National Board of Examinations - Journal of Medical Sciences
Volume 2, Issue 7, July; ISSN 2583-7524

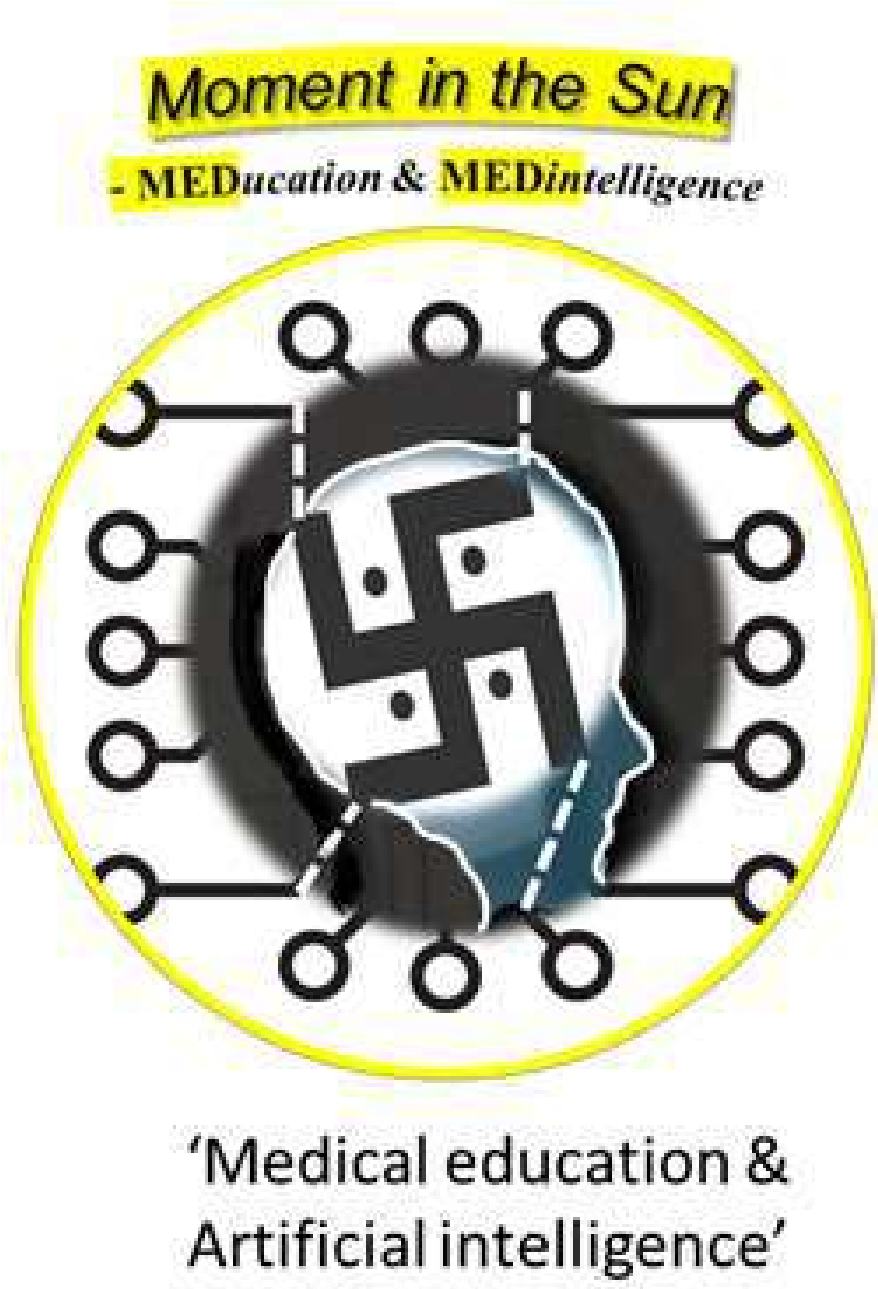
National Board of Examination (NBE)
Journal *of* Medical Sciences

NBEJMS

N
B
E

J

M
S



NATIONAL BOARD OF EXAMINATIONS –
JOURNAL OF MEDICAL SCIENCES

Volume 2 • Issue 7 • July 2024

(Contents Continued)

CASE REPORTS

National Board of Examinations - Journal of Medical Sciences
Volume 2, Issue 7, Pages 645–649, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.001

EDITORIAL

Moment in the Sun: MED*ucation* and MED*intelligence*

Minu Bajpai[1,*] and Abhijat Sheth[2]

[1]*Vice President and Honorary Executive Director, National Board of Examinations in Medical Sciences, Medical Enclave, Ansari Nagar, Mahatma Gandhi Marg, Ring Road, New Delhi, Delhi – 110029*
[2]*Senior Consultant, Cardiothoracic Surgeon & C.E.O., Apollo Hospital, Ahmedabad & President, National Board of Examinations in Medical Sciences, Medical Enclave, Ansari Nagar, Mahatma Gandhi Marg, Ring Road, New Delhi, Delhi – 110029*

Accepted: 07-July-2024 / Published Online 08-July-2024

Clinicians predict that technological literacy will be the most important capability for doctors and nurses in 10 years' time. Technological literacy is indeed becoming increasingly vital in healthcare. As medical technology advances, doctors and nurses must be proficient at using various digital tools and systems to improve patient care.

Developing these technological skills will empower healthcare professionals to leverage technology effectively, ultimately enhancing patient outcomes and the efficiency of healthcare delivery.

Artificial Intelligence (AI) provides

- Real-time feedback,
- Accurate evaluation,
- Can be used to monitor teaching quality,
- A possible reason why AI has not yet been applied widely to practical teaching may be the disciplinary gap between developers and end-users. Therefore,
- It is necessary to strengthen the theoretical guidance of medical education to synchronize with the rapid development of AI,
- Medical educators are expected to maintain a balance between AI and teacher-led teaching, and
- Medical students need to think independently and critically.

*Corresponding Author: Minu Bajpai
Email: bajpai2b@gmail.com

- **It is also highly demanded that research teams from a wide range of disciplines ensure the applicability of AI in medical education**

Clinicians predict that technological literacy will be the most important capability for doctors and nurses in 10 years' time. However, many report being overwhelmed by the sheer amount of data and information they are expected to take on, leading to concerns that increasing the role of health technology will take up more of their time than saving it. There is widespread support among clinicians to overhaul education and training to ensure they can keep pace with the rapid rate of technological advances. Fifty-six percent of clinicians globally predict they will base most of their clinical on using tools that utilize artificial intelligence; 69% report being overwhelmed with the current volume of data; 69% predict the widespread use of digital health technologies will become an even more challenging burden in the future; 83% believe training needs to be overhauled so they can keep pace with technological advancements.

- **Synergies and Overlaps in Generative AI and Transformative AI**
  - Generative AI and Transformative AI are not mutually exclusive; they often intersect and complement each other. They can be used within Transformative AI applications to generate synthetic data for training AI models. Transformative AI, on the other hand, utilizes generative models to enhance data analysis and decision-making processes. The synergy between Generative AI and Transformative AI leads to more robust and efficient AI systems with enhanced capabilities.

- **Medical graduates will be trained to bridge the gap between evolving technology in AI and Machine Learning (ML) and health care education and practice**

- **Evolving technology in Medical education**
  - ***Generative AI and Transformative AO***

Generative AI

Generative AI has significant potential to transform medical education by providing innovative and effective learning tools. There are several ways in which generative AI can enhance medical education

AI can create ***customized learning plans*** for students, adapting to their pace, strengths, and weaknesses, thereby enhancing individual learning experiences. Generative AI can create ***realistic virtual patients*** for medical students to diagnose and treat. These simulations can present a wide range of medical conditions, providing hands-on practice in a controlled environment. AI-driven ***interactive tutorials*** can engage students with adaptive learning pathways, quizzes, and real-time feedback, helping them grasp complex medical concepts more effectively. Generative AI can ***produce educational content***,

including lecture notes, summaries, and flashcards, tailored to the curriculum and student needs. AI can assist in ***understanding and generating medical texts***, helping students with complex medical literature, summarizing research articles, and translating medical jargon into more comprehensible language. AI can ***simulate clinical decision-making processes,*** allowing students to practice diagnosing and creating treatment plans in a risk-free environment. These simulations can adapt based on the student's decisions, providing immediate feedback and alternative scenarios. AI can generate detailed ***anatomical models and 3D visualizations***, aiding in the understanding of human anatomy and surgical procedures. Generative AI can ***evaluate student performance in real-time, providing detailed feedback on clinical skills, diagnostic accuracy, and theoretical knowledge.*** This can help identify areas that need improvement and track progress over time. AI can ***facilitate virtual study groups*** and collaborative projects, connecting students with peers and experts worldwide, fostering a collaborative learning environment. AI tools can assist students in research projects by ***analyzing large datasets, identifying patterns, and generating hypotheses,*** thereby enhancing their research skills.

By integrating generative AI into medical education, institutions can create more engaging, effective, and personalized learning experiences, ultimately producing more competent and confident healthcare professionals.

Transformative AI

Transformative AI in medical education goes beyond incremental improvements, fundamentally changing how future healthcare professionals are trained. Some of the examples are: ***Adaptive Learning Systems; Immersive Simulations and Virtual Reality (VR); AI-Enhanced Diagnostics Training; Advanced Data Analysis and Research; Natural Language Processing (NLP) for Medical Literature; Ethical and Professional Training; Continuous Assessment and Feedback; Global Learning Communities****:* AI can connect students with peers and mentors worldwide, promoting the exchange of knowledge and best practices across different cultures and healthcare systems.

By integrating transformative AI into medical education, institutions can create a dynamic, interactive, and personalized learning environment that prepares future healthcare professionals to excel in an increasingly complex and technology-driven world.

- **Health care education and practice**
  - AI in medical education can significantly enhance the processes of implementation, evaluation, and feedback, making them

more efficient and effective. Here's how AI can facilitate these aspects

Implementation involves

1. Curriculum Development: Content Customization and Resource Allocation
2. Interactive Learning Platforms
    - AI-Powered Simulations
    - Intelligent Tutoring Systems
3. Remote Learning
    - Tele-education
    - Learning Management Systems (LMS)

Evaluation involves

1. Automated Assessments
    - Objective Structured Clinical Examinations (OSCEs)
    - Multiple-Choice and Written Exams
2. Competency-Based Assessment
    - Performance Analytics
    - Skill Proficiency Tracking
3. Predictive Analytics
    - Performance Prediction
    - Outcome Analysis

Feedback involves

1. Real-Time Feedback
    - Instantaneous Responses
    - Adaptive Feedback
2. Comprehensive Feedback Reports
    - Detailed Analytics
    - Visualization Tools
3. Continuous Improvement
    - Iterative Feedback Loops
    - Peer and Self-Assessment

By leveraging AI in these ways, medical education can become more adaptive, efficient, and responsive to the needs of both students and educators, ultimately leading to better-prepared healthcare professionals.

☐ **Health Administration**

- AI and ML have the potential to significantly enhance efficiency and reduce costs in hospital administration.

☐ ***Predictive Analytics for Patient Flow***

- ML algorithms can analyze historical data to predict patient admissions, discharges, and transfers. This helps in optimizing bed utilization, reducing wait times, and improving overall patient flow.

☐ ***Resource Optimization***

- Fraud Detection and Prevention
- Supply Chain Management
- Automated Documentation and Data Entry
- Readmission Risk Prediction
- Clinical Decision Support Systems
- Patient Engagement and Remote Monitoring
- Operational Efficiency through Automation
- Efficient Diagnosis and Imaging Analysis

☐ **Specializing in a degree course on AI and ML can offer several advantages for a medical**

graduate. Here are some key benefits

- Advanced Analytical Skills
- Data-Driven Decision-Making
- Personalized Medicine
- Predictive Analytics
- Image and Signal Processing
- Automation of Repetitive Tasks
- Research Opportunities
- Interdisciplinary Collaboration
- Career Opportunities
- Continuous Learning and Adaptability: The field of AI and ML is dynamic and rapidly evolving. Pursuing a degree in this area encourages a mindset of continuous learning and adaptability, which are valuable qualities in any professional setting.

☐ **The next decade will see AI-ML-enabled healthcare professionals adept at the following**

- a) Efficient use of Electronic Health Records (EHRs) for accessing and updating patient information is critical for continuity of care and ensuring accurate patient data. b) The rise of telehealth requires doctors and nurses to be proficient in virtual consultation platforms to provide remote care. c) Familiarity with advanced medical devices, from diagnostic tools to wearable health monitors, ensures accurate patient monitoring and intervention. d) Ability to interpret data from various health technology tools can help in making informed decisions and predicting patient outcomes. e) Understanding how to use Artificial Intelligence (AI) and Machine Learning (ML) tools can aid in diagnosing diseases, personalizing treatments, and managing healthcare operations more efficiently. f) Knowledge of cybersecurity practices is essential to protecting patient data and complying with regulations like HIPAA. g) Ensuring different technological systems and devices can work together seamlessly to provide comprehensive care. h) Keeping up with the rapid advancements in medical technology requires ongoing education and adaptation.

It's important to note that integrating AI and ML into healthcare requires a deep understanding of both medical principles and technology. Therefore, combining a medical background with a specialization in AI and ML can position a professional to contribute significantly to the intersection of medicine and technology.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 650–657, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.002

ORIGINAL ARTICLE

A Comparative Study Between Open Hemorrhoidectomy and Rubber Band Ligation for Second Degree Hemorrhoids: A Prospective Randomized Control Study

G. Ray,[1] S. Selvakumaran,[1] Kapil Baliga,[1,*] Rakesh Raj E[2] and Jawahar K[2]

[1]*Associate Professor, Department of General Surgery, IGMCRI, Puducherry*
[2]*Assistant Professor, Department of General Surgery, IGMCRI, Puducherry*

