seventy two percent of healthcare workers with NSI had one episode of needle stick injury. The most common place of occurrence of NSI was wards (40%) followed by operation theatres (20%) and laboratory (12%) and majority of the

Table 3: Association of various factors with Needle Stick Injury (N=213)

Factors		NSI present (n=25) n (%)	NSI absent (n=188) n (%)	Chi square, (P value)	OR (C.I)
Gender	Female	11 (44%)	124(65.96%)	4.584, (0.032)	0.406 (0.177-0.929)
	Male	14 (56%)	64 (34.04%)		
Years of Experience	<3 years	12 (48%)	134 (71.28%)	5.545, (0.019)	0.372 (0.162- 0.853)
	>3 years	13 (52%)	54 (28.72%)		
Designation	Medical staff	15 (60%)	136 (72.34%)	1.628, (0.21)	0.574 (0.246-1.333)
	Paramedical staff	10 (40%)	52 (27.66%)		
Dissembling of Needles	By Hand	20 (80%)	70 (37.23%)	16.54, (<0.0001)	6.743 (2.423-18.767)
	By Needle Cutter	5 (20 %)	118 (62.77%)		
Working Shift	Day	15 (60%)	174 (92.55%)	23.388, (<0.0001)	0.121 (0.047- 0.312)
	Evening / Night	10 (40%)	14 (7.45%)		

injuries were superficial (84%). The most common sharp causing NSI was needle (72%), followed by glass items (20%) and scalpel (4%). The reporting of NSI was done by 68% of healthcare workers. Post exposure prophylaxis was given to 68% of healthcare workers. Since only those HCWs who have been working for a period of more than 1 year have been included in the study, all the HCWs included in the study had received training regarding needle stick injuries (under Bio medical Waste Management Guidelines) at the tertiary hospital.

Dissembling of needles by hand was being done by 90 (42.3%) of the healthcare workers and the rest used needle cutters. Personal protective equipment was being used by 198 (93%) of the healthcare workers.

Table 3 shows the association of various factors with NSI. It was found that there is a statistically significant association between NSI and gender, years of experience, dissembling of needles by hand and working shift of health care workers ($p<0.0001$). The working shifts i.e., evening and night shifts were combined in the table to test association.

Discussion:

NSI is not uncommon problem with healthcare workers, especially those who are working in laboratories, who are undergoing training for laboratory work or surgical procedures and those who are working in operation theatres. Rates of NSI in hospitals differ by country, use of safety devices and methodologies (including potential under-reporting) used.

The prevalence of NSI in the present study was 11.7% among the healthcare workers. An incidence of 8.9% was found in a comparable study conducted by Goel V. et al[6] in a tertiary care hospital in North India. The prevalence of needlestick injuries (NSIs), defined as the incidence of at least one NSI within the past 12 months, was evaluated in 87 research across 31 countries in a recent systematic review and meta-analysis by Bouya S. et al.[7] The random effects technique revealed that, among the 50,916 HCWs analyzed, the global prevalence of NSIs was 44.5% (95% confidence interval: 35.7-53.2).[8] Shah R. et al[9], conducted a cross- sectional study in a tertiary care hospital in Ahmedabad, Gujarat and showed that since NSIs are often under-reported, healthcare institutions should not interpret low reporting rate as low injury rate.

In the present study, among HCWs, doctors constituted the largest group that suffered NSI (60%), followed by paramedical staff (40%). In a similar research from Maharashtra, India conducted by Yadav S. et al[10], has shown that the prevalence of

NSI among doctors ranged from 39 and 73.7%.[10] This may be because resident physicians in teaching hospitals are frequently involved in clinical procedures and the collection of blood samples, just like in the current study.

A study done by Mbaisi EM et al[11], in a provincial hospital, Kenya showed that, the probability of ever having a NSI has been reported to be inversely related to the years of experience.[11] A study conducted in Ahmedabad by Shah et al[8] found that 61 per cent HCWs had an experience of less than five years of work. The increased prevalence of NSI among comparatively younger healthcare workers may be brought on by insufficient experience, more workload of patients, under pressure situations, and a lack of awareness as a result of insufficient preventive training.[9] In the current study, male HCWs reported NSI at a higher rate (56%) than did their female counterparts (44%). Notably, some researchers conducted by Goel V. et al[6] in North India and Muralidhar S et al[12], in New Delhi showed that, NSI was more common in male HCWs while an another study done by Mbaisi EM et al[11], in a provincial hospital, Kenya showed that, NSIs were more common in female HCWs, suggesting that there is no clear pattern.

According to the current study, needle stick injuries most frequently occurred to the fingers. Research from Rajesh J. et al,[13] Chennai, and Singru SA et al,[14] Mumbai revealed that the most common location for needle stick injuries was the index finger. According to a survey conducted by Rais N et al,[15] in Karachi, Pakistan, the most prevalent place for injuries is the finger. Maximum NSIs were observed in employees with three years or less of work experience. Similar findings were observed in a study conducted by Saxena S. et al,[16] in Bareilly, India, where the rate of NSIs declined as years of work experience increased.

Needles were the most frequently reported kind of device for needlestick injuries (NSIs) in our study. This conclusion is consistent with prior studies done by Saxena S. et al,[16] in Bareilly, India and Radha R. et al,[17] in Karnataka, India found that suturing needles caused the most injuries, followed by hollow bore needles., The current study found that the working environment is a significant risk factor for needle stick injuries (NSIs), with the wards being the most common place of NSIs. According to research conducted in Central India by Bagdey P et al., operation theatre is the most common location for needle stick injuries,[10] whereas research conducted in North India by Goel V. et al,[6] found that emergency and intensive care unit (ICU) wards were the most common places for NSIs.

These findings imply that the workplace has a significant impact on the incidence of needle stick injuries. Therefore, before being assigned to different wards, staff members should get sufficient and ongoing training about needle safety procedures. When staff members were asked if they were knowledgeable about universal safety precautions, 99.5% of them responded in the affirmative.

Conclusion:

Prevalence of NSI was fairly high among health care workers. Needle stick injuries among the health care workers had a significant association of NSI with gender, years of experience, dissembling of needles by hand and working shift of health care workers.

It is recommended that for prevention of NSI, using devices with safety features, and promoting education and safe work practices for handling needles and related systems should be undertaken. Continuous education regarding safe injection techniques and the use of protective equipment is necessary for the hospital staff. Every workplace should have materials for education, information and communication displayed prominently. All hospital staff members should be encouraged to self-report NSI.

Declaration:

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Conflicts of interest: Nil

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A Community-Based Assessment of Knowledge, Attitude and Practice on Hepatitis B among Residents in a Coastal Village of Southern India

Lalithambigai Chellamuthu[1], Senkadhirdasan Dhakshnamurthy[1], Vinodhini Balamurugan[2], Sindu Kanagalingam[5]

[1]Assistant Professor, [3]Postgraduate, Department of Community Medicine, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, Puducherry, India

[2]Assistant Professor, Department of Community Medicine, ACS Medical College & Hospital, Chennai, Tamil Nadu, India

Correspondence: Dr. Lalithambigai Chellamuthu, E-mail: lalli.muthu@gmail.com

Abstract:

Introduction: The National Viral Hepatitis Control Program launched by the Government of India aims to end viral hepatitis by the year 2030. The main key objective of the programme is to enhance community awareness about the virus, the disease and the preventive measures for tackling the burden of hepatitis. Lack of knowledge and awareness regarding the disease, its modes of spread and the available preventive strategies would seriously limit in achieving the goal of reduction in burden and elimination of HBV. **Objective:** To assess the knowledge, attitude and practice on epidemiology of Hepatitis B among residents in a coastal village of Puducherry, Southern India. **Method:** A community-based, cross-sectional survey was conducted for three months among 796 adults aged ⩾18 years residing in a coastal village which was one of the rural field practice areas of a private medical college in Puducherry. Multi-stage sampling technique was followed. A pre-validated, semi-structured questionnaire incorporated in Epicollect 5 software was utilized to capture the data through face-to-face interviews. The data analysis was performed using SPSS, v24.0. **Results:** About 66.3% of participants had heard of Hepatitis with 55.9% specifically aware of Hepatitis B as a viral disease. More than half (59.3%) believed they could contract Hepatitis B. About three-fourth (73.1%) had not undergone screening for Hepatitis B, and 67.1% had not received the Hepatitis B vaccination. Age, gender and socio-economic status of the respondents were associated with knowledge attitude and practice on Hepatitis B among participants which was found to be statistically significant (p-value < 0.0001). **Conclusion:** The findings from the study showed that more than two third of participants had heard of Hepatitis. More than half of the respondents believed they could contract Hepatitis B. Nearly two-third respondents had not received Hepatitis B vaccination.

Keywords: Epidemiology, Hepatitis B, Knowledge, Practice

Introduction:

Hepatitis B (HBV) infection has been considered as one of the major public health problems globally. Significant morbidity and mortality can result from HBV infection if it is left untreated, as it can cause cirrhosis and hepatocellular cancer. It has been reported that majority of viral hepatitis deaths were caused by the potentially fatal long-term consequences of HBV infection.[1] The prevalence of HBV infection in the general population has been documented to be 3.5%. India belongs to the intermediate endemicity zone (prevalence of

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2%–7%), with an estimated average prevalence of 3%–4%.[2–4]

The National Viral Hepatitis Control Program launched by the Government of India in 2018 aims to end viral hepatitis by the year 2030.[2] The main key objective of the programme is to enhance community awareness about the virus, the disease and the preventive measures for tackling the burden of hepatitis. As of 2019, 10.5% of all people estimated to be living with hepatitis B infection and were aware of their infection, while 22% of the people diagnosed with the disease were on treatment.[1] Knowledge and awareness rates about HBV range from 9.5% to 80% across various populations from Indian literature with higher percentages reported in studies involving health care workers and medical students.[5–8] Lack of knowledge and awareness regarding the disease, its modes of spread and the available preventive strategies would seriously limit in achieving the goal of reduction in burden and elimination of HBV. There are limited data on knowledge and awareness regarding HBV in the general population in India, and most of the studies assessed these parameters among those in the medical profession. With this background, the current research aims to assess the knowledge, attitude and practice on epidemiology of Hepatitis B among residents in a coastal village of Puducherry, Southern India.

Method:

Study design and Study Population

A community-based, cross-sectional survey was conducted from June– August 2023 (three months) among adults aged ≥18 years residing in the Panithittu village, for ≥6 months. Panithittu village a coastal village which was one of the rural field practice areas of a private medical college in Puducherry. People who were terminally ill, patients with any mental disorders and individuals who were not willing to take part in the study were excluded.

Sample Size and Sampling Method:

Considering 18.1% of the general population were having a good knowledge about Hepatitis B infection as per a study from Odisha, India[9] the estimated minimum required sample size was found to be 568 using the formula $n= 4pq/d^2$ [10] with 95% confidence interval, 5% absolute precision, a non-response rate of 20% and design effect of 2. Multi-stage sampling technique was followed in this study. In step I, one village was selected using simple random sampling among the eight villages present under the rural field practice area of the medical college. In step II, all households of the chosen coastal village were covered. In step III, simple random sampling following Kish grid technique[11] was used to select the participants from each household and written informed consent was obtained from each person.

Data Collection and Data Analysis :

A pre-validated, semi-structured questionnaire with a Cronbach's alpha value of 0.7[12,13] was incorporated in Epicollect 5 software to capture data through face-to-face interviews with participants. At the end of the study, the study participants had an educational programme on Hepatitis B based on the identified knowledge gap from the present survey. The data analysis was performed using Statistical Package for the Social Sciences software (SPSS, v24.0; IBM Corp, Armonk, New York). The data has been presented in the form of numbers and percentages for categorical variables and mean and SD/median & IQR for numerical variables.

Knowledge was assessed by giving 1 to correct answer and 0 to the wrong answer. The scale measured knowledge from maximum 20 to minimum 0. Scores < 11 was taken as poor, ≥11 as adequate knowledge of Hepatitis B. Attitude was assessed by giving 1 to positive and 0 to negative attitude. The scale classified attitude as positive with score >4 and negative ≤4. Practice was assessed by giving 1 to correct and 0 to wrong practice. The scale classified practice as good with score >5 and poor ≤5.

Appropriate test of significance was used to find out the association depending on the nature and distribution of variables like Chi-square test or Fisher's exact test for categorical variables. Values of $p < 0.05$ was considered to be statistically significant. Written informed consent was sought from all participants.

