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District Residency Programme

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Under the purview of the National Medical Commission in 2020, all Postgraduate students pursuing MD/MS in broad specialties across all its affiliated Medical Colleges began undertaking a compulsory residential rotation of three months termed as District Residency Programme (DRP) at District Hospitals/ District Health System as a mandatory requirement of their course curriculum.[1] The postgraduate medical student undergoing training under DRP was termed as a District Resident (DR). The DRP was applicable from the 2021 Postgraduate Batch onwards, with the goal of training doctors to comprehend the problems at the community level. Producing competent specialists is the aim of postgraduate medical education, and upon completion of the DRP, the DR should exhibit sufficient skills and knowledge of the concerned speciality. During DRP, residents should serve as speciality doctors with district teams and be posted in the concerned speciality team or services at the District Health System, working in areas concerned to their speciality to bridge gaps in medical education and healthcare delivery, especially in rural areas.[1]

The main objectives of DRP were envisaged to expose the post-graduate student to District Health System/ District Hospital and involve them in health care services being provided by District Health System/ District Hospital for learning while serving; to acquaint them with the planning, implementation, monitoring and assessment of outcomes of the National Health Programmes at the district level; and to orient them to promotive, preventive, curative and rehabilitative services being provided by various categories of healthcare professionals under the umbrella of National Health Mission.[2] By doing so, the post-graduate medical students would also be strengthening the District Health System's services. The District Specialists will supervise the training of the students in outpatient, inpatient, casualty, and other areas pertaining to their specialty, under the general guidance and oversight of the District Residency Program Coordinator (DRPC).

"Learning while serving" from places closest to the community, intends to address the persistent issue of human resource shortages at district hospitals that serve as catchment areas for adjacent villages and Talukas. The patients there get basic medical advice or referrals as per the availability of doctors and ancillary staff. District hospitals are usually better equipped and staffed than primary care centres, thus working in such hospitals allows residents to observe, examine, and treat while learning about locally prevalent diseases. Moreover, patients benefit from consulting a specialist, for which they would often be referred to a tertiary care centre.[3] DRP provides postgraduate students with the opportunity for personal development. District hospitals are often less hectic and provide plenty of reading time

compared to medical colleges, where the patient load is more substantial and the duty schedule allows minimal time for proper study and thesis completion. Additionally, DR can conduct research to improve their resume and practice clinical skills on patients on a regular basis to aid in their practical examination. The likelihood of having a cross-disciplinary discussion with other experts is higher in a smaller district hospital.

However, in most district hospitals, academic learning from cases is generally passive or absent, with the completion of tasks prioritised. Systemic inertia often supplants the necessity for knowledge updates, while the everyday experience of managing situations in demanding work environments suppresses professional interest. The infrastructure can at times be inadequate for delivering appropriate patient care. The system operates efficiently owing to the commitment of staff and healthcare professionals. The DR stays away from the academic activities of the parent college and might miss some rare cases. DR may experience a lack of infrastructure, amenities, food & facilities, transportation, and accommodation (for those coming from faraway places), ineffective communication with the parent department and safety concerns at the workplace. NMC has given State Governments the responsibility of providing necessary facilities, such as suitable accommodation and security, particularly for female residents.[1] Despite early setbacks, the District Residency Program is going on smoothly. Everything should come together for a smooth posting and rejoining in the upcoming years. Postgraduate students would surely miss out on many important cases, Departmental research projects etc while they remain away from the medical college; some of which would have involved procedures or rare diseases that are only treated in tertiary-level facilities.

One major concern among Postgraduate DRs is that the NMC has not appropriately specified work and rest hours during the DRP. The guidelines mention reasonable work hours and reasonable rest hours in a day for resident doctors, leaving a lot of scope for subjectivity.

What can we do to improve DRP?

Provide standardised training modules, orientation and thorough induction programs to ensure that residents are fully aware of their duties and responsibilities at the District Hospital. Comprehensive logbooks for other departments to ensure a standardized and thorough training experience across various specialties. To ensure the best possible patient care, district hospitals should invest in their infrastructure and allocate sufficient resources. Establishing strict supervision and monitoring processes, along with frequent inspections, evaluations, and feedback meetings. Enable residents to take part in online lectures (e-lectures) and discussions by keeping lines of communication open and facilitating academic integration with parent medical colleges. Thus making sure of the provision of internet availability in the DH for the residents, this will make sure that the Postgraduate is not missing out on the scheduled PG training in their parent department. It is crucial to provide residents with secure and comfortable accommodation, reliable transportation, and support networks to improve their work efficiency and alleviate their anxiety. Setting up transparent reporting mechanisms for any unethical practices is essential. District hospitals provide opportunities for research activities.

Residents should be encouraged to participate in research projects and provided with the necessary resources and guidance. Involving residents in community health awareness campaigns and establishing mechanisms to gather feedback from the community is important. Conduct periodic reviews of the DRP, involving all stakeholders to gather diverse perspectives and implement necessary improvements. Extending the initiative of comprehensive logbooks to other departments, guiding postgraduates about their roles and objectives during district postings to ensure a standardized and thorough training experience across various specialties.

In summary, teething problems and deeply rooted systemic inertia make it difficult to adopt any new tradition at first, but medical research is essentially avoiding these difficulties. Although the decision to develop the DRP with the benefits of residents in mind was a significant game-changer for postgraduate medical education, some residents may still find it difficult to accept. Regardless of the circumstances, this program will improve Postgraduate students' learning as well as patient care if implemented properly.

Declaration:

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A Study on Perceptions, Practices, and Experiences About Antibiotic Consumption and Antibiotic Resistance Among Various Stakeholders From the Catchment Area of an Urban Health Training Centre in Ahmedabad

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Abstract:

Introduction: Misuse or abuse of antibiotic consumption, leading to antibiotic resistance, is an emerging global public health issue. It is crucial to regulate the antibiotic usage by involving all stakeholders. **Objective:** To document the perceptions, practices, and experiences about antibiotic consumption and awareness of antibiotic resistance amongst doctors, drug dispensers, and end-users. **Method:** A qualitative study was conducted in the UHTC catchment area, Ognaj, Ahmedabad. A total of 26 In-depth interviews with stakeholders (10 Doctors, 8 Drug dispensers and 8 End users) were conducted using an interview guide. Various themes and sub themes were categorized manually, and verbatim were quoted, at the end of all the In-depth interviews, name of the antibiotics spoken was categories into Access, Watch and Reserve group as per WHO AWaRe classification and word cloud analysis was done. **Results:** Participated doctors had a wide range of qualifications and experience. It was found that doctors prescribe antibiotics mainly from the Access and Watch group (more from the Watch group). Drug dispensers were concerned about over-the-counter (OTC) dispensing and self-medication of antibiotics. However, they also shared the fact that the antibiotics are dispensed without prescriptions. End-users commonly sought antibiotics for minor ailments without prescriptions. Only one end user was aware of the implications of self-medication and resultant antibiotic resistance. **Conclusion:** Most antibiotics prescribed by doctors and dispensed at chemist shops were from the Watch and Access groups, respectively. End users mainly purchased antibiotics from the Access and Watch groups. The findings highlight the urgent need for awareness sessions on antibiotic use and resistance for all stakeholders, along with stronger regulatory measures to control antibiotic sales by drug dispensers.

Keywords: Anti-Bacterial Agents, Drug Resistance, Qualitative Research, Urban Population

Introduction:

The antibiotic consumption rate has dramatically increased in the twenty-first century, owing mostly to illogical prescriptions and inappropriate usage. Antibiotic resistance (ABR) is a longstanding concern.[1] It has become a major global public health risk, particularly in developing nations.[2] The highest consumption of antibiotics has been observed in India, China, and Pakistan.[3] Since antibiotics are among the most commonly given drugs, there is a significant risk of drug misuse. An estimated 20-50% of the antibiotics that patients are administered are unsuitable.[4] By 2050, ABR is predicted to cause 10 million fatalities if prompt action

is not taken.[5] Some of the main causes of ABR include inadequate infection control measures, excessive or underuse of antibiotics, and the accessibility of over-the-counter (OTC) medications.[6]

Despite numerous antimicrobial stewardship initiatives, the body of evidence from India suggests that the use of antibiotics is still inappropriate.[1,7] Healthcare providers (HCPs) are recognized as significant stakeholders in ABC control because they prescribe antibiotics and are trusted sources of medical information for patients. Thus, it is critical to investigate their perceptions, particularly in India, which has the greatest ABC.[3] Additionally, no published study has examined how Indian healthcare providers view this occurrence. Similarly, pharmacists/drug dispensers play a significant role in the dispensing of antibiotics, necessitating context-specific research in this area. Research indicates that the public is crucial in reducing the increasing burden of ABR.[8] The World Health Organization has classified antibiotics into three categories to regulate their usage: Access, Watch and Reserve (AWaRe). The goal is to increase the use of Access group antibiotics and reduce the use of the Watch and Reserve group antibiotics.[9] Therefore, it also becomes crucial to understand prescription and consumer behaviour, and experiences, to determine the most commonly used and pattern of antibiotics by healthcare professionals and their awareness of Antibiotic Resistance (ABR).

In light of this, authors conducted a qualitative study to document the treatment providers and drug dispensers especially their experience with a client of over-the-counter purchase, and finally treatment seeking behaviour and experiences of clients.

Method:

This qualitative Study through face-to-face In-Depth Interviews (IDIs) of doctors, drug dispensers, and end drug users was conducted during April-May 2024 in the catchment areas of Urban Health Training Centre (UHTC) under the Medical College of Ahmedabad city.

Study tools and validation: An interview guide was developed through an extensive literature search and brainstorming exercise for each stakeholder. All tools were validated during the validation workshop. The pilot study was conducted for the finalization of thematic guidelines and information was not included in the final study. Ethical clearance was obtained from the Institutional Ethics Committee (IEC) DHR Registration No. EC/NEW/INST/2023/3615 dated 12/09/2023). A total of 26 IDIs for 3 groups (doctors, drug dispensers & end users) were taken. A list of 35 doctors (Allopathic and AYUSH practitioners) working in this area was obtained from the urban health centre. For doctors, wide representation from private and government as well as qualification (BAMS, BHMS, DAMS, MBBS to superspecialists) was ensured, and as per availability and willingness to participate in the study after giving the brief of the study and appointment was taken. Similarly, a list of 38 Pharmacy owners/ assistants/ drug dispensers was obtained and thereafter 8 private drug dispensers, 2 from 4 different directions were interviewed. From the same drug dispensary, 8 exit IDIs were done who had taken antibiotics from the same drug dispenser. A team of trained investigators (two faculty members per team) conducted an IDI one of the team members was given the task of rapporteur to take field notes. Various theme/s and subtheme/s which emerged were categorized and analysed thematically. Verbal responses were noted during field notes and insights were compiled. Local language verbatims were translated via Google translator. At the end of all the In-depth interviews name of the antibiotics spoken was categories into Access, Watch and Reserve group as per WHO AWaRe classification. Word cloud analysis was done for drug dispensers and end drug users' IDIs.

Results:

Overall, a total of 26 IDIs to explore the perception, practice, experiences, and level of awareness about antibiotic resistance among stakeholders using thematic guidelines were conducted.

(1) Prescription Behaviour, experience, and knowledge about ABR amongst Doctors: A total of 10 doctors with a wide range of working experience (from a few months to 46 years), or in terms of qualification like traditional medicine/

AYUSH practitioners (BAMS, BHMS & DAMS) to allopathic (MBBS, MD, MS, Dentist) were interviewed. There were more male doctors than females (only 2). The reasons for prescribing antibiotics were (1) to treat infections like fever, Respiratory, and GIT infections to very severe cases (2) for fast recovery of patients and sometimes it was "a demand from the patient". They were prescribing antibiotics only when the case was either clinically confirmed or through investigations. Usually, only a single antibiotic was prescribed for a single illness but sometimes up to 3 antibiotics were prescribed for a single illness. As per WHO AWaRe classification analysis showed that antibiotics were more frequently prescribed from the "Watch" group than those from the "Access" group, especially for pediatric patients. In none of the cases, an antibiotic from the Reserve group was prescribed. Treatment providers were aware that many patients partially purchased prescribed antibiotics, due to financial constraints or lack of awareness about completing the course. Almost all of them were aware of antibiotic resistance and the reasons given were incomplete courses, self-medication, and irrational prescribing. They were also aware of its prevention like avoiding indiscriminate and prolonged use of antibiotics, prescribing first-line antibiotics wherever possible, introducing legislation to regulate antibiotic sales, and promoting sanitation and hygiene to prevent infections. (Figure 1)

Figure 1: Thematic analysis of Prescription Behaviour, experience, and knowledge about ABR among Doctors
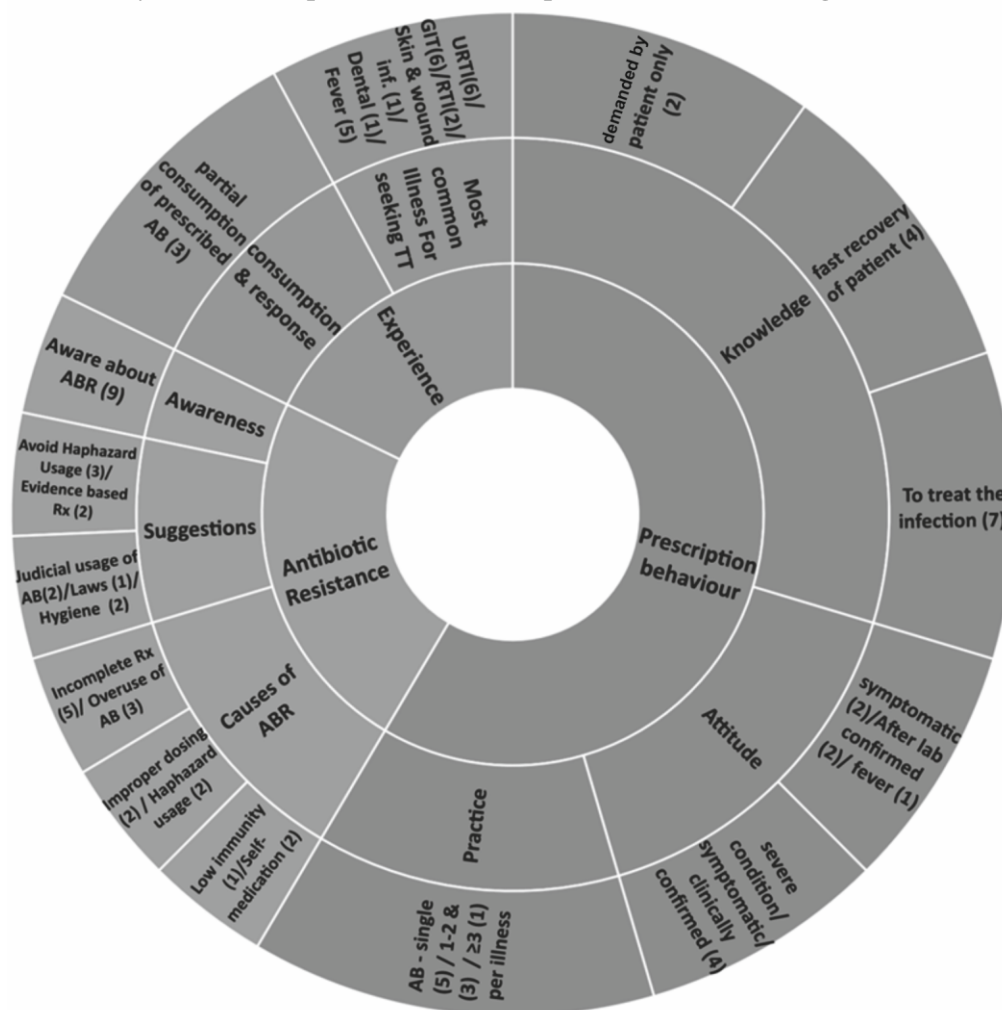
*Number in bracket reflect number of respondants

A few of the statements are quoted below *:*

"Usually patient completes 50% TT & keep remaining medicine for reuse in future." (33 Y/ F/ BHMS)

"20% stop taking TT after the recovery, 80%complete TT, go to another doctor if do not get well." (42 Y/ F /MBBS Govt)

"Patient usually stops treatment in between once they recover." (34 Y/ M/ Pediatrician)

"Generally, Patient partially purchases prescribed antibiotics and also uses same prescription in second illness episode through OTC." (34 Y/ M/ Pediatrician)

"After giving medicine, pharmacist does not explain duration of treatment." (42 Y/ F/ Govt MBBS)

"To prevent ABR, strict laws should be there against medicine dispensing." (74 Y/ M/ Pvt. MBBS)

(2) Experience sharing by drug dispensers: It was mainly regarding (1) most commonly prescribed antibiotics, (2) complete purchase of antibiotics as per prescription, (3) Over-the-counter (OTC) purchase, and (4) commonly dispensed antibiotic

A total of 8 male drug dispensers (pharmacists/ assistants/ shop owners) with work experience ranging from 3 months to 30 years, aged between 27- 61 years were interviewed. Half of the dispenser/s mentioned that the most commonly prescribed antibiotic/s by practicing doctor/s in the study area were Amoxycillin + Clavulanic acid and cefixime belonging to the Access and Watch group respectively. More than half of them shared their experience of partial purchase of antibiotic/s from the clients. (Table 1) None of them spoke of the sale of any antibiotic from the Reserve group. Initially, they (except 1) were hostile to accepting the practice of dispensing antibiotics over the counter. Half of the drug dispensers accepted dispensing antibiotics without prescription mostly for respiratory and gastrointestinal tract infections or fever. For paediatric cases, they said that they dispense antibiotics only with prescriptions. Some dispensers admitted selling antibiotics via WhatsApp prescriptions or leftover medicines.The most common adverse experience observed by them was related to gastrointestinal and giddiness**.** However, all of them

were dispensing over-the-counter antibiotics more so from the Watch group than the Access group (including pediatric cases) and none of them dispensed a reserve group of antibiotics. Amoxiclav, Ornidazole, Cefixime, Azithromycin, and Ofloxacin for adults, and Amoxiclav and Cefixime for paediatric were the most preferred antibiotics for self-medication from the Access and Watch group.Most commonly dispensed antibiotic was cefixime (from Watch group) followed by amoxycillin (Access group) (Table 1 & Figure 2) Half of the dispensers were aware of antibiotic resistance and the reasons mentioned by them for the antibiotic resistance were irrational use of antibiotics, self-medication, chronic use of antibiotics, and antibiotics given in viral illness. The need for creating awareness through CME, avoidance of irrational use of antibiotics, and legislation measures were suggested by them to prevent antibiotic resistance.

A few of the statements are quoted below.

1. *"Sixty percent of customers come to buy medicine without prescriptions. For children they bring old prescriptions. Mostly they come for vomiting, diarrhoea, cough etc. At times they take OTC products and get cured as well. So, they have trust upon us."*

   (27 years male pharmacist with 5 years of experience)

2. *"Customers come directly to us for medicine and get cured, so they trust us."*

   (42 years male pharmacist with 20 years of experience)

3. *"It is easier for the customer to take the medicine directly from us and getting a quick response than wasting half a day for going to the doctor, sitting in long queues, paying consultation charges, thus saving both money and time."*

   (27 years male pharmacist with 5 years of experience)

4. *"Patients are searching online by Google to find out what medicine to take for their illness.")*

   (28 years old male Pharmacist assistant with a mere 3 months experience)

Table 1: Thematic analysis of experience sharing by drug dispensers

Theme/s	Subtheme/s	Response/s
Antibiotics dispense (1)	Commonly dispensed antibiotics	Access: Amoxiclav (8) Watch: Ornidazole (3), Cefixime (8), Azithromycin (4), Ofloxacin (3)
	Mode of dispensing antibiotics (2)	With prescription only. (6) Over the counter (4) Direct demand by client (2)
Experience of client with prescription (2)	Most commonly prescribed antibiotics (1)	Access: Amoxycillin+ Clavulanic acid (6) Watch: Cefixime (6), Azithromycin (4)
	Purchase of antibiotics as per prescription (2)	Client partially purchase (7)
Experience with client of Over the counter (OTC) purchase (3)	Illness	Respiratory tract infection (4) Fever (2) GI infection (1)
	Criteria for OTC	Dispense after asking for the weight and age of the patient. (3)
	Commonly dispense antibiotics in OTC as per AWaRe classification	For Adults: Access: Amoxiclav (1) Watch 3): Cefixime (4), Azithromycin (3), cefpodoxime (1) For children : Access (Syp. Amox-clav) Watch (Syp. Cefixime)
	Experience	OTC are done rarely (3), frequently (1) Aware of the consequences of OTC dispensing antibiotics (3). The most common Adverse events observed after dispensing OTC antibiotics. GI side effects (3) followed by giddiness (1)
Experience with clients who directly demand antibiotics (4)	Antibiotics for self-medication	For adults: Access: Amoxiclav (1), Watch: Ornidazole (1), Cefixime (4), Azithromycin (3), ofloxacin (1) For pediatric: Access: Amoxiclav (1), Watch: Cefixime (2)
Antibiotic resistance (5)	Awareness	heard about antibiotic resistance (4)
	Cause	- Irrational use of antibiotics (2) - Self-medication (2) - Chronic use of antibiotics (1) - Antibiotics given in viral illness (1)
	Suggestions	- Awareness CME for pharmacists should be planned (2) - Irrational use of antibiotics should be avoided (1) - Legislation for rational selling of antibiotics (1)