Accepted: 07-May-2024 / Published Online 08-July-2024

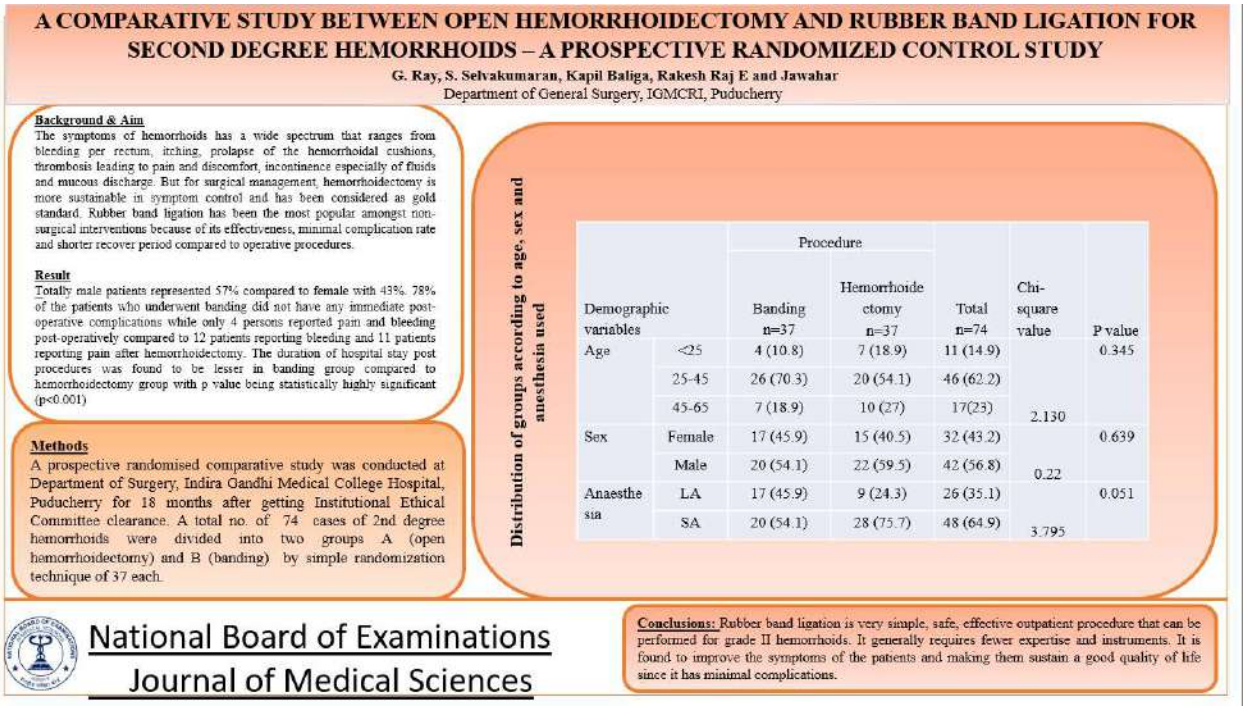
Abstract

Background: The symptoms of hemorrhoids has a wide spectrum that ranges from bleeding per rectum, itching, prolapse of the hemorrhoidal cushions, thrombosis leading to pain and discomfort, incontinence especially of fluids and mucous discharge. But for surgical management, hemorrhoidectomy is more sustainable in symptom control and has been considered as gold standard. Rubber band ligation has been the most popular amongst non-surgical interventions because of its effectiveness, minimal complication rate and shorter recover period compared to operative procedures. The present study aimed at determining the efficacy and safety of rubber banding ligation procedure versus the standard hemorrhoidectomy for second degree hemorrhoids. **Methods:** A prospective randomised comparative study was conducted at Department of Surgery, Indira Gandhi Medical College Hospital, Puducherry for 18 months after getting institutional ethical committee clearance. A total no. of 74 cases of 2nd degree hemorrhoids were divided into two groups A (open hemorrhoidectomy) and B (banding) by simple randomization technique of 37 each. A detailed history & examination including per rectal and Proctoscopy examination was done of each patient and the data entered in the pro forma. The description of data was expressed in the form of mean±SD for quantitative data, while frequency and proportion for qualitative data. **Results:** Totally male patients represented 57% compared to female with 43% 78% of the patients who underwent banding did not have any immediate post-operative complications while only 4 persons reported pain and bleeding post-operatively compared to 12 patients reporting bleeding and 11 patients reporting pain after hemorrhoidectomy. The duration of hospital stay post procedures was found to be lesser in banding group compared to hemorrhoidectomy group with p value being statistically highly significant ($p<0.001$). **Conclusion:** Rubber band ligation is very simple, safe, effective outpatient procedure that can be performed for grade II hemorrhoids. It generally requires fewer expertise and instruments. It is found to improve the symptoms of the patients and making them sustain a good quality of life since it has minimal complications.

Keywords: Hemorrhoids, Rubber band ligation, Open Haemorrhoidectomy

*Corresponding Author: Kapil Baliga
Email: baliga.kapil@googlemail.com

Graphical Abstract



Introduction

Among the commonest and frequently occurring pathology in the anal region is the hemorrhoids, which is commonly encountered at clinical practice. Globally 5% of the general population have been suffering from symptoms of hemorrhoids [1]. It has been found affecting both sexes equally and occurs at any age [2,3]. The pathological changes in the anal cushion which is the normal component of the anal canal and the enlargement of the hemorrhoidal plexus results in the development of hemorrhoids. The word hemorrhoids has its origin from the Greek word Hemarhos (Hema=blood, rhos=flow) [4].

The symptoms of hemorrhoids has a wide spectrum that ranges from bleeding per rectum, itching, prolapse of the hemorrhoidal cushions, thrombosis leading to pain and discomfort, incontinence especially of fluids and mucous discharge. Internal hemorrhoids are generally classified into four degrees based on their extent of prolapse among which the fourth degree hemorrhoids are permanently prolapsed. The severity of symptoms may not be associated with the degree of hemorrhoids. Various techniques and options for conservative medical management and also for non-surgical treatments are on the practice in treating symptomatic hemorrhoids which includes life style advice, diet, toilet behavior, rubber banding ligation, sclerotherapy, cryotherapy, photocoagulation, laser etc. But for surgical management, hemorrhoidectomy is more sustainable in symptom control and has been considered as gold standard (5) for symptomatic conditions but they incur

postoperative pain, long hospital stay and recovery and significant level of complications [6,7].

Rubber band ligation has been the most popular amongst non-surgical interventions because of its effectiveness, minimal complication rate and shorter recover period compared to operative procedures [5,8,9]. But considering its simplicity, this known for its rare adverse events like pelvic sepsis and Fournier's gangrene and also its diminishing long term efficacy [10]. We conducted this comparative randomized study to determine the efficacy and safety of rubber banding ligation procedure versus the standard hemorrhoidectomy for second degree hemorrhoids.

Material and Methodology

A prospective randomized comparative study was conducted at Department of Surgery, Indira Gandhi Medical College Hospital, Puducherry for 18 months. The institutional ethics committee approval obtained No.375/IEC-33/IGMCRI/PP-09/2022

Inclusion criteria

- Age >20 year
- Patient and/or his/her legal representative has read and signed the approved Informed Consent Form before treatment
- Patients with second degree hemorrhoids

Exclusion criteria

- Patients with fistula in ano
- Patients with fissure in ano
- Active malignancy
- Patients with bleeding disorder
-

All patients with second degree hemorrhoids admitted to Indira Gandhi Medical College Hospital were enrolled based on inclusion and exclusion criteria. A total no. of 74 cases of 2nd degree hemorrhoids were divided into two groups A (open hemorrhoids) and B (banding) by simple randomization technique of 37 each. A detailed history & examination including per rectal and Proctoscopy examination was done of each patient and the data entered in the pro forma. The patients were explained in detail about their disease and the modalities of treatment as Rubber band ligation, open hemorrhoidectomy with the advantages and disadvantages of each. Willing patients were selected and examined and investigated as per pro forma.

Presenting complaints were noted, duration of the surgery was calculated in minutes. The Group A patients (open hemorrhoidectomy) were done under spinal anesthesia and Group B patients (Banding) were operated under local anesthesia. Post-operative pain & requirement of analgesia was calculated in days. Post- operative stay was also calculated in days. Postoperative complications & cost of treatments were also compared.

Statistical analysis of the data was done using SPSS (Statistical Package for Social Science) version 26. The description of data was expressed in the form of mean±SD for quantitative data, while frequency and proportion for qualitative data. The analysis was done to test the statistical significance between the two groups using t

test for quantitative data and chi-square test for qualitative data. P<0.05 was considered significant.

Results

In our study totally 74 patients participated, 37 patients in each group. Only 4 patients were under 25 years of age in banding group while 26 patients were between 25-45 years compared to 20 patients in hemorrhoidectomy group. Totally male patients represented 57% compared to female with 43% as shown in Table 1. The presenting complaints (bleeding per rectum for both groups) and the comorbidities of the two groups were also comparable.

Table 1. Distribution of groups according to age, sex and anesthesia used

Demographic variables		Procedure		Total n=74	Chi-square value	P value
		Banding n=37	Hemorrhoidectomy n=37			
Age	<25	4 (10.8)	7 (18.9)	11 (14.9)		0.345
	25-45	26 (70.3)	20 (54.1)	46 (62.2)		
	45-65	7 (18.9)	10 (27)	17(23)	2.130	
Sex	Female	17 (45.9)	15 (40.5)	32 (43.2)		0.639
	Male	20 (54.1)	22 (59.5)	42 (56.8)	0.22	
Anaesthesia	LA	17 (45.9)	9 (24.3)	26 (35.1)		0.051
	SA	20 (54.1)	28 (75.7)	48 (64.9)	3.795	

78% of the patients who underwent banding did not have any immediate post-operative complications while only 4 persons reported pain and bleeding post-operatively compared to 12 patients reporting bleeding and 11 patients reporting pain after hemorrhoidectomy. The p value (p<0.002) was found to significant post operatively among the groups. On follow up visits on 1st and 3rd week patients underwent banding did not report any complications like pain or bleeding compared to hemorroidectomy group with p value between groups at 1st and 3rd week was found to be statistically significant (p<0.5) as in Table 2.

Table 2. Distribution of groups according to post-operative complications and follow up

Follow-up outcome		Procedure		Total	Chi-square value	P value
		Banding n=37	Hemorrhoidectomy n=37	n=74		
Post op complication	No	29 (78.4)	14 (37.8)	43 (58.1)	12.499	0.002*
	Bleeding	4 (10.8)	12 (32.4)	16 (21.6)		
	Pain	4 (10.8)	11 (29.7)	15 (20.3)		
1st week	Bleeding	0 (0)	6 (16.2)	6 (8.1)		<0.001*
	Mild pain	0 (0)	9 (24.3)	9 (12.2)		
	No pain	37 (100)	22 (59.5)	59 (79.7)	18.814	
3rd week	Bleeding	0 (0)	0 (0)	0 (0)	6.529	0.011*
	Mild pain	0 (0)	6 (16.2)	6 (8.1)		
	No pain	37 (100)	31 (83.8)	68 (91.9)		

The duration of hospital stay post procedures was found to be lesser in banding group compared to hemorrhoidectomy group with p value being statistically highly significant (p<0.001) as denoted in Table 3 and the level of pain felt by the patients post operatively for first three consecutive days was significantly lesser in banding group compared to hemorrhoidectomy group with p value again being statistically highly significant (p<0.001) as denoted in Table 4.

Table 3. Distribution of groups according to period of stay

Period of stay (days)	Procedure		Total n=74	Chi-square value	P value
	Banding n=37	Hemorrhoidectomy n=37			
<2	26 (70.3)	7 (18.9)	33 (44.6)		
2-4	11 (29.7)	20 (54.1)	31 (41.9)		
4-6	0 (0)	10 (27)	10 (13.5)	23.552	<0.001*

Table 4. Distribution of groups according to pain score

Pain score	Procedure	Mean	Std. Deviation	T value	P value
Day 1	Banding	2.68	1.473	-10.311	
	Hemorrhoidectomy	5.95	1.246		<0.001*
Day 2	Banding	0.59	0.896	-13.014	
	Hemorrhoidectomy	3.65	1.111		<0.001*
Day 3	Banding	0	0	-15.067	
	Hemorrhoidectomy	1.59	0.644		<0.001*

Discussion

Considering the modalities for management of hemorrhoids, there is no single best treatment since there are wide range of options available depending on the symptom and grading of hemorrhoids. Safety of the patient and the modality of treatment used in treating non-life threatening hemorrhoids is of prime importance. Many clinical studies have employed rubber band ligation procedure in comparison with other treatment modalities or as standalone procedure [11]. When it comes to the success rate of rubber band ligation technique, various studies have shown an average rate of about 75% and the highest being 92% [12,13]. In our study the overall success rate was around 78% (29/37 patients in banding group).

Lu et al. [14] in their study reported after two months follow up that among second degree patients, 92% did not show any residual symptoms while it was 76% among third degree patients. Compared to the present study, after third week follow up, there was no residual symptoms among banding group while 16% of patients among open hemorroidectomy group had residual symptoms. In a systematic review involving 39 studies indulging 8060 patients where banding procedure was done, 5.8% suffered from severe pain, 1.7% suffered from hemorrhage and 0.05% suffered from infection [15] while Lu et al. [14] observed that mild to moderate pain was appreciated by only 41% of patients after 24 to 48 hours initial treatment which is quite high compared to the present study where only 20% experienced pain post operatively in both the groups. Our study results was same as Vinayak et al study which again showed pain among 20% of their study subjects deploying ligation procedure [16].

Bleeding post ligation procedure was primarily due to falling off of the hemorrhoids and local inflammation of tissues. In Vinayak et al (16) study only 10% reported bleeding while study conducted by Lu et al. [14] and El Nakeeb et al. [13] study reported 2% and 4% of bleeding post banding procedure. In the present study among banding group only 4 out of 37 patients (10%) reported bleeding post operatively while there were zero reporting of any bleeding after first and third week review of the patients. When compared to the number

of hospitalization and early return to duty few studies are in par with our study where around 85% of patients returned back to duty around a week's stay at hospital among which nearly half of the patients (44%) had stayed less than three days in hospital post treatment [17,18].

Conclusion

Rubber band ligation is very simple, safe, effective outpatient procedure that can be performed for grade II hemorrhoids. It generally requires fewer expertise and instruments. It is found to improve the symptoms of the patients and making them sustain a good quality of life since it has minimal complications while preserving the anorectal anatomy and the anal sphincter. Comparatively it is found to have good outcome and cost effective when considered with other treatment modalities. It has got lesser prevalence of recurrence and good success rate after the first session itself.

Ethical Approval

The institutional ethics committee approval obtained No.375/IEC-33/IGMCRI/PP-09/2022

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Bernal JC, Enguix M, Lopez Garcia J, Garcia Romero J, Trullenque Peris R. Rubber-band ligation for hemorrhoids in a colorectal unit. A prospective study. Rev Esp Enferm Dig. 2005;97(1):38-45.
2. Lohsiriwat V. Treatment of hemorrhoids: a coloproctologist's view. World J Gastroenterol. 2015;21:9245–52.
3. Hollingshead JR, Phillips RK. Haemorrhoids: modern diagnosis and treatment. Postgrad Med J. 2016;92:4–8.
4. Hulme-Moir M, Bartolo DC. Hemorrhoids. Gastroenterol Clin North Am 2001;30(1):183–97.
5. MacRae HM, McLeod RS. Comparison of hemorrhoidal treatment modalities. A meta-analysis. Dis Colon Rectum 1995;38:687–694
6. Madoff RD, Fleshman JW. American Gastroenterological Association technical review on the diagnosis and treatment of hemorrhoids. Gastroenterology 2004;126:1463–1473.
7. Bleday R, Pena JP, Rothenberger DA, Goldberg SM, Buls JG. Symptomatic hemorrhoids: current incidence and complications of operative therapy. Dis Colon Rectum 1992;35:477–481.
8. Iyer VS, Shrier I, Gordon PH. Long-term outcome of rubber band ligation for symptomatic primary and recurrent internal hemorrhoids. Dis Colon Rectum. 2004;47(8):1364-70.