The institute's scientific and ethics committee approval were obtained before the commencement of the study (Refn.: MGMCRI/2023/IRC/02/04/IHEC/62

Results:

It was observed that among 796 participants, 460 (57.8%) were females and the remaining 336 (42.2%) were males. Among the study population, 283 (35.6%) were holding diploma or graduate degree, 164 (20.6%) were educated up to high school, 148 (18.6%) were illiterate, 132 (16.6%) were having middle-school level education and 69 (8.7%) were educated till primary school. Nearly half of the study subjects, 349 (43.8%) were unemployed or homemakers, 121 (15.2%) were involved in skilled work, 117 (14.7%) were involved in semi-skilled jobs, 86 (10.8%) were professionals, 71 (8.9%) were unskilled workers and 52 (6.5%) were semi-professionals. Majority of the respondents belonged to Hindu religion 775 (97.4%). Among the participants, 590 (74.1%) were married, 161 (20.2%) were single and 45 (5.7%) were widowed or separated. Nearly three-fourth 581 (73.0%) were living in nuclear families and 210 (26.4%) were in joint families.

The knowledge, attitude and practice regarding Hepatitis B has been depicted in their respective tables. The knowledge regarding Hepatitis B has been depicted in Table 1.

About 66.3% of participants had heard of Hepatitis, with 55.9% specifically aware of Hepatitis B as a viral disease. The attitude regarding Hepatitis B has been depicted in Table 2. More than half of the respondents (59.3%), believed they could contract Hepatitis B. Regarding timing for seeking medical help if they contract Hepatitis B, around half of the respondents (51.1%) would go as soon as they realized the symptoms were of Hepatitis B, while 30.9% would seek medical help after their own treatment failed. When asked about the cost, 42.1% believed diagnosis and treatment for Hepatitis B were free at government health facilities, while 49.2% feared death the most if diagnosed of Hepatitis B.

The practice regarding Hepatitis B has been depicted in Table 3. Around three-fourth of participants (73.1%), had not undergone screening for Hepatitis B, and nearly two-third (67.1%) respondents had not received Hepatitis B vaccination.

The socio-demographic determinants of knowledge attitude and practice on Hepatitis B among participants has been illustrated in Table 4. Age, gender and socio-economic status of the respondents were associated with knowledge, attitude and practice on Hepatitis B among participants which was found to be statistically significant (p-value < 0.05). Educational status and occupation of the individuals were significantly associated (p-value < 0.05) with knowledge and practice regarding Hepatitis B among participants. Religion of the individuals was significantly associated (p-value < 0.05) only with practices regarding Hepatitis B among participants.

Discussion:

The diverse sociodemographic profile of the 796 participants underscores the importance of considering various factors in understanding and addressing the Hepatitis B landscape within this community. This discussion synthesizes common themes and variations across the studies, shedding light on the challenges and opportunities for improving hepatitis B awareness and prevention.

Table 1: Knowledge about Hepatitis B among Study Participants (N = 796)

Knowledge	n (%)
Have you ever heard of a disease termed as Hepatitis?	
Yes	528 (66.3)
No	268 (33.7)
Have you ever heard of a disease termed as Hepatitis B?	
Yes	445 (55.9)
No	351 (44.1)
Is Hepatitis B a viral disease?	
Yes	362 (45.5)
No	434 (54.5)
Can Hepatitis B affect any age group?	
Yes	505 (63.4)
No	291 (36.6)
The early symptoms of Hepatitis B are same like cold and flu (fever, running nose, cough)	
Yes	511 (64.2)
No	285 (35.8)
Jaundice is one of the common symptoms of Hepatitis B?	
Yes	495 (62.2)
No	301 (37.8)
Is nausea, vomiting and loss of appetite common symptom of Hepatitis B?	
Yes	501 (62.9)
No	295 (37.1)
Are there no symptoms of Hepatitis B in some of the patients?	
Yes	224 (28.1)
No	140 (17.6)
Don't know	432 (54.3)
Can Hepatitis B affect liver function?	
Yes	457 (57.4)
No	339 (42.6)
Can Hepatitis B cause liver Cancer?	
Yes	297 (37.3)
No	499 (62.7)
Can Hepatitis B be transmitted by un-sterilized syringes, needles and surgical instruments?	
Yes	484 (60.8)
No	312 (39.2)
Can Hepatitis B be transmitted by contaminated blood and blood products?	
Yes	481 (60.4)
No	315 (39.6)
Can Hepatitis B be transmitted by using blades of the barber/ear and nose piercing?	
Yes	469 (58.9)
No	327 (41.1)
Can Hepatitis B be transmitted by unsafe sex?	
Yes	407 (51.1)
No	389 (48.9)
Can Hepatitis B be transmitted from mother to child?	
Yes	508 (63.8)
No	288 (36.2)
Can Hepatitis B be transmitted by contaminated water/food prepared by person suffering with these infections?	
Yes	493 (61.9)
No	303 (38.1)
Is treatment available for Hepatitis B?	
Yes	556 (69.8)
No	240 (30.2)
Is vaccination available for Hepatitis B?	
Yes	496 (62.3)
No	300 (37.7)

Table 2: Attitude towards Hepatitis B among Study Participants (N = 796)

Attitude	Frequency (%)
Do you think you can get Hepatitis B?	
Yes	324 (40.7)
No	472 (59.3)
What would be your reaction if you find that you have Hepatitis B?	
Fear	578 (72.6)
Sadness	93 (11.7)
Shame	38 (4.8)
Surprise	87 (10.9)
Who would you talk to about your illness?	
Children	27 (3.4)
Parents	52 (6.5)
Physician	326 (41.0)
Spouse	142 (17.8)
What will you do if you think that you have symptoms of Hepatitis B?	
Go to Hakeem	18 (2.3)
Go to Health facility	611 (76.8)
Go to Traditional healer	
If you had symptoms of Hepatitis B, at what stage you will go to the health facility?	
After 3-4 weeks of the appearance of symptoms	95 (11.9)
Own treatment fails	246 (30.9)
Soon as I realize the symptoms are of Hepatitis B	407 (51.1)
Will not go to physician	48 (6.0)
How expensive do you think is the diagnosis and treatment of Hepatitis B?	
Don't know	127 (16.0)
Expensive	71 (8.9)
Free of cost at Government health facility	335 (42.1)
Reasonable cost	168 (21.1)
Somewhat expensive	95 (11.9)
What worries you most if you will be diagnosed with Hepatitis B?	
Cost of treatment	58 (7.3)
Fear of death	392 (49.2)
Fear of disease spread to family	334 (42.0)
Isolation from the society	12 (1.5)

The socio-demographic characteristics of the study population in this study were similar to that of a community-based study conducted in Gujarat, India.[14] About 66.3% of participants had heard of Hepatitis and it was found that 67.1% respondents had not received Hepatitis B vaccination in this current study. Similar findings were published by Misra B et al from Coastal Eastern India. It was also observed in the Misra B et study that 50% of those who were aware had no knowledge about route of transmission, infectivity, or importance of vaccination.[15] Another study from Quetta, Pakistan, reported poor knowledge, attitude, and practice towards hepatitis B among healthy individuals.[13] A community-based survey in Gujarat, India, discovered that only one-third of the population in the study districts was aware of hepatitis B and its vaccine, with less than one-fifth being vaccinated.[14] Almost all studies indicate a significant gap in awareness levels, emphasizing the need for comprehensive education and awareness programs across different regions. Our study reflects a mixed awareness of Hepatitis B. While a majority of participants had heard of Hepatitis, gaps in understanding specific transmission routes and symptoms were evident. This emphasizes the necessity of targeted educational interventions to enhance community awareness and comprehension of Hepatitis B, ensuring that residents are equipped with accurate information.

Table 3: Practice regarding Hepatitis B among Study Participants (N = 796)

Practice	Frequency (%)
Have you done screening for Hepatitis B?	
Yes	214 (26.9)
No	582 (73.1)
Have you got yourself vaccinated against Hepatitis B?	
Yes	262 (32.9)
No	534 (67.1)
Do you ask for a new syringe before use?	
Yes	502 (63.1)
No	294 (36.9)
Do you ask for screening of blood before transfusion?	
Yes	466 (58.5)
No	330 (41.5)
Do you ask your barber to change blade/ for safe equipment for ear and nose piercing?	
Yes	538 (67.6)
No	258 (32.4)
In case you are diagnosed with Hepatitis B, would you go for further investigation and treatment?	
Yes	590 (74.1)
No	206 (25.9)
Do you avoid meeting Hepatitis B patients?	
Yes	418 (52.5)
No	378 (47.5)
Have you ever participated in health education program related to Hepatitis B?	
Yes	289 (36.3)
No	507 (63.7)

The study in coastal Eastern India found that educated individuals were more aware, especially those who read newspapers and listened to the radio.[15] In Quetta, Pakistan, education, locality, and occupation significantly influenced knowledge, attitude, and practice scores for hepatitis B patients.[13] In this study Gender, education, occupation, marital status, socioeconomic status, and age all play roles in shaping knowledge perceptions. Females, highly educated individuals, and professionals are more likely to perceive their knowledge as adequate. Married and younger individuals also share this perception. In contrast, males, those with lower education, unemployed individuals, and older age groups tend to perceive their knowledge as poor.

The study on the outbreak of hepatitis B in a rural area of West Bengal identified local medical practitioners' injections and unsafe sex with sex workers as risk factors.[16] Another Indian study found that unsafe sex with sex workers and injections given by local medical practitioners were risk factors for the outbreak.[15] Unsafe practices, especially related to medical procedures and sexual contact, were identified as significant contributors to hepatitis B outbreaks in different regions. Similar to this the present study also reflects 60.8% recognized the risk from unsterilized instruments, 60.4% from contaminated blood, and 51.1% from unsafe sex.

The present research in addition found fear emerged as the predominant emotional response, underscoring the need for psychological support services and initiatives to dispel myths and reduce stigma surrounding the disease. The preference for seeking medical help from health facilities is a positive aspect, indicating a willingness to engage with formal healthcare systems.

The studies conducted by Biswas et al[16] and Laishram et al[17] consistently report low awareness and utilization of hepatitis B vaccination. Even in areas with recent outbreaks, vaccination rates remain suboptimal. This indicates a critical gap in vaccination programs, necessitating not only increased accessibility but also targeted efforts to dispel misconceptions and enhance vaccine acceptance.

Table 4: Socio-demographic Determinants of Knowledge Attitude and Practice on Hepatitis B Among Participants (N = 796)

Variables	knowledge on Hepatitis B			Attitude on Hepatitis B			Practice on Hepatitis B		
	Adequate N=796 (%)	Poor N=796 (%)	p- value	Negative N=796 (%)	Positive N=796 (%)	p- value	Good N=796 (%)	Poor N=796 (%)	p- value
Age in years									
18-30	132 (70.2)	56 (29.8)	**<0.0001***	70 (37.2)	118 (62.8)	**<0.0001***	70 (37.2)	118 (62.8)	**<0.0001***
31-45	164 (70.7)	68 (29.3)		78 (33.6)	154 (66.4)		78 (33.6)	154 (66.4)	
46-60	89 (51.4)	84 (48.6)		38 (22.0)	135 (78.0)		38 (22.0)	135 (78.0)	
>60	52 (51.5)	49 (48.5)		17 (16.8)	84 (83.2)		17 (16.8)	84 (83.2)	
Gender									
Female	228 (56.4)	176 (43.6)	**<0.0001***	95 (23.5)	309 (76.5)	**<0.0001***	95 (23.5)	309 (76.5)	**<0.0001***
Male	209 (72.1)	81 (27.9)		108 (37.2)	182 (62.8)		108 (37.2)	182 (62.8)	
Education									
Diploma & above	203 (76.0)	64 (24.0)	**<0.0001***	56 (21.0)	211 (79.0)	0.213	104 (39.0)	163 (61.0)	**<0.0001***
High school	99 (70.2)	42 (29.8)		26 (18.4)	115 (81.6)		49 (34.8)	92 (65.2)	
Illiterate	36 (29.0)	88 (71.0)		37 (29.8)	87 (70.2)		12 (9.7)	112 (90.3)	
Middle school	69 (66.3)	35 (33.7)		26 (25.0)	78 (75.0)		23 (22.1)	81 (77.9)	
Primary school	30 (51.7)	28 (48.3)		13 (22.4)	45 (77.6)		15 (25.9)	43 (74.1)	
Occupation									
Professional	68 (82.9)	14 (17.1)	**<0.0001***	18 (22.0)	64 (78.0)	0.974	35 (42.7)	47 (57.3)	**0.001***
Semi-professional	38 (74.5)	13 (25.5)		10 (19.6)	41 (80.4)		16 (31.4)	35 (68.6)	
Semi-skilled	68 (67.3)	33 (32.7)		22 (21.8)	79 (78.2)		33 (32.7)	68 (67.3)	
Skilled	79 (71.8)	31 (28.2)		26 (23.6)	84 (76.4)		42 (38.2)	68 (61.8)	
Unemployed	156 (54.0)	133 (46.0)		66 (22.8)	223 (77.2)		63 (21.8)	226 (78.2)	
Unskilled	28 (45.9)	33 (54.1)		16 (26.2)	45 (73.8)		14 (23.0)	47 (77.0)	
Socioeconomic status (According to modified B.G.Prasad classification)									
Upper class	86 (77.5)	25 (22.5)	**0.003***	19 (17.1)	92 (82.9)	**0.041***	50 (45.0)	61 (55.0)	**0.001***
Upper middle	92 (57.9)	67 (42.1)		39 (24.5)	120 (75.5)		36 (22.6)	123 (77.4)	
Middle class	129 (58.1)	93 (41.9)		43 (19.4)	179 (80.6)		62 (27.9)	160 (72.1)	
Lower middle	89 (67.4)	43 (32.6)		42 (31.8)	90 (68.2)		34 (25.8)	98 (74.2)	
Lower class	41 (58.6)	29 (41.4)		15 (21.4)	55 (78.6)		21 (30.0)	49 (70.0)	
Religion									
Christian	7 (77.8)	2 (22.2)	0.639	5 (55.6)	4 (44.4)	0.058	5 (55.6)	4 (44.4)	**0.027***
Hindu	426 (62.7)	253 (37.3)		152 (22.4)	527 (77.6)		194 (28.6)	485 (71.4)	
Muslim	4 (66.7)	2 (33.3)		1 (16.7)	5 (83.3)		4 (66.7)	2 (33.3)	
Chi-square test applied (p-value < 0.05 considered as statistically significant)									

The significant percentage of participants who had not undergone screening or received vaccination in the present study highlights potential barriers to accessing preventive measures. The practice of avoiding Hepatitis B patients and low participation in health education programs observed in this study reveal social and informational gaps, suggesting the need for community-specific awareness campaigns.