Figure 2: Word cloud analysis of the text findings of in-depth interviews with Drug Dispensers (N=8)
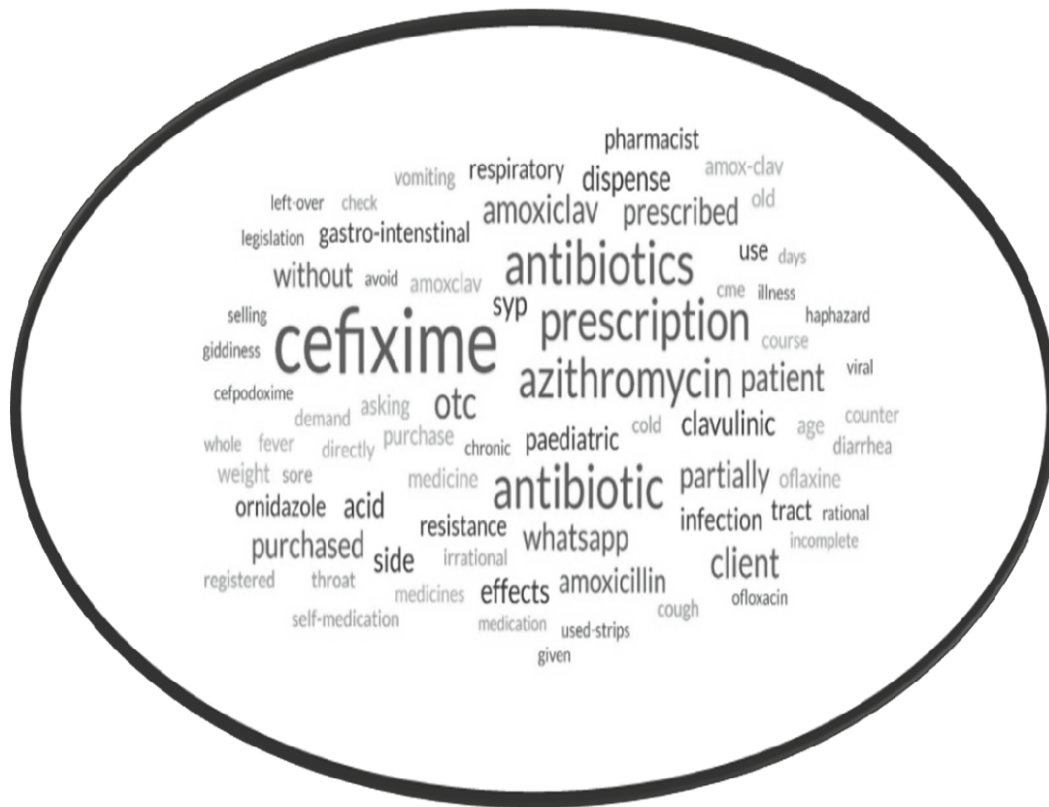
(Size of the font reflects the response which was repeatedly or frequently received from the respondent)

5. *"At times customers come with old bottle of medicine and ask for the same one"*

    (28 years male pharmacist assistant with 3 months of experience)

6. *"In entire day, 1-2 such customers come who directly ask for an antibiotic by name"*

    (61 years male pharmacist assistant with 30 years of experience)

(3) Antibiotic consumption experience sharing by end drug users

The third stakeholders were the clients who visited the chemist's shop to take antibiotics with or without a prescription. A total of 8 exit interviews were taken from the same chemist shops of those end users who had come to take antibiotics for common ailments such as fever, respiratory infection, Gastrointestinal infection and urinary tract infections to record the perception and experience regarding antibiotic consumption, purchase, and knowledge about antibiotic resistance. Most common reason for visiting chemist shop for over the counter purchase of antibiotic was expenses incurred for consulting doctor followed by partial purchased of course of antibiotics. Most common reason for purchasing same antibiotic based on similar episode of diarrhoea.(Figure 3) Only half of them had antibiotic prescriptions with adequate dosing and duration, while the rest demanded drugs directly from the pharmacist or over the counter (OTC). The most preferred antibiotics were Augmentin, clindamycin, and ornidazole from the acces sgroup followed by Azithromycin, and cefixime from the watch group. Those who approached with a prescription were mostly unaware of the antibiotics prescribed. Awareness about antibiotic resistance was nil to minimal. Only one participant had heard of this and could identify irrational antibiotic use as one of the causes. The respondent suggested creating awareness through campaigns on TV and social media, to educate the public about responsible antibiotic use. (Table 2, Figure 3)

Table 2: Thematic analysis of antibiotic consumption experience sharing by end drug users

Theme/s	Subtheme/s	Response/s
Treatment seeking behavriours	Antibiotic purchase for	Antibiotics were purchased for - Fever (3) - Respiratory tract infection (3) - GI infection (2) - UTI (1) - Painful lesion on leg (1)
	Source of information	- Half of the respondents came to purchase antibiotics with prescription only. (4) - Two Third of the respondent directly demanded antibiotics at store (3) - One was given antibiotics by OTC (1)
Experience of client with prescription	Client awareness about antibiotics	All respondents had prescription of antibiotic with proper dose and duration. (4) - Prescribed antibiotics as per AWaRe classification were: Augmentin (1), clindamycin (1), ornidazole (1) - Azithromycin (1), cefixime(1) 3/4 clients were purchased antibiotics having prescription from allopathic doctor.(2) - One respondents had prescription from BAMS doctor.
	Purchase complete course	Most of the clients purchase complete course of treatment as per prescription except one.(3)
Experience of client without prescription	Demanded/OTC antibiotics	- Half respondent purchased Watch(2) group antibiotics without prescription. - All respondents without prescription purchased the incomplete course of treatment.(4)

Figure 3: Word-Cloud analysis of experience sharing by end drug users

(Size of the font reflects the response which was repeatedly or frequently received from the respondent)

A few of the interesting statements have been quoted below

1. *"Medicine is the same, whether it is given by a chemist or a doctor. Our purpose is only to get well soon."*

   (28 years daily wager male)

2. *"If I go to a doctor, he/ she will also prescribe the same medicine so why to pay extra money for that when I already know the name of the medicine".*

   (32 years, 12ᵗʰ passed businesswomen)

Discussion:

The prescription behaviour of any HCP depends upon his/her knowledge about indication of prescribing antibiotic/s, own attitude towards prescription and finally practice based on the experience of working and dealing with clients. Doctors primarily rely on knowledge acquired during their medical school education, often decades ago. To prepare appropriate interventions it is essential to know the enablers and driving force for writing appropriate prescriptions. The results of this study are compared to other relevant studies to contextualize the data within broader global and regional contexts. An unfortunate aspect associated with prescription writing is the nexus between pharmaceutical firms and pharmacists on the one hand and few of the doctors, on the other hand, to compensate HCPs in exchange for antibiotic prescriptions.[10] Practitioners from alternative medicine such as Homeopathy also prescribe antibiotics (whatever the patient asks) based on their knowledge and experiences. At times these HCPs were found prescribing 2 or more antibiotics more so from the Watch group followed by the Access group. This was common in adults and children as stated by physicians and pediatricians. This is indicative of an over-reliance on broad-spectrum antibiotics, increasing the risk of resistance. This result is consistent with Khan et al. (2021)[7], who found that Indian HCPs were inconsistent even though they were aware of antimicrobial stewardship initiatives. A study by Atif et al. (2021),[3] similarly noted that inappropriate and overuse of broad-spectrum antibiotics is a key driver of resistance in India and other LMICs. Furthermore, with a history of eating outside food and for viral fever it

is advisable to wait and watch practice as shared by some physicians. The majority of drug dispensers said that patients purchase only partially of antibiotics prescribed, maybe to reduce the out-of-pocket expenses or to curtail the health facility visits as shared by a few clients specifically for childhood cases when health facilities are closed. Participants shared the fact that economic pressures and sociocultural factors influence HCP practices. Even with viral infections, doctors frequently give unnecessary antibiotic prescriptions in response to patient demand. The findings of Ahmed et al. (2020) [4], which showed that such illogical prescribing is common in low and middle-income countries (LMICs) which significantly contribute to ABR, are consistent with this trend. Additionally, similar to the findings in the current study, a study by Laxminarayan et al. (2013),[2] emphasizes that medical professionals in low-resource settings frequently give antibiotics empirically since diagnostic tools are either limited or not available.

Drug dispensers are essential to the pathway of antibiotic intake. Thematic analysis revealed that many of them sell antibiotics without a prescription. However, in the case of children, they were dispensing antibiotics as per weight bandage. This is consistent with the findings of García et al. (2011),[6] who noted comparable patterns in developing countries where the sale of over-the-counter antibiotics is widespread as a result of lax regulatory compliance. This practice is especially alarming because it increases the risk of incorrect dosing and severe reactions in susceptible populations. These findings support Klein et al.'s (2018) [11] observation that drug dispensers in LMICs frequently lack proper training and awareness of the consequences of illogical antibiotic dispensing.

Furthermore, the current study demonstrates the economic basis for over-the-counter antibiotic sales and partial purchase of antibiotics. Dispensers frequently cater to low-income customers who want quick relief over seeking expert medical help. This finding is consistent with Ahmed et al. (2020),[4] who identified socioeconomic factors influencing self-medication and over-the-counter antibiotic use in resource-constrained areas.

The study's findings on end-users' perception showed a lack of knowledge about antibiotics and risk of developing resistance. The majority of respondents were unaware that their prescriptions included antibiotics, and many used self-medication based on previous experiences or advice from non-medical sources. This is similar with DeBaun et al. (2021),[5] who emphasised the importance of public awareness efforts in overcoming information gaps that contribute to ABR. Notably, the study findings emphasize the tendency of end-users to cease antibiotics once symptoms have subsided, resulting in incomplete treatment regimens. This behaviour has been well recognized as a major contributory factor towards ABR. Noncompliance with prescribed antibiotic regimens is common in low- and middle-income countries, motivated by financial restrictions, a lack of knowledge, and overconfidence with partial recovery.[3,4] The current study documents the sociocultural factors that influence antibiotic use. Some respondents, for instance, relied on family members' advice or earlier prescriptions, which reflected deeply ingrained behavior. According to Khan et al. (2020), [8]community and familial effects are important determinants of antibiotic usage in rural and semi-urban populations. This finding is consistent with their findings.

Under the recently launched National Program of Antimicrobial Resistance (NP-AMR), several strategies have been identified which include (1)improving awareness through IEC, (2) efficient infection prevention/ control practices, (3) evidence generation through robust surveillance, (4) promoting investments for research and innovations, and (5) strengthening India's leadership in AMR are the identified six strategies.[12]

Limitation of study:

Due to the nature of the qualitative study, the responses might be influenced by the Hawthorne effect (changes in the behaviours/response of the studied pharmacists because they feel observed) and study has potential risk of few biases (subject & recall bias). Google Translator was used to translate local language text verbatim, which might have resulted in errors in expressing contextual meaning.

Conclusion and recommendation:

The study reveals a concerning pattern of antibiotic misuse which is on the increase and it seems that all 3 stakeholders are responsible for this trend. Inadequate awareness about antibiotic resistance in the community emphasizes how urgently awareness efforts concerning the risks of antibiotic resistance are needed for all parties involved. Training of HCPs to prescribe antibiotics should be strengthened through evidence-based treatment protocols. More stringent laws are needed to prevent the sale of antibiotics without a prescription.

The study also highlighted the current scenario and the challenges for reducing the misuse of antibiotics. Public awareness campaigns and strict laws to restrict the sale of over-the-counter antibiotics can be helpful in reducing the misuse of antibiotics and their resistance.

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Health-Seeking Behaviour and its Challenges for Reproductive Tract Infections Among Married Women of Reproductive Age Group Residing at Urban Slums of Agra: A Cross-Sectional Study

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Abstract:

Introduction: Reproductive tract infections continue to be a major public health issue, especially for urban low-income women of reproductive age. RTI burden is increased by delayed diagnosis and treatment due to poor health-seeking behaviour and other socioeconomic constraints. This study looks at the health-seeking habits and difficulties of married, reproductive-age women living in Agra's urban slums. **Objective:** 1. To assess the health-seeking behaviour for reproductive tract infections among married women of urban slum of Agra. 2. To explore the challenges they faced for the treatment of reproductive tract infections **Method:** A cross-sectional study among 500 married women in Agra's urban slums used the WHO syndromic approach for RTI/STI diagnosis. Multistage random sampling selected one ward and two slums. Interviews followed a random starting direction and the left-hand rule until the sample size was met. **Results:** The study found that 57.92% of females with RTI/STI symptoms sought treatment, while 42.07% did not, with barriers including perceived lack of importance, financial constraints, embarrassment, lack of family support, and time limitations. **Conclusion:** In Agra's urban slums, just over half of women sought treatment for RTI/STI symptoms, primarily at government facilities, while significant barriers prevented others. Perceived lack of seriousness, financial constraints, and embarrassment were key deterrents. A major reason for stopping the treatment was absence of symptoms. Interventions are needed to increase awareness, improve access, address financial issues and reduce stigma.

Keywords: Health Seeking Behaviour, Reproductive Health, Reproductive Tract Infections, Urban Slums

Introduction:

Health-seeking behaviour describes the actions of individuals, in response to a perceived health issue or condition, mainly that response refers to when and where they seek medical advice. The determinants of health-seeking behaviour among married women of reproductive age in urban slums are vital to inform targeted interventions. Women may recognize the symptoms of RTIs and STIs, but may not always seek timely or appropriate care, as indicated by several studies. Various socio-economic and cultural factors describe these barriers, including financial limitations, stigma, ignorance, and inadequate access to healthcare services, which lead to this delay in treatment. Moreover, studies suggest that health literacy is a strong determinant of health-seeking behaviour, especially among women from underprivileged communities.[1,2]

In India, urban slums are characterized by overcrowded living conditions, inadequate sanitation, and limited access to healthcare services. These factors exacerbate the risk of RTIs and STIs among women, who may face additional barriers due to cultural norms, lack of social support, and limited access to education. A study by Singh et al.[1] highlighted that women in low-income urban areas often delay seeking treatment for reproductive health issues due to the fear of social stigma and embarrassment. Furthermore, the lack of healthcare infrastructure in these areas often leads to a reliance on informal healthcare providers, who may not offer evidence-based treatments. As a result, many women in urban slums do not receive timely or appropriate medical care, leading to prolonged suffering and an increased burden on the healthcare system.[3]

This study aims to explore the health-seeking behaviour and the challenges faced by married women of reproductive age residing in the urban slums of Agra concerning RTIs and STIs. It also seeks to identify the barriers that prevent women from seeking treatment for these conditions, with a focus on socio-economic, cultural, and healthcare access factors. Understanding these factors is critical for designing effective interventions that promote timely diagnosis and treatment of RTIs and STIs, as well as improving overall reproductive health in urban slum populations. Through a comprehensive analysis of health-seeking behaviour, this study hopes to contribute to the development of targeted public health policies and community-based programs to address the reproductive health needs of women in underserved urban areas.[4]

Objectives:

1. To assess the health seeking behaviour for reproductive tract infections among married women in the reproductive age group from urban slums of Agra, Uttar Pradesh.

2. To explore the challenges they faced for the treatment of reproductive tract infections

Method:

This cross-sectional study was conducted among women of reproductive age group residing in urban slums of Agra district of Uttar Pradesh during a period of February 2021 to January 2022. A total of 500 women of reproductive age group were studied and data collection was done using a house-to-house survey technique in selected urban slum of Agra. The study was approved by the Institutional Ethical Committee of S. N. Medical College, Agra (IEC/2021/46).

Inclusion criteria: Women of the reproductive age group (15-49 years) who were married (regardless of whether their husbands were currently residing with them), were present at the time of the house visit, and gave verbal consent to participate in the study.

Exclusion criteria: Women who are not currently married or are outside the reproductive age range (15-49 years). Also, those who aren't permanent residents of the selected urban slums or are unable to provide informed consent, ensuring data relevance and ethical compliance.

Sample size: A sample size of 475 was calculated with an estimated prevalence of 27%[5], precision of 15%, and confidence interval of 95%. The sample size was calculated by using the formula of $4pq/d^2$. On adding 5% for non-responders, it was raised to the round figure of 500.

Sampling Technique: A multistage random sampling technique was used for the study. Firstly a complete list of municipal wards with the name of slums was obtained from the Agra municipal cooperation office. Then, one ward was selected randomly using a random number table. In next stage, at least two slums were selected randomly from that ward. For the selection of study participants, central location of each selected slum was chosen and direction to start the interview was randomly decided by spinning a pencil where the direction of the pencil point faced was chosen and the nearest household was visited in that direction. All the available women of the reproductive age group were interviewed from each consecutive household. Every house was covered following left-hand principle until desired sample size was achieved from each slum on the basis of proportionate to sample size. All the participants were informed about the studys objectives, and their verbal consent was taken before the interview. The data was collected by principal researcher with the help of healthcare workers. As the topic is quite sensitive, the

research team requested all male household members to give some privacy for the interview. Confidentiality was assured and maintained throughout the study. Participants were asked about any RTI/STI symptoms they had experienced in the past six months. Those respondents who were found to have any reproductive health problems were asked about their health-seeking behaviour and barriers related to them. For this study, health-seeking behaviour was defined as a sequence of remedial actions taken by the person to rectify perceived ill health. Appropriate or desired health-seeking behaviour was defined as seeking treatment and health advice from trained doctors (both allopathic and AYUSH) from public or private health facilities (government hospital, private clinic)

Results:

The study demonstrates that among 500 study participants, 32.80% participants had the symptoms suggestive of reproductive tract infections. The sociodemographic detail of the present study shows that among five hundred married women in the reproductive age group residing in urban slum of Agra more than half (53.20%) were 30 years or below, 52.80% were Hindu by religion, 51.40% belonged to other backward caste and

Table 1: Association of Treatment Seeking Behaviour for RTI/STI with Sociodemographic Characteristics

Sociodemographic Characteristics	RTI/STI Present n (%)	Treatment Taken n (%)	Treatment Not Taken n (%)	Odds Ratio (95% CI)	P value
Age (in years)					
15-30	99 (37.22)	59 (60)	40 (40)	1	0.59
31-49	65 (27.78)	36 (55)	29 (45)	0.75 (0.45, 1.25)	
Religion					
Hindu	68 (25.76)	43 (63)	25 (37)	1	0.24
Muslim	96 (40.68)	52 (54)	44 (46)	0.75 (0.45, 1.25)	
Caste					
General	15 (20)	8 (53)	7 (47)	1	0.89
OBC	98 (38.13)	58 (59)	40 (41)	1.34 (0.56, 3.20)	
SC	51 (30.36)	29 (57)	22 (43)	0.89 (0.45, 1.74)	
Type of Family					
Nuclear	93 (30.10)	67 (72)	26 (28)	2.10 (1.25, 3.53)	0.0001
Joint	71 (37.17)	28 (39)	43 (61)	1	
Age at Marriage					
Below 18 years	58 (30.21)	19 (33)	39 (67)	1	0.0001
≥18 years	106 (34.41)	76 (72)	30 (28)	5.19 (2.56,10.52)	
Educational Status					
Illiterate	70 (41.67)	22 (31)	48 (69)	1	<0.001
Up to Middle School	62 (33.51)	47 (76)	15 (24)	9.13 (4.22,19.74)	
Up to Intermediate	29 (25)	23 (79)	6 (21)	16.73 (5.51,50.75)	
Graduate & Postgraduate	3 (9.68)	3 (100)	0 (0)	Undefined[#]	
Occupational Status					
Working	29 (28.71)	14 (48)	15 (52)	1	0.24
Non-working	135 (33.83)	81 (60)	54 (40)	0.75 (0.39,1.44)	
Socioeconomic Status*					
Class I	0	0	0	Undefined[#]	<0.001
Class II	15 (9.14)	12 (80)	3 (20)	13.5 (3.56,51.24)	
Class III	46 (28)	34 (74)	12 (26)	9.41 (3.12,28.34)	
Class IV	76 (46)	43 (57)	33 (43)	4.7 (1.84,12.05)	
Class V	27 (16)	6 (22)	21 (78)	1	

Note. *Modified Kuppuswamy Classification-2021, [#]Undefined due to division by zero

Table 2: Distribution of study participants' reasons for not completing their course of treatment

Reasons for Not Completing Treatment	Number (n)	Percentage (%)
Participants left treatment when their symptoms subsided	17	44.73
Some participants dropped treatment due to fear of side effects	11	28.94
Left as they could not afford to buy the medicines	10	26.31
Total	38	100

Figure 1: Proportion of Symptomatic Females Seeking Treatment (N=164)
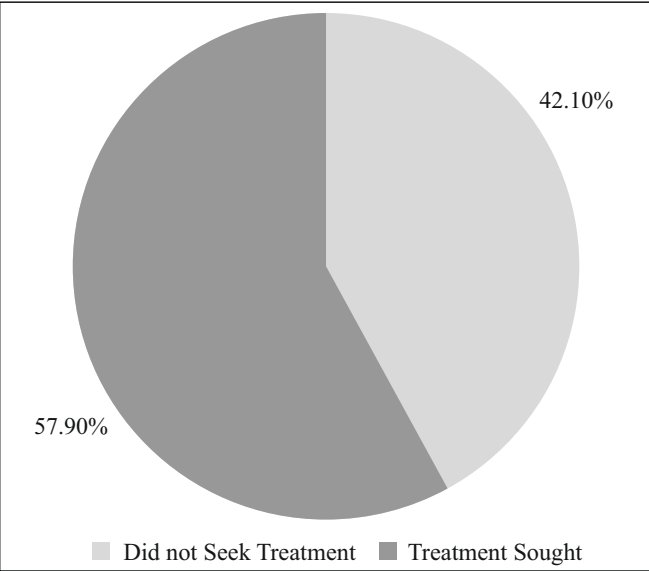
61.80% had a nuclear family. More than one-third (34.41%) of the women were reportedly married even before attaining the legal age of marriage. One-third (33.60%) were illiterate and 79.80% were unemployed or housewives. The majority (60.80%) of the study participants belonged to the lower socioeconomic class. Table 1 shows the association between treatment-seeking behaviour for RTI/STI and various sociodemographic factors. Participants aged 1530 years were more likely to seek treatment, while those in nuclear families and with higher educational levels had significantly higher odds of seeking treatment. Odds ratios highlights that the individual married at or above 18 years had greater treatment-seeking behaviour. Socioeconomic status also played a role, with higher classes showing increased treatment-seeking behaviour compared to lower classes. These findings underscore the influence of education, family type, and socioeconomic factors on health-seeking behaviours. The pie chart shows that 57.9% of symptomatic females sought treatment, while 42.1% did not. This indicates that although a majority sought care, a considerable portion still went untreated.

This study also illustrates that the primary reasons why the symptomatic participants did not seek treatment were because, at maximum (42.02%), they didn't think of the condition as a serious health issue, and at least 21.74% lacked enough money to do so. Additionally, 18.85% of symptomatic individuals reported feeling embarrassed to talk about it. However, 10.15% of symptomatic participants claimed that their families did not support them in receiving treatment, and only 7.24% of women said that they were too busy to get treatment. Our study depicts that of the participants who sought treatment for RTI/STI, over half (56.84%) went to a government doctor, 23.17% went to a private doctor, and the remaining 18.96% attempted a chemist shop or at-home remedy. Among the individuals who started treatment, 60% successfully completed it, while 40% did not. Despite still being on dosages when their symptoms reduced, almost half (44.73%) of women stopped taking treatment, and 28.94% quit because they were afraid of side effects. The inability to pay for the medications was mentioned by 26.31% of participants as another factor for discontinuing treatment (Table 2).