9. Pezzullo A, Palladino E. [Rubber band ligation of hemorrhoids. 5-year follow-up]. G Chir. 2000;21(5):253-6.
10. Bat L, Melzer E, Koler M, Dreznick Z, Shemesh E. Complications of rubber band ligation of symptomatic internal hemorrhoids. Dis Colon Rectum 1993;36:287–290.
11. Gagloo MA, Hijaz SW, Nasir SA, Reyaz A, Bakshi IH, Chowdary NA, et al. Comparative study of hemorrhoidectomy and rubber band ligation in treatment of second and third degree hemorrhoids in Kashmir. Indian J Surg. 201375:356–60.
12. Hollingshead JR, Phillips RK. Haemorrhoids: modern diagnosis and treatment. Postgrad Med J. 2016;92:4–8.
13. El Nakeeb AM, Fikry AA, Omar WH, Fouda EM, El Metwally TA, Ghazy HE, et al. Rubber band ligation for 750 cases of symptomatic hemorrhoids out of 2200 cases. World J Gastroenterol. 2008;14:6525–30.
14. Lu LY, Zhu Y, Sun Q. A retrospective analysis of short and long term efficacy of RBL for hemorrhoids. Eur Rev Med Pharmacol Sci. 2013;17:2827–30.
15. Wechter DG, Luna GK. An unusual complication of rubber band ligation of hemorrhoids. Dis Colon Rectum. 1987;30:137–40.
16. Nikam, Vinayak & Deshpande, Aparna & Chandorkar, Iti & Sahoo, Siddharth. A prospective study of efficacy and safety of rubber band ligation in the treatment of Grade II and III hemorrhoids – a western Indian experience. Journal of Coloproctology. 2018.38. 10.1016/j.jcol.2018.03.006.
17. Forlini A, Manzelli A, Quaresima S, Forlini M. Long-term result after rubber band ligation for haemorrhoids. Int J Colorectal Dis. 2009;24:1007–10.
18. McKenzie L, de Verteuil R, Cook J, Shanmugam V, Loudon M, Watson AJ, et al. Economic evaluation of the treatment of grade II haemorrhoids: a comparison of stapled haemorrhoidopexy and rubber band ligation. Colorectal Dis. 2010;12:587–93

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 658–668, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.003

ORIGINAL ARTICLE

Prevalence of ESKAPE pathogens and Antibiotic Susceptibility Status in Skin and Soft Tissue Infections from a tertiary care teaching hospital in South India

Rahil Pasha S A,[1,*] Bharathi R,[1] Arvind Natarajan[2] and Bindu Madhavi[3]

[1]*Assistant Professor, Department of Microbiology, Sri Devraj URS Medical College, Tamaka, Kolar, Karnataka 563101*
[2]*Professor & Head, Department of Microbiology, Sri Devraj URS Medical College, Tamaka, Kolar, Karnataka 563101*
[3]*Associate Professor, Department of Microbiology, Sri Devraj URS Medical College, Tamaka, Kolar, Karnataka 563101*

Accepted: 10-May-2024 / Published Online 08-July-2024

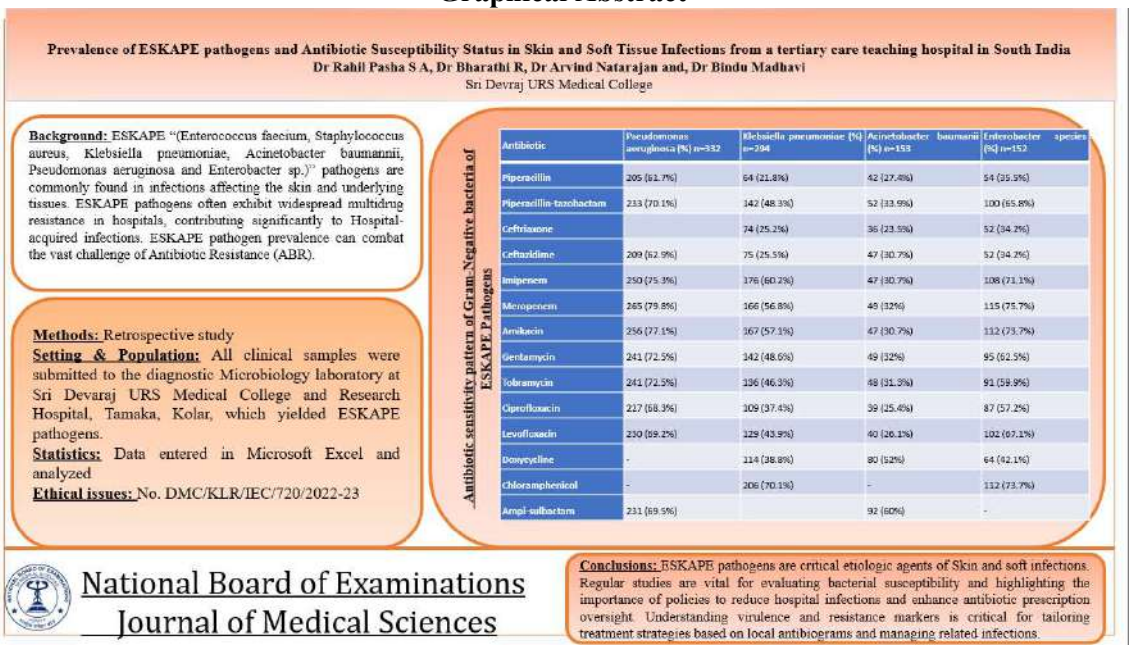
Abstract

Background: ESKAPE "(*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter* sp.)" pathogens are commonly found in infections affecting the skin and underlying tissues. ESKAPE pathogens often exhibit widespread multidrug resistance in hospitals, contributing significantly to Hospital-acquired infections. ESKAPE pathogen prevalence can combat the vast challenge of Antibiotic Resistance (ABR). **Materials and Methods:** "The microbiological statistics of ESKAPE infections and sensitivity between January 2020 and October 2022 were extracted from the laboratory records and analysed for the bacterial profile and antibiotic sensitivity pattern". **Results:** Out of the 2037 pathogens isolated from Skin and soft tissue infection, 1308 were ESKAPE pathogens accounting for a prevalence of 64.2%. *Staphylococcus aureus* (n=340/1308; 25.99%) was the predominant pathogen followed by *Pseudomonas aeruginosa* (n=332/1308; 25.38%). Among Gram-negative isolates, 29.43% exhibited multidrug resistance (MDR). Carbapenemase was found to be a frequent mechanism of resistance, highest among *Acinetobacter* species (n=99; 64.7%), followed by *Klebsiella pneumoniae* (n=109; 37.07%). Amp C production was seen most commonly in *Enterobacter* species (n=93; 61.2%), followed by *Klebsiella pneumoniae* (n=172; 58.5%) whereas ESBL production was seen in *Enterobacter* species (n=46; 30.03%). **Conclusion:** ESKAPE pathogens are critical etiologic agents of Skin and soft infections. Regular studies are vital for evaluating bacterial susceptibility and highlighting the importance of policies to reduce hospital infections and enhance antibiotic prescription oversight. Understanding virulence and resistance markers is critical for tailoring treatment strategies based on local antibiograms and managing related infections.

Keywords: ESKAPE, MDR, Antimicrobial resistance, soft tissue infections, Ulcer

*Corresponding Author: Rahil Pasha S A
Email: dr.rahilpasha@gmail.com

Graphical Abstract



Introduction

Skin and soft tissue infections (SSTIs) affect the skin, subcutaneous tissues, and associated structures [1]. SSTIs include a wide variety of infections, ranging from localized and superficial to deep and invasive infections, including "impetigo or ecthyma, to severe, life-threatening infections, such as necrotising fasciitis" [2,3].

ESKAPE pathogens are among the most prevalent bacteria causing skin and soft tissue infections [4]. ESKAPE pathogens are linked to higher mortality rates and financial expenses [5]. ESKAPE pathogens employ various mechanisms, such as "changing the target (by altering topoisomerase enzymes or ribosomal subunits), reducing drug absorption (by altering outer membrane (OM) proteins), forming biofilms or a protective exo-polysaccharide matrix, producing degrading enzymes (by producing beta(β)-lactamases), overexpressing efflux pumps, or adopting alternative metabolic pathways (by adapting folic acid metabolism) for its pathogenesis and virulence" [6].

Inappropriate antibiotic usage results in increasing antibiotic resistance among the ESKAPE pathogens. The multidrug-resistant ESKAPE pathogens result in delayed healing, increasing mortality rates [7]. Resistance mechanisms have been developed by ESKAPE pathogens against a variety of antibiotics, including "Carbapenems, Glycopeptides, Macrolides, Fluoroquinolones, Tetracyclines, β-lactams, and combinations of β-lactam and β-lactamase inhibitors" [8]. The rise in antimicrobial resistance has reduced skin and soft tissue infection treatment options.

In the current scenario, monitoring resistance patterns among ESKAPE pathogens worldwide is the need of the hour. The local data regarding the antimicrobial susceptibility pattern is limited.

The purpose of the study is to determine the frequency of skin and soft

tissue infections among the Kolar population, as well as the pattern of antibiotic resistance displayed by ESKAPE bacteria.

Materials and Methods

A retrospective study was carried out from 2020 to 2022 at Sri Devaraj Urs Medical College in Kolar in the Department of Microbiology. Regardless of age or gender, patients from critical areas and OPD who had been diagnosed with SSTIs were included. This study excluded patients with infected burns, those on previous antibiotic therapy, and those hospitalised for longer than three days. The bacterial isolates from clinical samples (pus, wound swab, tissue) collected from SSTIs were processed per standard operating procedures in Bacteriology. Colony characteristics, gram stain, and standard biochemical tests identified the bacterial isolates [9].

Antibiotic Susceptibility Testing

"The Kirby Bauer disk diffusion technique was used to identify the antibiotic susceptibility pattern of bacterial isolates". The Broth culture of the test organism matching 0.5 Mc Farland Standard was streaked on the Muller Hinton agar (MHA) plate. Antibiotic disc panels were used based on CLSI guidelines [10]. The MHA plates were incubated for 18 hours at 37^0C, and the antibiotic susceptibility was recorded as sensitive and resistant per CLSI guidelines [10].

Detection of Resistance Mechanisms

"Multi-drug resistance (MDR), Extended Spectrum β-Lactamase (ESBL) was detected by Phenotypic disc confirmatory test, The AmpC Disk test detected AmpC β-Lactamase."

Multi-drug resistance (MDR)

"MDR (multidrug-resistant) refers to the acquired resistance of a microorganism to at least one drug in three or more antimicrobial groups. In this study, a Gram-negative bacterium was classified as MDR if it exhibited resistance to antibiotics from the β-lactam, aminoglycoside, and quinolone families" [11,12].

Detection of ESBL by Disk diffusion test (DDT)

"Cefotaxime (30µg) or Ceftazidime disks (30µg) with and without clavulanate (10µg) were used. A difference of ≥5mm between the zone diameters of either cephalosporin disks and their respective cephalosporin/clavulanate disk was considered phenotypic confirmation of ESBL production." [11, 12]

Modified Amp C Disc method

"A lawn of ATCC 25922 E. coli was made on an MHA plate, a 30-µg of cefoxitin disk and a sterile filter paper disk (called an Amp C disk) were placed adjacent, and 10 µl of enzyme extract was added to Amp C disk and plate was incubated aerobically for 18 to 24 hours at 37^0C. Indentation of the cefoxitin-sensitive zone near the Amp C disk was considered as Amp C production, and no distortion was considered Amp C nonproducer" [11,12].

Results

A total No of 2037 Organisms grown from skin and soft tissue infection during the study period - January 2020 to October 2022 of these ESKAPE pathogens were 1308 **(**64.2%) (Figure 1 and Table 1).

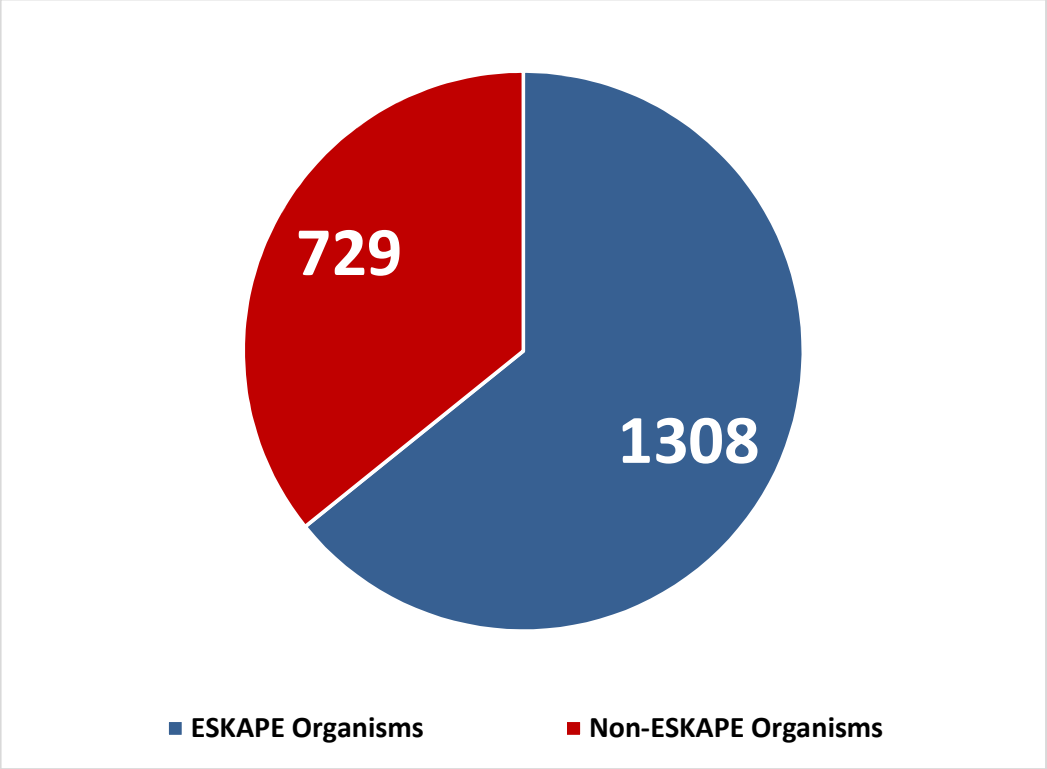


Figure 1. Prevalence of ESKAPE Organisms

Table 1. Distribution of ESKAPE pathogens (n=1308)

Organism	**Percentage (%)**
Staphylococcus aureus	340 (25.99%)
Pseudomonas aeruginosa	332 (25.38%)
Klebsiella pneumoniae	294 (22.48%)
Acinetobacter baumannii	153 (11.7%)
Enterobacter species	152 (11.62%)
Enterococcus faecium	37 (2.83%)

The most common organism among ESKAPE pathogens was *Staphylococcus aureus* 340 (25.99%), followed by *Pseudomonas aeruginosa* 332 (25.38%), *Klebsiella pneumoniae* 294 (22.48%), *Acinetobacter baumannii* 153(11.70), *Enterobacter species* 152 (11.62%) and *Enterococcus faecium* 37(2.83) (Table 2).

Table 2. Antibiotic sensitivity pattern of Gram-Positive bacteria of ESKAPE Pathogens

Antibiotic	***Staphylococcus aureus* (%) n=340**	***Enterococcus faecium* (%) n=37**
Penicillin	38 (11.2)	2 (5.4)
Amoxicillin-clavulanic acid	153 (45)	-
Cefoxitin	157 (46.8)	-
Cotrimoxazole	237 (69.7)	-
Gentamycin	216 (63.5)	-
Ciprofloxacin	70 (20.5)	-
Tetracycline	303 (89.1)	6 (16.2)
Doxycycline	282 (82.9)	8 (21.6)
Chloramphenicol	307 (90.2)	20 (54.1)
Clindamycin	216 (63.5)	-
Erythromycin	119 (35)	8 (21.6)
Linezolid	339 (99.7)	30 (81.1)
Vancomycin	340 (100)	30 (81.1)
Levofloxacin	-	8 (21.6)
High-level gentamycin	-	14 (37.8)

The most common gram-positive organism among ESKAPE pathogens was *Staphylococcus aureus* 340(25.99%), followed by *Enterococcus faecium* 37 (2.83). *Staphylococcus aureus* was more sensitive to Vancomycin (n=340; 100%), followed by Linezolid (n=339; 99.70%). 18.9% (n= 7) of Enterococcus species were Vancomycin-resistant (VRE). MRSA was detected at (n=195; 57.35%) and was sensitive to Vancomycin (n=195; 100%) and Linezolid (n=180; 92.30%) (Table 3).

Table 3. Antibiotic sensitivity pattern of Gram-Negative bacteria of ESKAPE Pathogens

Antibiotic	***Pseudomonas aeruginosa* (%) n=332**	***Klebsiella pneumoniae* (%) n=294**	***Acinetobacter baumanii* (%) n=153**	***Enterobacter species* (%) n=152**
Piperacillin	205 (61.7%)	64 (21.8%)	42 (27.4%)	54 (35.5%)
Piperacillin-tazobactam	233 (70.1%)	142 (48.3%)	52 (33.9%)	100 (65.8%)
Ceftriaxone		74 (25.2%)	36 (23.5%)	52 (34.2%)
Ceftazidime	209 (62.9%)	75 (25.5%)	47 (30.7%)	52 (34.2%)
Imipenem	250 (75.3%)	176 (60.2%)	47 (30.7%)	108 (71.1%)
Meropenem	265 (79.8%)	166 (56.8%)	49 (32%)	115 (75.7%)
Amikacin	256 (77.1%)	167 (57.1%)	47 (30.7%)	112 (73.7%)
Gentamycin	241 (72.5%)	142 (48.6%)	49 (32%)	95 (62.5%)
Tobramycin	241 (72.5%)	136 (46.3%)	48 (31.3%)	91 (59.9%)
Ciprofloxacin	227 (68.3%)	109 (37.4%)	39 (25.4%)	87 (57.2%)
Levofloxacin	230 (69.2%)	129 (43.9%)	40 (26.1%)	102 (67.1%)
Doxycycline	-	114 (38.8%)	80 (52%)	64 (42.1%)
Chloramphenicol	-	206 (70.1%)	-	112 (73.7%)
Ampi-sulbactam	231 (69.5%)		92 (60%)	-

The most common gram-negative organism among ESKAPE pathogens was *Pseudomonas aeruginosa* 332 (25.38%), followed by *Klebsiella pneumoniae* 294 (22.48%), *Acinetobacter baumannii* 153 (11.70), *Enterobacter species* 152 (11.62%). *Pseudomonas aeruginosa* was more sensitive to Meropenem (n=265; 79.8%) followed by Amikacin (n=256; 77.10%). *Klebsiella pneumoniae* was more sensitive to Chloramphenicol (n=206; 70.06%) and Imepenem (n=176; 60.20% each). *Acinetobacter baumannii* was more sensitive to Ampi-sulbactam (n=92; 60%), followed by Doxycycline (n=80; 52%) (Tables 4 and 5).