The main strength of this research is that it is a community-based study covering an adequate sample size guaranteeing generalizability of the study findings. One possible limitation of this study is that follow up screening for the disease for persons with high titres in sero-survey and Hepatitis B vaccination could have been added as an intervention component in the study.

Conclusion:

The findings from the study showed that more than two third of participants had heard of Hepatitis, with half of them specifically aware of Hepatitis B as a viral disease. More than half of the respondents believed they could contract Hepatitis B. Around three-fourth of participants had not undergone screening for Hepatitis B, and nearly two-third

respondents had not received Hepatitis B vaccination. Age, gender and socio-economic status of the respondents were associated with knowledge, attitude and practice on Hepatitis B among participants. Educational status and occupation of the individuals were significantly associated with knowledge and practice regarding Hepatitis B among participants. Religion of the individuals was significantly associated only with practices regarding Hepatitis B among participants.

Recommendation:

The findings from this community-based assessment highlight the importance of considering the identified diverse socio-demographic determinants such as age, gender, socio-economic status, educational qualification, occupation and religion when designing targeted awareness and prevention campaigns for Hepatitis B. A targeted action plan is essential to raise awareness about hepatitis B in the region. Comprehensive public campaigns should be launched to educate on transmission, prevention, and vaccination importance for Hepatitis B through various media and community events.

Declaration:

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Conflicts of interest: Nil

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A Cross-Sectional Study on Cardiovascular Disease Risk Assessment among the Adult Population in Poonamallee Taluka, Tiruvallur District, Tamil Nadu

Anjugam Sugavanam[1], R.N. Vaishali[1], Deepa Durgadasimi[2], Srivaishnavi Kumaravelu[3], Gomathy Parasuraman[4]

[1]Assistant Professor, [2]Research Assistant, Department of Community Medicine,PES Institute Of Medical Science And Research, Kuppam, Andhra Pradesh, India

[3]Assistant Professor, [4]Professor, Saveetha Medical College And Hospital, Chennai, Tamilnadu, India

Correspondence: Anjugam Sugavanam, Email : anjugovind2518@gmail.com

Abstract:

Introduction: Non – Communicable Diseases, driven by factors like increased life expectancy, urbanization and unhealthy lifestyles have become a leading cause of morbidity and mortality worldwide. India is undergoing a health transition, with Cardio Vascular Diseases now representing a significant part of its disease burden. **Objectives:** To estimate the prevalence of CVD risk and its associated factors using World Health Organization/ International Society of Hypertension risk prediction charts. **Method:** A community-based cross-sectional study was conducted for a period of 18 months among 545 participants in Poonamallee Taluk, Tiruvallur district. Participants were selected using a multistage simple random sampling method. Sociodemographic data were collected through interviews, and blood samples were taken to assess blood sugar and cholesterol levels. Descriptive statistics for background variables were computed using SPSS 21. The association between various factors and cardiovascular disease (CVD) risk was analysed using the chi-square test. Multiple logistic regression was performed to identify independent risk factors. **Results:** The mean age of the study subjects was 54.3$\pm$9 years with 60.2% being females. The 10-year CVD risk, based on the WHO/ISH risk prediction chart 30.6% had low risk (5 – 10%) and 30.3% had moderate risk (10 - $\leq$20%). Age, gender, education, socio – economic status and family history of NCDs, were significantly associated with CVD risk ($p<0.05$). **Conclusion:** This study highlighted that 11.8% have a high prevalence of CVD risk factors among adults over 40 years. The findings emphasize the importance of targeted interventions, including promoting physical activity, healthy diets, and regular screenings.

Keywords: Cardiovascular Diseases, Epidemiological transition, Risk assessment.

Introduction:

Non–Communicable Diseases (NCD's) has emerged as a predominant cause for morbidity and mortality globally, driven by factors such as increased in life expectancy, urbanization and unhealthy life styles.[1] According to WHO in 2023, NCDs are responsible for 41 million deaths each year, accounting for 74% of all global fatalities. Among these, 77% occur in low- and middle-income countries.[2] Among NCDs, Cardiovascular disease (CVDs) stand out as the leading cause, contributing to approximately 32% of all deaths globally in 2019.[3] The number of CVD's has doubled from 271 million in 1990 to 523 million in 2019 and during the same time period, the number of related death has risen from 12.1 million to 18.6 million. This rise in prevalence of CVD has been striking.[4]

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India is experiencing a notable health transition marked by a rising incidence of NCDs, partially CVDs, which now account for a significant percentage of the country's disease burden and mortality rates. States like Kerala, Tamil Nadu and Punjab exhibit higher prevalence rates, reflecting varying levels of epidemiological transition.[5] Economic development, altered eating patterns, decreased physical activity and raising alcohol and cigarette use are some of the factors causing this trend.[6] Recognising the urgency of addressing this public health challenge, India has implemented national policies aimed at reducing premature deaths from CVDs by managing risk factors like diabetes mellitus and hypertension, promoting their early diagnosis and treatment. Efforts like the National Program for Non Communicable Disease (NPNCD) underscore India's commitment to combating the growing impact of NCDs on its population.[7,8] With rapid urbanization in Poonamallee Taluk, there has been a significant rise in these risk factors. The above-mentioned facts necessitate the need to quantify the risk of CVD and its association with various study variables, providing valuable data for early interventions and public health strategies to reduce CVD related morbidity and mortality in the region.

Method:

This cross-sectional study was conducted in the villages of Poonamallee Taluk from January 2021 to March 2022, covering a period of 18 months. A sample size of 488 participants was determined based on the prevalence of cardiovascular disease (CVD) risk observed in a study by Ghorpade et al.,[1] using the formula $N = (Z\alpha)^2PQ/L^2$, where P = 17%, Q = 83%, L = 20%, and α = 5%. Adjusting for a 10% non-response rate, the optimum sample size was approximated to be 545 subjects. Based on the sample size 545, among 24 villages 7 villages were taken and from each village 78 participants were selected by simple random sampling method.

The study employed a multi-stage simple random sampling technique to select participants, ensuring representation across the study area (Figure 1). Eligible participants were adults aged 40 years and above, excluding individuals with terminal illness, mental disorders, or pre-existing diagnoses of cardiovascular disease or stroke. Prior to data collection, participants were fully briefed on the study objectives and provided informed and written consent. Data was collected through face-to-face interviews using a semi-structured questionnaire comprising two sections.

Section 1: socio-demographic details and detailed history of risk factors of CVD

Section 2: Assessment tools – Anthropometric measurements (height in meters and weight in Kilograms), blood pressure measurement, WHO risk prediction chart (Laboratory based charts - Age, Gender, presence or absence of Diabetes mellitus, Smoking status and Total blood Cholesterol level). the validation statistics showed that the WHO/ISH risk prediction charts had a sensitivity of 60% and a specificity of 93.2% in identifying cases of Coronary heart disease, as reported by Abd El- Wahab et al. [9]

A qualified lab technician took a 4ml blood sample from each subject and transmitted it to the lab, where results for total blood sugar and cholesterol were recorded for study purpose. With the above information the 10 - year CVD risk was assessed.[10]

The ten– year cardiovascular risk using the WHO risk prediction charts, begin by selecting the appropriate chart based on the individual's diabetes status. Next, choose the relevant table for either males or females, as this distinction can impact risk assessment. Then, determine the individual's smoking status by selecting either the smoker or non - smoker box. Afterward, identify the correct age group box for the individual. Finally locate the cell where the individual's systolic blood pressure and cholesterol levels intersects within the selected age group box; the color of this cell indicate the individual's 10-year cardiovascular risk level. This structured approach enables effective use of the risk

prediction charts for accurate evaluation. Green colour - <5% - very low risk; Yellow colour -5 to <10% -low risk; Orange colour – 10 to < 20% - Moderate risk; Red colour – 20 to <30% - high risk and Deep red ≥ 30% - very high risk. [10,11]

The data collected were analyzed using SPSS version 21. The background study variables were subjected compilation of descriptive statistics. The Chi square test was used to find the association between various study variables with CVD risk. In addition, logistic regression was done to find out significant contributing factor for CVD and p value < 0.05 was taken as significant. Institutional ethical committee approval was granted from a private medical college in Kacheepuram district (SMC/IEC/2021/07/001)

Operational Definition:

1. Physical Activity:[12]

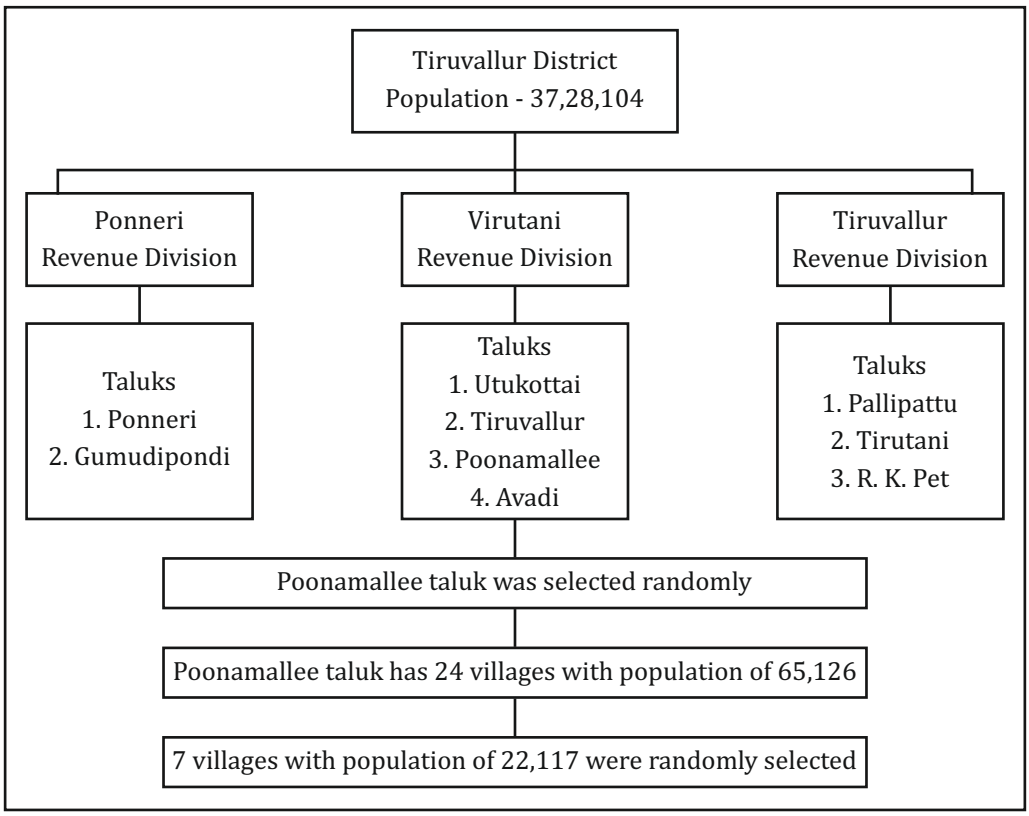
   Low – Person who do not engage in physical activity

   Moderate – Person who is doing moderate intensity activity for 5 or more days and walking of at least 30 minutes per day

   Heavy –Person with 7 days of any combination of walking, moderate or vigorous intensity activities achieving a minimum total physical activity of at least 3000 MET minutes a week.