Discussion:

In the present study, more than half (57.92%) of the participants who had RTI/STI reportedly took treatment while rest 42.07% denied taking any treatment. Similar findings were observed by Ipsa et al.[6] in Odisha, Deepak et al.[7] in Karnataka, Thekdi et al.[8] in Gujarat, Hegde et al.[9] in Tamil Nadu and Preethi S et al.[10] in Ludhiana where 55.56%, 57.1%, 53.16%, 60% and 64.4% of women with RTI/STI got a treatment respectively. Whereas studies by Doley et al.[11] in New Delhi and by Anjana et al.[12] in Delhi found that a comparatively more proportion of women with RTI/STI i.e. 70.3% and 73% got treated than present study. The reason of higher

treatment seeking behaviour in their study could be due to easy accessibility and availability of health services in Delhi. This study also explains that treatment-seeking behaviour for RTI/STI is not significantly associated with socioeconomic characteristics such as age, caste, religion, and occupation. However, there is a presence of significant association between treatment-seeking behaviour for RTI/STI and sociodemographic details like family type, age at marriage, educational status, and socioeconomic status. Similar findings were observed in a study done by Shingade et al.[13] where educational status and socioeconomic status were significantly associated with treatment-seeking behaviour. Study done by Mani et al.[14] also shows a significant association between treatment-seeking behaviour for RTI/STI with type of family.

It was found in the present study that government hospitals were favoured for seeking treatment by more than half (54%) of the women suffering from RTI/STI in comparison to private doctors (22%) and others (18%) which is consistent with the findings of Doley et al.[11] in Delhi, Deepak et al.[7] in Karnataka and Thekdi et al.[8] in Gujarat. On the contrary, few others like study by Anjana et al.[12] in New Delhi, and Hegde et al.[9] in Tamil Nadu reported that majority i.e. 70% and 75% women preferred private healthcare facility for treatment of RTI/STI in comparison to government facility. Accessibility, availability, timings and attitude towards government healthcare facilities in the study area could be some of the possible reasons for this difference.

This study shows that poor access to healthcare, poor knowledge or awareness act as barriers for treatment, which contribute to increase in prevalence of RTI/STI among women in our area. The major barriers for not taking treatment in our study were: not consider it as an important health problem i.e. 42.02% followed by lack of money (21.74%). It was also observed that 18.85% women feel embarrassed to discuss about it, 10.15% did not get support from family and 7.24% were too busy for seeking treatment. Similar findings have been reported with regard to barrier for seeking treatment for RTI/STI by Deepak et al.[7] and Shingade et al.[13] in urban slum of Mumbai in which major barrier for

not seeking treatment was: being not considered it as an important health problem whereas study done by Doley et al.[11] in Lucknow found that major barrier for not seeking treatment was: feel embarrassed to discuss about symptoms of RTI/STI.

The present study uniquely highlights a significant 42.07% of women with RTI/STI symptoms did not seek treatment, revealing a critical gap in care. The primary reasons were perceiving the condition as non-serious (42.02%) and lacking money (21.74%). Furthermore, 18.85% felt embarrassed and 10.15% lacked family support. These data strongly suggest that interventions must prioritize education on the severity of RTIs/STIs, alleviate financial burdens, and address social stigma within families and communities to encourage timely health-seeking behaviour. Similar findings were observed by Doley et al.[11] in Delhi where 59% of participants left their treatment once their symptoms subsided.

Conclusion:

In the present study, more than half of the participants who had RTI/STI sought treatment, while the remaining did not. Government hospitals were the preferred choice for treatment, followed by private doctors and other healthcare options. The major barriers to seeking treatment included not considering the condition as a significant health problem, financial constraints, embarrassment in discussing symptoms, lack of family support, and time constraints. Among those who discontinued treatment, the primary reason was stopping medication once symptoms subsided, followed by concerns about side effects and the inability to afford medicines. Poor access to healthcare, lack of awareness, and social stigma were identified as key factors contributing to the prevalence of RTI/STI among women in the study area.

Recommendations:

The present study highlights to raise awareness among women from underprivileged groups on prompt and appropriate treatment of symptoms suggestive of STIs and RTIs. This necessitates the need for repeated health education and counselling sessions at a community level by health care providers for RTI/STI

case management. Healthcare providers involved in reproductive health services should be more patient-friendly, sensitized and approachable so that women do not hesitate to seek treatment without fear of losing their privacy or any stigma.

Limitations:

Since it was a cross-sectional study, there was no follow-up done on the women who were seeking treatment for their reproductive tract infections. Male partners were not interviewed.

Declaration:

Funding: Nil

Conflicts of interest: Nil

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Nutritional Status and its Associated Factors Among Under-Five Children Attending the Well Baby Clinic of a Tertiary Care Institute of Kolkata, India

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Abstract:

   Introduction: A Well-Baby Clinic (WBC) is a primary healthcare facility, where children are monitored for growth and development, receive routine immunization and their caregivers are given appropriate nutritional counselling. **Objective:** To assess the nutritional status (Underweight and anaemia) of under-5 children attending WBC of a Tertiary Care Institute of Kolkata and to identify any associated sociodemographic characteristics. **Method:** A cross-sectional study was conducted for a period of 3 months (May 2023 to July 2023) among 106 under-5 children, attending WBC of a Tertiary care Institute of Kolkata, selected using consecutive sampling. Face-to-face interviews were conducted among caregivers of children using an interview schedule, and anthropometric measurements and haemoglobin levels of the children were obtained using appropriate tools. Nutritional status was defined as Normal, Underweight, and Severely Underweight based on weight for age. Anaemia levels were categorized as mild, moderate, and severe based on haemoglobin levels. Association of sociodemographic characteristics with nutritional status was assessed using Binary Logistic Regression. **Results:** Among the children, 72.6% belonged within 12-24 months. Almost 19% and 17% of children were Moderately Underweight and Severely Underweight, respectively. Nearly 75% had a history of exclusive breastfeeding till 6 completed months of life, while 34% received formula feed. Regression analyses revealed statistically significant associations between the nutritional status of children with their gender and mothers' education. **Conclusion:** Nearly 36% of the under-5 children who attended the Well-Baby Clinic of a Tertiary Care Institute in Kolkata were categorised as Moderately or Severely Underweight, indicating that a sizable fraction of these infants had nutritional issues. Furthermore, the nutritional health of these children was found to be statistically significantly correlated with maternal education and gender, highlighting the significance of addressing sociodemographic inequities.

Keywords: Nutritional status, Underweight, Under-5 children, Well Baby Clinic

Introduction:

   Nutritional disorders among children under five years of age are a significant public health problem. The first is undernutrition, which includes being underweight (low weight for age), stunting (being short for age), wasting (being underweight for height), and nutritional deficiencies or inadequacies such as lack of essential vitamins and minerals.[1] In India, according to the National Family Health Survey 5 (NFHS-5), in 2019-2020, 32.1% of children under five years of age were found to be underweight, 19.3% were wasted, and 35.5% were stunted. Not only underweight, but anaemia among under-5 children also a major public health problem globally.[1,2] It is a significant nutritional problem affecting millions of women and children in developing countries and is characterized by a reduction in the

haemoglobin concentration in blood, decreased quantity of red blood cells, and subsequent impairment in meeting the oxygen demands of tissues.[2,3] Anaemia affects the cognitive development, school performance, physical activity, motor and behavioural growth, and immune functions against diseases in young children. Nutritional anaemia is the major cause particularly for young children as they require high iron quantity to maintain their growth and development. Despite the implementation of anaemia control programs including iron-folic acid supplementation, annual mass deworming, and insecticide-treated bed nets distribution, South Asian countries like India account for the largest burden of anaemia cases, and progress to decline is almost stalled. The studies done by Goyal M et al.[4] and Ahmad S et al.[5], focussed primarily on the undernutrition status of the under-5 children, overlooking the anaemia status among them. Considering the slow progress in the reduction of anaemia prevalence, these conditions pose a significant challenge to policymakers tasked with achieving the WHO global nutrition targets 2025 and nutrition targets of the Sustainable Development Goals (SDG), 2030.[6]

Child growth and development are highly influenced by the living standards, socio-economic and demographic factors, cultural and climatic factors that can vary across the nations. Many studies have shown that more childhood deaths occurred in low and middle-income countries.[7] In India, the prevalence of underweight status and anaemia, respectively, has declined in the last decade, but continues to remain high in many regions. Children of today are citizens of tomorrow, so children's nutritional status plays an important role in determining the future of any country and hence their assessment should be prioritized.

A Well Baby Clinic (WBC) is a primary healthcare facility that emphasizes on providing primary care free of cost, where caregivers come with their children to know about their growth and development as well as to get proper nutritional and family planning counselling.[8,9] These clinics provide treatment, including immunization. Referrals to other tertiary health care centres are also done if needed.[10,11] As

already mentioned, assessing the nutritional status of children is of utmost public health importance as it will aid in identifying the underlying causes, risk factors and barriers and facilitators to proper nutrition among children and also help to develop policies, programs and awareness campaigns addressing nutritional issues. With this background, the current study was conducted in the Well Baby Clinic of a Tertiary Care Institute of Kolkata, among under-5 children to find out their nutritional status and factors associated with it, and also to identify any associated sociodemographic characteristics of the children with their nutritional status.

Method:

Study type, design, and study setting: A cross-sectional study was conducted among under-5 children attending the Well Baby Clinic (WBC) located at Khidirpur Maternity Home (KMH), which is under Institute of Post Graduate Medical Education and Research (IPGME&R) and Seth Sukhlal Karnani Memorial (SSKM) Hospital, Kolkata, India.

Study duration and study participants: The study was conducted for a period of 3 months (May 2023 to July 2023). The study participants were the under-5 children (0-59 completed months) who attended the WBC during the study period.

Inclusion and Exclusion criteria: The study included under-5 children attending the WBC, not yet diagnosed with undernutrition, wasting, stunting, or anemia. The study excluded all those participants whose caregivers were unwilling to give consent to participate in the study. Children with any existing infection/severely ill, or congenital anomaly were excluded.

Sample size and sampling technique: The sample size was calculated using Cochran's formula, which is as follows: Z_α^2 pq/ d^2 [Where Z= standard normal deviate, p= prevalence, q= (1-p), d= absolute precision]. Considering Z as 1.96, p as 50% or 0.05 (p= prevalence of severely underweight status among under-5 children) and d as 10%, the sample size was calculated as 96. After taking a 10% non-response rate, the final sample size obtained was 106. The children who fulfilled the selection criteria were included in the study by a

consecutive sampling technique to achieve the desired sample size.

Study tools and study technique: An anonymous, predesigned, pretested, and structured schedule was employed to obtain data from the caregivers of the eligible beneficiaries. It contained a mixture of open-ended and semi-open, single and multiple-response questions and was initially developed in English. The schedule was then translated into Bengali and Hindi by respective language experts and then retranslated back to English to ensure validity. It collected data across the domains of sociodemographic characteristics of the study participants, birth and feeding history, history of any past illness in the last 6 months and anthropometry [height/length, weight, mid upper arm circumference (MUAC)], general examination findings (pallor, oedema, cyanosis, clubbing, icterus, skin turgidity, presence of Bitot's spots) and haemoglobin levels using a Hemoglobinometer. The proforma was validated for its content by three subject experts- two from the Department of Community Medicine and one from the Department of Paediatrics of IPGME&R and SSKM Hospital, and necessary changes were incorporated before pretesting it. Pretesting was done on 15 under-5 children who were later excluded from the final sample. The WBC at KMH operates for two days in a week- Wednesday and Friday, hence data were collected on these two days every week during the study period, by a consecutive sampling technique till the desired sample size was achieved. After obtaining informed written consent from the caregivers of study participants who fulfilled the selection criteria, face-to-face interviews were conducted using the schedule, along with anthropometric measurements and haemoglobin levels (to check for the presence of anaemia). The study tools utilized in this study are summarized as follows-

   i)   Predesigned, pretested, and structured schedule (face-to-face interviews)

   ii) Measuring tape (height, for children of > 24 completed months, MUAC)

   iii) Infantometer (length, for children of ≤ 24 completed months)

   iv) Salters' weighing scale (for children of < 12 months)

   v)   Weighing machine (for children of ≥ 12 completed months)

   vi) Hemoglobinometer (for checking the presence of anaemia)

Study variables: Independent variables were the sociodemographic characteristics of the study participants. The dependent variable was the nutritional status.

Statistical analysis: Data were tabulated in Microsoft Office Excel 2021 and analysed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive analyses were represented using Mean (± SD), frequency and percentage and with the help of appropriate diagrams. Nutritional status was categorized into Normal [0 to -2 S.D.], Underweight [< -2 S.D. to – 3 S.D.] and Severely underweight [< -3 S.D.] (as per WHO Growth chart for weight for age).[12] Anaemia was classified as- Hb levels <7 g/dl- (severe), 7-9.9 g/dl- (moderate) and 10-11.9 g/dl (mild).[13] Multivariable Binary Logistic Regression analyses was performed to identify any associations between the sociodemographic characteristics of the study subjects with their nutritional status. All the variables having a p-value <0.2 in the univariate logistic regression analyses were considered biologically plausible and included in the multivariable model to check for model fitness, after checking for multi-collinearity (variance inflation factor > 10 and tolerance <0.1). A p-value of < 0.05 at 95% Confidence Interval (CI) was considered statistically significant.

Ethical considerations: The Proposal was submitted, and ethical clearance was obtained from the Institutional Ethics Committee (IEC) of IPGME&R and SSKM Hospital, Kolkata (**IPGME&R/IEC/2023/785**). Informed written consent was taken from the caregivers of the study participants. Anonymity and confidentiality of data were maintained throughout the study.

Results:

A.   Sociodemographic data:

Among the study participants, 72.6% belonged within 12-24 completed months, 70.8% were male

children, and 92.2% followed Islam. Among the participants, 73.2% belonged to Lower-middle (Class IV) socioeconomic status (as per Modified B.G. Prasad Scale, updated in 2023). (Table 1) Among the participants, 9 (8.5%) were diagnosed with hypothyroidism and were on regular medications for the same. Nearly 76% of caregivers did not know about the ICDS (Integrated Child Development Services Scheme) program operating in full swing in India. Among the children, 97.2% were fully immunized till date**.**

B. Birth details and feeding history:

All of the eligible study participants were delivered at healthcare institutions (100%), out of which 77.3% were delivered by Caesarean section. Almost 16% were preterm at birth while 2.8% were post-term deliveries as reported by respective caregivers. Breastfeeding was initiated within 1 hour of birth in majority (88.6%) of the participants. Nearly 75.5% of children had history of Exclusive Breast Feeding (EBF) till 6 completed months of age while 34% received formula feeds. Out of the children who were ≥ 6 completed months of age, almost 44% were started with complementary foods from 6 completed months of age, the most commonly given food items being rice, daal (lentil soup), biscuits and khichdi. Among the subjects, 11.3% consumed junk food for ≥ 5 days/week.

Only 4 (3.8%) children were receiving Iron and Folic Acid (IFA) supplementation **(**according to the dosage and schedule mentioned under the 'Anemia Mukt Bharat' program guidelines) while 63.2% children never received Vit. D drops. 5 (4.7%) had a history of worm infestation in the last 12 months out of which only 2 of them took medication [two tablets of Albendazole (400 mg), two weeks apart].

C. Anthropometry and biochemical profile:

MUAC was reported to be <11.5 cm in only 1 (1.8%) and between 11.5-12.5 cm in only 2 (3.6%) of the subjects belonging to ≥ 6 months of age, respectively.

Clinical pallor was found in 9.4% and icterus in only 1 (0.9%) child. The skin turgor reaction was > 3 seconds in only 1 (0.9%) child. anaemia was reported to be 'Moderate' in 39.6% and 'Severe' in 8.5% of the children.

Table 1. Distribution of Study Participants According to their Sociodemographic Characteristics (N= 106)

Sociodemographic Characteristics	n (%)
Age of the participants	
Neonate (0 to 28 days)	17 (16.0)
29 days to 24 completed months	81 (76.4)
24- 60 completed months	8 (7.5)
Gender of the participants	
Male	57 (54.0)
Female	49 (46.0)
Residence	
Urban	100 (100)
Religion	
Hinduism	15 (14.0)
Islam	91 (86.0)
Education of caregiver - Father	
Illiterate	12 (11.3)
Primary	7 (6.6)
Middle school	19 (17.9)
Secondary	29 (27.3)
Higher secondary	21 (19.8)
Graduate and others	18 (17.0)
Education of caregiver - Mother	
Illiterate	4 (3.7)
Primary	6 (5.6)
Middle school	22 (20.7)
Secondary	25 (23.5)
Higher secondary	23 (21.6)
Graduate and others	23 (21.6)
Occupation of caregiver - Father	
Unemployed	5 (4.7)
Employed	101 (95.3)
Occupation of caregiver - Mother	
Homemaker	99 (93.4)
Employed	7 (6.6)
Socio-economic Status (Modified B.G. Prasad Scale, updated on 2023)	
Class I (Upper)	2 (1.9)
Class II (Upper middle)	5 (4.7)
Class III (Middle)	14 (13.2)
Class IV (Lower middle)	85 (80.2)
Presence of siblings	
Yes	59 (55.7)
No	47 (44.3)

Table 2. Multivariable Multinomial Logistic Regression Showing the Association of Sociodemographic Characteristics of Study Participants With their Nutritional Status (N=106)

Sociodemographic characteristics	Moderately underweight (n= 20)			Severely underweight (n= 18)		
	Frequency (%)	AOR (95% Confidence Interval)	p value	Frequency (%)	AOR (95% Confidence Interval)	p value
Age of the participants						
Neonate (0 to 28 days)	4 (20.0)	0.82 (0.49-13.79)	0.89	5 (27.7)	0.72 (0.03-17.32)	0.84
29 days to 24 completed months	14 (70.0)	1.58 (0.11-22.90)	0.73	12 (66.7)	0.86 (0.04-18.12)	0.92
24- 60 completed months	2 (10.0)	Ref.		1 (5.6)	Ref.	
Gender of the participants						
Male	11 (55.0)	4.10 (1.20-14.02)	0.02	10 (55.6)	1.31 (0.30-5.69)	0.03
Female	9 (45.0)	Ref.		8 (44.4)	Ref.	
Child going to ICDS/School						
Yes	5 (25.0)	1.35 (0.29-6.24)	0.69	3 (16.7)	0.77 (0.11-5.22)	0.79
No	15 (75.0)	Ref.		15 (83.3)	Ref.	
Child immunized till date						
Yes	15 (75.0)	0.94 (0.20-4.4)	0.94	15 (83.3)	0.45 (0.79-2.58)	0.37
No	5 (25.0)	Ref.		3 (16.7)	Ref.	
H/O Hypothyroidism in any parent						
Yes	5 (75.0)	0.85 (0.13-5.56)	0.87	3 (16.7)	2.74 (0.39-19.01)	0.30
No	15 (25.0)	Ref.		15 (83.3)	Ref.	

Ref. cat. = normal weight-for-age

Model fitness information: *Omnibus Test of Model Coefficients was statistically significant, (p=0.01) and Hosmer-Lemeshow Goodness of Fit Test was not statistically significant (p =0.97)*

The majority of children had normal weight-for-age (64.1%), 18.9% were 'Underweight', while 17% were 'Severely underweight' (as per the WHO Growth chart for weight-for-age, from birth till 5 years of age).

Multivariable Multinomial Logistic Regression analyses revealed that female children had statistically significantly higher odds of being moderately underweight (aOR= 4.10, 95% CI 1.20-9.72; p 0.02) and severely underweight as compared to the male children. (aOR= 1.31, 95% CI 0.30-5.69; p 0.03). The model fitness information was given by the Omnibus Test of Model Coefficients, which was statistically significant (p=0.01), and by the Hosmer-Lemeshow Goodness of Fit Test, which was not statistically significant (p =0.97). These findings suggested a good fit of the model. (Table 2)

Discussion:

In a study done by Mahmood S et al.[14], malnutrition was found to be present in 32% of children. Adequately nourished children were 68%, while moderately and severely malnourished children were 14% and 18%, respectively. The present study indicated malnutrition to be significantly associated with maternal illiteracy and the presence of a family member with special needs. No significant association was found between malnutrition and gender, family size, family income, breastfeeding, and presence of siblings under 5 years of age. In contrast, in the current study, the majority of children had normal weight-for-age (64.1%), 18.9% were 'Underweight', while 17% were 'Severely underweight' (as per the WHO Growth chart for weight-for-age, from birth till 5 years of age). The children whose mothers were

illiterates also had statistically significantly higher odds of being severely underweight as compared to the mothers who were literate.

Another study done by Khadija U et al.[15], the study found that 27.2% mothers were belonged to stunted children, 17.3% belonged to wasted children, and 50.9% belonged to those children who were suffering from both stunting and wasting condition. 57.9% mothers who were illiterate belong to stunted and wasted children. CBC and Hb test were prominent, stunted and wasted children had Hb 9.88 mg/dL. The average height and weight of stunted and wasted children was 68.6 cm and 7.11 kg respectively. But in the present study, majority of children had normal weight-for-age (64.1%), 18.9% were 'Underweight', while 17% were 'Severely underweight' (as per WHO Growth chart for weight-for-age, from birth till 5 years of age). Anaemia was reported to be 'Moderate' in 39.6% and 'Severe' in 8.5% of the children. The children whose mothers were illiterates, also had statistically significant higher odds of being severely underweight as compared to the mothers who were literates.

A study conducted by Bhusal CK et al.[16], about half of Muslim children were underweight, 0.9% were overweight, 17.3% were wasted and 63.1% were stunted. Also in the study, underweight, wasting and stunting in under-five Muslim children were above the cutoff point from the significant level of public health and higher than national data. Hence, this study suggests collaborative and immediate attention from responsible governmental and non-governmental organizations working in nutrition for providing informal learning opportunity. But in the present study, the majority of children had normal weight-for-age (64.1%), 18.9% were 'Underweight', while 17% were 'Severely underweight'.

In study done by Chapagain R et al.[17], most participants were male (65.1%); mean age was 3.9 years (±3.4 years). The prevalence of stunting was 25.9 %, wasting was 17.3% and 24.0% when classified by BMI-for-age Z-score or MUAC, respectively. Two percent of participants were overweight. Notably, 32.1% of children ≥ 5 years were classified with wasting based on

MUAC-for-age Z-score, which is higher than that observed in children <5 (20.2%). Food insecurity was reported among 58.2% of children with stunting and 34.0 % with wasting. In contrast, in the current study, the majority of children had normal weight-for-age (64.1%), 18.9% were 'Underweight', while 17% were 'Severely underweight' (as per the WHO Growth chart for weight-for-age, from birth till 5 years of age). The children whose mothers were illiterates, also had statistically significant higher odds of being severely underweight as compared to the mothers who were literates.