Table 4. "Shows *Staphylococcus* strains to produce iMSLB (inducible macrolide streptogramin b lincosamide resistance) and cMSLB (constitutive macrolide streptogramin b lincosamide resistance)"

	No of Isolates (n=340)	**Percentage (%)**
iMSLB	18	5.29
cMSLB	132	38.82
Total	137	40.29

In our study, 18 (5.29%) *Staphylococcus aureus* isolates were iMSLB, and 132 (38.82%) were cMSLB (Table 5).

Table 5. Distribution of MDR phenotypes

Organism	**No of Isolates**	**Percentage (%)**
***Klebsiella pneumoniae* (n=294)**	105	35.71
***Acinetobacter baumanii* (n=153)**	92	60.13
***Pseudomonas aeruginosa* (n=332)**	45	13.56
***Enterobacter species* (n=152)**	32	21.05
Total (n=931)	274	29.43

Among ESKAPE pathogens obtained from Skin and Soft tissue infections, 29.43% (n=274/931) displayed multidrug resistance. Leading the list was *Acinetobacter baumannii (n=92; 60.13%)*, followed by *Klebsiella pneumoniae* at 35.71% (Table 6).

Table 6. Beta-lactamase production among Gram-negative isolates

	Klebsiella Pneumoniae **(n=294)**	***Acinetobacter baumanii*** **(n=153)**	***Pseudomonas aeruginosa*** **(n=332)**	***Enterobacter species*** **(n=152)**
ESBL	2 (0.68%)	-	-	46 (30.3)
AmpC	172 (58.5%)	-	-	93 (61.2)
Carbapenemase	109 (37.07)	99 (64.7%)	41 (12.3%)	35 (23.0)

Carbapenemase was found to be a frequent mechanism of resistance, highest among *Acinetobacter* species (n=99; 64.7%), followed by *Klebsiella pneumoniae* (n=109; 37.07%). Amp C production was seen most commonly in *Enterobacter* species (n=93; 61.2%), followed by *Klebsiella pneumoniae* (n=172; 58.5%) whereas ESBL production was seen in *Enterobacter* species (n=46; 30.03%).

Discussion

ESKAPE pathogens are exhibiting a rising resistance to numerous antibiotics, primarily due to improper use and excessive consumption of these medications. Inherent factors such as increased efflux pump activity, elevated biofilm formation, and diminished cell wall permeability in resistant bacteria hinder the efficacy of drugs. The pathogens also obtain resistance via horizontal gene transfer and plasmids. The diminishing effectiveness of antibiotics presents a significant threat, underscoring the imperative to prioritise the development of novel drugs, advance therapeutic approaches, and enhance education concerning ESKAPE pathogens.

According to our analysis, as shown in Figure 1, 64.2% (n=1308) of our region's pathogens are ESKAPE. This is in line with research by Masoud SS et al. on the "Extent and Resistance Patterns of ESKAPE Pathogens Isolated in Pus Swabs from Hospitalized Patients", which found that 68.4% of the pathogens were ESKAPE [15].

Staphylococcus aureus remained the most frequent isolated ESKAPE pathogen at 25.99% (n=340), with *Pseudomonas aeruginosa* following at 25.38% (n=332) and *Klebsiella pneumoniae* at 22.48% (294). Dinda V et al. conducted a study at Aga Khan University Hospital and found that among ESKAPE pathogens, *S. aureus* was the most often discovered bacterium. In contrast, *P. aeruginosa* was found to be the most common drug-resistant bacterium at 16.3% (n = 24/147), followed by *S. aureus* at 12.2% (n = 18/147) and *K. pneumoniae* at 10.8% (n = 16/147) in Manyahi et al.'s study on surgical site infections in Tanzania [16,17].

Staphylococcus aureus displayed the highest sensitivity to Vancomycin (100%) and Linezolid (99.70%). The prevalence of MRSA in our study was at (n=195; 57.35%) and these isolates were

sensitive to Vancomycin (n=195; 100%) and Linezolid (n=180; 92.30%). MRSA prevalence in surgical site infections (SSI) ranged from 15.7% to 63.5% in Indian studies [18]. Our results align with Bhattacharya et al. study on MRSA-related SSI, where *Staphylococcus aureus* exhibited similarly high sensitivity to Vancomycin and Linezolid (100%), with a prevalence of 25.45% [19].

In our study, *Pseudomonas aeruginosa* (25.38%) emerged as the most prevalent gram-negative organism among ESKAPE pathogens causing surgical site infections (SSI), followed by *Klebsiella pneumoniae* (22.48%) and *Acinetobacter* species (11.70%). *Acinetobacter* species exhibited the highest resistance to various antibiotic groups, aligning with Masoud SS et al.'s study titled "Extent and Resistance Patterns of ESKAPE Pathogens Isolated in Pus Swabs from Hospitalized Patients." where *Pseudomonas aeruginosa* was shown to be the most frequent gram-negative bacterium responsible for SSI in their investigation; both *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* showed signs of increased resistance [15].

In our study, 18/340 (5.29%) *Staphylococcus aureus* isolates demonstrated inducible clindamycin resistance (iMSLB), which is in line with the results of Assefa M et al.'s investigation on "Inducible Clindamycin-Resistant *Staphylococcus aureus* Strains in Africa". *S. aureus* had an overall incidence of inducible clindamycin resistance of 19.8%, with a range of 2.9% to 44.0% [20].

According to our study, 29.43% of ESKAPE pathogens were multidrug resistant. *Acinetobacter baumannii (n=92; 60.13%)*, was leading followed by *Klebsiella pneumoniae* at (n=105; 35.71%). In contrast, a study by Foschi D et al. on "Surgical Site Infections caused by multi-drug resistant organisms" reported a higher prevalence of multidrug resistance at 47% [21]. Carbapenemase was found to be a frequent mechanism of resistance, highest among *Acinetobacter* species (n=99; 64.7%), followed by *Klebsiella pneumoniae* (n=109; 37.07%). Amp C production was seen most commonly in *Enterobacter* species (n=93; 61.2%), followed by *Klebsiella pneumoniae* (n=172; 58.5%) whereas ESBL production was seen in *Enterobacter* species (n=46; 30.03%). A study by Mora-Guzmán et al. on Surgical site infection by carbapenemase-producing Enterobacteriaceae reported that carbapenemase-producing bacteria causing SSI accounted for 74.3% [22]. In contrast, a study by Dubinsky-Pertzov et al. on "Extended-spectrum Beta-lactamase-producing Enterobacteriaceae and the Risk of Surgical Site Infection" revealed a lower prevalence, with ESBL-producing bacteria causing SSI at 15.75% [23].

Limitation of Study

Clinical data and outcomes were not taken in our study. Furthermore, antimicrobial susceptibility testing was conducted solely using the Kirby-Bauer method instead of the more sensitive micro-dilution method.

Conclusion

This study underscores the significance of ESKAPE pathogens in skin and soft tissue infections, highlighting challenges from their substantial antimicrobial resistance and heightened virulence. The implications include prolonged illnesses, treatment failures, increased healthcare costs, and elevated mortality risks from MDR/XDR/PDR

strains in human infections. The persistent unnecessary prescription of antimicrobials, especially broad-spectrum ones, despite effective alternatives, is concerning. The research emphasizes the urgent need for regulatory authorities to implement measures limiting over-the-counter sales of antimicrobials and addressing their irrational use to curb the emergence of multi-drug resistant strains.

Ethical Approval

Ethical approval obtained from Sri Devaraj Urs Medical College in Kolar in the Department of Microbiology

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Sartelli, M., Coccolini, F., Kluger, Y. et al. WSES/GAIS/WSIS/SIS-E/AAST global clinical pathways for patients with skin and soft tissue infections. World J Emerg Surg 2022;17:3.
2. Ki V, Rotstein C. Bacterial skin and soft tissue infections in adults: A review of their epidemiology, pathogenesis, diagnosis, treatment and site of care. Can J Infect Dis Med Microbiol. 2008;19(2):173-84.
3. https://doi.org/10.1128/microbiolspec.DMIH2-0014-2015
4. Vale de Macedo GHR, Costa GDE, Oliveira ER, Damasceno GV, Mendonça JSP, Silva LDS, Chagas VL, Bazán JMN, Aliança ASDS, Miranda RCM, Zagmignan A, Monteiro AS, Nascimento da Silva LC. Interplay between ESKAPE Pathogens and Immunity in Skin Infections: An Overview of the Major Determinants of Virulence and Antibiotic Resistance. Pathogens. 2021;10(2):148
5. Ma YX, Wang CY, Li YY, Li J, Wan QQ, Chen JH, Tay FR, Niu LN. Considerations and Caveats in Combating ESKAPE Pathogens against Nosocomial Infections. Adv Sci (Weinh). 2019;7(1):1901872. doi: 10.1002/advs.201901872.
6. Arbune M, Gurau G, Niculet E, Iancu AV, Lupasteanu G, Fotea S, Vasile MC, Tatu AL. Prevalence of Antibiotic Resistance of ESKAPE Pathogens Over Five Years in an Infectious Diseases Hospital from South-East of Romania. Infect Drug Resist. 2021;14:2369-2378. doi: 10.2147/IDR.S312231.
7. Zhen, X., Lundborg, C.S., Sun, X. et al. Economic burden of antibiotic resistance in ESKAPE organisms: a systematic review. Antimicrob Resist Infect Control 2019;8:137.
8. David M. P. De Oliveiraa, B, Brian M. Forde, Timothy J. Kidda,b, Patrick N. A. Harrisb,c, Mark A. Schembri. Antimicrobial Resistance in ESKAPE Pathogens. Clin Microbiol. Rev. 2020;33(3).
9. Indian council of Medical Research. Antimicrobial Resistance Surveillance and Research. New Delhi: Division of Publication and Information on behalf of the Secretary, DHR and Director General; 2019.
10. CLSI. Performance Standards for Antimicrobial Susceptibility Testing. 28th ed. CLSI supplement M100. Wayne, PA: Clinical and Laboratory Standards Institute; 2018.
11. J G Collee, W Marr. Specimen collection, culture containers, and media. In: Mackie and McCartney Practical Medical Microbiology. 14th

edition. JG Collee, AG Fraser, 113 BP Marmion, A Simmons, editors. Churchill Livingstone, Gurgaon Haryana;2014:95-100

12. Clinical and Laboratory Standards Institute (CLSI). M100-S24. Performance standards for antimicrobial susceptibility testing; 24th informational supplement: Wayne, PA: CLSI; 2014.
13. Tanwar, J, Das, S, Fatima, Z, Hameed, S. Multidrug resistance: an emerging crisis. Interdiscip. Perspect. Infect. Dis. 2014;541340:1–7.
14. Moradigaravand D, Palm M, Farewell A, Mustonen V, Warringer J, Parts L. Prediction of antibiotic resistance in Escherichia coli from large-scale pan-genome data. PLoS Comput Biol 2018;14:e1006258.
15. Masoud SS, Kovacevich A, Gangji R, Nyawale H, Nyange M, Ntukula A. Extent and Resistance Patterns of ESKAPE Pathogens Isolated in Pus Swabs from Hospitalized Patients. Can J Infect Dis Med Microbiol. 2022;31:3511306. doi: 10.1155/2022/3511306.
16. Dinda V, Gunturu R, Kariuki S, Hakeem A, Raja A, Kimang'a A. Pattern of pathogens and their sensitivity isolated from surgical site infections at the Aga Khan University Hospital, Nairobi, Kenya. Ethiop J Health Sci. 2013;23(2):141-9.
17. Manyahi J. Predominance of multi-drug resistant bacterial pathogens causing surgical site infections in Muhimbili National Hospitals, Tanzania. BMC Research Notes. 2014;7.
18. Negi V, Pal S, Juyal D, Sharma MK, Sharma N. Bacteriological profile of surgical site infections and their antibiogram: a study from resource constrained rural setting of Uttarakhand state, India. J Clin Diagn Res. 2015;9(10):17–20.
19. Bhattacharya S, Pal K, Jain S, Chatterjee SS, Konar J. Surgical Site Infection by Methicillin-Resistant Staphylococcus aureus- on Decline? J Clin Diagn Res. 2016;10(9):DC32-DC36. doi: 10.7860/JCDR/2016/21664.8587.
20. Assefa M. Inducible Clindamycin-Resistant Staphylococcus aureus Strains in Africa: A Systematic Review. Int J Microbiol. 2022;19;2022:1835603. doi: 10.1155/2022/1835603.
21. Foschi D, Yakushkina A, Cammarata F, Lamperti G, Colombo F, Rimoldi S, Antinori S, Sampietro GM. Surgical site infections caused by multi-drug resistant organisms: a case-control study in general surgery. Updates Surg. 2022;74(5):1763-1771. doi: 10.1007/s13304-022-01243-3.
22. Mora-Guzmán I, Rubio-Perez I, Maqueda González R, Domingo Garcia D, Martín-Pérez E. Surgical site infection by carbapenemase-producing Enterobacteriaceae. A challenge for today's surgeons. Cir Esp (Engl Ed). 2020;98(6):342-349. doi: 10.1016/j.ciresp.2019.11.006.
23. Dubinsky-Pertzov B, Temkin E, Harbarth S, Fankhauser-Rodriguez C, Carevic B, Radovanovic I, Ris F, Kariv Y, Buchs NC, Schiffer E, Cohen Percia S, Nutman A, Fallach N, Klausner J, Carmeli Y; R-GNOSIS WP4 Study Group. Carriage of Extended-spectrum Beta-lactamase-producing Enterobacteriaceae and the Risk of Surgical Site Infection After Colorectal Surgery: A Prospective Cohort Study. Clin Infect Dis. 2019; 2;68(10):1699-1704. doi: 10.1093/cid/ciy768.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 669–677, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.004

ORIGINAL ARTICLE

Birth Preparedness and Complication Readiness Among Rural Pregnant Women of Tamilnadu: A Cross Sectional Study

Rajsri Thuthikadu Rajasekaran,[1,]* Srimadhi Muthaiyan[1] and Preethi Selvaraj[2]

[1]*Assistant Professor, Department of Community Medicine, Faculty of Medicine, Sri Lalithambigai Medical College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamilnadu*
[2]*Associate Professor, Department of Community Medicine, Faculty of Medicine, Sri Lalithambigai Medical College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamilnadu*