2. Body Mass index[13] - BMI was calculated as per WHO guidelines for Asians.
3. Hypertension[14] - Person known case of HTN, Systolic ≥140 mmHg or diastolic ≥ 90 mmHg, those who are anti – hypertensive medications.
4. Diabetes Mellitus[15] - Person Known Case, Random Blood Sugar ≥ 200 mg/dl or on oral hypoglycaemic drugs and insulin.
5. Hypercholesterolemia[16] - 200mg/dl or ≥5.2 mmol/ L.
6. Perceived Stress Scale (PSS)[17] - Low – 0-13, Moderate – 14 – 26, High – 27 – 40.

Figure 1: Sampling method and Selection of study participants



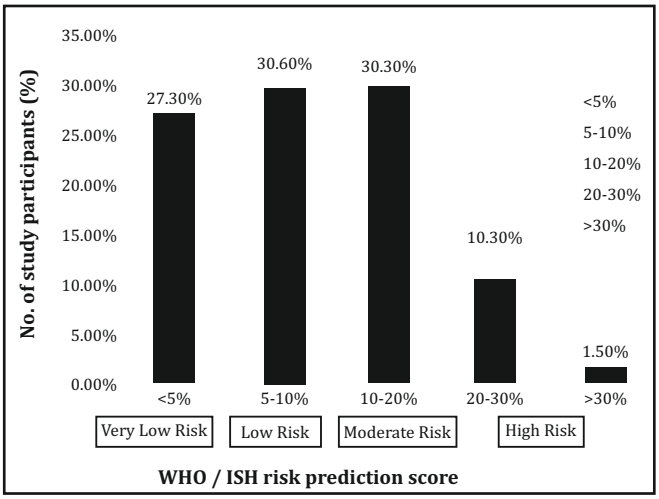
Results:

The mean age of the study subjects was 54.3±9 years. Among total participants, 328 (60.2%) were females aged 40-44 years 110 (20.2%). The majority 490 (89.9%) identified as Hindu. Additionally, 212 (38.9%) belonged to the middle class and 190 (34.9%) were illiterate. Furthermore, 250 (45.9%) were unemployed. 247 (45.2%) reported a family history of NCDs. Diabetes was reported by 293 (53.8%), hypertension by 202 (37.1%) and both the conditions by 119 (21.8%) of the subjects. A history of alcohol use was reported by 105 (19.3%), while 101 (18.5%) were smokers. Pickle consumption was noted in 450 (82.6%) of the subjects and 344 (63.1%) reported consuming fruits 2 to 3 days in a week. Adding salt after cooking was a habit for 135 (24.8%) of the subjects, whereas 412 (75.6%) stated consuming an appropriate amount of salt (5 – 9 gms). Saturated oil (palm oil) was used for cooking by 274 (50.3%) and 80 (14.7%) mentioned a habit of consuming processed foods. A sedentary lifestyle (low physical activity) was reported by 313 (57.4%) of the subjects. Hypercholesterolemia (≥ 5.2 mmol/L) was found in 226 (41.5%) of the subjects. Obesity was assessed according to WHO BMI and was found that 223 (40.9%) had normal BMI and 511 (93.8%) had moderate level of stress among the subjects.

Based on WHO/ISH risk prediction chart 30.6% had low risk (5 – 10%) and 30.3% had moderate risk (10 - <20%) (Figure 2).

According to the WHO risk prediction chart the 10 -year risk of developing CVD was evaluated. The analysis revealed that socio-demographic variables such as age, gender, religion, education, Socio-economic status and family history of NCD were statistically significant ($p < 0.05$) in relation to CVD risk scores. However, dietary factors, including consumption of pickles and the addition of salt after cooking were not statistically significant. Additionally, BMI was not significantly associated with the CVD risk score. The statistically significant risk factors for the CVD risk score are presented in the table 1.

Figure 2: Prevalence of CVD risk prediction according to WHO/ISH charts among the study participants (N = 545)



The prevalence of high CVD risk increases with increasing age, with 41.2% among older age group (70-74) when compared with their younger individuals 4.6%. Religion-wise, Hindus (12%) are at high risk of developing CVD compared to Muslims (8.3%). In the current study, 19.6% of participants from lower middle class had high risk of getting CVD than 13.1% of the participants from upper middle-class. The significant factors identified in the bivariate analysis were included in a multivariate logistic regression. Among these risk factors religion, marriage status, economic status, fruit intake, processed food usage, type of cooking oil, alcohol use, physical activity, family history of NCD and stress were not found to be independent risk factors linked with CVD risk. The notable factors outlined in Table 2. The mean age of the study participants is 55 years.

Discussion:

It is widely acknowledged that myocardial infarction, stroke or death are seldom due to single risk factor alone, rather these outcomes are typically the result of combination of multiple risk factors. Over the previous three decades, research has consistently identified CVD's as a major cause of death in India. Our study employed the WHO/ISH risk stratification guide to assess the likelihood of

Table 1: Association between NCD Risk Factors and WHO Risk Score (N = 545)

Variables	Very Low risk (< 5%) N = 149	Low risk (5 – 10%) N = 167	Moderate (10–20%) N = 165	High risk (>20%) N = 64	$\chi 2$	p value
Fruits consumed in a week						
No	21 (10.4)	43 (21.4)	92 (45.8)	45 (22.4)	102.31	<0.001*
1 or 2 days	75 (35.3)	72 (33.8)	51 (23.9)	15 (7)		
>3 days	53 (40.5)	52 (39.7)	22 (16.7)	4 (3.1)		
Processed food						
No	144 (31)	146 (31.4)	132 (28.4)	43 (9.2)	36.37	<0.001*
Yes	5 (6.3)	21 (26.2)	33 (41.3)	21 (26.2)		
Salt consumed						
Don't know	1 (9.1)	2 (18.2)	6 (54.5)	2 (18.2)	20.82	0.013*
Just right	122 (29.6)	120 (29.1)	124 (30.1)	46 (11.2)		
Too little	11 (14.3)	36 (46.8)	22 (28.6)	8 (10.3)		
Too much	15 (33.3)	9 (20)	13 (28.9)	8 (17.8)		
Type of oil						
Sunflower	65 (33)	69 (35)	51 (25.9)	12 (6.1)	26.74	<0.001*
Groundnut	22 (29.7)	28 (37.8)	19 (25.7)	5 (6.8)		
Palm	62 (22.6)	70 (25.5)	95 (34.7)	47 (17.2)		
Usage of alcohol						
Yes	16 (15.3)	42 (40)	35 (33.3)	12 (11.4)	11.09	0.011*
No	133 (30.3)	125 (28.4)	130 (29.5)	52 (11.8)		
Smoking form Current tobacco user						
Yes	7 (6.9)	18 (17.8)	47 (46.6)	29 (28.7)	66.76	<0.001*
No	142 (32)	149 (33.6)	118 (26.6)	35 (7.8)		
Smokeless tobacco						
Yes	6 (9.2)	13 (20)	19 (29.3)	27 (41.5)	67.4	<0.001*
No	143 (29.8)	154 (32.1)	146 (30.4)	37 (7.7)		
Physical activity						
Low	59 (18.8)	100 (31.9)	113 (36.2)	41 (13.1)	33.91	<0.001*
Moderate	83 (38.2)	66 (30.4)	46 (21.2)	22 (10.2)		
Heavy	7 (46.7)	1 (6.6)	6 (40)	1 (6.7)		
Diabetes Mellitus						
Yes	30 (10.2)	101 (34.5)	113 (38.6)	49 (16.7)	98.54	<0.001*
No	119 (47.2)	66 (26.2)	52 (20.6)	15 (6)		
Hypertension						
Yes	22 (10.9)	57 (29.2)	80 (41.1)	38 (18.8)	58.02	<0.001*
No	127 (37)	110 (31.5)	85 (23.9)	26 (7.6)		
Both (DM/ HTN)						
Yes	4 (3.4)	34 (28.6)	51 (42.9)	30 (25.1)	63.7	<0.001*
No	145 (34)	133 (31.2)	114 (26.8)	34 (8)		
Stress levels						
Low	8 (47.1)	6 (35.3)	1 (5.9)	2 (11.7)	12.96	0.044*
Moderate	136 (26.6)	157 (30.7)	156 (30.5)	62 (12.2)		
High	5 (29.4)	4 (23.5)	8 (47.1)	0		
Cholesterol						
< 5.2mmol/L	90 (28.2)	115 (36)	86 (26.9)	28 (8.9)	16.11	0.001*
≥ 5.2mmol/L	59 (26.1)	52 (23)	79 (34.9)	36 (16)		

*p value <0.05 is significant; Percentages are calculated row wise

Table 2: Multi Variate Regression Analysis of Risk Factors for CVD Risk Scores (N = 545)

Variables	Categories	AOR	95%CI	p-value
Age	> 55 years	58.49	17.49 – 76.54	<0.001*
	<55 years		1	
Gender	Male	0.21	0.083 – 0.567	0.002*
	Female		1	
Religion	Hindu	0.64	0.281 – 1.958	0.445
	Others		1	
Education	Illiterate	3.62	1.722 – 7.623	0.001*
	Literate		1	
Marital status	Widow & divorce	1.21	0.494 – 2.969	0.676
	Married		1	
Socio economic class	Lower middle, Lower	2.31	0.997 – 5.362	0.051
	Upper, upper middle & middle		1	
Fruits intake	Yes	0.5	0.252 – 1.008	0.053
	No		1	
Processed food usage	Yes	0.71	0.303 – 1.704	0.454
	No		1	
Type of oil	Saturated	0.83	0.421 – 1.670	0.616
	PUFA		1	
Smoking tobacco usage	Yes	12.76	4.415 – 36.89	<0.001*
	No		1	
Smokeless tobacco usage	Yes	14.11	4.57 – 43.53	<0.001*
	No		1	
Alcohol usage	Yes	0.56	0.20 – 1.57	0.271
	No		1	
Physical activity	Moderate & vigorous	0.57	0.284 – 1.175	0.13
	Low		1	
Family history of NCD	Yes	0.94	0.492 – 1.821	0.87
	No		1	
History of NCD	Yes	16.22	6.82 – 38.56	<0.001*
	No		1	
Stress	Moderate & high	5.75	0.631 - 52.52	0.121
	Low		1	
Cholesterol	> 5.2 mmol/L	6.55	3.172 - 13.54	<0.001*
	< 5.2mmol/ L		1	

* statistically significant p value < 0.05 (two tailed)

developing CVD within the next decade. It was found that 27.3% of participants were classified as very low risk, 30.6% as low risk risk, 30.3% as moderate risk, and 11.8% as high risk. This contrasts with the study by Ghorapade et al. conducted in Pondicherry, which reported 86% of participants at low risk and 17% at moderate risk.[1] Such differences may be attributed to regional variations in risk factors.

In this study 39.8% of participants were male and 60.2% were females. It was found that males were 0.21 times odds of getting CVD when compared to females and this was found to be statistically significant Jaiswal et al study similarly showed that 2.7% of males were at moderate risk for CVD in the next decade, while only 0.1% of females.[18] This underscores a notable association between CVD risk and gender. Regarding education, illiterates were at 3.62 times odds of developing CVD when compared to literates and it was statistically significant (p=0.001) which aligns with Kumar et al, with 17.3% of illiterates at high risk of CVD as compared to 4.4% of professionals.[19] This indicates that individuals

with higher education levels are more likely to be aware of risk factors, which can lead to healthier behaviors such as regular physical activity and balanced diets.

The current study found that smokers had 12.76 times higher odds of developing CVD compared to non - smokers. Similarly, Trideep et al[20] reported that 35.2% of smokers were at heightened risk of getting CVD whereas only 1.4% of non – smokers, also showing a statistically significant difference (p = 0.001). These findings highlight the elevated risk of getting CVD among smokers due to tobacco chemicals that contribute to plaque formation and artery narrowing. Furthermore, the present study observed that smokeless tobacco users at 14.11 times higher odds of developing CVD compared to non – users. This aligns with Rani et al study, which found that 44.8% of smokeless tobacco users were at high risk compared to non – users.[21] This indicates that smokeless tobacco can lead to inflammation, vasoconstriction, clot formation and direct damages to coronary arteries.

The current study found that 13.1% of participants with minimal physical activity were at high risk of developing CVD compared to 6.7% of those with heavy physical activity (p<0.001). These findings were consistent with the study done by Devamani et al[22] and Johnson et al[23] where the participants with inadequate physical activity (63.3% - 74.2%) were at high risk of developing CVD and was statistically significant (p=0.025). Physical inactivity, influenced by cultural and lifestyle factors lead to artery blockage. In the present study, higher BMI levels were associated with an increased likelihood of high CVD risk (p = 0.715) whereas a study done by Muthunarayanan et al[24] was contrast to the study, 1.9% of participants with BMI >25 had high CVD risk compared to 6.3% with normal BMI (p = 0.017). This discrepancy might be due to usage of different BMI classifications (International WHO standards), cultural practices, sedentary life style and unhealthy diet.