Hamann SA et al.[18], conducted by the proportion of obesity, overweight, underweight, and stunting among school children was 4%, 12%, 7%, and 17%, respectively. More girls were overweight/obese compared with boys (20% vs. 13%). The mixed-effects logistic regression model showed that both participants from Lower SES households and Upper SES households had a higher tendency to be overweight compared to participants from Middle SES respectively. In contrast, in the current study, the majority of children had normal weight-for-age (64.1%), 18.9% were 'Underweight', while 17% were 'Severely underweight' (as per the WHO Growth chart for weight-for-age, from birth till 5 years of age). The children whose mothers were illiterates also had statistically significantly higher odds of being severely underweight as compared to whose mothers were literate.

Strengths and Limitations:

The study focused on the nutritional status of under-five children in a WBC, which may allow for the early identification of potential nutritional deficiencies and poor growth and development, so that accurate measures can be taken promptly. It also provided insight into the prevalence of underweight or anaemia in a vulnerable age group like under-five children.

A larger sample size could have been obtained had the clinic operated on a regular basis. Also, since the current study was conducted only in one WBC, the nutritional status of the under-five children, along with the factors associated with it could not be compared with those provided by other WBCs located at other parts of the state or country.

Conclusion and Recommendations:

Majority (72.6%) children were within 12-24 completed months. Nearly one-fifth were severely underweight and very few (8.5%) had severe anaemia. Nutritional status significantly associated with gender of children and education of mothers.

Improving the underweight status and anaemia requires a multi-faceted approach, combining various appropriate nutritional interventions, healthcare measures and broader socioeconomic strategies. Improving the IYCF (Infant and Young Child Feeding) practices among the caregivers, counselling regarding iron supplementations and provision of iron fortified food along with periodic deworming, use of clean water, proper sanitation and hygiene practices and improving the maternal nutrition can help mitigate the problem. Consistent measures must be put in to generate awareness, strengthen the health care delivery standards to combat these nutritional issues.

Declaration:

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Conflict of Interest: Nil

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Morbidity Profile of Sedentary Workers in a Food Packaging Industry in Goa: A Retrospective Record-Based Study

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Abstract:

Introduction: With the advent of mechanization and technological advancement, there is an increase in sedentary and light intensity nature of work in the food manufacturing industry. **Objective:** To describe the morbidity profile of sedentary workers and factors associated with it in a food packaging industry in Goa. **Method:** A retrospective record-based study was conducted for a period of 3 months on 523 workers from food packaging industry in North Goa who are registered with an Occupational Health Service. Morbid conditions such as common chronic diseases like Diabetes, Hypertension, Visual and auditory problems were studied. Continuous data with normal distribution were expressed as mean and standard deviation. Morbidity profile was depicted as frequency and percentage and association with appropriate statistical test. **Results:** Majority, i.e. 495 workers (94.6%) did not have any co-morbidity, 17 (3.3%) had hypertension, 7 (1.3%) had diabetes and 4 (0.8%) had both diabetes and hypertension. Age $\geq$30 years (p=0.000), presence of comorbidities (p=0.011), near vision (p=0.000), total vision (p=0.031) and blood pressure (p=0.002) were significantly associated with being overweight or obese. A low positive correlation was observed between Body Mass Index and systolic blood pressure (r=0.232, p=0.000), diastolic blood pressure (r=0.166, p=0.000) and Random Blood Sugar Level (r=0.089, p=0.042). **Conclusion:** Workers from the food packaging industry suffer from diabetes, hypertension and overweight, which are known to progress with prolonged periods of reduced physical activity as seen at their workplace.

Keywords: Food packaging industry, Goa, Morbidity, Sedentary workers

Introduction:

Globally, the packaging industry sector has positioned itself as the third largest industry and is one of the fastest growing industries across all countries thus generating ample of employment. However, with the advent of mechanization and technological advancement, there is an increase in the sedentary and light intensity nature of work in this sector. For many of these workers, it is not uncommon to remain seated for well over an hour without standing.

Evidence demonstrates that sedentary behaviour contributes to mortality by doubling the risk of non-communicable diseases like; cardiovascular diseases, type II diabetes, obesity, several types of cancers and musculoskeletal conditions.[1,2]

Approximately two million deaths per year are attributed to physical inactivity, prompting WHO to issue a warning that a sedentary behaviour could very well be among the 10 leading causes of death and disability in the world.[3]

A considerable number of individuals work in the manufacturing sector like the food packaging industry but with limited access to occupational health services. Very few studies have reported adverse health effects of

sedentary behaviour. There is a scarcity of manpower needed to assess and address diseases related to occupational health. Most of the workers from the industrial sector are outside the panorama of even the existing provisions of health care. If the industrial sector of India is to be at par with other nations, it cannot afford to be neglectful of the health of its workers. This study was conducted considering the importance of the subject and the lack of published evidence.

Objective:

1. To describe the morbidity profile of sedentary workers at the food packaging industry at Goa.

2. To find out the factors associated with the morbid conditions

Method:

Study design and duration

Aretrospective record-based cross-sectional study was conducted over a month in July 2022. Institutional Ethics Committee (IEC) approval was obtained prior to commencement of the study (GMCIEC/2022/88 dated 30/06/2022). Waiver of consent was obtained from IEC of Goa Medical College.

Sampling technique

Universal Sampling Technique was used to collect records of all 523 workers from food packaging industry in North Goa who are registered with an Occupational Health Service (OHS) Centre after necessary permissions ensuring the confidentiality and privacy of the data of the food packaging industry workers.

Study participants

Inclusion criteria- All workers working in the Food packaging industry for 5 years, registered with the OHS center and having complete records.

Data collection

The OHS Centre conducts periodic medical check-ups of these food packaging industry workers along with other industry workers and thus was a reliable source of epidemiological data on these industry workers. The data included socio-demographic details, presence of co-morbidities, anthropometry (height, weight, BMI), pulse, blood pressure measurements, routine blood investigations (haemoglobin, Random Blood Sugar Levels (RBSL), serum creatinine, blood group), vision tests, ECG, chest x-ray, urine microscopy, stool microscopy and audiometry readings.

Data analysis

Data was entered and analysed using Microsoft Excel. Descriptive statistics for continuous data with normal distribution were expressed as mean and standard deviation. Frequency distribution was estimated for categorical data and expressed in percentages. Chisquare test was used to find the association of categorical variables with BMI and all variables with $p \leq 0.05$ were considered statistically significant. Pearson's correlation was used to find the correlation between BMI and the continuous variables.

Operational Guidelines

Sedentary worker

Any waking behavior such as sitting or leaning with an energy expenditure of 1.5 metabolic equivalent task (MET) or less.[1]

Hypertension

History of hypertension or Systolic BP$\geq$130 mmHg and/or Diastolic BP$\geq$80mmHg according to the new American Heart Association guidelines.[4]

Diabetes

History of diabetes or fasting blood glucose $\geq$126 mg/dl and/or post prandial blood glucose $\geq$200 mg/dl according to the American Diabetes Association guidelines (2022).[5]

Nutritional status

Underweight (<18.5 kg/m^2), normal or lean BMI (18.5–22.9 kg/m^2), overweight (23.0–24.9 kg/m^2) and obese ($\geq$25 kg/m^2).[6]

Audiometry

Audiometry results were interpreted as follows based on WHO grades of hearing impairment. Hearing levels of 26-40 dB as mild, 41-60 dB as moderate, 61-80 dB as severe and >80 dB as profound hearing impairment.[7]

Visual status

Far vision was checked using Snellen's chart and Near vision using Roman text type and patients were classified as having Normal vision, Normal vision with correction and Uncorrected vision.

Anaemia

Normal haemoglobin- Women: 12.1 to 15.1 gm/dl; Men: 13.8 to 17.2 gm/dl.[8]

Results:

Among the records of 523 workers that were studied, the mean age of the workers was 33.12 years among which 472 (90.2%) were males and 51 (9.8%) were females. As mentioned in Table 1 only 17 (3.3%) workers were known hypertensives. A quarter i.e.127 (24.2%) workers had isolated systolic hypertension of which, 16 (3%) were known hypertensives and 36 (6.8%) of them had isolated diastolic hypertension of which only 7 (1.3%) were known hypertensives. Although, 7 (1.3%) were known diabetics, 11 (2.1%) were found to have RBSL more than 200mg/dl of which none of them were known diabetics. A small percentage i.e. 4 (0.8%) had both diabetes and hypertension.

From Table 1 it was observed that, the BMI of the workers ranged from 14.88kg/m^2 to 37.39 kg/m^2 with a mean of 23.01 kg/m^2. It was observed that15 (2.9%) workers had mild conductive deafness while 4 (0.8%) had moderate conductive deafness.

Visual acuity for far vision with Snellen's Chart showed that 42 (8%) workers had uncorrected defect while 38 (7.3%) had normal vision with correction. The study showed that 8.2% workers (42 males and 1 female) had a serum creatinine above the reference range (0.57-1.11 mg/dl). Majority, i.e. 514 (98.3%) individuals had normal ECG readings while 9 (1.7%) showed abnormal readings which needed further evaluation with treadmill test and 2D Echocardiography. Nearly16.9% of the workers were anaemic. However, in contrast to a small percentage of female workers with anaemia i.e. 24 (4.5%), more males were detected with anaemia i.e. 65 (12.4%).

As seen in Table 2, on bivariate analysis, variables such as age ≥30 years (*p*=0.000), presence of comorbidities (*p*=0.011), near vision (*p*=0.000), total vision (*p*=0.031) and blood pressure (*p*=0.002) were significantly associated with being overweight or obese. While variables such as sex, audiometry, color vision, far vision had no statistical significance with BMI.

From Table 3 it was observed that there were significant (*P*<0.01) positive correlations of BMI with both systolic and diastolic BP. It showed that BP increased with increase in BMI. Correlation coefficient showed that relationship of BMI with systolic BP (0.232) was stronger than diastolic BP (0.166). There was also significant positive correlation between age and BMI.

Other investigations e.g. chest x-ray, stool and urine routine and microscopy did not reveal any abnormality. All workers with abnormal findings were subjected to further evaluation and treatment.

Table 1: Health Profile of Study Participants (N=523)

Health indicator	Frequency	Percentage (%)
Body Mass Index		
Underweight	53	10.1
Normal	218	41.6
Overweight	103	19.6
Obese	149	28.4
Blood pressure		
Normotensive	343	65.5
Hypertensive	17	3.3
Raised systolic BP	127	24.2
Raised Diastolic BP	36	6.8
Blood investigations		
Anaemia	89	17
Diabetes (RBSL)	11	2.1
Raised serum Creatinine	43	8.2
ECG		
Normal	514	98.3
Abnormal	9	1.7
Audiometry		
No hearing impairment	523	96.3
Mild impairment	15	2.9
Moderate impairment	4	0.8
Severe impairment	0	0
Profound impairment	0	0
Far vision		
Normal	443	84.7
Normal with correction	42	8.0
Uncorrected	38	7.3
Near vision		
Normal	460	88
Normal with correction	21	8.0
Uncorrected	42	4.0
Colour vision		
Normal	510	97.5
Defective	13	2.4

Table 2: Bivariate Analysis of Factors Associated with BMI (N=523)

Variable	BMI		p value	Crude OR	95% CI
	Overweight/Obese	**Normal**			
Age (years)					
≥30	164 (58.8)	115 (41.2)	0.000	2.574	1.806-3.667
<30	87 (35.7)	157 (64.3)			
Gender					
Female	30 (58.8)	21 (41.2)	0.103	1.622	0.903-2.916
Male	221 (46.8)	251 (53.2)			
Comorbidities					
(Diabetes, Hypertension, Both)					
Present	20 (71.4)	08 (28.4)	0.011	2.857	1.235-6.610
Absent	231 (46.7)	264 (53.3)			
Color vision					
Defective	08 (61.5)	05 (38.5)	0.322	1.758	0.567-5.447
Normal	243 (47.6)	267 (52.4)			
Near vision					
Defective	46 (71.9)	18 (28.1)	0.000	3.166	1.781-5.628
Normal	205 (44.7)	254 (55.3)			
Far vision					
Defective	39 (48.8)	41 (51.2)	0.883	1.036	0.644-1.669
Normal	212 (47.9)	231 (52.1)			
Total vision					
Defective	70 (56.5)	54 (43.5)	0.031	1.561	1.040-2.343
Normal	181 (45.4)	218 (54.6)			
Blood pressure					
Raised	187 (52.5)	169 (47.5)	0.002	1.781	1.224-2.591
Normal	64 (38.3)	103 (61.7)			
Audiometry					
Abnormal	09 (47.4)	10 (52.6)	0.956	0.974	0.389-2.439
Normal	242 (48.0)	262 (52.0)			

Table 3: Correlation Matrix between BMI, Blood Pressure and Age (N=523)

Variables	BMI	Systolic BP	Diastolic BP	Age
BMI	1.000	0.232*	0.166*	0.203*
Systolic BP	0.232*	1.000	0.610*	0.322*
Diastolic BP	0.166*	0.610*	1.000	0.236*
Age	0.203*	0.322*	0.236*	1.000

Correlation is significant at the *0.01 level (2-tailed)

Discussion:

It was observed that 3.3% of the workers were known to be hypertensive at the time of examination whereas 24.2% were diagnosed to be hypertensive during the study thus signifying the importance of periodic screening and health check-ups. 1.3% of the workers were known diabetics. The study conducted by Mhalshekar et alshowed the prevalence of hypertension to be 24% and diabetes to be 32.2%.[9] Similar findings were reported by Lokhande et al[10] in Mumbai whose study showed that 35% of the workers were hypertensive and 6% were diabetic.

The mean BMI of the study participants was 23.01±3.68kg/m², which is considered overweight for the Asian Indians.This value was lower that found by Kazi et al in their study which has reported the mean BMI of 26.8±4.8 kg/m².[11] In this study 8.2% workers had a serum creatinine above the above the reference range. This needs further evaluation, as no other obvious underlying etiology was found. Therefore, all causes of raised serum creatinine need to be ruled out.

Majority i.e. 504 (96.4%) of the workers did not have any hearing impairment however 15 (2.9%) and 4 (0.8%) had mild and moderate hearing impairment respectively. The findings of the study showed less hearing impairment than that reported in a study by Shivali et al.[12] 16.9% of the workers were anaemic which was significantly higher than that seen in the study by Kalyani et al[13] which revealed that 0.4% of the workers with anaemia.

There was a significant association between obesity/overweight and the presence of comorbidities among the participants, which was similar to the study performed by Liu et al[14] using eHealth records from the University of Wisconsin Hospital. Similar results were also seen in a study by Pantalone et al in USA.[15]

In a cross-sectional study that included 8,000 participants from the 1999 to 2008 National Health and Nutrition Examination Survey (NHANES), it was observed that myopia was positively associated with higher BMI which is similar to the findings in this study.[16] Noh et al in their study also found that obese subjects had a higher probability of having myopia compared to individuals with a normal weight.[17]

This study showed a significant positive correlation between BMI and SBP and DBP. This was similar to the findings of a study performed by Song et al in a study among 843 students at a Medical University.[18] Like the study done by Mungreiphy et al,[19] this study also showed a positive correlation between age and BMI.

Since this study is a retrospective record-based study, it relies on pre-existing records, there is a lack of control over the quality and consistency of the data. There may also have been differences in how data was recorded across the subjects.

Conclusion:

As per the findings in this study,almost half i.e. 252 (48.1%) of the workers from the food packaging industry were either overweight or obese. About one-third, 28 (5.3%) of the workers suffer from disorders related to or exacerbated by a sedentary lifestyle like diabetes, hypertension which are known to progress with prolonged periods of reduced physical activity as seen at their workplace. Some workers also had hearing and visual impairment which needs further evaluation and appropriate treatment to prevent reduced work efficiency. Raised blood pressure (p=0.002), increasing age (p=0.000) and presence of comorbidities (p=0.011), was significantly associated with a raised BMI.

Recommendation:

There is a need to create awareness regarding avoidance of prolonged inactivity and the importance of promoting regular physical activity to prevent these lifestyle disorders among the workers. Regular health check-ups to screen the workers at their workplaces will help in reducing the burden of these diseases. Inaddition, health education regarding nutritious diet, importance of compliance to medication, exercise, adequate rest and relaxation techniques should also be repeatedly reinforced.

Declaration:

Funding: Nil

Conflicts of interest: Nil

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Infant and Young Child Feeding Practices and Their Association with Women's Autonomy: A Community-Based Study in Rural West Bengal

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Abstract:

Introduction: In majority of societies women are the primary caregivers of children. Poor feeding habits in early childhood contribute to malnutrition and child mortality in India. While the effects of some of the resources such as education on child feeding practices have been extensively evaluated, women's autonomy have received less attention. **Objective:** To assess feeding practices among the infants and young children in Budge-budge II block of West Bengal. **Method:** A descriptive study with cross-sectional design was conducted among 161 children between 6-23 months of age and their respondent mothers in Budge-Budge II block, West Bengal, using multistage random sampling. Mothers were interviewed face to face, and data were collected using a predesigned, pretested and structured IYCF practice schedule and a Likert-type women's autonomy measurement scale and analysed using SPSS v26.0. Multivariable binary logistic regression and the Pearson's correlation was done to find association. **Results:** Among the study participants, 155 (96.3%) reported being breastfed, 29 (18%) received pre-lacteal feed, 60 (37.3%) had not initiated breastfeeding early within 1 hour, 149 (92.5%) received colostrum, 39 (24.2%) were not exclusively breastfed; 119 (73.9%) of the study participants had adequate meal frequency whereas 87 (54%) and 97 (60.2%) had inadequate dietary diversity and acceptable diet respectively. Overall IYCF practice was significantly poor 113 (70.2%). Among the mothers 88 (54.7%) had lower level of autonomy. **Conclusion:** More than half of the study participants had poor overall IYCF practices. A majority of the mothers were having a lower level of autonomy. IYCF practices were found to be poorer among the female children and those delivered by Caesarean Section. Moderately positive correlation was found between mothers' autonomy and IYCF practices.

Keywords: Breast feeding, Dietary diversity, Female self-government, Growth and development

Introduction:

The practice of infant and young child feeding (IYCF) plays a critical role to improve child survival and promote their growth and development. According to the World Health Organization breastfeeding should begin within an hour of birth, exclusive breastfeeding for six months and initiation of complementary feeding along with breastfeeding from six months of birth.[1] In low and middleincome countries, exclusive breastfeeding (EBF) was observed among 37% of the children below six months of age.[2] EBF rates in India range from 35.8% in Meghalaya to 77.2% in Chhattisgarh.[3] Breastfeeding could prevent 8,23,000 deaths of under 5 children per year.[4] It provides protection to a child against various infections, asthma, sudden infant death syndrome, misaligned dentition and improves intelligence and reduces the risk of overweight and diabetes.[2,4] The duration of EBF is inversely proportional to prevalence of underweight and stunting.[5]

In order to provide effective care, women being the primary caregivers to their children require resources like education, physical and mental health, adequate time as well as social support and autonomy.[6] Autonomy provides women with the opportunity to access and control resources and to use these resources in response to the food and health-care needs of their children. Children of women with lower autonomy have been shown to be at a higher risk of mortality, under-5 immunization and morbidity from acute respiratory infections.[7-10]

From previous studies it was seen that greater women's autonomy has been associated with better child nutritional status in India and among children under 3 years of age in Jordan.[11-13] By contrast, in Kenya, no such association was found among children less than 3 years of age.[14] In a study conducted by Smith et al.[15], higher women's autonomy was associated with shorter duration of breast-feeding in the three regions of South Asia, sub-Saharan Africa and Latin America, while in an Indian study conducted in 60 villages in the district of Nalgonda in the state of Andhra Pradesh, a positive association between women's autonomy and breast-feeding practices has been observed.[12]

While the effects of some of the resources such as education on infant and young child feeding practices have been extensively evaluated, women's autonomy have received less attention. Keeping that in mind the present study was formulated.

Primary Objective:

1. To assess feeding practices among the infants and young children in Budge-budge II block of West Bengal

Secondary Objectives:

2. To evaluate the level of autonomy among the mothers of the study participants

3. To identify the association of infant & young child feeding practices with their socio-demographic characteristics

4. To examine the correlation between infant & young child feeding practices and women's autonomy

Method:

A descriptive study (community based) with cross-sectional in design was conducted among the children between 6-23 months of age where respondent being their mothers. The study was conducted in three subcenters of Budge-Budge II block of West Bengal over a period of three months (19th February to 21st May 2024). Using Cochran's formula; $n = Z^2 pq/d^2$ [Z (standard normal variate) =1.96 at 95% CI, p=30**%** based on a study done by Chakraborty et al.[16], q=1-p, d=10% (absolute error)], adding a design effect of 1.5 and 10% of non-response, the sample size was calculated as 133. Finally, a total of 161 samples were collected. Multistage random sampling technique was followed as showed in Figure 1. Out of twenty-seven subcentres of Budge-Budge II block three subcentres were chosen via simple random sampling technique and then from those subcentres a list of infants and young children aged between 6 to 23 months was prepared with the help of ASHAs. A total of 161 samples were collected from the three selected subcentres using probability proportional to size (PPS) sampling technique, with simple random sampling employed within each subcentre.

Figure 1: Multistage Random Sampling Technique Used In The Study
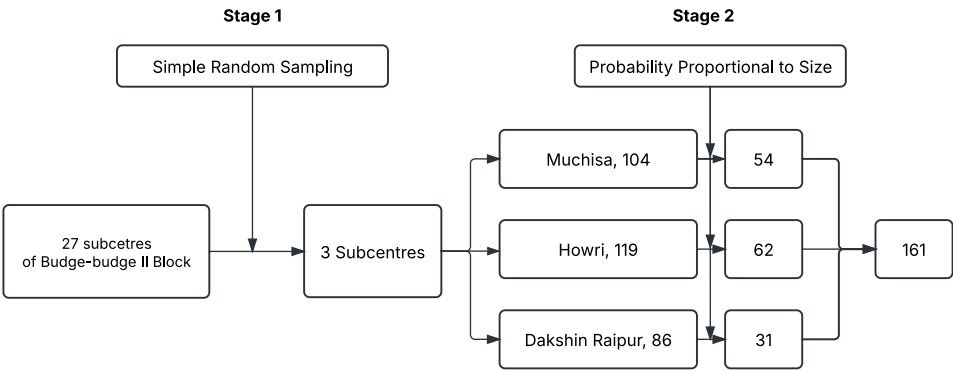
Inclusion criteria:

(i) Children between 6-23 months of age who lived in the village for more than six months.

(ii) Mothers of the children who gave consent to participate in the study.

Exclusion Criteria:

(i) Children whose mothers were not present at the time of data collection.