Accepted: 17-April-2024 / Published Online 08-July-2024

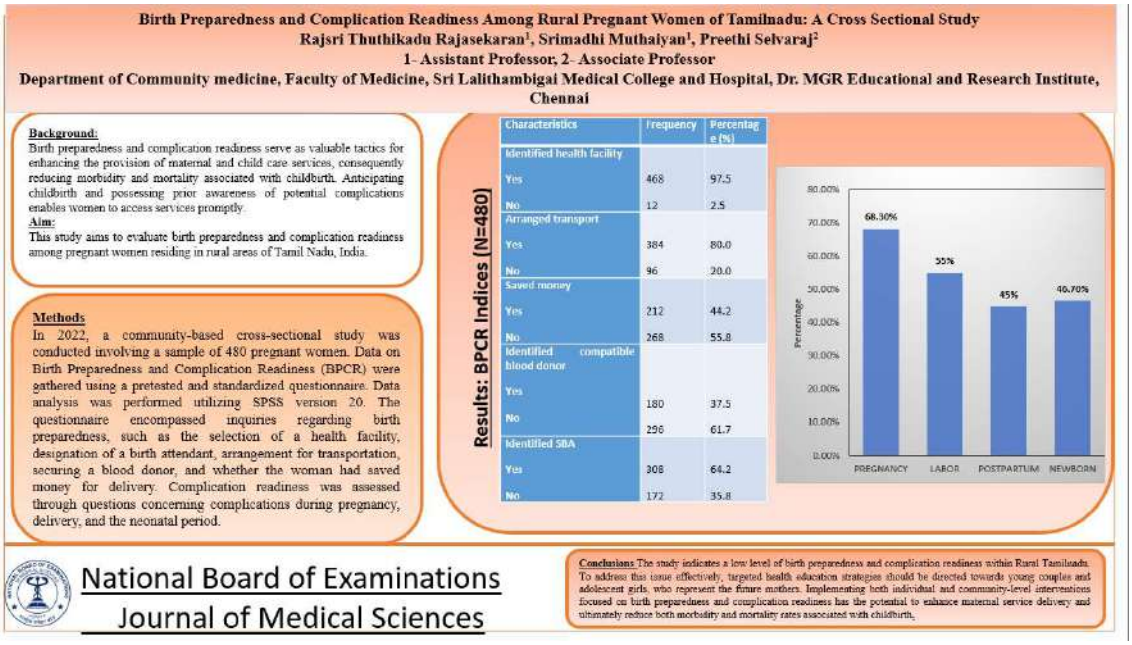
Abstract

Background: Birth preparedness and complication readiness serve as valuable tactics for enhancing the provision of maternal and child care services, consequently reducing morbidity and mortality associated with childbirth. Anticipating childbirth and possessing prior awareness of potential complications enables women to access services promptly. **Methods:** In 2022, a community-based cross-sectional study was conducted involving a sample of 480 pregnant women. Data on Birth Preparedness and Complication Readiness (BPCR) were gathered using a pretested and standardized questionnaire. Data analysis was performed utilizing SPSS version 20. The questionnaire encompassed inquiries regarding birth preparedness, such as the selection of a health facility, designation of a birth attendant, arrangement for transportation, securing a blood donor, and whether the woman had saved money for delivery. Complication readiness was assessed through questions concerning complications during pregnancy, delivery, and the neonatal period. **Results:** Out of the 480 pregnant women included in the study, 30.8% were classified as belonging to the upper middle class. Additionally, 55% of the participants had experienced multiple pregnancies, while 74.2% were identified as being in their third trimester. Furthermore, 70% of the women had undergone their initial Antenatal Care (ANC) checkup before reaching 12 weeks of gestation. Despite these demographics, the study found a general lack of awareness regarding Birth Preparedness and Complication Readiness (BPCR) among the participants. **Conclusion:** The study indicates a low level of birth preparedness and complication readiness within Rural Tamilnadu. To address this issue effectively, targeted health education strategies should be directed towards young couples and adolescent girls, who represent the future mothers. Implementing both individual and community-level interventions focused on birth preparedness and complication readiness has the potential to enhance maternal service delivery and ultimately reduce both morbidity and mortality rates associated with childbirth.

Keywords: Pregnancy, Maternal Health Services, Birth Preparedness, Obstetric Labor Complications, Health Education, Health Knowledge, Attitudes, Practice

*Corresponding author: Rajsri Thuthikadu Rajasekaran
Email: rsri34@gmail.com

Graphical Abstract



Introduction

Maternal mortality remains a significant global concern, particularly accentuated in developing nations [1]. Trend analysis between 2000 to 2020 estimated 287,900 maternal deaths occurred annually across 180 countries, with a majority concentrated in developing regions [2]. Complications arising from pregnancy and childbirth stand as the primary causes of mortality among women of reproductive age in both India and worldwide [3]. The lack of access to skilled attendants and emergency care significantly contributes to these fatalities [4]. Despite India's status as a developing country, maternal care services are provided free of charge in the public sector [5]. However, a survey conducted by the National Sample Survey Organization in 2004 revealed that 80% of households bore the financial burden of maternal healthcare services, with private sector services costing four times more than those in the public sector [6]. Birth preparedness entails encouraging individuals to take appropriate measures during pregnancy, ensuring the presence of a skilled care provider during childbirth [7]. Complication readiness involves raising awareness of danger signs among women, families, and communities, equipping them to respond effectively during emergencies [8]. Birth preparedness and complication readiness (BPCR) encompass the process of planning for normal childbirth while anticipating necessary actions in case of emergencies [9]. Despite various evidence-based interventions implemented under national programs to promote maternal health in India, several small-scale cross-sectional studies conducted in both rural and urban populations have revealed persistent challenges regarding BPCR indicators [10-12]. Against this backdrop, the present study was conducted rural Tamil Nadu, India, aiming to establish a baseline understanding of the BPCR status in the region.

Objectives

This study aims to assess birth preparedness and complication readiness among rural pregnant women in Tamil Nadu, India.

Methods

A community-based, cross-sectional study was conducted between May and October 2022 in rural Tamil Nadu. Institutional Ethical clearance was obtained. The study targeted antenatal women in their second and third trimesters of pregnancy residing within the district. All 480 pregnant women registered within the district were included in the study. Pregnant women who were residents of the area and provided informed consent were eligible for participation, while postnatal women, non-residents, and those who did not provide informed consent were excluded.

Upon obtaining informed consent, a pretested standardized questionnaire was administered through personal interviews. The questionnaire was translated into Tamil, the local language, and back-translated into English to ensure consistency. The first section of the questionnaire collected sociodemographic information, including age, caste (Scheduled Caste, Scheduled Tribe, Other Backward Class [SC/ST/OBC], and General), religion, duration of formal education, occupation, total family income, and parity. The second section focused on birth preparedness, encompassing early registration (gestational age at first ANC visit), number of antenatal checkups, identification of health facilities, availability of transportation, saving money for delivery, identification of compatible blood donors, and designation of skilled birth attendants. The section on complications readiness included questions regarding potential complications during pregnancy, delivery, and neonatal period. Key danger signs were identified for each stage, such as severe vaginal bleeding, swollen hands/face, and blurred vision during pregnancy; severe vaginal bleeding, prolonged labor, convulsions, and retained placenta during labor; and severe vaginal bleeding, foul-smelling vaginal discharge, and high fever during the postpartum period. Key danger signs for neonates included convulsions, difficulty/fast breathing, very small size, lethargy/unconsciousness, and inability to suck/drink during the first 7 days of life.

Data analysis was performed using SPSS Version 20, and the results were expressed in terms of frequency and percentage.

Results

Socio-demographic Profile

Within the cohort of 480 study participants, a majority (47.5%) fell within the age bracket of 20-25 years, with 13.3% being below 20 years old, 24.2% between 26 to 30 years old, and 15% over 30 years old. Regarding caste distribution, 46.7% of participants belonged to Scheduled Caste, 23.3% to the general caste, and 30% to other categories. Among the participants, 96 out of 240 were degree holders, while 33.3% had completed higher secondary education, and 10.8% had primary education. A notable 15.8% of participants were illiterate. Employment status showed that 88.3% of participants were employed, while 11.7% were unemployed. In terms of socioeconomic class, 13.3% were classified as upper class, 30.8% as upper middle class, 30.1% as middle class, 23.3% as lower middle class, and only 2.5% as lower class (Table 1).

Table 1. Sociodemographic profile of the participants (N=480)

Characteristics	Frequency	Percentage (%)
Age		
< 20years	64	13.3
20-25 years	228	47.5
26-30 years	116	24.2
>30 years	72	15.0
Caste		
General	112	23.3
SC/ST	224	46.7
Others	144	30.0
Education		
Illiterate	76	15.8
Up to 8^{th}	52	10.8
8^{th} – 12^{th}	160	33.3
Degree Holder	192	40.1
Occupation		
Employed	56	11.7
Unemployed	424	88.3
Socio economic status		
Upper class	64	13.3
Upper middle class	148	30.8
Middle class	144	30.1
Lower middle class	112	23.3
Lower class	12	02.5

Obstetric profile of the participants

Among the study population, 45% were primigravidae and 55% were multiparous. Distribution across trimesters showed that 7.5% were in the first trimester, 18.3% in the second trimester, and 74.2% in the third trimester. Concerning Antenatal Care (ANC), 70% of ANC mothers had their first check-up and registration before 12 weeks of pregnancy (Table 2).

Birth Preparedness Indices

A significant proportion (97.5%) of study participants had already decided and identified the health facility for their delivery, with only 2.5% yet to decide. Regarding transport arrangements, 80% of participants had made arrangements, while 20% had not. Additionally, 44.2% of subjects had saved money specifically for delivery expenses, and 37.5% had identified a blood donor. Furthermore, 64.2% had identified a skilled birth attendant within their community (Table 3).

Complication Readiness Indices

A considerable percentage (68.3%) of participants were aware of danger signs during pregnancy, while 55% were aware of danger signs during labor. In the postpartum period, 45% were aware of danger signs, and 46.7% were aware of danger signs in newborns (Figure 1).

Table 2. Obstetrics profile of the participants (N=480)

Characteristics	Frequency	Percentage (%)
Parity		
Primi	216	45.0
Multi	264	55.0
Trimester		
First	36	7.5
Second	88	18.3
Third	156	74.2
GA at first ANC		
<12 weeks	336	70.0
>12 weeks	144	30.0

Table 3. BPCR Indices (N=480)

Characteristics	Frequency	Percentage (%)
Identified health facility		
Yes	468	97.5
No	12	2.5
Arranged transport		
Yes	384	80.0
No	96	20.0
Saved money		
Yes	212	44.2
No	268	55.8
Identified compatible blood donor		
Yes	180	37.5
No	296	61.7
Identified SBA		
Yes	308	64.2
No	172	35.8

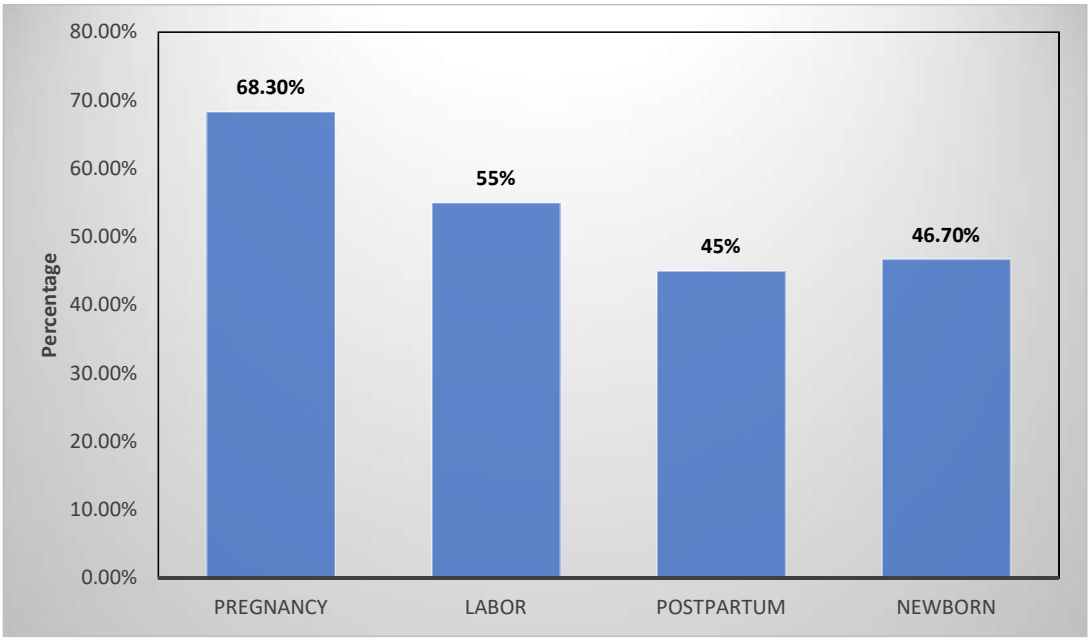


Figure 1. Complication readiness (Awareness regarding danger signs) (N=480)

Government Schemes

The majority (90%) were aware of government financial assistance for pregnant mothers, and 56.7% were aware of the government's free transport scheme for ANC, delivery, and Postnatal Care (PNC) visits. However, only 36.7% were aware of Birth Preparedness and Complication Readiness (BPCR), while 63.3% had not heard of it (Table 4).

Table 4. Awareness regarding government schemes (N=480)

Characteristics	Frequency	Percentage (%)
Government financial assistance		
Aware	432	90.0
Not aware	48	10.0
Government transport scheme		
Aware	272	56.7
Not aware	208	43.3
BPCR		
Aware	176	36.7
Not aware	304	63.3

Discussion

This community-based cross-sectional study aimed to assess the level of birth preparedness and complication readiness (BPCR) among antenatal mothers in rural Tamilnadu. The study findings indicate a poor level of BPCR among the participants, consistent with similar studies conducted in various regions of India. For instance, research by Agarwal et al. [13] among slum dwellers in Indore city reported a BPCR score of 47.8%, while

Acharya et al. [14] found a BPCR of 41% among antenatal women in Delhi. Studies in West Bengal populations also revealed BPCR scores ranging from 34.5% to 49.4% [15,16]. Globally, BPCR levels vary widely, with reports ranging from 16.5% in Ethiopia [17] to 65% in Nepal [18]. These discrepancies may be attributed to factors such as female literacy levels, health-seeking behavior, community empowerment, spouse's education status, and occupation, as well as variations in assessment methodologies.

Numerous studies from India and beyond underscore the significant impact of female literacy on BPCR [8-11]. In the current study, the low level of BPCR may be linked to limited exposure to healthcare providers during early pregnancy. Insufficient knowledge of key danger signs has also been identified as a contributing factor in other studies. Adequate knowledge of danger signs is crucial for early recognition of potentially life-threatening complications and prompt healthcare seeking behavior. Auxiliary Nurse Midwives (ANM) and Accredited Social Health Activists (ASHAs) should play a proactive role in educating expectant mothers and their families about these danger signs during Antenatal Care (ANC) visits.

Furthermore, the study found that women preferring public sector institutions for delivery tended to belong to lower socioeconomic status, possibly due to low awareness of available schemes. Maternal mortality in India is often attributed to maternal anemia and postpartum hemorrhage, highlighting the importance of identifying compatible blood donors and ensuring blood availability during emergencies [3]. Given India's resource-constrained setting, preventive care is crucial, and complications must be anticipated to facilitate timely initiation of appropriate treatment.

This community-based study provides valuable insights into the actual BPCR status within the community. Based on the findings of poor BPCR, targeted health education and awareness programs should be conducted to mitigate maternal mortality.

The study might have a sampling bias if the participants were not randomly selected, which could affect the generalizability of the findings to the entire population of rural pregnant women in Tamil Nadu. Participants might have provided socially desirable responses, leading to overestimation of birth preparedness and complication readiness.

Conclusion

The study revealed a low level of BPCR among participants. Multiparous women with adequate contact with healthcare providers demonstrated better BPCR, indicating the importance of knowledge acquisition. Field workers such as ASHAs and ANMs should be encouraged to educate women and their families about BPCR. Adolescent girls and newly married couples should be specifically targeted for BPCR advice, as they represent future mothers in need of essential knowledge and preparation.