In the present study, increased stress levels significantly raised the likelihood of developing moderate grade 2 CVD risk (Likelihood ratio = 12.96; p = 0.044). Stress can elevate inflammation, leading to high blood pressure and lower HDL cholesterol which harms the heart.

In the present study, 41.5% of participants had hypercholesterolemia, with 16% at high risk of CVD compared to 8.9% with normal cholesterol levels (p<0.001) which was contrast with Deori et al[20] with 20% risk in participants with high cholesterol but this was not significant. This discrepancy would be due difference in behavior, diet and culture.

Our study identified that age, gender, education, tobacco use, history of NCD and cholesterol are the independent risk factors for CVD. Both modifiable and non- modifiable risk factors equally contribute to CVD development. The WHO/ISH CVD risk prediction charts can serve as simple screening tool for peripheral health workers, aiding in risk stratification and informed decision making. By implementing appropriate interventions such as health education and treatment the incidence of CVDs at the community level can be reduced.

Conclusion:

This cross-sectional study evaluated cardiovascular disease (CVD) risk among adults over 40 years in Poonamallee Taluk, Tiruvallur District, Tamil Nadu. The results reveal a significant prevalence of (11.8%) high CVD risk factors in this population, emphasizing the need for targeted interventions and awareness programs. Promoting physical activity, healthy diets, and regular health screenings is essential for reducing CVD risk. Future research should assess the long-term impact of these interventions to enhance cardiovascular health in the community.

Declaration:

Funding: Nil

Conflicts of interest: Nil

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Assessment of the Time Utilization of the Community Health Officers (CHO) of Bhavnagar District, Gujarat: A Cross-sectional Study

Kartik B. Prajapati[1], Kailesh D. Bhalani[2]

[1]Senior Resident, Department of Community Medicine, B.J. Medical College, Ahmedabad, Gujarat, India
[2]Associate professor, Department of Community Medicine, Government Medical College, Bhavnagar, Gujarat, India
Correspondence: Dr. Kartik B. Prajapati E-mail: drkartik6185@gmail.com

Abstract:

Introduction: To attain "universal health coverage" and "health of all", a new cadre namely Community Health Officer (CHO) was introduced at HWC (Health and Wellness Center). In the community, CHO serves as the initial point of contact and source of information for health-related issues. **Objective:** To assess the utilization of time of CHO at HWCs, Bhavnagar. **Method:** Out of 63 CHOs with experience of more than 1 year in Bhavnagar district, 30 CHOs were selected randomly for utilization of time. Each CHO was accompanied during their duty hours for all working days of a week. Time spent by a CHO in different activities was recorded. Data were analyzed by using Epi Info Software. **Results:** It was observed that on an average, CHOs remained on duty for 93% of their duty hours. Around 29.61% of their actual on-duty-time (per week) was used for the personal work, while 17.34% of their on-duty-time was used in OPD, 14.36 % in COVID-19 related work and 14.13% in administration work. **Conclusion:** The analysis revealed that CHOs spent 93% of their scheduled duty hours on the job. CHOs spent almost one third of their duty hours for the personal work.

Keywords: Ayushman Bharat, Health and Wellness Center, Utilization of time

Introduction:

Primary health care plays an important role in all disease. The primary health care system is the only practical and cost-effective means of achieving universal health coverage (UHC), according to the Report on Primary Health Care Task Force by Government of India.[1] Only 15% of morbidities were covered by the public healthcare system, which forced the majority of people to seek treatment at district hospitals or in the private sector, incurring large out-of-pocket costs.[2] About 17% of Indian households suffered poverty as a result of OOPE for health care.[3]

According to a press release from the Ministry of Health and Family Welfare, India has a doctor-population ratio of 1:834 as compared with the WHO standards of 1:1000.[4]

About 26.2% of urban households and 32.5% of rural households seek government/ public hospital services for illnesses.[5] India has committed to attain Universal Health Care for All by 2030, which is necessary for accomplishing the other Sustainable Development Goals. Universal health care involves making sure everyone has access to high-quality medical care, including preventive, educational, therapeutic, and palliative care, without facing financial hardship. Comprehensive primary health care (CPHC) is the most important concept for achieving "universal health coverage" (UHC) and "Health for All". To achieve this, government of India

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launched Ayushman Bharat programme. One of its components is converting all Sub Health Center (SHC) and PHC in to Health and Wellness Centers (HWC) for primary health care and other is to give health insurance up to 5 lakhs for secondary and tertiary level health care. To provide CPHC, government introduced a new cadre of Community Health Officer (CHO) in HWC.

A CHO is the first point of care or source of information for the health related issues for the community by the virtue of the proximity of HWCs to its catchment population. CHOs are broadly expected to perform the following three functions: 1. Clinical functions for ambulatory care and management; 2. Public health functions for health promotion, prevention and disease surveillance 3. Managerial Functions for efficient functioning of HWCs

It was about two years from posting this new cadre CHO in the primary health care system in Bhavnagar (Gujarat). It was interesting to know how this new cadre is utilizing their time to perform their duties in providing comprehensive primary health care. First CHO was appointed in the HWCs of Bhavnagar district in the year 2018. As the CHO is expected to play a crucial role in providing CPHC, this study was intended to assess the working hours of CHOs in order to assess the utilization of time of a CHO.

Method:

A Cross sectional study was carried out on assessment of utilization of time. Study was conducted by observing the CHOs of Bhavnagar district continuously during their working hours for all the working days of a week. The data collection was done during the period from 1st July 2021 to 31st September 2022.

A list of CHOs, who had completed at least 1 year of service, was obtained from Chief District Health Office (CDHO) of Bhavnagar district. There were 63 such CHOs. Out of them, 30 CHOs were selected randomly for the study by lottery method. To draw a judgment about a population (cadre) that is statistically sound, thirty data points are considered sufficient. Each of the selected CHO was contacted telephonically and was briefed about the study and their verbal consent was taken to participate in the study. A week of the visit was fixed in consultation with the CHO. If any of the selected CHO was not available for data collection due to any reason (transfer, left the job, etc.), the replacement was done by selecting other CHO from the list using simple random sampling.

Relevant socio-demographic data about CHOs was obtained using structured questionnaire during the visit. Each CHO was accompanied during their duty hours of all working days of a week (Monday to Saturday) from their arrival to the working place till their departure. Time spent by CHOs for different activities during the whole day was measured and recorded in a validated tool. Time was recorded from the start of the first activity to the start of the second activity, and the difference between the two recorded times was the time utilized in the first activity. The activities carried out by CHO on daily basis were categorized into OPD, administration work, COVID-19 related work, travel, personal work, Mobile use for personal work, and lunch time. Other activities which were not to be performed by CHO on daily basis were categorized into NCD Screening, home visits, MAMTA day, meetings, trainings and others.

If visit was not possible on any day of the week due to any reason, it was done on the same day of another week convenient to the CHO.

Data were collected in self-designed, structured and validated tool. Before the start of the study, a pilot study was conducted, and a self-designed and structured questionnaire was used. It was validated by the peer review. Data were entered in excel sheet and data analysis was done with the help of Epi Info Software.

Ethical approval was obtained for the study from the ethical committee of Government Medical College, Bhavnagar. All participants were pre-informed for study and verbal consent was taken.

Results:

In Bhavnagar district, CHO was posted only in SHC-HWCs. Among the selected CHOs, 53.33% were female and remaining were male CHOs. Almost half of CHOs were serving the population of more than 5000. 10% of CHOs usually need to travel for more than 30 minutes to reach to their HWC from their home.

CHO should be available on duty for 480 minutes per day. As observed from Table 1, CHOs remained on duty for 93% of the time of their expected duty hours. They spent around 30% of their duty hours in either personal or non duty related work.

Table 2 shows that 29.61% (9.74%+19.87%) of the CHOs' on-duty hours were spent for the personal work. More than 14% of their time was utilized in Covid-19 pandemic related work during the period of the study. The duties on which they spent highest amount of their time were OPD and administrative work, which was more than 17% and 14% of their time respectively.

Apart from these activities, there were some other activities in the job profile of CHOs, which were not done on daily basis. Among them, it was observed that CHOs spent 1.64% of their time for NCD Screening, 1.71% for home visits, 1.62% for MAMTA day, 3.67% for meetings, 2.50% for training and 2.06% in other activities.

In actual service delivery, 56.66% of CHOs utilized less than 1800 minutes per week (which is almost 68% of their expected duty hours). In personal work, 43.33% of CHOs spent more than 750 minutes per week. Except 7(23.33%), all of the CHOs spent at least 500 minutes every week (which is almost 19% of their on duty time) for personal work from their duty hours. 60% of CHOs spent less than 500 minutes per week on OPD work. In COVID-19-related work, 56.66% of CHOs spent more than 250 minutes per week. If Covid-19 pandemic would not have been there, this time could have been used for other activities like OPD, NCD screening, MAMTA day work, home visits etc. For lunch, 63.33% of CHOs spent more than 150 minutes per week.

It was observed from this study that 43.75% of the female CHO spent more than 500 min per week in OPD work as against 35.72% of male CHOs. 18.58% of CHOs having Ayurvedic degree and 42.11% of CHO having GNM degree spent more than 500 min per week for OPD work. 46.66% of CHOs staying at headquarters spent more than 500 minutes per week in OPD work as against 33.34% of CHOs who were not staying at headquarters. None of these three differences found statistically significant.

It can be observed from the Table 5 that 50% of female CHOs and 35.72% of male CHOs spent more than 750 minutes per week in personal work, but there was no statistically significant difference found between them in the time spent in personal work. Among CHOs, 42.86% having Ayurvedic degree, 25% of CHOs having Bsc nursing degree and 47.37% of

Table 1: Time Utilization by CHOs of HWCs of Bhavnagar District (N=30)

Duty hours		Total Duration Observed (Out of 79200 Minutes *)	Average Duration/day (Out of 480 Minutes)	Standard Deviation	Percentage
Actual time spent on duty	Total	73675	446	43.47	93.02
	Male	34897	453	46.10	94.37
	Female	38778	441	41.62	91.87
Time spent for providing service (including lunch break)	Total	51857	314	85.59	70.39**
	Male	25147	326	89.53	72.06**
	Female	26710	303	83.37	68.88**
Time spent for personal work	Total	21818	132	50.86	29.61**
	Male	9750	127	48.38	27.94**
	Female	12068	137	54.00	31.12**

*1 week (5 full and 1 half day) = 480 minutes x 5.5 days = 2640 minutes, total 30 weeks = 2640 minutes x 30 CHOs = 79200 minutes

**Out of actual time spent on duty

Table 2: Day wise utilization of time by a CHO in different activities (N=30)

Time spent [Median(IQR)]	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly Average min.	%
OPD	62 (115)	75 (118)	55 (91)	60.5 (80)	66 (77)	43.5 (64)	414.5 (484)	17.34
Admin work	50.5 (53)	42.5 (62)	50 (60)	51 (76)	60 (82)	40 (61)	331.5 (204)	14.13
COVID	13.5 (137)	9.5 (111)	38 (115)	59.5 (132)	1 (60)	22.5 (60)	347 (535)	14.36
Travel	4 (30)	17.5 (37)	17.5 (42)	9.5 (25)	0 (33)	0 (10)	100 (69)	4.36
Personal mobile	35 (34)	24.5 (22)	43 (56)	41.5 (43)	49.5 (52)	22 (31)	224.5 (146)	9.74
Personal work	84.5 (71)	73 (85)	75.5 (64)	77.5 (51)	81.5 (74)	47 (70)	524 (390)	19.87
Lunch	30.5 (52)	42.5 (15)	31 (33)	37.5 (27)	34.5 (21)	0 (0)	180.5 (108)	7.02
Duration Spent on Duty (n)	432.5 (56)	457 (60)	436 (62)	452 (41)	439 (49)	239 (70)	2456*	100

*Total Observed on Duty Period 73675 minutes / 30 CHOs = 2456 minutes/week

Table 3: Distribution of CHOs according to time spent (weekly) in various activities (N=30)

Time Spent For	Weekly Time spent (minutes)	Mean	SD	n(%)
Providing services	<1400	1162.25	182.87	8 (26.66)
	1400 - <1800	1575.11	109.55	9 (30.00)
	1800 - <2200	1966.83	46.09	6 (20.00)
	≥2200	2362.85	127.85	7 (23.33)
Personal Work	<500	341.57	35.75	7 (23.33)
	500 - <750	662.10	46.85	10 (33.33)
	750 - <1000	862.71	85.22	7 (23.33)
	≥1000	1127.83	68.36	6 (20.00)
OPD	<250	127.10	76.50	10 (33.33)
	250 - <500	378.25	87.57	8 (26.67)
	500 - <750	620.67	71.72	9 (30.00)
	≥750	964.67	235.08	3 (10.00)
COVID	<250	81.23	86.33	13 (43.33)
	250 - <500	392.42	70.95	7 (23.33)
	≥500	677.70	122.33	10 (33.33)
Administration work	<250	146.12	42.18	8 (26.70)
	250 - <500	367.00	74.47	19 (63.30)
	≥500	756.33	192.67	3 (10.00)
Lunch	<150	94.18	50.57	11 (36.66)
	≥150	217.63	36.91	19 (63.33)