(ii) Children who were very ill/sick while study had been carried out.

(iii) Research participants who were not available even after three visits.

Selected mothers were interviewed face to face and data were collected using a predesigned, pretested & structured schedule for infant and young child feeding practices (taken and modified from IYCF guideline). Scoring was done from different IYCF parameters; for each parameter the highest score was '1' and lowest '0'. Less than equals to median score of the total IYCF practices score was considered to be poor.

Regarding mother's autonomy, a three-point (2,1,0) likert-type women's autonomy measurement scale[17] **(**modified and pretested) was used, which consists of 18 questions; for each question maximum possible score was '2' and minimum possible score was '0'. The scale covers major three dimensions of women's autonomy i.e. decision-making autonomy, freedom for movement and financial autonomy which are most relevant in developing countries. Less than median score of the total women's autonomy score was considered to be lower.

Data were entered and analysed using SPSS v26.0. Categorical data were represented as proportions and with help of suitable diagrams. Chi-square test and binary logistic regression was done with AOR (in 95% CI); p-value< 0.05 was considered significant. Pearsons's correlation was done to find association between the dependent variables.

Ethical approval was obtained from the Institutional Ethics committee (IEC) of IPGME&R AND SSKM Hospital, Kolkata (Vide memo no. IPGME&R/IEC/2024/0096). An informed written consent was taken from the mothers. Anonymity and confidentiality were maintained.

Operational definitions:

1. "Women's autonomy": The autonomy of women is the result of having the capacity to freely make decisions that affect their lives under conditions of equality.[18]

2. "IYCF": Infant and Young Child Feeding (IYCF) is a set of well-known, common and scientific recommendations for appropriate feeding of newborn and children under two years.[19]

3. "Early initiation of breastfeeding": Newborns who were started on breastfeeding within an hour after birth.[19]

4. "Exclusive breastfeeding (EBF)": For the first six months of life, no additional food or drink, including water, is allowed except breast milk, however the newborn on the other hand, is permitted to receive ORS, drops, and syrups (vitamins, minerals, and medicines).[19]

Figure 2: Study Tools and Scoring Criteria
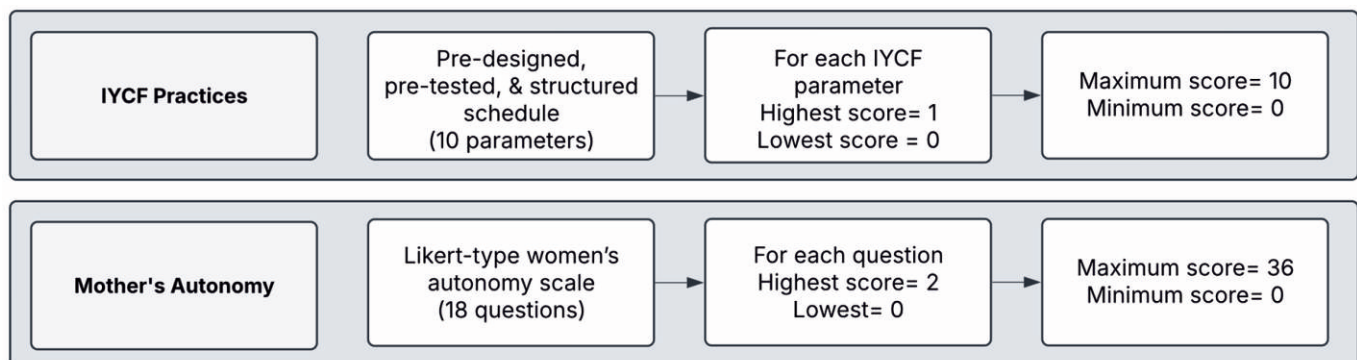
5. "Continued breastfeeding at 2 years": Proportion of children more than 12 months of age who fed breast milk.[19]

6. "Minimum dietary diversity (MDD)": Children aged 6–23 months who had consumed items from four or more dietary groups in the previous 24 hours (grains, roots and tubers, legumes and nuts, dairy products, meat foods, eggs, vitamin A rich fruits and vegetables, other fruits, and vegetables).[19]

7. "Minimum meal frequency (MMF)": Children aged 6–23 months who had solid, semisolid, or soft solids food in a minimum number of times (6–8 months 2 times/ 9–23 months 3 times/ non-breastfeeding children 4 times a day) within the previous 24 hours.[19]

8. "Minimum acceptable diet (MAD)": In the past 24 hrs, children aged 6–23 months had a sufficient minimum diet diversity and meal frequency.[19]

Results:

General characteristics of study participants:

Table 1 describes the socio-demographic characteristics of the study participants. Out of 161 children, 79.5% belonged to 9-23 months of age whereas 20.5% belonged to 6-8 months; 32.3% delivered via LUCS. Among the mothers 77% were between the age group of 21-30 years; 67.1% studied higher secondary (HS) & above; 75.8% were homemakers whereas 24.2% were working mothers; 54.7% belonged to joint family; 61.5% belonged to lower-middle and lower socio-economic class.

Distribution of participants according to feeding practices:

Table 2 describes child feeding practices. Among the study participants 18% received pre-lacteal feed, 37.3% not initiated breastfeeding early within 1 hour, 7.5% not received colostrum, 24.2% were not exclusively breastfed, 93.2% continued breastfeeding beyond 1year of age, 81.8% were introduced to solid/semi-solid/soft food in age group 6 to 8 months whereas 96.9% in 8 to 23 months of age. Among the study participants 54% had inadequate dietary diversity, 26.1% had inadequate meal frequency, and 60.2% had inadequate acceptable diet (Figure 3).

Table 1: Distribution of the Study Participants According to Their Socio-Demographic Characteristics (N=161)

Variables	Frequency (%)
Child's age (in completed months)	
6-8	33 (20.5)
9-23	128 (79.5)
Gender	
Male	86 (53.4)
Female	75 (46.6)
Mode of delivery	
Normal vaginal	109 (67.7)
Lower Uterine segment Caesarean Section	52 (32.3)
Type of family	
Nuclear	49 (30.4)
Joint	88 (54.7)
3 Generation	24 (14.9)
Socio-economic status*	
Upper & Upper middle	9 (5.6)
Middle	53 (32.9)
Lower-middle & Lower	99 (61.5)
Mother's age (years)	
15-20	21 (13)
21-30	124 (77)
31-40	16 (10)
Educational qualification of the mothers	
Higher Secondary & above	108 (67.1)
Below Higher Secondary	53 (32.9)
Working status of the mothers	
No	122 (75.8)
Yes	39 (24.2)

Note. *Modified BG Prasad Scale, 2024

Table 2: Distribution of the Study Participants According to Their Feeding Practices (N=161)

IYCF Indicator	Yes (%)
Ever Breastfed	155 (96.3)
Given Pre lacteal feed	29 (18)
Early initiation of breastfeeding	101 (62.7)
Received colostrum	149 (92.5)
Exclusive breastfeeding	122 (75.8)
Continued breastfeeding (12-23 months) (n=103)	96 (93.2)
Introduction of solid, semisolid or soft food among children 68 months (n=33)	27 (81.8)
Introduction of solid, semisolid or soft food among children 9-23 months (n=128)	124 (96.9)

Figure 3: Distribution of the Study Participants According to Their Minimum Meal Frequency, Minimum Dietary Diversity & Minimum Acceptable Diet (N=161)
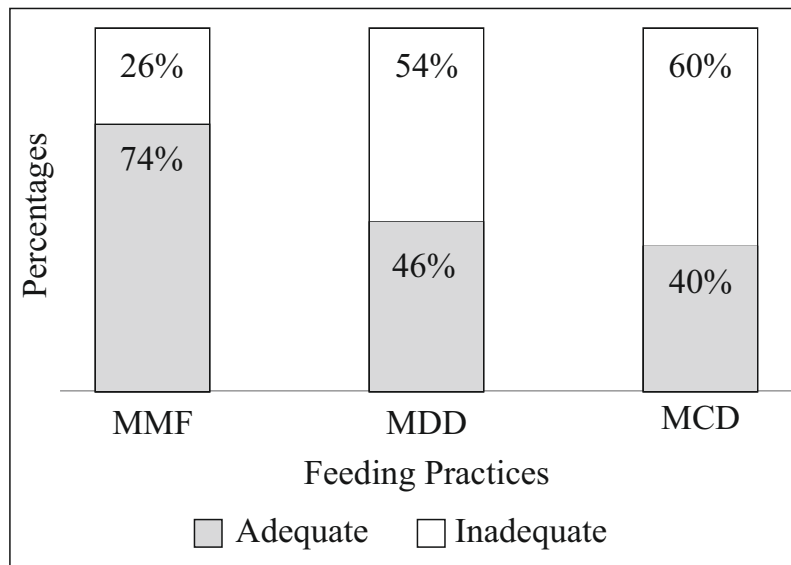
Table 3: Association of IYCF Practices with Different Socio-Demographic Characteristics (N=161)

Variables	IYCF Practices		Total n (%)	Chi-square	p-value
	Poor n (%)	Good n (%)			
Age group (months)					
6-8 months	6 (18.2)	27 (81.8)	33 (20.5)	0.825	0.364
9-23 months	33 (25.8)	95 (74.2)	128 (79.5)		
Gender					
Male	53 (61.6)	33 (38.4)	86 (53.4)	6.462	0.011
Female	60 (80.0)	15 (20.0)	75 (46.6)		
Mode of delivery					
Normal vaginal	67 (61.5)	42 (38.5)	109 (67.7)	12.259	0.001
LUCS	46 (88.5)	6 (11.5)	52 (32.3)		
Type of family					
Nuclear	38 (74.5)	13 (25.5)	49 (30.4)	0.938	0.626
Joint	61 (69.3)	27 (30.7)	88 (54.7)		
Three-generation	14 (63.6)	8 (36.4)	24 (14.9)		
Socio-economic status					
Upper & Uppermiddle	9 (100)	0 (0)	9 (5.6)	4.467	0.107
Middle	38 (71.7)	15 (28.3)	53 (32.9)		
Lower-middle & Lower	66 (66.7)	33 (33.3)	99 (61.5)		
Mother's age (years)					
15-20	16 (76.2)	5 (23.8)	21 (13)	0.419	0.811
21-30	86 (69.4)	38 (30.6)	124 (77)		
> 30	11 (68.8)	5 (31.3)	16 (10)		
Mother's educational qualification					
Higher Secondary & above	38 (71.7)	15 (28.3)	108 (67.1)	0.086	0.769
Below Higher Secondary	75 (69.4)	33 (30.6)	53 (32.9)		
Working status of mothers					
Not working	93 (76.2)	29 (23.8)	122 (75.8)	8.79	0.003
Working	20 (51.3)	19 (48.7)	39 (24.2)		

Table 4: Binary Logistic Regression Showing Factors Associated With Infant And Young Child Feeding Practices (N=161)

Variables	Poor IYCF practices N (%)	OR (CI), p-value	AOR (CI), p-value
Gender			
Male	53 (61.6)	Ref	Ref
Female	60 (80.0)	2.491 (1.220-5.083), 0.012	2.626 (1.199-5.751), 0.016
Mode of delivery			
Normal vaginal	7 (61.5)	Ref	Ref
LUCS	46 (88.5)	4.806 (1.888-12.231), 0.001	5.077 (1.908-13.512), 0.001
Working status of the mothers			
Not working	93 (76.2)	Ref	Ref
Working	20 (51.3)	3.047 (1.434-6.473), 0.004	1.554 (0.582-4.145), 0.379

Omnibus test = 0.001, Negelkerke R Square = 0.446, Hosmer and Lemeshow test = 0.674

Table 5: Distribution Of The Mothers As Per Their Response On Different Domains Of Autonomy (N=161)

Autonomy domains	Scale		
A. How do you make decision on-	Independent (2)	Joint (1)	Dependent (0)
(Total score = 0 to 16)	n (%)	n (%)	n (%)
Daily household expenditure?	89 (55.3)	35 (21.7)	37 (23)
Children's clothes and food?	31 (19.3)	123 (76.4)	7 (4.3)
Children's health care?	34 (21.1)	99 (61.5)	28 (17.4)
Inviting and hosting guests?	17 (10.6)	88 (54.6)	56 (34.8)
Use of contraceptives?	13 (8)	131 (81.4)	17 (10.6)
Having baby/another baby?	31 (19.3)	125 (77.6)	5 (3.1)
Purchasing major goods in household such as land, house, computer, TV?	9 (5.6)	96 (59.6)	56 (34.8)
Being a member of public institutions/organizations?	31 (19.2)	117 (72.7)	13 (8.1)
B. Do you need permission to-	Never (2)	Sometimes (1)	Always (0)
(Total score = 0 to 12)	n (%)	n (%)	n (%)
Going outside the house/compound?	26 (16.1)	56 (34.8)	79 (49.1)
Going for marketing/shopping?	35 (21.7)	60 (37.3)	66 (41)
Going to hospital/health care facility?	37 (23)	79 (49.1)	45 (27.9)
Visiting to natal family/relative/s' house?	38 (23.6)	44 (27.3)	79 (49.1)
Visiting friend/s' house?	17 (10.6)	25 (15.5)	119 (73.9)
Going to public places/programs such as temple etc.?	23 (14.3)	95 (59)	43 (26.7)
C. Do you need permission to-	Never (2)	Sometimes (1)	Always (0)
(Total score = 0 to 8)	n (%)	n (%)	n (%)
Spend money for household affairs	36 (22.4)	112 (69.6)	13 (8)
Lend/spend money as per personal need and interest	65 (40.4)	81 (50.3)	15 (9.3)
Saving money for your future use	89 (55.3)	58 (36)	14 (8.7)
Give money or goods to natal family	112 (69.6)	39 (24.2)	10 (6.2)
Maximum possible score = 36, Minimum possible score = 0, Median score = 14			

Figure 4: Scatterplot Showing Correlation Between Total Mother Autonomy Score and Total IYCF Practice Score of the Study Participants (N=161)
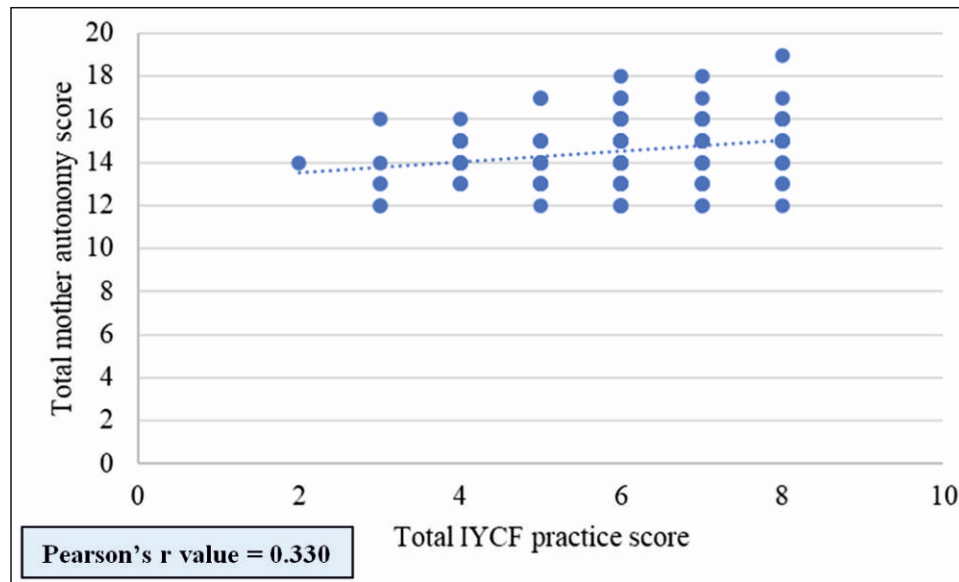
Overall IYCF practice of the study participants:

Among the study participants, only 48 children (29.8%) exhibited overall good Infant and Young Child Feeding practices.

Factors associated with IYCF practices:

Table 3 shows factors associated with IYCF practices. The result from the regression analysis showed that IYCF practice was poor for female gender of the child (AOR 2.626, 95% CI 1.199-5.751) and for those who delivered via LUCS (AOR 5.077, 95% CI 1.908-13.512).

Autonomy of the mothers:

The distribution of mothers of the study participants according to their level of autonomy revealed that more than half (88, 54.7%) of the mothers had an overall lower level of autonomy (Table-5).

Association between IYCF practices and women's autonomy:

Figure 4 illustrates a moderately positive correlation (Pearson's r = 0.330) between mothers' autonomy and Infant and Young Child Feeding (IYCF) practices among their children.

Discussion:

Present study found that most of the children (96.3%) were breastfed, majority (62.7%) were initiated breastfeeding early within one hour of delivery. Agarwal N et al. came up with similar results where 93.40% of babies were breastfed as their first diet.[20] According to IYCF Guidelines, the Indian Government recommends that breastfeeding should be started immediately after delivery, preferably within an hour of birth.[21] This study revealed that delayed breastfeeding (>1 hr) is still practised in rural West Bengal (37.3%). Low rate of early onset of breastfeeding was also documented by Chakraborty et al.[16] showing 47.9% of the study participants-initiated breast feeding early within one hour; colostrum was given to 63.3% of the participants, which is 92.5% in this study. The increased rate of colostrum feeding may be due to increased awareness among the mothers, their family members and healthcare workers in this area. Regarding pre lacteal feeds number (18%) was much lower than the corresponding study done by Vyas et al.[22] in the rural areas of Uttarakhand (61.8%).

Exclusive breast feeding (EBF) was practiced by 75.8% mothers in the present study which is higher than the study conducted by Aggarwal A et al.[24] (63.50%) in Delhi, whereas Saxena V et al.[25] at Uttarakhand reported higher percentage (77.4%) of EBF than of ours. The difference could be attributed to the differences in the study population, study area, and sample size.

In this study, continued breastfeeding was found to be 93.2% in 12 to 23 month-old children. This was comparable to a study done in Karnataka, showing that 81% of children continued breastfeeding for 12 to 23 months.[26]

In study 73.9% of the children had adequate meal frequency whereas 54% and 60.2% had inadequate dietary diversity and acceptable diet respectively. Saxena et al.[27] came up with similar type of results where 33.47% mothers gave their children a diet having minimum food diversity, 52.72% received the recommended minimum meal frequency and minimum acceptable diet was found to be adequate only in 34% of the 6 to 23 months old children. Another study done by Adhikari et al.[28] in Syangja district, Western hilly region of Nepal which showed minimum dietary diversity, minimum meal frequency and minimum acceptable diet were 61.5%, 67.3%, and 49.4% respectively. A cross-sectional study done by Shroff MR et al.[29] in 60 villages of rural Andhra Pradesh showed mothers with higher financial autonomy were more likely to breastfeed 3–5 months old infants and mothers with higher participation in decision-making in households had infants that were less underweight and less wasted. In the present study IYCF practice was found to be significantly poor among the female children and among those who were delivered via LUCS; and a moderately positive correlation was found between the mothers' autonomy and IYCF practices among their children.

Limitations of the Study:

This study is limited by its small sample size, which may not be representative of the larger population. Additionally, the study's findings may be susceptible to information bias, which could impact the accuracy and reliability of the results.

Conclusion:

The study showed important findings on infant and young child feeding practices and their association with their maternal autonomy and different socio-demographic characteristics in Budge-Budge II block, West Bengal.

A significant proportion of the study participants had poor practice regarding pre-lacteal feeding (18%),

early initiation of breastfeeding (37.3%), exclusive breastfeeding (24.2%), introduction to solid/semi-solid/soft food in age group 6 to 8 months (18.2%) and a major chunk of them had inadequate dietary diversity (54%) and acceptable diet (60%); whereas most of them had good practice regarding colostrum feeding (92.%), continued breastfeeding beyond one year of age (93.2%), introduction to solid, semi-solid or soft food in age group 9 to 23 months (96.9%) and majority had adequate meal frequency (74%). However, an overall IYCF practice was found to be poor among majority (70.2%) of the study participants.

More than half, i.e. 54% and 60% of the study participants failed to meet the Minimum Dietary Diversity and Minimum Acceptable Diet standards, respectively.

More than half of the mothers (54.7%) had overall lower level of autonomy related to decision-making, freedom for movement and financial independence. IYCF practice was found to be poorer among the female children and among those delivered via LUCS.

Moderately positive correlation was found between mothers' autonomy and IYCF practices among their children.

Recommendations:

To improve infant and young child feeding (IYCF) practices in Budge-Budge II block, West Bengal, targeted interventions should focus on reducing poor feeding practices such as pre-lacteal feeding, delayed initiation of breastfeeding, and inadequate exclusive breastfeeding. Awareness campaigns and community-based programs should be strengthened to educate mothers and caregivers about the importance of early breastfeeding initiation, exclusive breastfeeding for the first six months, and timely introduction of complementary feeding with adequate dietary diversity.

Given the high percentage of children not meeting the Minimum Dietary Diversity and Minimum Acceptable Diet standards, efforts should be made to promote diversified and nutrient-rich food intake through counselling sessions, nutrition education, and support programs for families. Health workers should play an active role in ensuring mothers receive guidance

on appropriate food choices and feeding frequency. Policies supporting affordable and accessible nutritional supplements for infants from lower socioeconomic backgrounds should be considered.

Since maternal autonomy showed a positive correlation with better IYCF practices, empowering mothers through education, skill development, and financial inclusion programs can significantly improve child nutrition. Encouraging women's participation in decision-making, enhancing their mobility, and fostering economic independence can lead to better feeding practices. Special attention should be given to mothers of female children and those who had a cesarean delivery (LUCS), as these groups showed poorer IYCF practices

It is recommended to educate women and their families about correct IYCF practices and not only in terms of meal frequency but also in terms of dietary diversity.

Overall, a multi-sectoral approach involving healthcare providers, policymakers, community leaders, and family members is essential to improve maternal autonomy and IYCF practices. Strengthening maternal health services, increasing awareness through mass media, and integrating IYCF education into routine antenatal and postnatal care will ensure sustainable improvements in child nutrition and health outcomes.