Statements and Declarations

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

Ethical approval

The study was approved by Institutional Ethical Committee

References

1. Souza JP, Day LT, Rezende-Gomes AC, Zhang J, Mori R, Baguiya A, Jayaratne K, Osoti A, Vogel JP, Campbell O, Mugerwa KY. A global analysis of the determinants of maternal health and transitions in maternal mortality. The Lancet Global Health. 2024;1:12(2):e306-16.
2. World Health Organization. Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division: executive summary.
3. Balsarkar G. Mothers Shouldn't Die: Significant Decline in Maternal Mortality in India. The Journal of Obstetrics and Gynecology of India. 2023;73(2):99-101.
4. Iyengar S, Dholakia R, Bajpai N. Factors Impacting Quality of Skilled Birth Attendant Services in Rural India. Journal of Health Management. 2024;19:09720634241229557.
5. Kamath R, Brand H, Nayak N, Lakshmi V, Verma R, Salins P. District-Level Patterns of Health Insurance Coverage and Out-of-Pocket Expenditure on Caesarean Section Deliveries in Public Health Facilities in India. Sustainability. 2023;4;15(5):4608.
6. Leone T, James K, Padmadas SS. The burden of maternal health care expenditure in India: multilevel analysis of national data. Maternal and child health journal. 2013;17(9):1622-30.
7. Ketema DB, Leshargie CT, Kibret GD, Assemie MA, Petrucka P, Alebel A. Effects of maternal education on birth preparedness and complication readiness among Ethiopian pregnant women: a systematic review and meta-analysis. BMC pregnancy and childbirth. 2020;20:1-9.
8. Singh T, Tripathy B, Pandey AK, Gautam D, Mishra SS. Examining birth preparedness and complication readiness: a systematic review and meta-analysis of pregnant and recently delivered women in India. BMC Women's Health. 2024;14;24(1):119.
9. Salroo FN, Nazir ST, Gadoo MM. Birth preparedness and complication readiness among pregnant women attending a maternal and child care hospital of government medical college in south kashmir, india: a cross-sectional study. Birth. 2023;16(1).
10. Banerjee MI, Arora V, Banerjee S, Madhwani KP, Singh JK, Sahasrabuddhe A. A study on birth preparedness and complication readiness in the field practice area of RHTC of a tertiary care establishment in Central India. International Journal of Research in Medical Sciences. 2023;11(9):3299.
11. Punia A, Pruthi M, Punia MS, Punia A, Jha SK, Rani B. Birth preparedness and complication readiness among pregnant women in rural area of District Sonipat, Haryana, India: a cross sectional community based study.
12. Parija PP, Tiwari P, Sahoo SS. How much do we follow birth

preparedness? A community-based snapshot study from rural Delhi, India. Journal of Family Medicine and Primary Care. 2023; 1;12(9):1901-7.

13. Agarwal S, Sethi V, Srivastava K, Jha PK, Baqui AH. Birth preparedness and complication readiness among slum women in Indore city, India. Journal of health, population, and nutrition. 2010;28(4):383.
14. Acharya AS, Kaur R, Prasuna JG, Rasheed N. Making pregnancy safer—birth preparedness and complication readiness study among antenatal women attendees of a primary health center, Delhi. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine. 2015;40(2):127.
15. Mukhopadhyay DK, Mukhopadhyay S, Bhattacharjee S, Nayak S, Biswas AK, Biswas AB. Status of birth preparedness and complication readiness in Uttar Dinajpur District, West Bengal. Indian journal of public health. 2013;57(3):147.
16. Mazumdar R, Mukhopadhyay D, Kole S, Mallik D, Sinhababu A. Status of birth preparedness and complication readiness in a rural community: a study from West Bengal, India. Al Ameen J Med Sci. 2014;7(1):52-7.
17. Markos D, Bogale D. Birth preparedness and complication readiness among women of child bearing age group in Goba woreda, Oromia region, Ethiopia. BMC pregnancy and childbirth. 2014;14(1):282.
18. Nawal D, Goli S. Birth preparedness and its effect on place of delivery and post-natal check-ups in Nepal. PloS one. 2013;8(5):e60957.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 678–692, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.005

ORIGINAL ARTICLE

Prevalence of Domestic Violence and Perceived Stress Among Married Women in an Urban Area of Puducherry: A Cross Sectional Study

J. Thamizhmathi,[1,*] D. R. Vedapriya[2] and N. Bhuvaneswari[3]

[1]*Senior Resident, Department of Community Medicine, SVMCH & RC, Puducherry, India*
[2]*Professor & Head, Department of Community Medicine, SVMCH & RC, Puducherry, India*
[3]*Assistant Professor, Department of Community Medicine, SVMCH & RC, Puducherry, India*

Accepted: 17-April-2024 / Published Online 08-July-2024

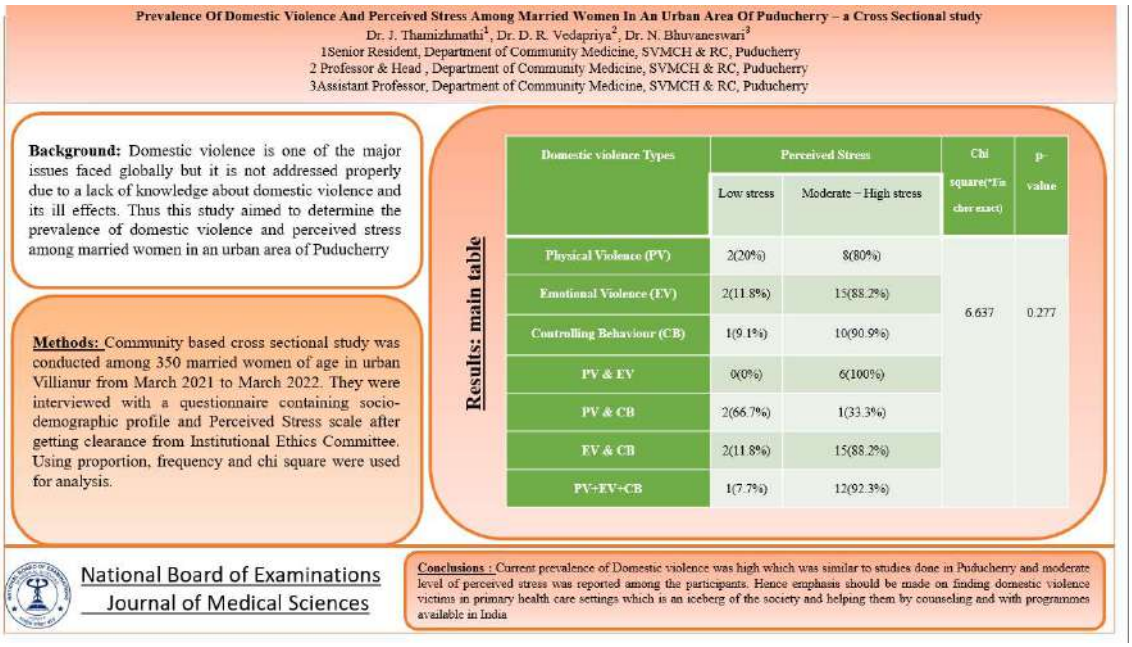
Abstract

Background: Domestic violence is one of the major issues faced globally but it is not addressed properly due to a lack of knowledge about domestic violence and its ill effects. Thus this study aimed to determine the prevalence of domestic violence and perceived stress among married women in an urban area of Puducherry. **Methods:** Community based cross sectional study was conducted among 350 married women of age in urban Villianur from March 2021 to March 2022. They were interviewed with a questionnaire containing socio-demographic profile and Perceived Stress scale. **Results:** In this study**,** the prevalence of domestic violence were 77(22%). Among 350 participants 3.2% had high stress score using Perceived stress scale. There is no significant association with domestic violence and perceived stress. **Conclusion:** Current prevalence of Domestic violence was high which was similar to studies done in Puducherry and moderate level of perceived stress was reported among the participants. Hence emphasis should be made on finding domestic violence victims in primary health care settings which is an iceberg of the society and helping them by counseling and with programmes available in India

Keywords: Domestic violence, Perceived Stress, Domestic violence determinants, Help seeking behavior

*Corresponding Author: J. Thamizhmathi
Email: thamizhmathij@gmail.com

Graphical Abstract



Introduction

Domestic violence against women is an important social problem found globally as well as in India. Violence is defined as the intentional use of physical force or power, threatened or actual, against another person or against a group or community that either results in or has a high likelihood of resulting in injury, death, psychological harm, mal-development or deprivation [1]".

Globally about 27% of married women of age 15–49 years are estimated to have experienced physical or sexual, or both forms of intimate partner violence in their lifetime [2].

Perceived stress is the feelings or thoughts that an individual has about how much stress they are under at a given point in time or over a given time period. Perceived stress can badly affect physical and mental health. Perceived stress incorporates feelings about the uncontrollability and unpredictability of one's life, how often one has to deal with irritating hassles, how much change is occurring in one's life and confidence in one's ability to deal with problems or difficulties [3].

Perceived stress is not measuring the types or frequencies of stressful events which have happened to a person, but rather how an individual feels about the general stressfulness of their life and their ability to handle such stress. Individuals may suffer similar negative life events but appraise the impact or severity of these two different extents as a result of factors such as personality, coping resources, and support. In this way, perceived stress reflects the interaction between an individual and their environment which they appraise as threatening or overwhelming their resources in a way that will affect their wellbeing (Lazarus & Folkman, 1984). Perceived stress is commonly measured as the frequency of such feelings using a questionnaire such as the Perceived Stress

Scale designed by Cohen, Kamarck & Mermelstein in 1983 [4].

Domestic violence is prevalent in all societies among all socio-economic groups, but the highest prevalence is found in the South-East Asia region. Though the problem of domestic violence is more prevalent in India, most of the studies have been done in rural areas to know the magnitude of domestic violence. There were very few studies on help seeking behavior as well as perceived stress. With this background, the study was done on domestic violence in an urban area to find out the magnitude and perceived stress among married women of age 18- 45 years.

Objectives

Among married women of age 18- 45 years old residing in Urban Health Training Centre, SVMCH&RC, Puducherry.

- To estimate the prevalence of domestic violence
- To assess the relationship between perceived stress and domestic violence.

Materials and Methods

The present study was conducted after getting clearance from Scientific Research Committee and Institutional Ethics Committee. This study was done as community based cross sectional study to determine the prevalence and determinants of domestic violence and perceived stress among married women in an urban area of Puducherry. The present study was conducted in Field Practice Area of Urban Health Training Centre (UHTC), Department of Community Medicine, in a Medical college in Puducherry over the period of 1 year from March 2021 to February 2022. The Study population was Married women of age 18 – 45 years residing at urban area of Villianur Commune Panchayat were considered. Married women of reproductive age 18 – 45 years, Participants who are staying with their family for atleast one year of duration and Married women who gave consent for the study were included. Married women who are not available for atleast three consecutive house visits, Women whose privacy could not be obtained, Women who are divorced, widowed, separated were excluded

Sample size

According to Community based cross sectional study by Nadda et al. [4] the prevalence of Domestic violence was 28%, this prevalence was taken into consideration to calculate the sample size. The sample size was determined with the formula $n = Z^2pq/d^2$ (Where Z = Confidence limit of 95% or 1.96, p = prevalence (p = 28 %), q = 1-p (q = 72), d = Sampling error (d = 5 %) and 10 % non- respondent rate, confidence interval 95% and power 80%)

Final Sample Size: 350 (311 + 10% non response rate (~ 344) rounding off to 350)

Sampling Technique

Study participants were included by Probability Proportional to Size Sampling. The number of eligible participants required from area was calculated using the following formula, Probability of each individual being sampled in each area was calculated using the following formula

$$\textbf{Sample \%} = \frac{\textbf{Required number of samples}}{\textbf{Total number of eligible participants}} \textbf{ x 100}$$

Sample % = $\frac{350}{1407}$ x 100 = 24.8 = 25%

UHTC Villianur – Puducherry

13 Villages in Field Practice Area

Vellalar Street	Perumal Street	Padmini Nagar	Perumalpuram	VCP Nagar	Pazhanisamy Nagar	Ananadhamal Nagar	Moolakadai	Thirukameshwar Nagar	Vasantha Nagar	Sultanpet	Kanuvapet	Manaveli
Total Eligible couples												
157	20	55	45	27	12	59	57	102	92	229	202	350
Using Simple Random Sampling by Lottery method							**25% of cluster (Using Probability Proportional to Size)**					
39	5	14	11	7	3	15	14	25	23	57	50	87

Sample size : 350

Study tools:

Married women were interviewed using a pretested pre- designed semi structured questionnaire containing socio-demographic profile and validated questionnaire of Perceived Stress scale developed by Cohen, Kamarck and Mermelstein (1983) to assess Perceived stress.

Part 1: Socio-Demographic Profile

Information about socio-demographic characteristics like age, sex, marital status, literacy, occupation, monthly income, type of marriage, age at marriage, number of years married and about domestic violence (physical and emotional domestical violence) were obtained.

Part 2: Questionnaire related to Perceived Stress Scale

Cohen, Kamarck and Mermelstein designed Perceived Stress Scale containing validated ten questions with scores ranging from 0 to 40. Scores ranging from 0-13 would be considered low stress, 14-26 would be considered moderate stress, 27-40 would be considered high perceived stress.

Data collection procedure

This study was conducted in Villianur, an urban area of Puducherry. All 13 areas under our Urban Health Training Centre were selected and by using Probability Proportional to Size Sampling (PPS) technique, 25 % of married eligible women were included from each ward. Within wards, Simple Random Sampling technique method was applied to select the participants using register which was maintained in Health Centre If more than one eligible participant were present in a house, using lottery method participants were selected for the study. Total 350 Married women were included for the study. House to house survey was conducted to contact the participants. After explaining the purpose of the study to the eligible married women in local language, written consent was obtained from all the study participants. Information regarding domestic violence, and stress was assessed using Perceived Stress scale.

Data management and analysis

Data was entered in Microsoft Excel Sheet and analyzed by SPSS version 23. A ‘p’ value of 0.05 or less will be considered for the statistical significance.

Objectives	**Statistical Test**
To estimate the prevalence of domestic violence among married women of age 18- 49 years.	Proportion
To assess the relationship between perceived stress and domestic violence.	Chi square

Operational definitions

Domestic violence

Protection of Women from Domestic Violence Act (PWDVA) defines domestic violence as "all forms of physical, emotional, verbal, sexual, and economic violence, and covers both actual acts of such violence and threats of violence".

Physical violence

Physical violence includes push you, shake you, or throw something at you; slap you; twist your arm or pull your hair; punch you with his fist or with something that could hurt you; kick you, drag you, or beat you up; try to choke you or burn you on purpose; or threaten or attack you with a knife, gun, or any other weapon.

Emotional violence

Emotional violence includes say or do something to humiliate you in front of others; threaten to hurt or harm you or someone close to you; insult you or make you feel bad about yourself.

Results

Among the 350 married women, 77 (22%) had experienced domestic violence in the last one month (Figure 1).

Out of 350 participants, 77 had domestic violence. Number of episodes of domestic violence suffered by the victims was 187. Average number of domestic violence episode per woman (187/77) is 2.43 (Table 1).