CHOs having GNM degree spent more than 750 minutes per week in personal work, but the difference observed between them was not found statistically significant. Among CHOs, 26.67% staying at headquarters spent more than 750 minutes per week in personal work as against 60% of CHOs who were not staying at headquarters. However, the difference was not found statistically significant. Among the CHOs, whose distance from their home to HWC was 15 minutes or less, 29.41% of them spent more than 750 minutes every week for personal work while they were on duty. Among the CHOs whose distance from home was more than 15 minutes, 61.54% of them spent more than 750 minutes in personal work every week. The association of time spent for personal work with the

Table 4: Association of time utilized in OPD with selected variables (N=30)

Variables		Time spent in OPD in a week n (%)		Chi Square Value	p Value
		<500Min	≥500 Min		
Gender	Female	9 (56.25)	7 (43.75)	0.0056	0.9404
	Male	9 (64.29)	5 (35.71)		
Education	Ayurvedic	5 (71.43)	2 (28.57)	0.0699	0.7915
	Nursing	13 (56.52)	10 (43.48)		
Staying at Headquarters	Yes	8 (53.33)	7 (46.67)	0.1389	0.7093
	No	10 (66.67)	5 (33.33)		

Table 5: Association of time utilized in personal work with selected variables (N=30)

Variables		Time spent in OPD in a week n (%)		Chi Square Value	p Value
		<750Min	≥750 Min		
Gender	Female	8 (50.00)	8 (50.00)	0.1751	0.6755
	Male	9 (64.29)	5 (35.71)		
Education	Ayurvedic	4 (57.14)	3 (42.86)	0.6741	0.7139
	BSc (Nursing)	3 (75.00)	1 (25.00)		
	GNM	10 (52.63)	9 (47.37)		
Staying at headquarters	Yes	11 (73.33)	4 (26.67)	2.1719	0.1405
	No	6 (40.00)	9 (60.00)		
Time required to reach at HWC from home	<15 min	12 (70.59)	5 (29.41)	1.9263	0.1651
	≥15min	5 (38.46)	8 (61.54)		

time required to travel to & from their home was not found statistically significant.

As observed from the study, 75% of female CHOs as against 64.29% of male CHOs spent less than 120 minutes per week in administrative work. It was also observed that 68.75% of female CHOs spent >150 minutes every week in lunch break as against 57.14% of male CHOs. None of these two differences were found statistical significant.

Discussion:

In present study it was observed that a CHO remained present for 446 (359-533) minutes daily on duty i.e. about 93% time of their total duty hours. This finding is comparable to study by Sehr Brar, et al.[6], done in four selected HWCs of a district of Punjab in 2020, which found that CHO spent 5.7 (5.6–5.9) hrs/day on duty i.e. about 95% of the duty hours. A time-motion study by Swetang Ninama, et al.[7], in Bhavnagar district in 2017 found that MPHWs and FHWs (other cadres of sub-health centres) remained 79.09% and 79.77% of their time on duty out of total duty hours respectively. Thus, CHOs remained on duty for longer hours compared to other cadres of SHCs. This may be because they belong to relatively newer cadre.

However, if the time utilized in productive work is compared, in present study it was found that 63.37% (70.39% - 7.02% time spent for lunch break) of their time spent on duty was utilized in productive work as against 57% of the time in the study by Sehr Brar et al.[6] The present study was conducted in relatively larger sample as compared to their study, in which only four CHOs and four ANMs had been observed.

It was observed that, the activities that consumed most of the time of CHOs were OPD (17.34%) and Covid related work (14.36%), while Sehr Brar, et al.[6] in their study observed that services related to NCDs and maternal health consumed most of the time of CHOs, i.e. 40% and 18% respectively.

The Covid-19 pandemic related work which included vaccination consumed good amount of time of the CHOs, which otherwise would have been spent in other activities.

It was observed in the present study that CHOs spent 14.13% of their time on administration work, which included online data entry, updating registers and reporting to higher authorities; while Sehr Brar, et al.[7] found that CHOs spent 29.5% of the time in reporting to higher authorities and 12.1% time in administration. So the time consumed in administrative and reporting work by the CHOs of Bhavnagar was much less than the time consumed by CHOs of Punjab.

Present study shows that CHOs spent 29.61% of their on-duty time for personal (non duty-related) work. A time-motion study conducted by Anand Shah, et al.[8], in 2013 among MPHWs of a PHC of Ahmedabad district, had similar findings where it was observed that 30.17% time of MPHWs was consumed in non-productive (personal) activities. While Swetang Ninama, et al. observed that MPHWs and FHWs in Bhavnagar spent 14.56% and 2.04% of their on-duty hours respectively for non productive work.[7]

CHOs in present study spent on an average 34 minutes per day for lunchtime. While Anand Shah, et al. in their study observed that MPHWs on an average spent 56 minutes per day for lunch-break[8], which was almost 20 minutes higher than that of CHOs in present study.

Conclusion:

CHOs remained present on-duty for 93% time of their total duty hours. CHOs engaged in personal or non-duty-related work for 29.61% of their on-duty hours. Over 750 minutes a week were devoted to personal work by 43.33% of the CHOs during their duty hours. Apart from personal work, most of the on-duty time of CHOs was consumed for OPD (17.34%), followed by Covid-19 related work (14.36%) and administrative work (14.13%). Associations of time spent in personal work by CHOs with their gender, education, staying at headquarters and time to reach HWCs from their residence were not found to be statistically significant.

Limitations:

As the Covid-19 pandemic was ongoing during the study period, significant amount of time of CHOs had to be spent for pandemic related work. If pandemic would not have been there, CHOs could have used this time for other duty related work. In this study, as the CHOs were observed directly by the investigator, the estimated on-duty time of the CHOs might be higher than the actual on-duty time and the estimated time spent on the personal work might be lower than the actual time spent on personal work.

Declaration:

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A Cross-Sectional Study on Functional Disability among the Elderly in Rural Area of Goa

Arya Ravi[1], Vanita G. Pinto Da Silva[2]

[1]Postgraduate Student, [2]Associate Professor, Department of Community Medicine, Goa Medical College and Hospital, Bambolim, Goa, India

Correspondence: Dr. Arya Ravi, Email: aryaravi2024@gmail.com

Abstract:

Introduction: Functional disability among the elderly reduces autonomy, leading to dependency, decreased quality of life, increased hospitalization, and higher mortality rates, ultimately lowering general life expectancy and increasing disabled life expectancy. **Objectives:** 1. To estimate the prevalence of functional disability among the elderly residing in the field practice area of Rural Health and Training Centre, Mandur, Goa. 2. To determine the factors associated with functional disability among study participants **Methods:** A community-based cross-sectional study was conducted among elderly individuals (aged 60 years and above) in the field practice area of Rural Health and Training Centre, Mandur, Goa. Systematic random sampling recruited 372 participants from 1,588 households. Functional disability was assessed using the Barthel Index, with data analysed using SPSS 22.0. Prevalence was expressed as a percentage, and associations were evaluated using significance tests and Odds ratios with 95% confidence intervals. **Results:** Out of 372 participants (mean age: 71.24 ± 8.03 years), 95 (25.5%) had functional disabilities in ADL, visual, or hearing impairments. Significant associations were found with age, literacy, financial dependence, and current alcohol consumption ($p < 0.05$). **Conclusion:** The high prevalence of functional disability among the elderly in rural Goa highlights the need for targeted interventions to improve quality of life and independence. Health education, literacy, and financial support are critical for preserving functional abilities. Community-based initiatives and supportive healthcare policies are essential for reducing disability and healthcare costs among the elderly.

Keywords: Activities of Daily Living , Elderly, Functional disability

Introduction:

Disability is an intrinsic aspect of the human experience, with nearly everyone encountering temporary or permanent disability at some juncture in their lives.[1] Embracing a holistic perspective, the International Classification of Functioning, Disability and Health (ICF) advocates for a biopsychosocial model that integrates both medical and social dimensions of disability.[2] Disability encompasses impairment in bodily structure or function, activity limitations, and participation restrictions in daily activities.[2]

Presently, about 15% of the global population, amounting to one billion individuals, live with

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disabling conditions, with a significant portion being elderly individuals, constituting over 46% of the elderly worldwide.[3] The demographic landscape is shifting, particularly in countries like India, where the proportion of elderly in the population rose from 5.61% in 1961 to 8.6% in 2011.[4] This figure is further projected to gradually rise to approximately 20% in 2050, posing substantial challenges to healthcare and social support systems.[4] This demographic shift underscores the imperative for increased attention to disability inclusion, not only for the well-being of individuals but also for advancing global health priorities and Sustainable Development Goals.[4]

As individuals age, they often face a myriad of challenges that can impact their overall well-being and functional abilities.[5] These challenges can manifest as acute morbidity conditions and functional losses, encompassing both physical and mental aspects. Consequently, older adults frequently experience functional disability, which poses risks to their health and working capacities.[5] Activities of Daily Living (ADLs) serve as vital indicators of functional disability, comprising two categories: Basic ADLs and Instrumental ADLs.[6] While Basic ADLs primarily involve motor functions, Instrumental ADLs are more closely associated with cognitive abilities.[6]

The spectrum of disability among the elderly can be broadly categorized into three groups: those who can manage daily activities with mechanical aids, those with significant health issues requiring intensive care, and those with mild impairments in ADLs or cognitive functions.[7] Understanding the magnitude of disability is crucial in assessing disease burden alongside morbidity and mortality rates.[7]

Access to effective healthcare plays a pivotal role in ensuring the well-being and financial stability of older individuals.[8] Recognizing the rights of persons with disabilities to equitable healthcare access underscores the importance of integrating disability considerations into public health and development agendas.[8] This study was carried out to estimate the prevalence of functional disability among the elderly residing in rural areas of Goa using the Barthel index. Also, this study was done to explore the factors associated with functional disability. By shedding light on these aspects, it is aimed to contribute valuable insights into the understanding of disability among the elderly population in rural areas of Goa.

Method:

This community-based cross-sectional study was conducted in the field practice area of Rural Health and Training Centre, Mandur, and includes villages namely Mandur, Azossim, Neura over a period of three months from March 25, 2023, to June 25, 2023.

The study focused on elderly individuals aged over 60 years residing in the area, who consented to participate. The inclusion criteria encompassed individuals aged over 60 years who had been residents of the area for more than six months, while those who could not be contacted after two consecutive visits, refused consent, were unable to comprehend the questionnaire, or were too ill to participate were excluded.

The sample size was calculated using $n = Z^2pq/d^2$ and estimated at 372, based on the prevalence of functional disability affecting activities of daily living (ADL) status, found to be 37.4% in a previous study by Gupta et al.,[14] with a 5% permissible error. Participants were recruited using systematic random sampling from a total of 1,588 households within the study area, which encompasses a population of 5,812 individuals. The estimated geriatric population within this area is 512 individuals. The sampling process began by calculating a sampling interval 'K', which was determined by dividing the total number of households (1,588) by the required sample size of elderly individuals (372). This yielded a sampling interval of approximately 4. Starting with a randomly selected household within the first interval, every fourth household was subsequently included in the sampling process. Within each selected household, if

more than one elderly individual was eligible for inclusion in the study, one was randomly chosen using a simple lottery method. Any identified health issues were addressed with referrals to appropriate healthcare facilities. Age verification relied on birth certificates or Election Commission identity cards, with alternative age estimation methods employed when necessary.