Declaration:

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Determinants of Drug Resistance Among Tuberculosis Patients: A Hospital-Based Case-Control Study

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Abstract:

Introduction: Tuberculosis is a public health concern for developing and low-income countries including India. The emergence of drug-resistant tuberculosis has added to the already existing economic and social burden. **Objective:** To assess the determinants of drug resistance among tuberculosis patients attending the tertiary care hospital **Method:** A hospital-based case-control study was carried out with sample size of 220 in a tertiary care institution, Dehradun, Uttarakhand, over the span of one year. Convenient sampling method was used to identify the cases and matched controls were selected with 1:1 ratio from patients visiting the outpatient department of the hospital. Data collection involved face-to-face interviews using a pretested structured questionnaire. The data were analyzed using SPSS for Windows. **Results:** The majority of study subjects belonged to the age group of 15-34 years. Higher numbers of DR-TB cases were found to have Diabetes mellitus (14.5%) as compared to controls (9.1%). The risk involved in development of drug resistance was approximately 4 times higher in TB contacts and it was statistically significant (p-value 0.027). Higher number of DR-TB cases reported having TB in the past (66.3%) as compared to controls (20%). The majority of cases (48.2%) were found to be underweight as compared to controls (10.1%). **Conclusion:** Risk of development of DR-TB among diabetic cases was 1.7 times more in comparison to controls. The risk of development of drug resistance was 7.8 times more in subjects who had TB in the past. Underweight cases were more susceptible to developing DR-TB (OR 4.9; p<0.0001).

Keywords: Case-control study, Determinants, Drug Resistance, Tuberculosis

Introduction:

Globally, Tuberculosis is included in the top ten causes of mortality.[1] It is a public health concern for developing and low-income countries including India. Although the overall mortality rate of TB is decreasing globally, this earlier incurable disease is now becoming curable because of anti-tubercular drugs; however, development of resistance against the anti-tubercular medicines is a big challenge for cure of the DR-TB. Globally, proportion of new cases of tuberculosis with drug resistance decreased from 4.0% (95% UI: 3.14.9%) in 2015 to 3.3% (95% UI: 2.64.0%) in 2022 and proportion of previously treated cases with drug resistance tuberculosis was 25% (95% UI: 1536%) in 2015 and 17% (95% UI: 1123%) in 2022. In 2022 the estimated number of incident cases of drug resistant in India was 110000 (95% UI: 89000-140000).[2] In 2020 in Uttarakhand state the estimated cases of tuberculosis was 275 per lac per year.[3] Emergence of Drug resistance Tuberculosis has added to the already existing economic

and social burden of countries and thus is a major concern for global TB control efforts.[4] The diagnosis and treatment of the drug resistant TB is a challenge because of the high cost of treatment and poor patient compliance associated with multiple drug therapy.[5] In a country like India, it is difficult to measure the magnitude of the DR-TB because there are only limited laboratories available, which can conduct quality assured drug susceptibility testing.[6] The diagnosis and treatment of the drug resistant TB is a challenge because of the high cost of treatment and poor patient compliance associated with multiple drug therapy.[7] With the aim to assess the determinants of drug resistance among tuberculosis patients attending the tertiary care hospital, this study intends to play an important part in evaluating the risk factors leading to the development of drug resistance among tuberculosis patients to provide newer dimensions for timely intervention and prevention.

Methods:

Study design: A hospital-based case-control study

Place of study: A tertiary care institution, Dehradun, Uttarakhand.

Duration of study: 1 year; from January 2020 to December 2020.

Sample size: The sample size was calculated by using Epi-Info statistical software, considering 1:1 ratio of cases and controls. We assumed that 50% of the control group had been exposed to the risk factor under study. To detect a two-fold increase in risk, we were looking for exposure in the case group is significantly higher at least twice as high (i.e., 100%) compared to control group (50%). This assumption helps in determining the sample size required for the study to detect a meaningful difference between cases and controls with statistical confidence. The level of significance was taken as 5%, power of 80% and confidence level of 95%. Accordingly, the sample size came out to be 220 (110 cases and 110 controls).

Inclusion criteria

Cases: All DR-TB patients & both male and female aged 15 years and above

Controls: All TB patients & both male and female aged 15 years and above

Exclusion criteria

Parents of children aged 15 to 18 years and adult 18 years of age that were not willing to give consent to participate in the study, The patients who were suffering from severe mental illness, Bedridden patients needed emergency or ICU care

Operational Definitions[8]

Cases: Cases were drug-resistant pulmonary tuberculosis (DR-TB) patients, resistant to at least one of the first-line anti-tubercular drugs, diagnosed from an NTEP accredited laboratory during the study period. Cases were selected from the tertiary care hospital by using convenient sampling method.

Controls: Controls were new sputum smear-positive tuberculosis patients (Presumptively Non-resistant), diagnosed from NTEP accredited laboratory during the study period.

- The controls were selected from the same hospital

- One matched control was selected from the same hospital per case (1:1). Matching was done with respect to age, sex and socioeconomic status of the cases.

Study tools and Data collection

After getting the informed written consent or assent from the participants, data were collected using a validated and pretested structured questionnaire as a study tool. The questionnaire included questions about sociodemographic details, concurrent co-morbidities, past exposure to TB patients, and previous TB infections. It was created based on a thorough review of existing literature to ensure it met the studys needs. The study tool was rigorously validated and piloted to minimize information bias, with input from experts such as a chest physician, an epidemiologist, and a public health specialist (Cronbachs alpha = 0.8). After incorporating feedback and making necessary adjustments, the refined questionnaire was used to collect data from participants who met the inclusion criteria of the study.

Data entry and Statistical analysis

Data were entered into Microsoft Excel spread sheet and analyzed using SPSS version 26.0 for windows. Descriptive analysis was done, and proportions were also calculated. Data were compared using cross-tabulation to find strength of association and significance between the study variables. The confidence interval was taken as 95%. The p-value less than 0.05 was considered as statistically significant.

Results:

In this study almost half of the study participants in both the case and control groups belonged to the age group of 15-34 years and the male-female ratio among cases and controls was 1.4:1 and 2.4:1 respectively. Most of the respondents were Hindus (cases-86.4% and controls-90%) followed by Muslims (cases-10.9% and controls-8.2% respectively).

In the present study it was found that 63 cases (53.7%) and 68 controls (61.8%) were educated above high school level (education level above 10th standard/matriculation). Fifty-six cases (50.9%) and 58

controls (52.7%) were found to be unemployed. Most of the cases (97.3%) and controls (95.5%) belonged to the socioeconomic scale of middle class and above (as per modified BG Prasad scale)[9]. It was found that 61 cases (55.5%) and 74 controls (67.3%) had a joint family. The majority of cases (81.8%) and controls (83.6%) were staying with a family size of ≥4. As per the person per room criteria a few cases (21.3%) and controls (14.5%) were found to live in an overcrowded household. (Table 1)

Higher numbers of DR-TB cases were found to have Diabetes mellitus (14.5%) as compared to controls (9.1%) and risk of development of DR-TB among diabetic cases was 1.7 times more in comparison to controls. Similarly, cases with other chronic diseases had higher odds (2.6 times) of development of DR-TB. Co-existence of chronic obstructive pulmonary disease (COPD) was slightly more among the controls (3.6%) as compared to cases (2.7%). However, no statistical significance could be established between any of the coexisting morbidities and development of DR-TB. (Table 2)

Table 1: Distribution of Study Population according to Sociodemographic and Disease Profile (N= 308)

Variables	Cases (N=110)	Controls (N=110)	OR (95% CI)	p-value
Education				
High school or lower	47 (42.7%)	42 (38.2%)	1.2 (0.7-2.07)	0.49
Above high school	63 (57.3%)	68 (61.8%)		
Occupation				
Unemployed	56 (50.9%)	58 (52.7%)	0.92 (0.54-0.57)	0.78
Employed	54 (49.1%)	52 (47.3%)		
Socioeconomic Status (SES)				
Lower	3 (2.7%)	5 (4.5%)	0.58 (0.13-2.52)	0.47
Middle and above	107 (97.3%)	105 (95.5%)		
Family Type				
Joint	61 (55.5%)	74 (67.3%)	0.60 (0.350-1.04)	0.072
Nuclear	49 (44.5%)	36 (32.7%)		
Family Size				
≤3	20 (18.2%)	18 (16.4%)	1.13 (0.56-2.28)	0.72
≥4	90 (81.8%)	92 (83.6%)		
Overcrowding				
Yes	24 (21.8%)	16 (14.5%)	1.6 (0.817-3.291)	0.16
No	86 (78.2%)	94 (85.5%)		

Table 2: Distribution of study subjects according to concurrent co-morbidities

Variables	Cases (N=110)	Controls (N=110)	OR (95% CI)	p-value
Diabetes Mellitus (DM)				
Yes	16 (14.5%)	10 (9.1%)	1.7 (0.73-3.93)	0.21
No	94 (85.5%)	100 (90.9%)		
COPD				
Yes	3 (2.7%)	4 (3.6%)	0.74 (0.16-3.40)	0.70
No	107 (97.3%)	106 (96.4%)		
Any Other Chronic Disease*				
Yes	5 (4.5%)	2 (1.8%)	2.6 (0.48- 13.55)	0.24
No	105 (95.5%)	108 (98.2%)		

* Chronic kidney and liver diseases

Table 3 Distribution of study subjects according to BMI (Asia Pacific classification)[10]

BMI Classification	Cases (N=110)	Controls (N=110)	χ^2, p-value
Underweight (<18.5 kg/m^2)	53 (48.2%)	11 (10.0%)	51.319, <0.0001
Normal (18.5-22.9 kg/m^2)	40 (36.4%)	41 (37.3%)	
Overweight (23.0-24.9 kg/ m^2)	5 (4.5%)	28 (25.5%)	
Obese (≥25 kg/m^2)	12 (10.9%)	30 (27.2%)	

The study subjects having positive history of contact with TB patients were more likely to develop drug resistant TB. The risk involved in development of drug resistance was approximately 4 times higher in TB contacts and it was statistically significant (p-value 0.027).

It was seen that higher number of DR-TB cases reported having TB in the past (66.3%) as compared to controls (20%). The risk of development of drug resistance was 7.8 times more in subjects who had TB in the past.

The majority of cases (48.2%) were found to be underweight as compared to controls (10.1%). Odds ratio was calculated by taking normal as reference category and it was found that cases who were underweight had 4.9 times higher risk of developing DR-TB as compared to controls and it was statistically significant (p-value <0.0001). (Table 3)

Discussion:

A hospital-based case-control study was carried out with equal number of cases and control by involving a total of 220 participants to find out the determinants of

drug resistant among tuberculosis patients. In the present study 47 cases (42.7%) and 42 controls (38.2%) were educated up to high school level. Twenty cases (18.2%) and 18 controls (16.4%) had ≤3 membered family and a few participants (21.8% cases and 14.5% controls) found to be living under overcrowding condition. The risk of getting drug resistant tuberculosis among participants with education level of high school or lower is 1.2 times as compared with participants with education level of above high school. This finding supports the need of higher education of the people which would help them to be aware and more sensitized about development of drug-resistant tuberculosis.

Odds of staying of participants in the family size of ≤3 were 1.13 times among the drug-resistant tuberculosis cases compared with controls. The risk of getting drug-resistant tuberculosis in participants who were residing in a house with overcrowding was 1.6 times as compared with participants not staying in an overcrowded household. No significant difference (p>0.05) between the case and control groups were observed as per education level, occupation, socioeconomic status, family type, family size and

overcrowding. Almost similar findings were reported by various studies.[11-14] In contrast, other studies reported that lower socioeconomic status and family size ≥3 was associated with the development of drug-resistant tuberculosis.[15-17]

Diabetes was present as comorbidity in 14.5% of cases and 9% of the controls in the present study and risk of development of drug-resistant tuberculosis among diabetic cases was 1.7 times more in comparison to controls. Similar findings were also reported by various studies.[14,17] In contrast, a study reported negative association of diabetes with drug-resistant tuberculosis (OR 0.82, 95% CI 0.35-1.91) and this finding would be due to their insufficient data available about the diabetes cases.[18]

In the present study it was found that participants having positive history of contact with TB or DR-TB patients were more likely to develop drug resistant TB. The risk involved in development of drug resistance was approximately 4 times higher in TB contacts and it was statistically significant. Mazta et al.[12] also reported the positive association between contact with TB patients and development of drug resistance. In contrast, a few studies could not establish association between contact with TB patients and development of drug resistance.[13,14] It was found that the majority of DR-TB cases (48.2%) were found to be underweight and risk of development of DR-TB was 4.9 times higher among the cases as compared to controls. In a study by Kumar A et al.[19] almost 69% of DR-TB cases were undernourished. Basu R et al.[20] also reported that majority of DR-TB (56.6%) were underweight. Therefore to reduce the incidence of DR-TB, it is important to prevent and treat undernutrition especially who are suffering from tuberculosis.

Limitations:

This study was done during the covid-19 pandemic and because of this sample size for recruiting cases and control in the ratio of 1:1. The study subjects and their attendants were apprehensive to talk to the investigator due to the pandemic.

Conclusion:

Higher numbers of DR-TB cases were found to have Diabetes mellitus (14.5%) as compared to controls (9.1%). Risk of development of DR-TB among diabetic cases was 1.7 times more in comparison to controls. Participants having positive history of contact with TB or DR-TB patients were more likely to develop drug resistant tuberculosis. The risk of development of drug resistance was 7.8 times more in subjects who had tuberculosis in the past. Underweight cases were found to be more susceptible to develop DR-TB (OR 4.9; p<0.0001).

Recommendations:

Early diagnosis and robust treatment of diabetes while diagnosing tuberculosis may reduce the incidence of drug resistance tuberculosis. With proper monitoring of anti-tubercular drug intake among the TB positive patient and reducing the incidence of underweight by providing them good nutrition, cases of DR-TB can be reduced. Further analytical study or randomized trials needed to provide better evidence regarding determinants of DR-TB.

Declaration:

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Conflicts of interest: Nil

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A Cross-Sectional Study of Stress and Related Conditions Among Nursing Students at a Tertiary Care Hospital, North India

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Abstract:

Introduction: Mental well-being is a vital component of overall health, particularly for nursing students who face academic, clinical, and career-related pressures. **Objective:** To estimate the prevalence of depression, anxiety, and stress emotions among nursing students and its association with societal and bio-social behavioural factors. **Method:** An analytic cross-sectional study was conducted at a nursing college of a tertiary care hospital in Lucknow, India, from November 2023 to August 2024. 240 nursing students enrolled for the study with complete enumeration, out of which 205 filled questionnaires. Data were collected using a self-administered questionnaire, including the DASS-21 scale to assess depression, anxiety and stress levels. Societal variables (religion, caste, residence, family type) and bio-social behavioural factors (sleep duration, social media use, spiritual practices, and outdoor sports) were analysed. Statistical analysis was performed using STATA 18.0, and Chi-square tests were applied to determine associations. **Results:** Out of 205 nursing students, 78 (38%) experienced depressive emotions, 109 (53.2%) reported anxiety, and 84 (41%) suffered from stress emotions. Depression was most common among third-year students 24 (48%), anxiety among fourth-year students 35 (61.4%), and stress among third-year students 31 (62%). Social factors such as female gender, rural residence, hostel living, and minority religion were significantly associated with depression, anxiety and stress. Bio-social behaviours, including fewer than six hours of sleep and lack of outdoor activities, were significantly linked to higher depression, anxiety and stress scores. **Conclusion:** Nursing students face substantial mental health challenges, with anxiety being the most prevalent. Stress-related disorders were significantly associated with demographic factors such as Muslim religion, rural place of residence, residing in. hostels, Hours of sleep and indulgence in outdoor sports were found to be protective for stress-related illnesses.

Keywords: Anxiety, Depression, Emotions, Stress, Societal factors, Nursing students

Introduction:

Mental health a component of broader topic health is affected by various societal factors. The mental health and well-being of nursing students is paramount. The potentially challenging nature of the work of nursing students starts from the moment they enter the nursing course. Stress and related conditions such as anxiety and depression are affected by a cluster of societal factors such as income, education, younger age, gender, marital status and unemployment.[1]

Nurses and nursing students play a very crucial role in healthcare. The potentially challenging nature of the work of nursing students starts from the moment they enter the nursing course. During the course along with studies, nursing students are exposed to clinical experience, they also have to interact with patients, their

attendants and other healthcare workers.[2] Due to continuous exposure to pressure due to studies, clinical experience and seeking a job after post-graduation nursing students are at risk of stress.[3] Early identification of stress, anxiety and depression is important as they can lead to reduced productivity, minimize life satisfaction and even lead to suicidal thoughts. In a systematic review, it was observed that in nurses, the incidence of anxiety ranged from 22.8% to 27% and the incidence of depression was observed to be 28%.[4] A study conducted on nursing students of a tertiary care hospital in Central India reported a prevalence of depression (46.6%), anxiety (72.2%), and stress (34.7%).[5]

Hence, there is circumscribed evidence relating to mental health troubles among undergraduate nursing students. Owing to the dearth of data relating to the cause of mental health issues among nursing students the present study seeks to estimate the prevalence of emotional states of anxiety, stress and depression in all the four years of nursing students. The study also aims to determine various societal and Bio-social behaviour factors associated with anxiety, stress and depression among nursing students.

Method:

An analytical cross-sectional study was carried out in a nursing college of a tertiary care hospital, Lucknow. The study was conducted from November 2023 to August 2024.

Study population and sample size: The study population were all the nursing students admitted to the college. In Nursing College, 60 students enrolled for nursing courses each year, students from all four years were eligible to take part in this study. A questionnaire was administered to all the nursing students admitted to the college for more than six months except to those with diagnosed physical and mental illness. Of 240 nursing students, completely filled questionnaires were received from 205 enrolled students.

Data was collected in a self-administered questionnaire using a Google form. Depression, anxiety and stress were assessed by the Depression, Anxiety and Stress Scale - 21 Items (DASS-21).[6] Data was collected

after formal approval from the Principal of the Nursing College. Students were explained the purpose of the study, DASS-21 scale was also explained to the students before data collection. After an instructional session, the students were directed to fill out the questionnaire in class.

DASS-21 is a self-reported scale for psychological disorders; it is applied to measure emotional states of stress, anxiety and depression. The tool consists of 21 questions to assess the level of depression, anxiety and stress. Of the 21 questions, seven questions were for each depression, anxiety and stress. Each question is to be answered on a 4-point rating scale. To calculate the final score, each of the total scores obtained for DASS-21 was multiplied by 2. For depression 0-9 was normal, 10-13 was mild, 14-20 moderate 21-27 was severe and >28 extremely severe. Similarly, for anxiety 0-7 was normal, 8-9 was mild, 10-14 moderate, 15-19 severe, >20 was extremely severe. And for stress 0-14 was normal, 15-18 was mild, 19-25 moderate, 26-33 severe and >34 was extremely severe.[6]

Data included in the study had the following variables:

Demographic factors: Age, gender, religion, caste, belonging to rural or urban areas, residing in any type of family.

Bio-social behaviour factors: hours of sleep, hours spent on social media, devotion to religious or spiritual practice (such as prayer, or certain types of meditation)[7] and play outdoor games (such as sports involving physical activity).[8]

The data was collected and entered in Microsoft Excel 2013 and was analysed using version 18.0 of STATA. Categorical variables are presented as frequency and percentage. A continuous variable was presented as mean and standard deviation. Association was determined by the Chi-square test. P-values <0.05 were considered statistically significant.

The study was approved by the Institutional Ethical Committee of T.S. Misra Medical College and Hospital, Lucknow, India (Ref No. TSMMC&H/ IEC/July-23/ 94/39).

Results:

In the present study emotional states of depression, anxiety and stress were measured using the DASS-21 scale in 205 nursing students. The mean age of nursing students was 20.88±2.766 years. Of 205 nursing students 78 (38%) reported depressive emotions. Anxiety was present in 109 (53.2%) nursing students and Stress in 84 (41%). (Tables 1 and 2)

Table 1: Demographic Characteristics of Nursing Students (N= 205)

Characteristic	First year N=44 n(%)	Second year N=54 n(%)	Third year N=50 n(%)	Fourth year N=57 n(%)	Total N=205 n(%)
Gender					
Male	16 (36.4)	11 (20.4)	11 (22.0)	10 (17.5)	48 (23.4)
Female	28 (63.6)	43 (79.6)	39 (78.0)	47 (82.5)	157 (76.6)
Religion					
Hindu	42 (95.5)	48 (88.9)	49 (98.0)	56 (98.2)	195 (95.1)
Muslim and others	2 (4.5)	6 (11.1)	1 (2.0)	1 (1.8)	10 (4.9)
Place of residence					
Rural	32 (72.7)	32 (59.3)	36 (72.0)	32 (56.1)	132 (64.4)
Urban	12 (27.3)	22 (40.7)	14 (28.0)	25 (43.9)	73 (35.6)
Type of family					
Nuclear	25 (56.8)	33 (61.1)	36 (72.0)	34 (59.6)	128 (62.4)
Joint	19 (43.2)	21 (38.9)	14 (28.0)	23 (40.4)	77 (37.6)
Caste					
General	11 (25.0)	11 (20.4)	14 (28.0)	12 (21.1)	48 (23.4)
OBC	28 (63.6)	36 (66.7)	29 (58.0)	33 (57.9)	126 (61.5)
SC/ST	5 (11.4)	7 (13.0)	7 (14.0)	12 (21.1)	31 (15.1)
Residence in					
Hostel	21 (47.7)	28 (51.9)	27 (54.0)	37 (64.9)	113 (55.1)
Home	23 (52.3)	26 (48.1)	23 (46.0)	20 (35.1)	92 (44.9)

Table 2: Bio-social Behaviour of Nursing Students (N=205)

Characteristic	First year N=44 n(%)	Second year N=54 n(%)	Third year N=50 n(%)	Fourth year N=57 n(%)	Total N=205 n(%)
Hours of sleep					
<6	15 (34.1)	6 (11.1)	8(16.0))	22 (38.6)	51 (24.9)
6 to 7	24 (54.5)	36 (66.7)	22 (44.0)	28 (49.1)	110 (53.7)
7 to 8	5 (11.4)	9 (16.7)	17 (34.0)	7 (12.3)	38 (18.5)
>8	0 (0.0)	3 (5.6)	3 (6.0)	0 (0.0)	6 (2.9)
Hours spent on social media					
<1	9 (20.5)	11 (20.4)	6 (12.0)	16 (28.1)	42 (20.5)
1 to 2	22 (50.0)	22 (40.7)	27 (54.0)	27 (47.4)	98 (47.8)
>2	13 (29.5)	21 (38.9)	17 (34.0)	14 (24.6)	65 (31.7)
Indulgence in spiritual practice					
Yes	40 (90.9)	49 (90.7)	35 (70.0)	55 (96.5)	179 (87.3)
No	4 (9.1)	5 (9.3)	15 (30.0)	2 (3.5)	26 (12.7)
Indulge in outdoor games					
Yes	21 (47.7)	29 (53.7)	23 (46.0)	21 (36.8)	94 (45.9)
No	23 (52.3)	25 (46.3)	27 (54.0)	36 (63.2)	111 (54.1)