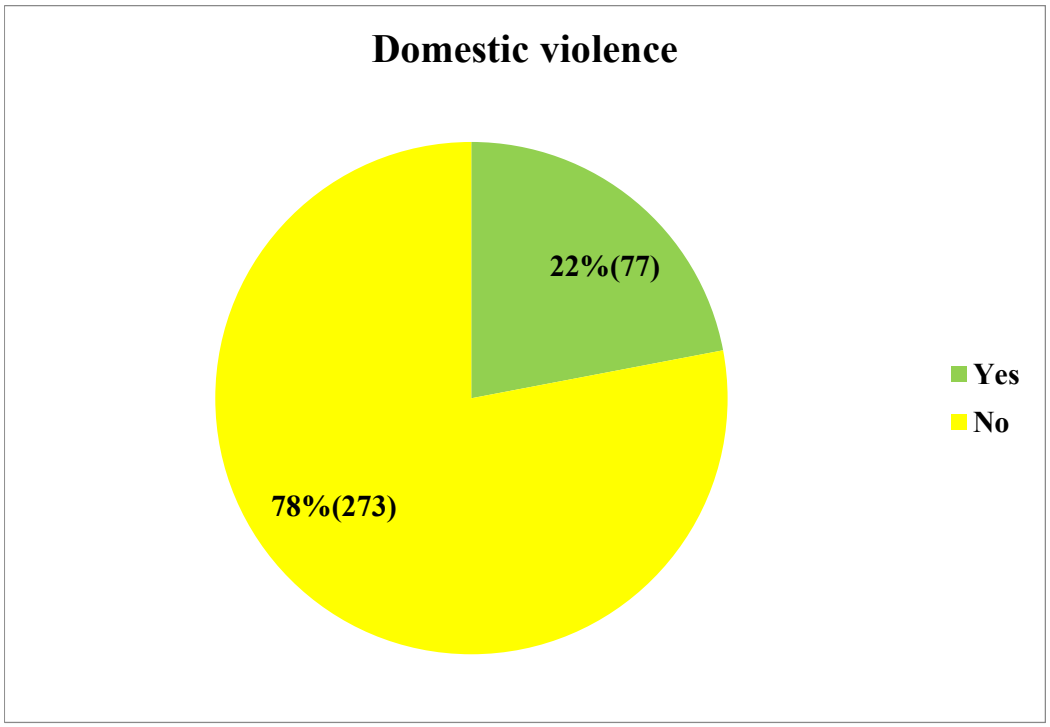


Figure 1. Prevalence of domestic violence among study participants (n=350).

Table 1. Magnitude of Domestic Violence among study participants (n=350)

Domestic violence among women	**Frequency (n=350)**
Domestic Violence suffered	77
Number of episodes of domestic violence	187
Average number of episodes of domestic violence per woman	2.43

Among study participants who had experienced domestic violence, around 40 (51.9%) women had experienced domestic violence atleast once in last one month, followed by 19 (24.7%) women who had experienced domestic violence twice in last one month and remaining 18 (23.4%) women had experienced domestic violence more than twice in the last one month. (The maximum number of episodes experienced being 16 times in the last one month) (Table 2).

Majority 66 (85.7%) of the victims had experienced domestic violence by their husband followed by 7 (9.1%) by both husband and family members and 4 (5.2%) by family members (Figure 2).

Out of 77 sufferers of domestic violence, 38 (49.3%) sought help from others after the episode of domestic violence and remaining 39 (50.7%) did not seek any help (Figure 3).

Among 38 participants who sought help, the most common person from whom they sought help was family members (Mother, sister and mother in -law) around 31 (81.6%) and from friends and the police were 6 (15.8%) and 1 (2.6%), respectively (Table 3).

Among 39 participants who didn't seek help for domestic violence, 36 (92.3 %) felt that they can solve it by themselves and remaining 3 (7.7 %) thought parents will get hurt (Table 4).

Among 350 study participants, 11 (3.2 %) had high stress, 286 (81.2 %) had moderate stress and 53 (15.1 %) had low stress in the last one month (Figure 4).

This table shows that there was no significant association between domestic violence episodes with age of married women (p value=0.157) (Table 5).

This table shows that there was no significant association between domestic violence and perceived stress (p value = 0.146) (Table 6).

This table shows that there was no significant association between types of domestic violence and perceived stress (p value = 0.277) (Table 7).

In this study, it was found that there was no significant association found between types of domestic violence and help seeking behavior with p value = 0.493 (Table 8).

Table 2. Distribution of Domestic violence among study participants based on number of episodes (n=77)

No. of episodes of domestic violence	Frequency (n=77)	Percentage (%)
1	40	51.9
2	19	24.7
>3	18	23.4

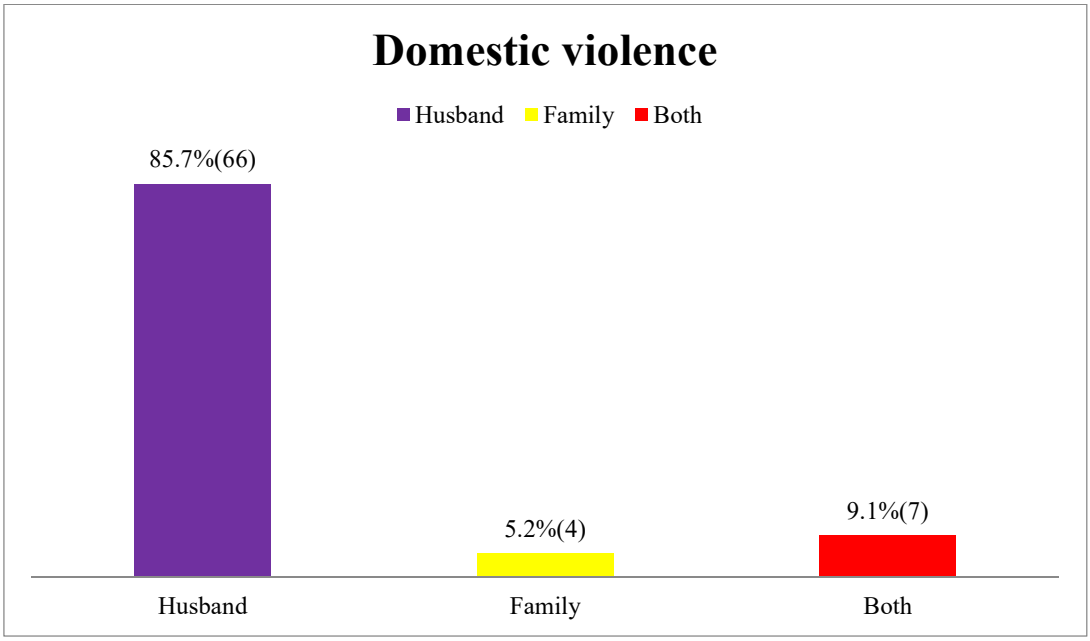


Figure 2. Distribution of victim's domestic circle who committed Domestic violence (n=77)

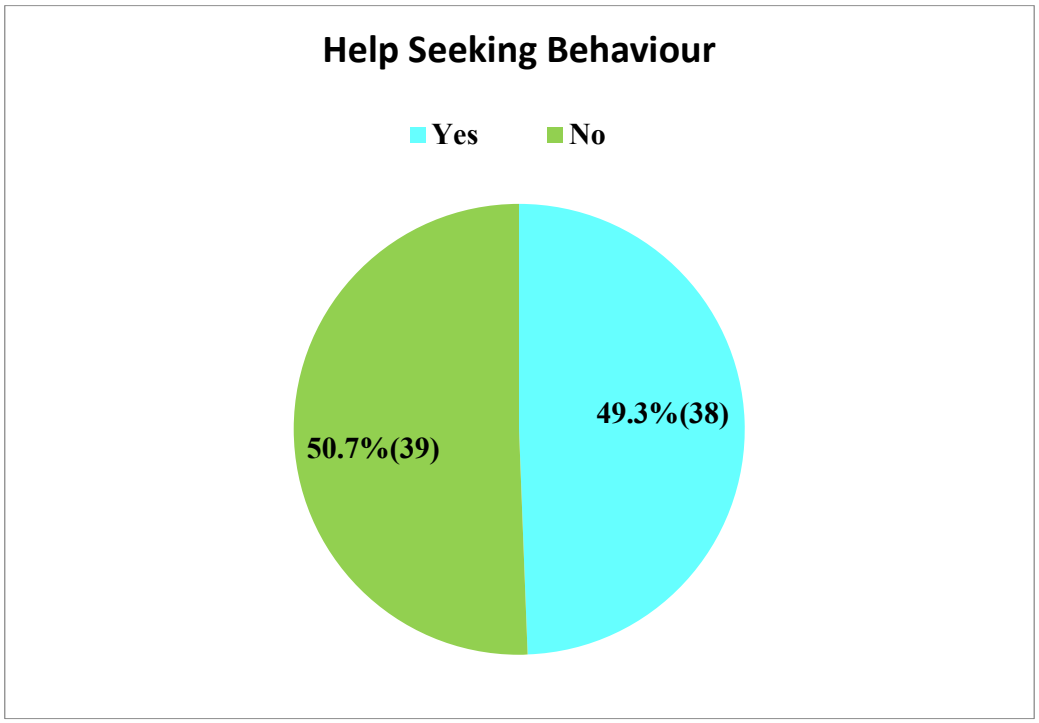


Figure 3. Help seeking behavior of Domestic Violence sufferers (n=77)

Table 3. Help seeking behavior of study participants for domestic violence (n=38)

Help seeking behavior (Sought help from)	**Frequency (n=38)**	**Percentage (%)**
Family members	31	81.6
Friends	6	15.8
Police	1	2.6

Table 4. Reason for not seeking help for domestic violence among study participants (n=39)

Reasons for not seeking help	**Frequency (n=39)**	**Percentage (%)**
Solve by themselves	36	92.3
Parents will get hurt	3	7.7

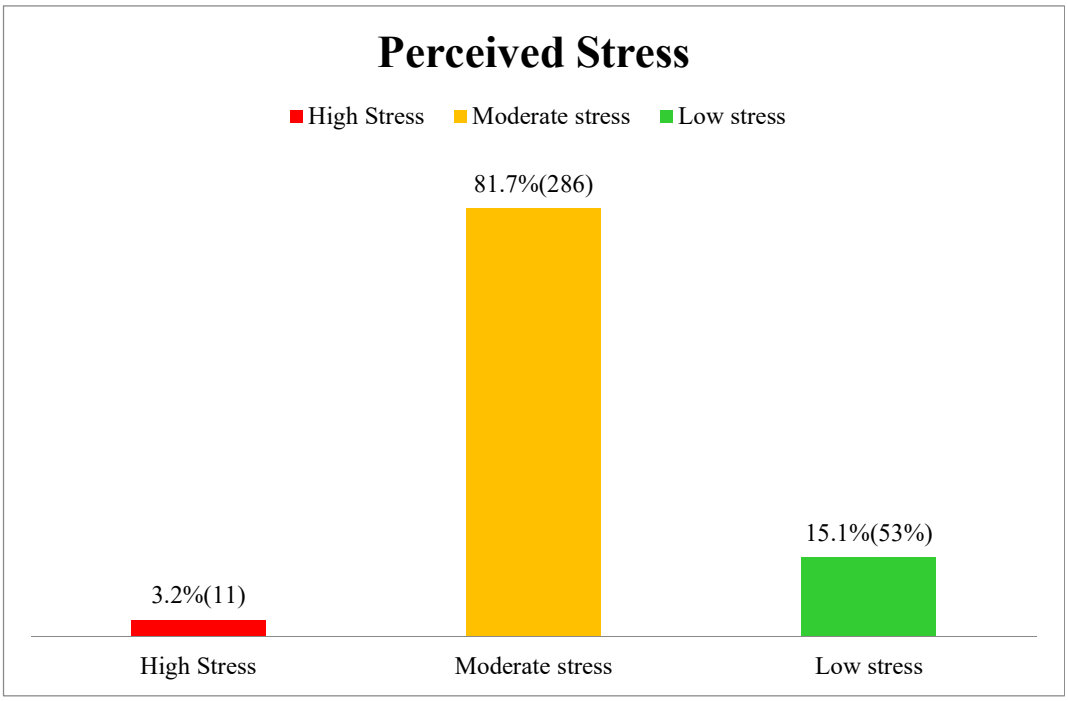


Figure 4. Perception of stress by study participants based on Perceived stress scale (n=350)

Table 5. Association of Domestic violence episodes with age of the married women

Married woman	**Age (years)**		
	≤35 (n=187)	**>35 (n=163)**	**Total (N=350)**
Domestic violence victims	42(54.5%)	35(45.4%)	77(100%)
Total no. of episodes of domestic violence suffered	120(64.2%)	67(35.8%)	187
Average no. of episodes of domestic violence suffered per married woman (victims)	2.86	1.91	2.43
Association of episodes of domestic violence suffered and age of the married women	Unpaired Student's t test =1.431 p value =0.157		

Table 6. Association between Domestic violence and Perceived Stress

Domestic violence	**Perceived Stress**			**Chi square**	**p-value**
	Low stress	**Moderate stress**	**High stress**		
Yes	10(13%)	62(80.5%)	5(6.5%)	3.847	0.146
No	43(15.8%)	224(81.7%)	6(3.1%)		

Table 7. Association between Types of Domestic violence and Perceived Stress

Domestic violence Types	**Perceived Stress**		**Chi square (*Fischer exact)**	**p-value**
	Low stress	**Moderate – High stress**		
Physical Violence (PV)	2(20%)	8(80%)	6.637	0.277
Emotional Violence (EV)	2(11.8%)	15(88.2%)		
Controlling Behaviour (CB)	1(9.1%)	10(90.9%)		
PV & EV	0(0%)	6(100%)		
PV & CB	2(66.7%)	1(33.3%)		
EV & CB	2(11.8%)	15(88.2%)		
PV+EV+CB	1(7.7%)	12(92.3%)		

Table 8. Association between types of domestic violence and help seeking behavior (n=77)

Domestic violence	Help seeking behavior		Chi square	p-value
	Yes	No		
Physical violence only	2(20%)	8(80%)	5.405	0.493
Emotional violence only	8(47.1%)	9(52.9%)		
Controlling behavior only	7(63.6%)	4(36.4%)		
Both Physical violence and Emotional violence	3(50%)	3(50%)		
Both Physical violence and Controlling behavior	1(33.3%)	2(66.7%)		
Both Emotional violence and Controlling behavior	10(58.8%)	7(41.2%)		
Physical violence, emotional violence and Controlling behavior	7(53.8%)	6(46.2%)		

Discussion

The prevalence of domestic violence was found to be 22% in our study among married women of age 18 to 45 years in urban area of Puducherry which is similar to the studies done by NFHS-V which showed a prevalence of 29.8% in Puducherry [6], 25.8% in Indu et al. [7] and 26.6% Songul and Selma Tepehan [8]. In contrast, the prevalence of domestic violence was lower in study done by Samal et al. [9] reported 6.5% since it was a hospital based study. The prevalence of domestic violence was higher in studies (National Family Health Survey data) done by Durga B. Avanigadda et al. [10] which reported that prevalence of domestic violence in India to be 31.6%

In the present study 49.3 % of victims of domestic violence sought help from others after the incident which was similar to the study done by Ghose et al. [11] whereas other studies done by Leonardsson and Sebastian [12] reported 23.7%, Handebo et al. [14] reported 22.5%, Goodson and Hayes [13] reported 34.8% women sought help after the incident respectively which is in lower proportion compared to our study. Among 49.3 % of victims of domestic violence who sought help only 3% sought help from the police in our study which is similar to the study done by Goodson and Hayes [13] and in the study done by Leonardsson and Sebastian [12] showed 1% had sought help from police. In contrast, few studies reported higher proportion of help seeking behavior

from the police like Handebo et al.[14] and Djikanovic [15] which ranged from 8.4-12.2%.

Around 3.2% had high stress whereas the study done by Indu et al. [16] [showed 66% of domestic violence victims reported high stress. In our present study there was no statistically significant association between stress and domestic violence since proportion of participants reporting high perceived stress was low compared to other studies done by Indu et al. [16], Kadam et al. [17], Poonam et al. [18] and Piraino et al. [19] which showed that there was a positive relationship between High perceived stress and domestic violence.

Conclusions

The prevalence of domestic violence was 22% among married women. Most common type of domestic violence was combination of emotional and controlling behavior. Around 38 (49.4%) domestic violence victims sought help for the domestic violence. Majority of participants 286 (81.2%) had moderate perceived stress followed by 53 (15.1%) had low perceived stress and 11 (3.2%) had high perceived stress in the last one month. No significant association was observed between Perceived stress and Domestic violence.

To conclude the prevalence of domestic violence was high among the study participants. Hence emphasis should be made for finding domestic violence victims at primary health care settings which is an iceberg of the society and helping them by counseling and with programmes available in India.