Data collection commenced after obtaining ethical clearance from the Goa Medical College Ethical Committee (GMC IEC/2023/69). Participation was voluntary, with informed consent secured from all participants, and confidentiality maintained. Sociodemographic information, including age, gender, religion, marital status, education, occupation, and financial dependence, was collected through face-to-face interviews using a pre-designed and pre-tested proforma. Educational levels were assessed using the Modified Kuppuswamy Socioeconomic Scale: 2022,[9] while socioeconomic status was evaluated using the Updated BG Prasad's classification for 2022.[10]

Operational Definition:

Elderly or senior citizens are defined as individuals aged over 60 years.[11]

Functional disability was defined in this study as having a disability in (ADL) or blindness or bilateral hearing impairment or a combination of these.[12]

Visual acuity was measured using Snellen's distance vision chart at 6 meters. Participants were categorized as having vision <6/60 or ≥6/60, with blindness defined as presenting visual acuity of <6/60 in the better eye.[13]

Hearing assessment began with Rinne's and Weber's tests using a 512 Hz tuning fork to determine bilateral hearing impairment.[14]

Activities of Daily Living was measured using Barthel's Index.[15] It uses 10 variables - Dressing, grooming, bathing, toileting, bladder control, bowel control, feeding, transferring from bed to chair, mobility, and stair climbing.[15] The participant was considered as having a disability in Activities of Daily Living, if he/she had at least one of these ten Activities of Daily Living disabilities. Sum the patient's scores for each item.[15] The ten items are summed and x 5 to get a total score out of 100.[24]

Scores of 0-20 indicate "total" dependency

Scores of 21-60 indicate "severe" dependency

Scores of 61-90 indicate "moderate" dependency

Scores of 91-99 indicate "slight" dependency

Score of 100 indicate "independent"

Most studies use a score of 60/61 (moderate dependency) as a cutting point.[24]

Statistical Analysis

Data was entered in Microsoft Excel and transferred to IBM Statistical Package for the Social Sciences Statistics (SPSS) 22.0 for statistical analysis. Simple bivariate analysis was used to compute the association between various socio-demographic factors and functional disability. The prevalence of functional disability was estimated and reported as prevalence (95% confidence interval [CI]). To control for confounding factors, Binary logistic regression analysis was used. $P < 0.05$ was considered to be statistically significant

Results:

In Table 1, it was observed that a total of 372 elderly individuals participated in this study, out of which 226 (60.8 %) were females and 146 (39.2%) were males. The mean age of the participants was 71.24 ± 8.03 years. Predominantly, 189 (50.8%) elderly individuals belonged to the age group of <70 years, 196 (52.7%) were Hindu by religion, 364 (97.8%) were unmarried/separated/divorced, 218 (58.6%) were educated up to primary school, 254 (68.3%) were financially dependent, 313 (84.1%) had comorbidities, 231 (62.1%) were not current smokers, and 259 (69.6%) were current alcoholics.

According to Updated BG Prasad's classification for 2022, majority of the study participants 154 (41.4%) belonged to middle class, followed by 136

(36.6%) belonged to Upper middle class, 51 (13.7%) belonged to Lower middle class, 22 (5.9%) belonged to Upper class and 9 (2.4%) belonged to Lower class

Table 1 depicts the factors affecting functional disability are described. A statistically significant association ($p<0.05$) was observed with age, literacy, financial dependence, currently alcoholic, whereas there is no such significant association between the comorbidities, gender, religion, marital status, and smoking.

Table 2, depicts the prevalence of functional disability among the study participants. A total of 292 (78.5%) participants obtained a Barthel score of 100 indicating complete independence, whereas only 80

Table 1: Factors affecting Functional Disability and its Association with the Socio Demographic Characteristics (N=372)

Variables	Functional disability		Total (N=372)	χ^2	p value
	Presentn n (%)	Absent n (%)			
Age*					
≥ 70 years	73 (39.9%)	110 (60.1%)	183 (100%)	39.02	0.001
<70 years	22 (11.6%)	167 (88.4%)	189 (100%)		
Gender					
Male	37 (25.3%)	109 (74.7%)	146 (100%)	0.005	0.945
Female	58 (25.6%)	168 (74.4%)	226 (100%)		
Religion					
Hindu	53 (27.0%)	143 (73%)	196 (100%)	0.492	0.483
Christian	42 (23.8%)	134 (76.2%)	176 (100%)		
Literacy*					
Illiterate	51 (47.7%)	56 (52.3%)	107 (100%)	38.669	0.001
Literate	44 (16.6%)	221 (83.4%)	265 (100%)		
Financial status*					
Financial independence	9 (7.6%)	109 (92.4%)	118 (100%)	29.153	0.003
Financial dependence	86 (33.9%)	168 (66.1%)	254 (100%)		
Marital Status					
Married	2 (25%)	6 (75%)	8 (100%)	0.001	0.972
Unmarried/Widower/Separated	93 (25.5%)	271 (74.5%)	364 (100%)		
Comorbidities					
Present	79 (25.2%)	234 (74.8%)	313 (100%)	0.092	0.761
Absent	16 (27.1%)	43 (72.9%)	59 (100%)		
Current Smoker					
Yes	36 (25.5%)	105 (74.5%)	141 (100%)	0.00	0.998
No	59 (25.5%)	172 (74.5%)	231 (100%)		
Current Alcoholic*					
Yes	58 (22.4%)	201 (77.6%)	259 (100%)	4.432	0.035
No	37 (25.5%)	76 (74.6%)	113 (100%)		

*$p<0.05$ is considered statistically significant.

Table 2: Prevalence of Functional Disability among the Study Participants (N=372)

Characteristics	n (%)
Visual impairment	25 (6.7%)
Hearing impairment	15 (4.0%)
ADL score (<100)	80 (21.5%)
Disability in (ADL) or blindness or bilateral hearing impairment or a combination of these.	95 (25.5%)

(21.5%) participants had Disability in activities of daily living (ADL) items according to Barthel index. About 95 (25.5%) have a disability in (ADL) or blindness or bilateral hearing impairment or a combination of these.

Discussion:

The study describes the prevalence of functional disability among elderly persons in a rural area and its association with socio-demographic variables. The study population was randomly selected from the field practice area under Rural health and training centre, Mandur. In the present study, it was observed that the prevalence of functional disability among the elderly was about 25.5%. Similar findings were reported in other studies; Vaish et al.,[16] conducted in urban Delhi reported 25.6%, Gupta et al.[14] conducted in rural Haryana reported 37.4%, Chakrabarty D et al[19] in rural West Bengal reported 16.6%, Paul et al[18] in Tamil Nadu reported 20.6%, Medhi GK et al[19] in Dibrugarh reported 43.7% and Gupta S et al[20] in Jhansi reported 23.4%. Disparities in prevalence rates were also evident when using the Katz scale, with figures ranging from the studies done by Sowmiya Kr et al[21] done in rural Tamil Nadu reported 46.7% to Kavya C et al[22] in Bangalore reported 24.2%. These variations may stem from differences in measurement scales and the inclusion criteria for disability types, particularly locomotor disabilities. The present study was conducted in a rural village, possibly yielded lower prevalence rates due to improved healthcare access. It is crucial to acknowledge that differences in defining functional disability across studies could contribute to discrepancies in prevalence rates.

Age emerged as a significant factor associated with functional disability in our study. As participants' age increased, so did the likelihood of experiencing functional limitations. Similar findings were reported in the studies done by Gupta et al.,[14] Paul et al.,[18] Gureje et al.,[23] and Vaish et al,[16] all of which underscore the impact of advancing age on functional disability. The observed pattern suggests that physiological changes associated with aging, cumulative health issues, and reduced resilience to stressors may contribute to the increased susceptibility to functional limitations among older adults.

In the present study, it was observed that a notable gender disparity in functional disability, with a higher prevalence observed among females (61.1%) compared to males (38.9%). This gender gap was particularly pronounced in the age group of 70 years and above, where 61.1% of females and 38.9% of males experienced functional disability. This finding underscores the complex interplay between gender and age in shaping the burden of functional disability among elderly populations. Factors such as differences in healthcare-seeking behaviour, socio-economic status, and biological factors likely contribute to this gender disparity.

Financial dependence among the elderly emerged as another significant correlate of functional disability in the present study. Financially dependent elderly individuals often rely heavily on family members for various needs beyond financial support, which may lead to overlooked health concerns and exacerbate disability risks.

In terms of sensory impairments, we identified visual impairment in 6.7% and hearing impairment in 4% of participants. These figures contrast with those reported by Kavya C et al[22] in Bangalore, where

visual impairment affected 28.5% and hearing impairment affected 38.5% of elderly participants.

Strengths and Limitations:

The present study benefits from a community-based approach, providing a potentially accurate representation of functional disability prevalence among elderly residents in rural Goa. Rigorous methodology ensured robust participant selection and data collection by a single interviewer minimized inter-observer bias. The use of validated questionnaires such as Barthel's Index enhanced the reliability of our assessment.

However, the study's limitations include the lack of inclusion of locomotor disabilities and Instrumental Activity of Daily Living (IADL) which may affect the comprehensiveness of our findings and the absence of information on disability duration hinders our understanding of the permanence or transience of disabilities observed in the study population.

Conclusion:

The study emphasizes the urgent need to address various factors that greatly impact the quality of life and independence of the elderly in rural Goa. According to the study findings, the prevalence of functional disability among the elderly was found to be 25.5%. With a notable prevalence of functional disability, particularly among those aged 70 and above and among the illiterate, it is clear that targeted interventions are necessary. Programs aimed at health education and improving literacy could be crucial in mitigating the risk of functional disability. It was observed that there were significant associations ($p < 0.05$) between functional disability and factors such as age, literacy, financial dependence, and alcohol consumption, while no significant associations were found with comorbidities, gender, religion, marital status, or smoking.

Recommendations:

By addressing functional disability in the elderly through a multidisciplinary approach that includes family support, healthcare, policy initiatives, and community engagement, we can significantly improve the elderly's quality of life, encourage their independence, and lessen the burden of disability in rural Goa. Putting the needs of the elderly first and carrying out focused interventions can encourage good aging and improve their health outcomes.

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Conflicts of interest: Nil

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Assessment of Routine Immunization Program at Selected Urban Health Centres in Ahmedabad, Gujarat, India

Jinalben Nogas[1], Karankumar Desai[1], Nandan Shah[2], Mitesh Patel[3], Shivam Chauhan[4], Bhavesh Gelot[5]

[1]Senior Resident, [3]Associate Professor, [5]Junior Resident, Community Medicine Department, B.J. Medical College, Ahmedabad
[2]Former MBBS Student, Narendra Modi College, Ahmedabad, Gujarat, India
[4]MBBS Student, B.J. Medical College, Ahmedabad, Gujarat, India
Correspondence: Dr. Mitesh Patel, Email: drmiteshpatel@yahoo.co.in

Abstract:

Introduction: Urban Health Centre is a key place for implementing Routine Immunization program and vaccine storage. The present study evaluated Cold Chain Point (CCP) and logistics related to routine immunization at selected Urban Health Centers (UHCs) in Ahmedabad. **Objective:** 1. To evaluate the cold chain infrastructure and logistics supporting routine immunization programs at UHC with a focus on assessing the quality and reliability of vaccine storage and handling practices. 2. To assess the knowledge about cold chain among the Vaccine Cold Chain Handlers (VCCHS). **Method:** In this cross-sectional study, one UHC from each of the seven zones of Ahmedabad city was randomly selected for assessment of Cold Chain management. Knowledge of VCCHs at each UHCs was assessed using semi-structured questionnaire. Analysis was done using Microsoft excel 2019. **Results:** It was observed that all UHCs were having session plans and logistics estimation. Around 28.5% UHCs were having lack of essential tools, such as Drop Out charts and maps of their catchment areas. Open vials were found without dates and times labelled in 43% of UHCs, and in one UHC, a vaccine vial was found beyond its usable Vaccine vial Monitor (VVM) stage. All the medical officers utilize various strategies to create awareness, with the majority (86%) using interpersonal communication. All Health Care Providers stated Socio-cultural beliefs and fear of side effects as reason for non-utilization of services. Only 42% of Vaccine Cold Chain Handlers (VCCHs) demonstrated complete knowledge about live vaccines. **Conclusion:** The study highlights certain issues at UHC like maintenance of drop out chart, map of catchment area, training of medical officers on module of immunization, ice-packs arrangment in Deep Freeze, no knowledge of VCCHs about shake test, which indicates lack of efficiency of VCCHs and need of their training.

Keywords: Cold Chain, Health Personnel, Routine Immunization, Vaccine Storage

Introduction:

Immunization is an investment for today and tomorrow. It is a cost effective and highly successful health intervention, which prevents needless suffering through sickness, disability and death.

Widespread immunity due to vaccination is largely responsible for the worldwide eradication of smallpox and the elimination of diseases such as polio and tetanus from much of the world.[1] Vaccines against rotavirus, rubella and polio (injectable) will

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help the country meet sustainable development goal 3 target (3.2) that include by 2030, end preventable death of newborns and children under 5 year of age, with all countries aiming to reduce neonatal mortality (NNMR) to at least as low as 12 per 1000 live births (NNMR for Ahmedabad is 18.0 per 1000 live births according to NFHS 5) and under 5 mortality rate (U5MR) to at least as low as 25 per 1000 live births. (U5MR for Ahmedabad is 29.5 per 1000 live births according to NFHS 5).[2] The Programme now consist vaccination for 12 disease, Tuberculosis, Polio, Hepatitis, Diphtheria, Pertussis, Tetanus, Hemophilus influenza B, Measles, Rubella, Pneumonia, Rotaviral gastroenteritis, Japanese encephalitis.