Distribution of depression, anxiety and stress by academic year: From all the four-year nursing students depression was most common in third-year students (48%). Anxiety was most commonly reported in fourth-year students (61.4%), followed by first-year students (56.8%). Stress was most commonly reported in third-

year students (62%). (Table 3)

Distribution and association of depression, anxiety and stress by societal factors: Depression was more common among female nursing students, 66 (42%) of female and 12 (25%) of male nursing students reported depressive emotions, the difference was found to be

Table 3: Levels of Depression, Anxiety and Stress among Nursing Students (N=205)

Characteristic	First year N=44 n(%)	Second year N=54 n(%)	Third year N=50 n(%)	Fourth year N=57 n(%)	Total N=205 n(%)
Depression					
Normal	26 (59.1)	40 (74.1)	26 (52.0)	35 (61.4)	127 (62.0)
Mild	16 (36.4)	10 (18.5)	18 (36.0)	12 (21.1)	56 (27.3)
Moderate	2 (4.5)	4 (7.4)	5 (10.0)	10 (17.5)	21 (10.2)
Severe	0 (0.0)	0 (0.0)	1 (2.0)	0 (0.0)	1 (0.5)
Anxiety					
Normal	19 (43.2)	28 (51.9)	27 (54.0)	22 (38.6)	96 (46.8)
Mild	9 (20.4)	12 (22.2)	10 (20.0)	8 (14.0)	39 (19.0)
Moderate	16 (36.4)	13 (24.1)	13 (26.0)	25 (43.9)	67 (32.7)
Severe	0 (0.0)	1 (1.8)	0 (0.0)	2 (3.5)	3 (1.5)
Stress					
Normal	28 (63.6)	36 (66.7)	19 (38.0)	38 (66.7)	121 (59.0)
Mild	16 (36.4)	18 (33.3)	29 (58.0)	17 (29.8)	80 (39.0)
Moderate	0 (0.0)	0 (0.0)	2 (4.0)	2 (3.5)	4 (2.0)
Severe	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table 4: Association of Depression, Anxiety and Stress with Societal Factors (N=205)

Societal factors	Participants n(%)	Depression N=78 n(%)	χ^2, P-value	Anxiety N=109 n(%)	χ^2, P-value	Stress N=84 n(%)	χ^2, P-value
Gender							
Male	48 (23.4)	12 (25.0)	4.527,	18 (37.5)	6.181,	15 (31.3)	2.451,
Female	157 (76.6)	66 (42.0)	**0.033**	91 (58.0)	**0.013**	69 (43.9)	0.117
Religion							
Hindu	195 (95.1)	72 (36.9)	2.149,	101 (51.8)	3.039,	76 (38.9)	6.620,
Muslim and others	10 (4.9)	6 (60.0)	0.143	8 (80.0))	0.081	8 (80.0)	**0.010**
Place of residence							
Rural	132 (64.4)	58 (43.9)	5.457,	63 (47.7)	4.411,	68 (51.5)	17.025,
Urban	73 (35.6)	20 (27.4)	**0.019**	46 (63.0)	**0.036**	16 (21.9)	**0.000**
Type of family							
Nuclear	128 (62.4)	50 (39.1)	0.149,	69 (53.9)	0.074,	53 (41.4)	0.026,
Joint	77 (37.6)	28 (36.4)	0.700	40 (51.9)	0.786	31 (40.3)	0.872
Caste							
General	48 (23.4)	20 (41.7)	0.348,	27 (56.3)	0.239,	21 (43.8)	0.199,
OBC and SC/ST	157 (76.7)	58 (36.9)	0.555	82 (52.2)	0.625	63 (40.1)	0.655
Residence in							
Hostel	113	48 (42.5)	2.095,	69 (61.1)	6.297,	54 (47.8)	4.831,
Home	92	30 (32.6)	0.148	40 (43.5)	**0.012**	30 (32.6)	**0.028**

significant statistically (P=0.033). Nursing students from rural areas had a higher prevalence of depressive emotions 58 (43.9%) as compared to urban areas 20 (27.4%) and it was statistically significant (P=0.019). Depression was more common in nursing students belonging to the General caste (41.7%) and in nursing students living in hostel (42.5%). (Table 4)

Anxiety was more common in female nursing students 91 (58.0%) compared to male 18 (37.5%) and it was statistically significant (P=0.013). Anxiety was common in Muslim nursing students (80%) when compared with Hindu students (51.8%). Anxiety was significantly associated with students belonging to urban residences (P=0.036). Anxiety was more common in hostelites (61.1%) and it was significantly associated (P=0.012). (Table 4)

Stress was more common among female nursing students 69 (43.9%) as compared to male students 15 (31.3%). Only 38.9% of Hindu nursing students reported stress, whereas 80% of Muslim and other religious students were suffering from stress (P=0.010). Stress was more common in nursing students from rural residences (51.5%), and it was statistically significantly associated (P=0.000). Stress was almost equally distributed between General and other castes. Stress was

significantly more common among students living in hostel (P=0.028). (Table 4)

Distribution and association of depression, anxiety, and stress by Bio-social behaviour: In the present, it was observed that nursing students sleeping hours were significantly associated with depression (P=0.010). The proportion of students having less than six hours of sleep had more depressive emotions (52.9%). Depressive emotions were more common in students who spent less than one hour on social media (40.5%). Depression was more commonly seen in participants who did not indulge in spiritual activities (50%) and outdoor sports (41.4%). It was observed that 70.6% of students with anxiety had less than six hours of sleep. Anxiety was significantly associated with sleeping hours (P=0.015). Anxiety was more commonly seen in students who spent fewer hours on social media, did not indulge in outdoor sports or those who were not indulging in spiritual activities. Anxiety was significantly linked with those who avoided outdoor sports (P=0.025). Students under stress had fewer hours of sleep and it was significantly associated (P=0.032). Stress was seen higher proportion in those nursing students who did not indulge in outdoor sports or spiritual activity. Stress was significantly associated with individuals who abstained from outdoor sports (P= 0.032). (Table 5)

Table 5: Association of Depression, Anxiety and Stress with Bio-social Behaviour Factors (N=205)

Bio-social behaviour	Participants n(%)	Depression N=78 n(%)	χ^2 P-value	Anxiety N=109 n(%)	χ^2 P-value	Stress N=84 n(%)	χ^2 P-value
Hours of sleep							
<6	51 (24.9)	27 (52.9)		36 (70.6)		29 (56.9)	
6-7	110 (53.7)	41 (37.3)	11.401,	56 (50.9)	10.533,	36 (32.7)	8.819,
7-8	38 (18.5)	7 (18.4)	**0.010**	14 (36.8)	**0.015**	17 (44.7)	**0.032**
>8	6 (2.9)	3 (50.0)		3 (50.0)		2 (33.3)	
Hours spent on social media							
<1	42 (20.5)	17 (40.5)		25 (59.5)		18 (42.9)	
1-2	98 (47.8)	38 (38.8)	0.323,	51 (52.0)	0.882,	34 (34.7)	3.492,
>2	65 (31.7)	23 (35.4)	0.851	33 (50.8)	0.644	32 (49.2)	0.174
Indulgence in spiritual practice							
Yes	179 (87.3)	65 (36.3)	1.804,	99 (55.3)	2.587,	71 (39.7)	1.003,
No	26 (12.7)	13 (50.0)	0.179	10 (38.5)	0.108	13 (50.0)	0.317
Indulge in outdoor games							
Yes	94 (45.9)	32 (34.0)	1.182,	42 (44.7)	5.025,	31 (32.9)	4.59,
No	111 (54.1)	46 (41.4)	0.277	67 (60.4)	**0.025**	53 (47.7)	**0.032**

Discussion:

It was observed that depressive symptoms were present in 38% of study participants, anxiety in 53.2% and stress in 41%. These results were almost similar to other studies conducted in Pakistan, Nepal and China, which showed the prevalence of depression in 44.2%, 38.2% and 57.9% respectively among nursing students.[9-11] Likewise anxiety was seen to be 64.2%, 51.6% and 50.0% in studies conducted in Pakistan, China and Malaysia.[9,11,12] In the same way, symptoms of stress seen in other studies were 42.3%, 55.6% and 12%.[9,11,13] The variations in prevalence rates across countries may be attributed to differences in healthcare systems, work environments, and cultural influences affecting mental health. Since the majority of the cited studies originate from developing nations, it is likely that nursing students in these settings face inadequate working conditions, Nursing students face high stress, with 65.3% experiencing moderate to severe stress and 43.2% showing depression.[14] The WHO (2019) links burnout to long hours, high patient loads, and poor support. Globally, 50-70% of students report stress, with 30-50% experiencing anxiety/depression.[15] Addressing these challenges through mental health programs, workload management, and peer support is crucial for student well-being and academic success.

Societal factors can affect the likelihood of developing stress-related symptoms. In the present study, it was observed that students coming from rural households had a higher prevalence of depression, anxiety and stress symptoms. Similar findings of a higher prevalence of depressive symptoms were seen in a study conducted in Kerala (P-0.002).[16] A higher prevalence of depressive symptoms among rural students may be attributed to additional stressors such as economic hardships, lack of access to mental health resources, and difficulty in adapting to urban academic settings.[17]

Religion was significantly associated with stress in the present study. Religion and spirituality often play a protective role in mental health by providing coping mechanisms; however, differences in religious beliefs and practices may influence stress perception and management.[18] Previous research suggests that students with strong religious affiliations may experience either increased or decreased stress levels depending on the degree of social support and religious coping mechanisms available.[19]

Anxiety and depression emotion were significantly more common in female nursing students. Similar findings of a higher prevalence of anxiety were seen in female nursing students in a study conducted in Kerala.[16] A study conducted in Spain on college students showed a higher prevalence of anxiety among female students.[20] It was observed by Fryers et al.[21] that some mental health diagnoses such as anxiety states and depression were more common in females. This higher prevalence in females could to attributed to higher social demands on females, greater material deprivation than males and females might be suffering from premenstrual dysphoria caused by hormone changes leading to serotonin deficiency, which affects mood.[22]

Nursing students residing in hostel also had a higher prevalence of anxiety and stress. This aligns with findings from prior research that highlight the role of environmental factors in the development of depression, anxiety and stress symptoms.[23] Hostel life often involves challenges such as homesickness, and lack of immediate family support, all of which contribute to increased psychological distress.[24] Individual factors such as family support are a protective factor, preventing the development of stress-related illnesses. Studies indicate that strong familial bonds provide emotional security, practical assistance, and stress-buffering effects, which significantly reduce the risk of depression and anxiety.[25] The absence of family support, particularly for students living away from home, exacerbates feelings of loneliness and stress, leading to poor mental health outcomes.[12]

Biosocial behavioural variables such as hours of sleep and indulgence in outdoor games were significantly associated with depression, anxiety and stress. It is well well-established fact that sleep is an important variable that determines the mental health problems in an individual.[26-28] Individuals not obtaining sufficient sleep are at a higher risk of developing of

developing depression, stress and anxiety.[27] Sleep deprivation disrupts neurochemical processes in the brain, leading to increased cortisol levels and heightened susceptibility to emotional dysregulation.[29] Several studies have confirmed that healthcare students who experience poor sleep quality are at a greater risk of developing depression, anxiety and stress symptoms.[30]

Participation involved in outdoor sports were significantly associated with reduced depression, anxiety and stress emotions. Indulgence in sports activity has number of benefits such as mood enhancement, and relieve mild depression anxiety and stress.[31,32] Outdoor sports help in reducing the level of cortisol and stress hormones.[33,34]

Conclusion:

The finding of the current study indicates that nursing students were facing a significant amount of stress-related symptoms. Anxiety-related symptoms were most common in study participants followed by stress and depression. Stress-related disorders were significantly associated with demographic factors such as Muslim religion, rural place of residence, residing in. hostels. Hours of sleep and indulgence in outdoor sports were found to be protective for stress-related illnesses. Hence positive reinforcements such as yoga, meditation and mental health nurse may help ameliorate the symptoms of stress-related disorders and could improve the academic and clinical performance of nursing students.

Declaration:

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Conflicts of interest: Nil

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Screen-time and Associated Factors among MBBS Students of a Government Medical College of Northeast India: A Cross-sectional Study

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Abstract:

Introduction: Individuals now-a-days spend considerable time for viewing at LCD or LED screens of electronic gadgets. Such prolonged viewing may affect their health adversely. **Objective:** To estimate the proportion of high screen-time among MBBS students of a Government Medical College of Northeast India and to determine its association with their self-reported health problems and socio-demographic factors. **Method:** A cross-sectional study was conducted during August and September 2024, using a self-administered and validated questionnaire in a calculated sample of 254 MBBS students of a Government Medical College, chosen by stratified random sampling. High screen-time was defined as spending more than 2 hours per day by a person for viewing an active LCD or LED screen. Chi-square test was used to test the significance of difference between two or more proportions and logistic regression analysis was also used. **Results:** Proportion of high screen-time was found to be 96.1% (244). Among all, 96.4% of the male, 96.7% of the urban, 98.3% of the hosteller, 97.5% of the students from nuclear families and all of the third year MBBS students had high screen-time. Except the type of family, proportion of high screen-time did not differ significantly across different groups of students. Logistic regression analysis has identified 'studying online' (AOR: 1.984, 95% CI: 1.565–2.342) and 'studying in 3rd year' [AOR: 1.756, 95% CI: 1.014–1.671) as the significant determinants of screen-time (p<0.05). No significant association was detected between screen-time and self-reported health problems of the respondents. **Conclusion:** Majority of the MBBS students have high screen-time but it had no significant association with their self-reported health problems. Studying online' and 'studying in 3rd year' were found to be significant determinants of high screen-time.

Keywords: Health problem, MBBS students, Screen-time

Introduction:

Various electronic gadgets with either LCD or LED screen are extensively used these days. Screen-time is the amount of time spent by a user for viewing LCD or LED screen of devices like: smartphone, computer, television, video game console or tablet etc.[1] Such devices have become indispensable in the day-to-day activities of life and are used extensively by almost all the youngsters.[2] It was observed that apart from sleeping, children and adolescents used to spend maximum time with screen-based media and it was on an average seven and half hour per day.[3] Utility of a smartphone is not only limited to making and receiving phone calls on the go but also used for various other

purposes like photography, internet access and internet-based task, using social media, controlling various smart home appliances, medical gadgets, transport vehicles, security system, DTP works, banking, listening music, watching movies, playing games and so on. Computers and tablets are used in all the establishments like offices, banks, transport, educational institutes, factories and also at personal level for routine works.

There is a saying that science is a blessing as well as a curse too and it holds true for these smart devices also. Excessive use of such gadgets with a display screen is not devoid of adverse health effects. Apart from causing intractable addiction, it may cause visual problems, cervical spondylosis, obesity, leg vein thrombosis, psychosomatic disorders and other health problems.[4-7] It is not possible to stop the use of such devices but their misuse or excessive use may be controlled. Prevalence of cervical spondylosis is increasing among young people and majority of them are attributable to excessive smartphone use.[8] Research has established positive associations between excessive use of smartphone and cervical disc degeneration.[5]

Higher chances of developing psychological problems like bipolar disorder, depression, anxiety, somatization, dependent personality disorder, and compulsive personality disorder etc. were found to be associated with excessive use of smartphone by the young people.[9] Indian Academy of Paediatrics recommends that children below the age of 2 years should not be exposed to any type of screen with the exception of occasional video call with relatives. Screen time for children between the age of 2 and 5 years should not exceed 1 hour and the lesser, the better.[10] The American Academy of Paediatrics in 2016 also recommended limiting screen-time for children aged 2–5years to 1 hour/day.[11]

It is considered by many people that screen time for adolescents should not exceed 2 hours per day. Since COVID-19 pandemic, screen time among adolescents has increased many folds for academic reason and this did not decline much even after the pandemic has been over. Apart from IT professionals, a sizeable proportions of office works are now based upon use of smart devices with screens. Educational establishments are also shifting towards smart classes.

Information from the developed nations may not be applicable to Indian population, which is passing through rapid economic and social transition. Limited number of studies have explored the use of various screen-based media and their effect upon the health of Indian population. Medical profession requires many years of study including multiple competitive examinations and to get prepared for them students get enrolled for various online study courses. All these things increase their screen time considerably apart from their recreational and other extracurricular activities.

Hence it was felt necessary to generate local data on high screen-time and factors associated with it. In this context present study was designed with the objectives to estimate the proportion of high screen-time among the MBBS students of a Government Medical College of Northeast India and to determine its association with their self-reported health problems and socio-demographic factors.

Method:

It was an institution based cross-sectional study conducted during August and September 2024 among MBBS students of a Government Medical College of Northeast India.

Minimum sample size requirement for this study was determined by using the formula for calculating sample size using proportion.[12] Considering the prevalence of high screen-time among young adults as 61.8%,[13] at 5% level of significance and using 10% allowable error sample size was calculated to be 238 students. Bearing in mind the chances of receiving incomplete responses as 10% it was further inflated to 262.

At first, class representatives of different MBBS professional batches were informed about the study. After that all the students of each professional batch were briefed about the study objectives and methodology in a class room session. Study subjects were chosen by stratified random sampling. MBBS students were stratified into 1st, 2nd, 3rd and final year batches. Attendance registers were used to construct sampling frames for different professionals. Lottery method of simple random sampling was used to choose the study subjects. It was decided to select 66 students from each professional year using attendance registers on the day of data collection as the sampling frames. But it was not possible to get equal number of students from each professional year as many of them had prior assignments. Finally, it was possible to include 254 students as 10 of them denied participating during final stage of sampling due to their prefixed assignments.

Written informed consent for participation in this study was sought from the selected students. Unselected students were requested to leave the classroom for the time being. MBBS students who remained absent during the process of sampling and Intern doctors were also excluded.

A self-administered and validated questionnaire containing socio-demographic particulars, information regarding usage of LED / LCD screen devices, self-reported existing health problems etc. was distributed among the consenting students and they were asked to fill it in the class room itself. Half an hour time was allotted for this purpose. Students were also briefed to fill in the questionnaire themselves without discussing with their fellow friends. Filled in questionnaires were scrutinized as far as possible for missing entries while receiving back. Screen-time was defined as the amount of time spent by a subject for viewing an active display on an LCD or LED screen. High screen-time was defined as spending more than 2 hours per day by an adolescent

or adult for viewing an active LCD or LED screen. In this study self-reported screen-time was considered.

Data from the filled in questionnaires were entered and analyzed in computer using SPSS-29 for windows.[14] Result of this study has been prepared using descriptive statistics namely mean & SD for continuous data and discrete data are presented in terms of proportions. In univariate analysis, Chi-square test has been performed to test the significance of difference between two proportions. Student 't' test has been used to test the significance of difference between two means. In multivariate analysis, Logistic regression model has been applied to predict the consequences of high screen-time using selected independent covariates.

Obtaining written informed consent from all the study subjects was ensured. Confidentiality was maintained at every step while dealing with data. Subjects found to have high screen-time were informed about their status and were advised to get counselled at the Yuba-Yubati Clinic of RKSK program operational in OPD complex of the institute. Protocol of this study was approved by the Institutional Ethics Committee vide order no: F.4(6-13)/AGMC/Medical Education/IEC Approval/2022/11476, dated 09. 08. 24.

Results:

Mean (SD) age of the study subjects was 21.20 (1.455) years and mean (SD) number of family members of the students was 4.37 (1.481). Proportion of high screen-time among the MBBS students was found to be 96.1%.

Among the study subjects 140 (55.1%) were male, 61 (24%) were studying in first professional year, 86 (33.9%) in second, 76 (29.9%) in third and 31 (12.2%) were studying in final year MBBS. Among the students 152 (59.8%) were residents of urban areas, 204 (80.3%) were from nuclear families, 133 (52.4%) were day scholars and 127 (50%) of the students were pursuing some online study courses. (Table 1)

Table 1: Socio-demographic Characteristics of the Study Subjects (N=254)

Variables	Subgroup	n(%)
Gender	Male	140 (55.1)
	Female	114 (44.9)
Study year	First	61 (24)
	Second	86 (33.9)
	Third	76 (29.9)
	Final	31 (12.2)
Residence	Urban	152 (59.8)
	Rural	102 (40.2)
Family type	Nuclear	204 (80.3)
	Joint	50 (19.7)
Type of student	Hosteller	121 (47.6)
	Day scholar	133 (52.4)
Online study course	Enrolled	127 (50)
	Not enrolled	127 (50)
Screen-time	Normal Screen-time	10 (3.9)
	High Screen-time	244 (96.1)

Out of all the respondents, majority, i.e. 96.4% of the male students had high screen-time. Similarly, 96.7% of the urban residents, 97.5% of the students from nuclear families, 98.3% of the students who were residing in hostels, 96.1% of the students irrespective of pursuing online courses had high screen-time and all the students studying in third year MBBS had high screen-time. Except the type of family, proportion of high screen-time did not differ significantly across different groups of respondents. (Table 2)

Based upon self-reported health problems, it was observed that 110 (43.3%) were having some eye problems like dryness, blurring of vision, redness etc, 69 (27.17%) had sleep disturbances, 15 (41.34%) had mood disturbance, and 66 (25.98%) were having neck pain. Among all, 118 (46.5%) opined life as unthinkable without a smartphone, 98 (38.6%) said it is not so and 38 (15%) had no idea about it. Higher proportion i.e. 60% of the students with normal screen-time reported to be suffering from eye problems as compared to those who had high screen-time. Higher proportion i.e. 80% of the

Table 2: Factors associated with the screen time among the study participants (N=254)

Variables	Sub group	Screen time		Chi Square (p-value)
		Normal, n (%)	High, n (%)	
Gender	Male	05 (3.6)	135 (96.4)	0.110 (0.740)
	Female	05 (4.4)	109 (95.6)	
Residence	Urban	05 (3.3)	147 (96.7)	0.420 (0.517)
	Rural	05 (4.9)	97 (95.1)	
Family type	Nuclear	05 (2.5)	199 (97.5)	6.051 (0.014)
	Joint	05 (10.0)	45 (90.0)	
Type of student	Hosteller	02 (1.7)	119 (98.3)	3.188 (0.074)
	Day scholar	08 (06)	125 (94.0)	
Online study	Undergoing	05 (3.9)	122 (96.1)	0.000 (1.000)
	Do not undergo	05 (3.9)	122 (96.1)	
Year of study	First	05 (8.2)	56 (91.8)	6.605 (0.086)
	Second	03 (3.5)	83 (96.5)	
	Third	00 (00)	76 (100)	
	Final	02 (6.5)	29 (93.5)	

Table 3: Health Problems of the Students by the Amount of Screen Time (N=254)

Health problems	Sub group	Screen time		Chi Square (p-value)
		Normal, n (%)	**High, n (%)**	
Eye problems	Present	06 (60.0)	04 (40.0)	0.580 (0.446)
	Absent	104 (42.6)	140 (57.4)	
Sleep disturbance	Present	02 (20.0)	08 (80.0)	0.025 (0.875)
	Absent	67 (27.5)	177 (72.5)	
Mood disturbance	Present	04 (40.0)	06 (60.0)	0.058 (0.810)
	Absent	101 (41.4)	143 (58.6)	
Neck pain	Present	03 (30.0)	07 (70.0)	0.005 (0.942)
	Absent	63 (25.8)	181 (74.2)	
Other health problems	Present	00 (00)	10 (100.0)	0.069 (0.793)
	Absent	18 (7.4)	226 (92.6)	

Table 4: Logistic Regression Analysis of the Determinants of Screen-time (N=254)

Variables		COR (95% C.I.)	AOR (95% C. I.)	p - value
Gender	Female	1		0.067
	Male	2.876 (0.733 – 4.113)	3.534 (0.643 – 4.283)	
Study year	1st, 2nd & final yr	1		0.038
	3rd year	1.756 (1.134 – 1.957)	1.216 (1.014 – 1.671)	
Residence	Rural	1		0.078
	Urban	3.409 (0.145 – 6.563)	2.378 (0.235 – 5.563)	
Family type	Joint	1		0.083
	Nuclear	1.183 (0.717 – 1.937)	2.023 (0.019 – 3.231)	
Type of student	Day scholar	1		0.089
	Hosteller	1.029 (0.274 – 3.674)	1.339 (0.256 – 4.437)	
Online study	Not pursuing	1		0.019
	Pursuing	2.160 (1.565 – 4.342)	1.984 (1.565 – 2.342)	

AOR= Adjusted odds ratio; COR = Crude odds ratio.

subjects with high screen-time had sleep disturbances like delayed onset of sleep after going to bed and wakening in between sleep etc. Higher proportion i.e. 60% of the subjects with high screen-time had mood disturbances like getting irritated easily, being intolerant in minor issues, restlessness etc. Higher proportion i.e. 70% of the subjects with high screen-time suffered from neck pain. Similarly, all the students high screen-time complained of other minor health problems like dizziness, bloating of stomach, nausea etc. But none of these differences in proportions were found to be statistically significant. (Table 3)

Logistic regression model was used to determine the effects of some selected sociodemographic variables, study year, type of student, pursuing online study course etc. upon the respondent's screen-time. In this model high screen-time was the dependent variable ($\leq$2h/day = 0 and >2h/day = 1). Gender of the respondents (female =

1, male = 2), Study year (1st, 2nd and final year = 1, 3rd year = 2), Residence (Rural = 1, Urban = 2), Type of family (Joint = 1, Nuclear = 2), Type of student (Day scholar = 1, Hosteller = 2), Pursuing online study course (Pursuing = 1, Not pursuing = 2) etc. were the independent variables. In the adjusted analysis, all the independent variables were included in the model. Logistic regression analysis showed that a MBBS student pursuing online study course had 98.4% higher chance (AOR: 1.984, 95% CI: 1.565–2.342) of having high screen-time, similarly a student studying in 3rd year had 21.6% higher chance [AOR: 1.756, 95% CI: 1.014–1.671) of having high screen-time than the rest when the effect of other variables were controlled and these were found to be statistically significant (P<0.05). The effects of other independent variables in determining screen-time of a study subject did not attain the level of statistical significance. (Table 4)

Discussion:

Present study has detected the proportion of high screen-time to be 96.1% among the undergraduate medical students in Tripura state, whereas, a cross-sectional study conducted among undergraduate medical students in Indore city during 2023, has found the proportion of high screen-time to be 74%.[15] Probable reasons for detecting lesser prevalence in this study may be due to the fact that here high screen-time was defined as viewing screens for 3 hours or more. Similarly, study carried out among high school adolescents in Joao Pessoa city, Brazil during 2009, has also found the prevalence of high screen-time as 79.5%.[16] A study conducted in Bangladesh also detected prevalence of screen-time as 79%.[17]

In another study conducted in the year 2019 proportion of high screen-time was found to be 87.7% among high school students in an urban area of Kerala state of India.[18] This lesser proportion detected by the Kerala study may be due to the facts that the subjects were school students and younger in age than the present study mean (SD) age being 14 (0.81) vs 21.20 (1.455)

which might have allowed lesser access to smartphones and insufficient availability of 5g network in India at that time. Prevalence of high screen-time among 9–11-year-old children has been reported to be 45% in Canada, 63% in Australia, 68% in Malaysia and 59% in United States.[19] A community based cross-sectional study conducted during 2018 among adolescents residing in a resettlement colony of New Delhi has found the proportion of high screen-time to be 98%.[20] Though the study was conducted seven years earlier than the present study, it's finding was at par with the finding of the present study. It may be due to the fact that the 37.8% of the participants of that study were aged either 15 years or more and they were residing in an urban area of the national capital of India, where accessibility to internet was better than other areas. An institution based cross-sectional study conducted in Ghaziabad during 2019–20 among children aged 2-5 years has found the proportion of high screen-time to be 60%.[21] Though this proportion of high screen-time was found to be lower than the present study, it was actually huge in amount for the study population, who were children aged 2-5 yr only.

In the present study, mean (SD) age of the study subjects was found to be 21.20 (1.455) years, similarly, it was found to be 21.4 (1.6) years by a study conducted in North India.[22] Whereas, a study conducted in Kerala has found mean (SD) age of the study subjects as 14 (0.81) years as the study was among high school students.[18]

This study has found 96.4% of the male students to have high screen-time, whereas, a study conducted among MBBS students in Indore has found it to be 79.5% only.[15] In a Brazilian study also, male adolescents were found to have higher screen-time i, e, 84.3%.[16] A study conducted in Zhejiang province of China also showed higher screen-time in boys than in girls (45.4% vs 39.1%).[23]

In the present study 80.3% of the study subjects were from nuclear families. A similar study conducted in Kerala also found that 80.9% respondents were from nuclear families.[18] But a study conducted in Delhi has

found it to be 65.8%, which was lower than the present study.[20] It was observed in this study that 96.7% of the urban residents were having high screen-time though it was not significant. Similarly, a study conducted in China also did not find significant urban rural difference in this regard.[23]

In the present study 27.17% of the study subjects were found to have sleep disturbances but it was not significant, similarly a cohort study conducted in Uttar Pradesh and Bihar also has found it to be only 18.4% and 33.24% in male and female adolescents respectively and it was also not significant.[24] It was observed that 41.34% of the subjects were having mood disturbances in the present study, similarly a study conducted in China also showed increased screen-time to be associated with higher depressive symptomatology.[25] A study conducted in UK during 2020 has also reported positive association between higher screen-time and poor mental health.[26] In this study 43.3% students reported some eye problem, whereas, in a study conducted among adolescents in Saudi Arabia during 2018-19, most 66.0% the study subjects reported to be having one or more ocular problems after smartphone use.[27] Present study has identified pursuing online study course and studying in 3rd professional year as the significant determinants of high screen-time among the medical students, which was at par with the findings of a study conducted in Indore.[15]

Limitation:

Self-reported screen-time and self-reported health problems were considered in this study and it may be a possible source of bias. As the study subjects were young adults, health effect of prolonged high screen-time might have not been revealed by this study. Examination of the effect of other variables in determining screen-time was not possible due to resource constraint.

Conclusion:

Though majority of the MBBS students have high screen-time (>2 hrs / day) but it was not affecting their health significantly. 'Studying online' and 'studying in higher classes' were found to be the significant determinants of high screen-time in the study population.

Declaration:

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Conflicts of interest: Nil

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Evaluation of Quality of Life in Patients on Different Treatment Modalities for Primary Glaucoma in a Tertiary Care Teaching Hospital- A Prospective Observational Study

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Abstract:

Introduction: Glaucoma, causes irreversible vision loss, involves optic nerve damage due to increased aqueous outflow resistance in primary open-angle glaucoma (POAG) or iris blockage in primary-angle closure glaucoma (PACG). **Objective:** This study evaluates different treatment patterns and their effectiveness in primary glaucoma using the NEI VFQ-25. **Method:** A 2-month prospective observational study included patients with primary glaucoma, excluding those with secondary glaucoma or other ocular conditions. The sample size was determined based on study duration. Treatment groups received medical, laser, or surgical interventions, alone or combined. NEI VFQ-25 was administered at baseline and one month. **Results:** Among 100 patients, mean age 56.7 years, equally divided between POAG and PACG, QoL improved significantly across all treatment groups, greatest in medical treatment alone, multimodal treatment, least. One-way ANOVA showed difference in treatment approach on outcomes. **Conclusion:** Using NEI-VFQ-25, study assessed QoL in glaucoma patients across six treatment groups, finding highest QoL with medical therapy alone and lowest with combined treatments.

Keywords: NEI-VFQ-25, Primary glaucoma, Quality of life

Introduction:

Glaucoma, a leading cause of irreversible vision loss, involves optic nerve degeneration and visual field loss. Primary Open Angle Glaucoma (POAG) results from increased trabecular outflow resistance, while Primary Angle Closure Glaucoma (PACG) occurs due to iris blockage of drainage channels.[1] Topical drugs are the primary treatment for POAG, while surgery or laser therapy is required if medical management fails.[2] Glaucoma-related vision loss significantly impacts QoL, which varies with the treatment approach.[3] Here, we intend to evaluates QoL and drug use in primary glaucoma patients on different treatments. Glaucoma treatment aims to reduce intraocular pressure, with first-line therapies including prostaglandin analogues, beta-blockers, and carbonic anhydrase inhibitors.[1] Incisional surgeries, including trabeculectomy or tube shunt implantation, are used when medications and laser treatments do not provide sufficient results.[4] Assessing health-related quality of life (QoL) is vital for determining the success of glaucoma treatments, including medical and surgical approaches. Regular QoL assessments help track changes in patients' well-being and enable tailored modifications to their treatment strategies.[5]

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Method:

A 2-month prospective observational study was conducted after IRB approval (NHLIRB/2022/09/22/No-1) from November 2022 to December 2022. A total of 100 patients with primary glaucoma were selected based on convenient sampling. Patients over 18 years of age, providing informed consent, were included, while those with ocular co-morbidities, secondary glaucoma, or acute conditions were excluded. Patient receiving medical treatment, or other modalities like laser or surgical intervention were included. QoL was assessed using the NEI VFQ-25 at baseline and after one month.[5] The NEI VFQ-25 has 25 questions across 12 subscales. Its composite score, averaging 11 subscales (excluding General Health), summarizes the overall impact of visual impairment on QoL. Subscale scores ranged from 0 to 100, with composite scores averaging vision-related subscales. Data was recorded in case forms and analysed using Excel 2021 and SPSS 25. Paired t-tests compared composite scores between visits, while ANOVA assessed differences across six treatment groups (p<0.05 considered significant).
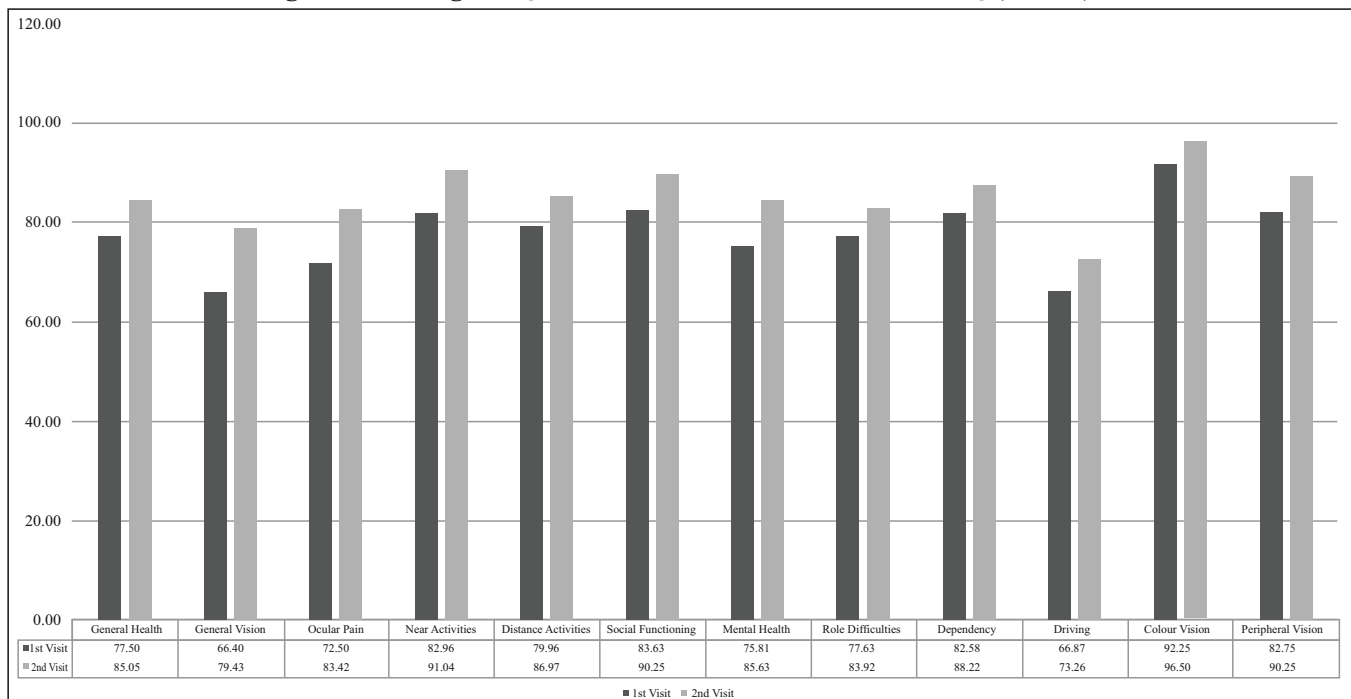
Results:

The study included 100 patients (55 males, 45 females, mean age 56.7, range 2284). Most were non-professionals. Co-morbidities included cardiovascular disease (43, with 34 hypertensive, 9 ischemic heart disease), diabetes (18), asthma, dyslipidaemia, and hypothyroidism (3 each). Common symptoms were diminished vision (86), headache (12), eye watering (9), halos/glare (7), pain (5), redness, and vertigo (2). Of 200 eyes studied, 177 were glaucomatous. Open-angle and angle-closure glaucoma were equally distributed (50 each). Newly diagnosed cases were 42, while 58 had

Table 1: Drugs prescribed to the Study Participants (N=100)

Group wise Drugs	Route	n
Beta Blockers		
Timolol	Topical	53
Betaxolol	Topical	1
Alpha Agonist		
Brimonidine	Topical	51
Carbonic Anhydrase Inhibitors		
Brinzolamide	Topical	16
Dorzolamide	Topical	35
Acetazolamide	Oral	7
Prostaglandin Analogues		
Bimatoprost	Topical	7
Travoprost	Topical	33
Latanoprost	Topical	8
Rho-kinase inhibitors		
Netarsudil	Topical	4
Ripasudil	Topical	3
Adjuvant Drugs		
Moxifloxacin	Topical	7
Tobramycin + Fluorometholone	Topical	21
Carboxymethyl cellulose	Topical	12
Dexamethasone	Topical	3
Glycerol	Oral	1
Nepafenac	Topical	2
Atropine	Topical	6

Nine prescriptions in this study contained two FDCs, while 56 prescriptions contained one. The most prescribed combination was Bimatoprost with Timolol (n=30). Postoperatively, 20 patients received Tobramycin with Fluorometholone, while 2 received Moxifloxacin with Dexamethasone, both combining an antibiotic with a steroid.

Figure 2: Average of QoL scores in 12 subscales of NEIVFQ (N=100)

	General Health	General Vision	Ocular Pain	Near Activities	Distance Activities	Social Functioning	Mental Health	Role Difficulties	Dependency	Driving	Colour Vision	Peripheral Vision
1st Visit	77.50	66.40	72.50	82.96	79.96	83.63	75.81	77.63	82.58	66.87	92.25	82.75
2nd Visit	85.05	79.43	83.42	91.04	86.97	90.25	85.63	83.92	88.22	73.26	96.50	90.25

Table 2: Mean composite score of 6 management groups at both visits (N=100)

Management Group	n	Mean, SD of Composite Score		t value	p-value
		1st Visit	**2nd Visit**		
Only Medical	42	80.138 (9.20)	85.186 (7.52)	7.22	<0.01
Only Laser	17	71.129 (15.43)	81.027 (11.27)	4.439	<0.01
Only Surgical	5	53.310 (6.09)	67.667 (7.92)	3.693	0.021
Medical followed by Laser	22	76.227 (10.36)	85.125 (8.13)	8.379	<0.01
Medical followed by Surgical	10	70.44 (14.23)	77.59 (12.50)	3.583	0.006
Medical followed by Laser and Surgical	4	68.219 (20.26)	75.407 (17.07)	1.983	0.142

Composite Score = Average of vision targeted subscale scores (excluding general health rating question), Mean composite Score is calculated by averaging composite score of all the patients in that particular group.

prior diagnosis. Most (76) had no family history, 19 had one affected parent (11 mothers, 8 fathers), and 5 had both parents with glaucoma.

The study included six treatment groups: medical (26 old, 16 new), laser (2 old, 15 new), surgical (1 old, 4 new), medical + laser (16 old, 6 new), medical + surgery (9 old, 1 new), and medical + laser + surgery (4 old, 0 new), totalling 58 old and 42 new cases. Table 1 summarizes the frequency of each drug prescribed, either alone or in combination.

Figure 2 depicts QoL scores of all 12 subscales at the time of the first visit and at the time of second visit of

patients. The highest change in the mean percentage of average QoL score is observed in General Vision (20%), Ocular Pain (15%), and Mental Health (13%), while the least change is seen in the Colour Vision subscale (5%).

Table 2 presents the mean composite scores of six management groups at both visits. One-way ANOVA of second-visit scores showed a significant difference among all groups (p < 0.05) except group 6.

Post hoc analysis with the Tukey HSD test (p<0.05) revealed significant QoL differences, particularly between medical-only (Group 1; Mean, SD - 85.186, 7.52) and surgical-only (Group 3; Mean, SD - 67.667,

7.92) patients, as well as between surgical-only (Group 3; Mean, SD-67.667, 7.92) and those receiving laser after medical treatment (85.125, 8.13).

The Mean Composite Score increased significantly between visits for both old and new glaucoma cases. Among old cases, the mean Composite Score rose from 75.91 (SD=12.64) at the first visit to 82.00 (SD=10.26) at the second visit (t=8.395, p<0.001). Similarly, new cases showed an increase from 73.64 (SD=13.65) to 83.00 (SD=10.21) (t=8.405, p<0.001), indicating a statistically significant change in both groups.

Discussion:

The primary goal of glaucoma treatment is to lower intraocular pressure, typically using first-line therapies such as prostaglandin analogues, beta-blockers, and carbonic anhydrase inhibitors.[1]

Hypertension, diabetes, and cardiovascular diseases were the most prevalent comorbidities reported in this study. A study by Muralidharan S et al.'s[5] reported the same.

Seth PK et al.[7] reported 36.4% POAG and 34.5% PACG cases. Present study's equal POAG and PACG distribution aligns with these findings, supporting the validity of demographic data of this study.[6] A family history of glaucoma significantly increases the risk. In this study, 19% of patients had a hereditary predisposition from one or both parents.

Glaucoma in its early or moderate stages can remain undetected for a long time. Key symptoms like blurred vision, headaches, and halos around lights should be considered along with visual field tests.[8]

Treatment approaches may deviate based on the stage and type of Glaucoma.[1] Patients were classified into six treatment groups. Three received only medication, laser therapy, or surgery, while the others had combined treatments. Most (42%) relied on medication, and only 4% underwent all three treatments.

Carbonic anhydrase inhibitors were the most prescribed (n=58), followed by beta-blockers (54), alpha-1 agonists (51), and prostaglandin analogues (48). Unlike a study by Meesala A. et al.[9] in another Indian

region, where beta-blockers were most common, findings from this study contrast with standard guidelines favouring beta-blockers and prostaglandin analogues as first-line treatments.

This discrepancy highlights potential variations in clinical practice and adherence to guidelines. According to the American Academy of Ophthalmology's Preferred Practice Pattern for Primary Open-Angle Glaucoma, prostaglandin analogues and beta-blockers are generally the preferred initial treatments due to their effectiveness and safety profiles.[10]

Seven patients received Rho kinase inhibitors (Netarsudil, Ripasudil) alongside standard treatment. These novel drugs effectively lower IOP by relaxing the trabecular meshwork and enhancing aqueous humor outflow.[11]

Timolol was the most prescribed FDC component, often combined with Brinzolamide, Travoprost, or Dorzolamide, similar to Meesala A. et al.'s[9] findings.

Glaucoma primarily affected general vision, driving, and ocular pain. Post-treatment, the most notable QoL improvements were in general vision, ocular pain, and mental health.

QoL scores were lowest at baseline and follow-up in patients receiving medical, laser, and surgical treatments, while highest in those on medical therapy alone. Patient with severe glaucoma were on multiple treatment. All groups showed significant QoL improvement (p<0.05) except Group 6, likely due to the impact of advanced glaucoma requiring multiple treatments.

Pastore MR et al.[12] compared QoL and visual function in glaucomatous patients treated with medical therapy, canaloplasty, or trabeculectomy using NEI VFQ-25, While Pastore's study found canaloplasty to be better, results of present study showed that aggressive multi-modal treatments, like medical, laser, and surgery combined, resulted in the poorest QoL score.

A study done by Runjić T. et al.[3] suggested that there were significant differences in QoL scores depending on the severity of visual impairment, with

more severe impairment correlating with lower QoL i.e., those requiring more aggressive treatment, tending to have a more substantial negative impact on QoL.

One-way ANOVA showed significant differences in NEI-VFQ scores, indicating treatment type impacts QoL in primary glaucoma. A paired t-test showed significant QoL improvement in both groups.

Strength and Limitations:

This study comprehensively assessed QoL in glaucoma patients using the NEI VFQ-25, supported by a robust prospective design and statistical analysis. However, limitations include a small sample size, short follow-up of one-month, subjective assessments, and exclusion of patients with ocular comorbidities. Additionally, the lack of randomization and treatment allocation based on the patients condition or severity of glaucoma may have influenced the QoL scores.

Conclusion:

This study evaluated QoL in primary glaucoma patients across six treatment groups using the NEI VFQ-25. Patients on medical therapy alone had the highest QoL, while those undergoing medical, laser, and surgical treatments had the lowest, reflecting disease severity. One-way ANOVA showed significant differences, emphasizing treatment impact.

Declaration:

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