According to NFHS-5, 76.1% of children in India were fully immunized. The percentage of fully immunized children in India has increased with time, as percentage was 35% from 1992-1993. Percentage of fully immunization coverage in Gujarat is 64.1% and 70.3% in Ahmedabad city.[3] The success of immunization program in field depends on the availability of appropriate logistics and proper training of health workers. These have impact on not only in improving the coverage and reducing dropouts but also in improving the quality of vaccination.

It was realized that merely providing vaccine just to achieve targets without giving adequate attention to quality of immunization services doesn't guarantee a reduction in disease morbidity and mortality. Urban Health Centre (UHC) is a key place for implementing routine immunization program and storing of vaccines. The present study was conducted with an objective to evaluate the cold chain infrastructure and logistics processes supporting routine immunization programs at UHCs in Ahmedabad, with a focus on assessing the quality and reliability of vaccine storage, handling practices and knowledge assessment of VCCHs.

Method:

A cross-sectional observational study was conducted at seven Urban Health Centers (UHCs) in Ahmedabad City between 2021-2022 to assess the cold chain management practices and staff knowledge and skills. The study focused on evaluating temperature control and monitoring, vaccine storage and handling practices, cold chain equipment maintenance and functionality, and the knowledge and skills of vaccine cold chain handlers. Ahmedabad Municipal Corporation consists of seven zones with total 81 Urban Health Centres (UHCs) which are distributed across all the zones. The study population comprised a convenience sample of 49 healthcare providers, including: 7 Medical Officers (MOs), one representing each of the 7 Urban Health Centres (UHCs), 7 Vaccine Cold Chain Handlers (VCCHs), one from each UHCs and 35 additional healthcare staff, consisting of nurses and Accredited Social Health Activists (ASHAs), who were present at the UHCs on the day of data collection. This study received ethical approval from the institutional ethic committee. Prior to data collection, informed verbal consent was obtained from each healthcare provider. Data collection was conducted utilizing a pre-designed, semi-structured questionnaire.

Table 1: Findings of Routine Immunization Programme management at Urban Health Centres (N=7)

Programme Management Aspects	Yes (%)	No (%)
Availability of map of catchment area	5 (71.42)	2 (28.57)
Availability of session plan	7 (100)	0
Estimation of logistics	7 (100)	0
Availability of drop out chart	5 (71.42)	2 (28.57)
Joint review meeting conducted in last calendar month	7 (100)	0
Training of medical officer on recent module of Immunization	5 (71.42)	2 (28.57)

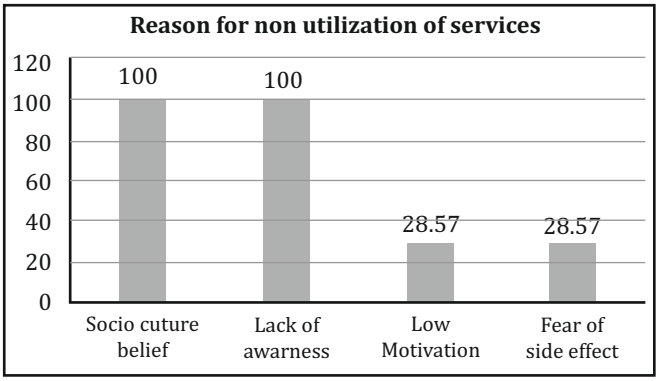
Additionally, interviews were conducted with healthcare providers, comprising Medical Officers, VCCHs, and Vaccinators. The questionnaire encompassed various components, including planning, cold chain management, logistics, and knowledge assessment. Statistical analysis was performed using Microsoft Excel 2019.

Programme management aspects at Urban Health Centre are depicted in Table 1. It was observed that all UHCs were having session plans and logistics estimation. Medical officer also conducts joint review meeting on weekly basis. Out of all the UHCs, two centers (28.57%) were having lack of essential tools, such as Drop Out charts and maps of their catchment areas. Two medical officers have not received training on the recent immunization module.

Various awareness activity were undertaken to promote UIP. Medical Officers utilize various strategies to create awareness, with the majority (86%) using interpersonal communication. Additionally, other approaches, including mother meetings (43%), health camps (28%), and other IEC (Information, Education, and Communication) activities (14%) were also utilized.

Reasons for non utilization of services are depicted in Figure 1. All Health Care Providers stated socio-cultural beliefs and fear of side effects as primary reason for non-utilization of services. While lack of awarness about programme services and low level of motivation was stated by 29% of Health Care Providers.

Figure 1: Reason for Non-utilization of immunization services according to Health Care Providers (N=49)*



(*Multiple responses)

Table 2: Findings related to Cold Chain system at UHC (N=7)

Cold chain aspects	Yes (%)	No (%)
Thickness layer of ice inside the equipment >5 mm	2 (28.5)	5 (71.42)
Cold chain room have facility for handwashing with water and soap	2 (28.57)	5 (71.42)
Any open vial stored in Ice Lined Refrigerator (ILR)without date and time mention on it	3 (42.85)	4 (57.14)
Ice pack arranged in criss-cross manner	4 (57.14)	3 (42.85)
Cold Chain Point have adequate space for dry storage	4 (57.14)	3 (42.85)
Deep freeze (DF) temperature (-15 to -25°C)	5 (71.42)	2 (28.5)
Any vaccine vial beyond usable VVM in the ILR	1 (14.28)	6 (85.71)
ILR and DF placed on wooden blocks & 10 cm away from wall	7 (100)	0
ILR/DF connected through functional voltage stabilizer	7 (100)	0
Functional thermometer inside ILR & DF	7 (100)	0
Twice daily recording of temperature log book	7 (100)	0
Record of defrosting	7 (100)	0
Signature of Medical officer in temperature log book	7 (100)	0
Vaccine vials correctly arranged inside ILR	7 (100)	0
Vaccine vial placed inside labelled cartons	7 (100)	0
ILR temperature (+2 to +8 ^{0}C)	7 (100)	0
Presence of things Other than vaccine inside ILR	0	7 (100)
Diluent placed inside ILR at least 24 hrs before distribution	7 (100)	0
VCCH clean all vaccine carrier with warm water and detergent after return	7 (100)	0

Table 2 shows findings related to Cold chain system at Urban Health Centre Several cold chain rooms were found to have inadequate facilities. Specifically, lack of handwashing facilities found in 71% of cold chain rooms and insufficient space for dry storage were found in 43% of cold chain rooms. Furthermore, issues with vaccine storage and handling were observed. Open vials were found without dates and times labelled in 43% of UHCs, and in one UHC, a vaccine vial was found beyond its usable VVM stage. Additionally, ice packs were not arranged in a crisscross manner in 42.85% of the DF (Deep Freezers), and in 28.5% of UHCs, the ice layer inside the DF was excessively thick (>5mm).

Knowledge assesement of VCCH was found that all of them possessed complete knowledge about freeze sensitive vaccine, VVM, Early Expiry First Out (EEFO), First In, First Out (FIFO), conditioning of ice pack and storage temeperature of ILR and DF. However, only 42% of VCCHs demonstrated complete knowledge about live vaccines, and a significant 14.28% lacked knowledge about the shake test.

Discussion:

Planning is a continuous process of analysing data, evaluating progress and constraints and making decisions about reaching program objectives. It was observed in the present study that session plan and estimation of logistic was prepared at all UHCs but other important matters which were helpful for better planning of immunization services like map of catchment area, drop out chart were not prepared in many UHCs. NIHFW study in various states of India in 2009 observed poor results regarding planning as compared to present study i.e., map of catchment area was not available in 61% of UHCs as compared to 28.57% in present study and Estimation of number of beneficiaries were not done in 39% of UHCs as compared to 100% done in the present study.[4] Better results in this study has been observed because of the timely preparation of list of beneficiaries by the ANM/Female health worker (FHW), as Gujarat uses E- Mamta developed by National infromatics centre. It is the duty of the ANM/FHW to prepare the list of the beneficiaries due for vaccination on the given day. The state of Gujarat uses the mother and Child Tracking Software named E-Mamta (developed by National Informatics Canter, New Delhi, India). This software gives a list of due beneficiaries for various services including immunization. Such due list of beneficiaries was available at all 14 (100%) sites. Whereas in a study conducted by Parmar et al.,[5] the due list of beneficiaries was available at only 1 site out of 13 sites visited by them in the rural areas of Vadodara. Joint review meeting was conducted in the all UHCs in present study which was not conducted in half of the UHC in a study done by Mithun Sanghvi et al[6] in Jamnagar district.

In present study the communication channels used for motivating parents to about utilization of UIP services was interpersonal communication. Same result was found in the evaluation of UIP in different state of India under INCLEN study in 2005.[7] In present study reason for non utilization of services according to HCPs were socio cultural belief and lack of awareness. Similar reasons found in study conducted by Nath L et al.2015,[8] who conducted similar study at Haridwar.

Cold chain component was assessed at UHC level in the present study. Temperature of ILR was between +2 to +8^{0}C at all visited UHCs. Study conducted by Patel et al,[9] in Anand district, Gujarat during the year 2008 observed that 90.9% of UHCs had appropriate ILR temperature which was slightly lower than present study. In present study arrangement of vaccine in ILR was found to be adequate at all the UHCs. Diluent were placed inside ILR before 24 hours of distribution. Contrary to this finding, vaccines were not placed properly inside ILR and diluents were not placed inside ILR before 24 hours of distribution in a study conducted by Sanghavi M et al,[6] in Jamanagar district. In their study 85.71% UHCs had proper storage of vaccines

inside the ILR. In a study conducted by Patel et al[9] storage of vaccines in ILR was adequate in 93.2% of centers.

In the present study, it was observed that 28.57% of Urban Health Centres (UHCs) had deep freezer (DF) temperatures outside the recommended range of -15°C to -25°C, which was associated with frost thickness exceeding 5 mm and improper placement of ice packs. Notably, all UHCs had functional Ice Line Refrigerators (ILRs) and DFs, thermometers inside ILRs and DFs, and appropriate placement of ILRs and DFs. These findings are consistent with a study by Sanghavi M et al. (2019).[6] In contrast, a 2009 study by the National Institute of Health and Family Welfare (NIHFW) across various Indian states reported lower proportions of functional equipment in Primary Health Centres (PHCs): 80% had functional DFs, 78% had ILRs, 91% had thermometers, and 82% had voltage stabilizers[4] In present study, at all UHCs, ILR/DF were placed on wooden blocks, connected with functional voltage stabilizere and proper maintenance of twice daily temeperature record in log book with signature of medical officer along with record of defrosting. While the study conducted by Sanghavi M et al.,[6] in Jamnagar district 2013 they were found some issues like ILR/DF not placing on the wooden blocks, not connected with functional voltage stabilizer, temperature log book was also not properly maintained were observed in 14.29% PHCs and record of defrosting was not available in 42.86% of PHCs. NIHFW study in various states of India in 2009 observed that 36% of PHCs were not correctly maintained their temperature log books.[4] Overall cold chain maintance was satisfactory.

The success of cold chain management depends very much on the knowledge of cold chain handlers and awareness regarding cold chain practices, management, and handling. Regarding the knowledge of cold chain handlers is concerned, in the present study 86% of respondents have adequate knowledge about shake test. These finding were higher than study conducted by bishnu ram das who conducted study on effect of mobile-based supportive supervision on cold chain point management and routine immunization service delivery, Assam, India (40%).[10]

Limitation of the study:

The sampling frame was restricted to seven Urban Health Centres (UHCs) within Ahmedabad city, which limits the external validity and generalizability of the findings to other geographic locations.

Conclusion:

The present study highlights various issues related component of routine immunization program at UHC level. Issues regarding planning like maintenance of drop out chart, map of catchment area, training of medical officer on recent module of immunization were found at two centers. All sessions were according to micro plan and conducted timely at all the centers.

There were no issues found in maintenence of ILR temperature, maintenance of temperature log book, record of defrosting, vaccine arrengment in ILR but issues found in maintenance of DF temperature, ice packs arrangment in DF, in some UHCs open vial found in ILR without date and time of opening, VCCH having poor knowledge about shake test, which indicates lack of efficiency of cold chain handler and need of their training. In three facilities had inadequate space for dry storage, while five lacked access to hand washing facilities within the Cold Chain Point (CCP) room.

Recommendation:

There is a need for training of Medical Officer who hasn't received training on Immunization at two UHCs. Vaccine cold chain handlers (VCCH) and vaccinators play a vital role in UIP, necessitating timely training, particularly for newly recruited candidates. This training is essential, as some UHCs have been found to lack knowledge of essential procedures like defrosting ILR and conducting shake

tests. Accurate mapping of the catchment area should be prepared in order to monitor UIP. The dropout chart should be prepared at all the centers which help to increase vaccination coverage by identifying children who have not completed their vaccination schedule.

Declaration:

Funding: Nil

Conflicts of interest: Nil

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

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