Strengths and Limitation

Strengths

1. To avoid selection bias, Probability Proportional to Size sampling technique was used to include equal proportion of study participants.
2. We used standard questionnaires like NFHS Survey questionnaire to assess domestic violence and questionnaire to assess perceived stress using Perceived stress scale.
3. Finding prevalence, determinants, help seeking behavior and perceived stress of domestic violence among married women were hidden area in Puducherry; only limited similar studies were conducted in Urban Puducherry which adds strength to this study.
4. The chance of inter-observer variability is very minimal, since it was a single investigator study.
5. Women who suffered from domestic violence were referred to Psychiatrist of our Institution.
6. Since UHTC, Villianur, SVMCH & RC is accessible to the study participants, future follow up and intervention can be planned.

Limitation

1. Domestic violence is a sensitive issue to be reported at the first instance and since this was a cross sectional study design there could be underreporting of domestic violence.
2. The study participant's perception can be better elicited by Qualitative methodology.
3. Due to time constraint, other mental health issues like depression, anxiety were not included.
4. Subjective assessment was carried out to obtain information on

questionnaire which leads to recall bias.

Recommendations

1. Identification of victims of domestic violence is important to know the magnitude of domestic violence in the community. Domestic violence being a sensitive issue, it is difficult to find victims as they rarely report about the issue. There are more chances that the women open up about the violence to grassroot level workers (ASHA /ANM/Anganwadi) as they are constantly in contact with the women of their areas.
2. Primary health care need to be strengthened by providing counseling services to the victims and spouses with the help of Psychiatrist/ Counselor at the PHC
3. Women should be empowered by means of education which helps them understand about gender equality, self worth, freedom, household decision making. Another way of empowerment is by providing employment to women. Employment gives financial independence and decision making power.

Statements and Declarations

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Rutherford A, Zwi AB, Grove NJ, Butchart A. Violence: a glossary. J Epidemiol Community Health 2007;61(8):676–80.
2. Violence against women. Available from: https://www.who.int/news-room/fact-sheets/detail/violence-against-women
3. Whittaker was Phillips A. Perceived Stress; Available from: https://www.researchgate.net/publication/309275310_Perceived_Stress
4. Percieved stress scale.pdf; Available from: https://www.das.nh.gov/wellness/docs/percieved%20stress%20scale.pdf
5. Nadda A, Malik JS, Rohilla R, Chahal S, Chayal V, Arora V. Study of Domestic Violence among Currently Married Females of Haryana, India. Indian J Psychol Med 2018;40(6):534–
6. Puducherry.pdf; Available from: http://rchiips.org/nfhs/NFHS-5_FCTS/PY/Puducherry.pdf
7. Indu PV, Vijayan B, Tharayil HM, Ayirolimeethal A, Vidyadharan V. Domestic violence and psychological problems in married women during COVID-19 pandemic and lockdown: A community-based survey. Asian J Psychiatr 2021;64:102812.
8. Duran S, Eraslan ST. Violence against women: Affecting factors and coping methods for women. J Pak Med Assoc 2019;69(1):53–7.
9. Samal S, Poornesh S. Prevalence of Domestic Violence among Pregnant Women: A Cross-sectional Study from a Tertiary Care Centre, Puducherry, India. JCDR; Available from: https://www.jcdr.net//article_fulltext.asp?issn=0973-709x&year=2022&month=April&vo

lume=16&issue=4&page=QC06-QC08&id=16213
10. Avanigadda DB, Kulasekaran RA. Associations between intimate partner violence and pregnancy complications: A cross-sectional study in India. J Family Community Med 2021;28(1):17–27.
11. Ghose B, Yaya S. Experience of Intimate Partner Violence and Help-Seeking Behaviour among Women in Uganda. Psych 2019;1(1):182–92.
12. Leonardsson M, San Sebastian M. Prevalence and predictors of help-seeking for women exposed to spousal violence in India - a cross-sectional study. BMC Womens Health 2017;17(1):99.
13. Goodson A, Hayes BE. Help-Seeking Behaviors of Intimate Partner Violence Victims: A Cross-National Analysis in Developing Nations. J Interpers Violence 2021;36(9–10):NP4705–27.
14. Handebo S, Kassie A, Nigusie A. Help-seeking behaviour and associated factors among women who experienced physical and sexual violence in Ethiopia: evidence from the 2016 Ethiopia Demographic and Health Survey. BMC Women's Health 2021;21(1):427.
15. Djikanović B, Lo Fo Wong S, Jansen HAFM, Koso S, Simić S, Otašević S, et al. Help-seeking behaviour of Serbian women who experienced intimate partner violence. Family Practice 2012;29(2):189–95.
16. Indu PV, Vijayan B, Tharayil HM, Ayirolimeethal A, Vidyadharan V. Domestic violence and psychological problems in married women during COVID-19 pandemic and lockdown: A community-based survey. Asian J Psychiatr 2021;64:102812.
17. Kadam KS, Anvekar S, Angane AY, Unnithan VB. The Silent Survivor: A Cross-Sectional Study of Domestic Violence, Perceived Stress, Coping Strategies, and Suicidal Risk in the Wives of Patients with Alcohol Use Disorder. Indian Journal of Social Psychiatry 2022;38(2):188.
18. Poonam, Sandeep, Sharma K, Tyagi P. Correlates of domestic violence in relation to physical health and perceived stress during lockdown [शोध सरिता]. 2020;
19. Piraino G, Toto M, Invitto S. The impact of COVID-19 in women with intimate partner violence (IPV): a psychological and psychophysiological study [Internet]. 2020 [cited 2022 Dec 23];Available from: http://sibaese.unisalento.it/index.php/jdream/article/view/23496/19677

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 693–703, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.006

ORIGINAL ARTICLE

Psychiatric Morbidity Among Patients Recovered from COVID-19 Pneumonia: A Cross Sectional Telephonic Survey

TharunPrakash K,[1] Vinithra Devi K,[2,*] Usaid S,[3] Sumithra Devi S[4] and Siva Ilango T[5]

[1]*Junior Resident, Department of Psychiatry, Karpaga Vinayaga Institute of Medical Sciences and Research Center, Palayanoor, Maduranthakam, Tamil Nadu 603308*
[2]*Consultant Psychiatrist, Anna Nagar, Chennai, Tamil Nadu 600040*
[3]*Assistant Professor, Department of Psychiatry, Karpaga Vinayaga Institute of Medical Sciences and Research Center, Palayanoor, Maduranthakam, Tamil Nadu 600308*
[4]*Associate Professor, Department of Psychiatry, Karpaga Vinayaga Institute of Medical Sciences and Research Center, Palayanoor, Maduranthakam, Tamil Nadu 603308*
[5]*Professor & HOD, Department of Psychiatry, Karpaga Vinayaga Institute of Medical Sciences and Research Center, Palayanoor, Maduranthakam, Tamil Nadu 603308*

Accepted: 27-April-2024 / Published Online 08-July-2024

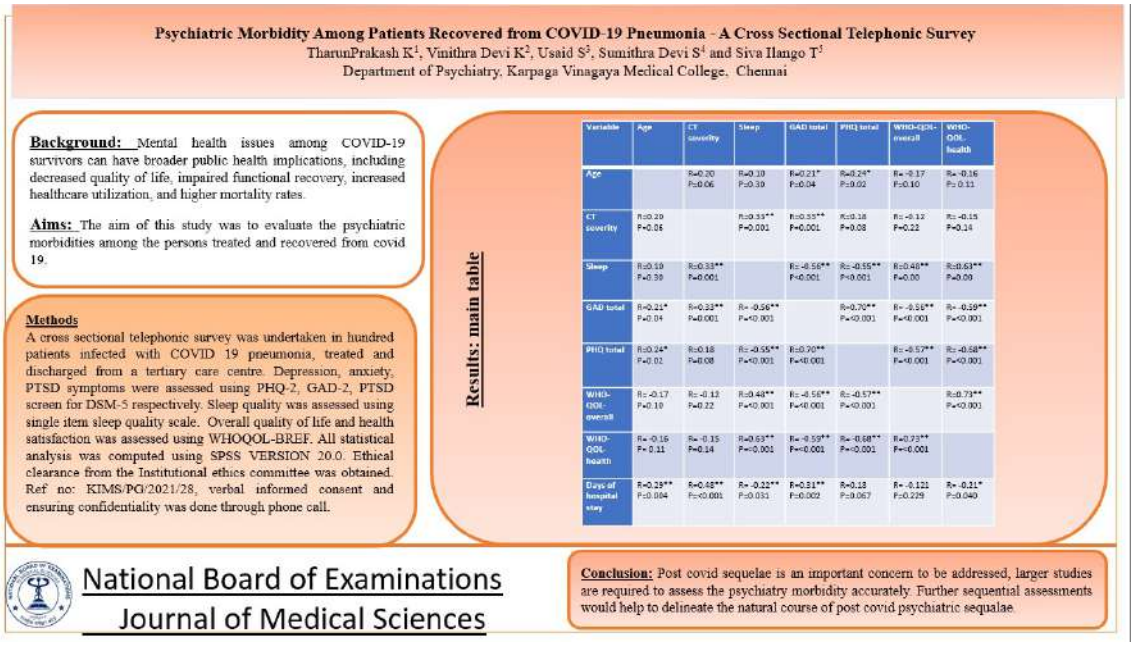
Abstract

Background: Mental health issues among COVID-19 survivors can have broader public health implications, including decreased quality of life, impaired functional recovery, increased healthcare utilization, and higher mortality rates. **Aims and Objectives:** The aim of this study was to evaluate the psychiatric morbidities among the persons treated and recovered from COVID-19. **Materials and Methods:** A cross sectional telephonic survey was undertaken in hundred patients infected with COVID-19 pneumonia, treated and discharged from a tertiary care centre. Depression, anxiety, PTSD symptoms were assessed using PHQ-2, GAD-2, PTSD screen for DSM-5 respectively. Sleep quality was assessed using single item sleep quality scale. Overall quality of life and health satisfaction was assessed using WHOQOL-BREF. **Results:** Mean age of study participants is 46.15 years and study sample included 62% of males. Admitted patients had mean CT severity score of 40% lung involvement. On the measures of sleep quality, twelve were having fair range and two participants had poor sleep quality. 24% and 31% of participants had anxiety and depressive symptoms respectively while 14% had symptoms of PTSD. **Conclusion:** Post covid sequelae is an important concern to be addressed, larger studies are required to assess the psychiatry morbidity accurately. Further sequential assessments would help to delineate the natural course of post covid psychiatric sequalae.

Keywords: COVID-19 pneumonia, Depression, Anxiety, PTSD

*Corresponding Author: Vinithra Devi K
Email: drvinikarun1993@gmail.com

Graphical Abstract



Introduction

As of mid-April 2022, the global COVID-19 caseload surpassed 500 million, with over 6.1 million recorded fatalities [1]. Post-COVID-19 symptomatology affects a considerable proportion of survivors, ranging from 13% to 60% within the general population. These symptoms encompass a diverse array of sequelae affecting respiratory, gastrointestinal, functional, neurocognitive, and urinary systems [2-4]. Persistent physical and psychological challenges afflict COVID-19 survivors akin to those observed in SARS patients, enduring even years post-hospital discharge. Notably, a substantial number of survivors report post-discharge mental health issues, including fatigue, insomnia, diminished quality of life, anxiety, despair, and post-traumatic stress disorder [5,6].

Despite the growing recognition of these challenges, research on COVID-19 survivors one year post-discharge remains sparse, with predominant focus on physical health outcomes [7]. Notably, findings from a singular study conducted at Jinyintan Hospital revealed significantly elevated levels of anxiety and depression among 1,276 survivors at the 12-month mark compared to the general population [8]. The paucity of comprehensive investigations underscores a significant knowledge gap regarding the enduring mental health implications of COVID-19, necessitating further research endeavors.

From early stages of COVID-19 pandemic, concerns have been raised about the fact that, patients who survived COVID-19 are at an increased risk of psychological problems within 3 months after infection, which is widely predicted and not yet accurately measured [3]. Pooled data from meta-analysis studies also estimated and given evidences of occurrence of psychiatric morbidities among the people infected with COVID-19 [4]. This highlights the need to address

the mental health needs and not to ignore psychological dimensions in this group of patients [9,10].

This study investigating the mental health impact of COVID-19 on survivors is crucial due to the pandemic's unprecedented scale, unique stressors, and long-term consequences. With millions affected globally, understanding the psychological implications is paramount for comprehensive public health management. Utilizing telephonic surveys ensures efficient data collection while adhering to safety measures. By examining survivors one year post-discharge and comparing with similar conditions like SARS, this study not only highlights the enduring nature of mental health challenges but also informs targeted interventions. Its clinical relevance lies in guiding healthcare providers to identify and address psychiatric morbidities, ultimately enhancing patient outcomes and promoting overall well-being amidst this global crisis. The aim of this study is to evaluate the psychiatric morbidities among the persons treated and recovered from COVID-19 through telephonic survey.

Materials and Methods

A cross sectional survey was undertaken through a phone call at department of psychiatry, at a tertiary care centre at Chengalpattu district. Sample for the study was obtained from data acquired from medical records department. Study duration lasted about 2 months (1st July 2021- 31st august 2021). Study population constitutes patients who got treated for COVID-19 pneumonia and discharged from same institution. The study included (a) patients infected by COVID-19 pneumonia, (b) treated as an inpatient. Patients who did not respond to phone call after three attempts were excluded from the study. Participant sociodemographic details were obtained through semi structured questionnaire proforma. Ten item structured screening questionnaire developed from standardized questionnaires (Generalized anxiety disorder-2, Patient health questionnaire-2, Primary care-PTSD screen for DSM-5, WHO-Quality of life, single item sleep quality scale) was used for screening of Psychiatric sequelae.

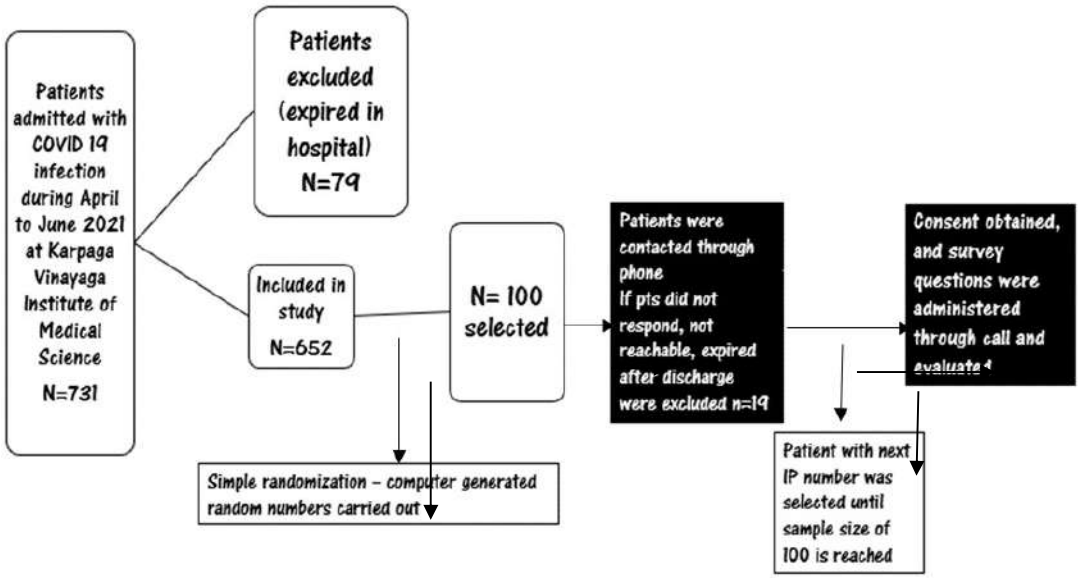


Figure 1. Methodology flow chart

From medical records department data of patients affected by COVID-19 pneumonia is obtained according to IP number. Patients who recovered and discharged from hospital during the month of 1st April -30th June 2021 due to COVID-19 pneumonia infection which came to about 731 patients during that time period, were selected and enrolled in the study. Sample size calculation was done using the formula, $n= Z^2PQ/d^2$, N=100, where, z=2, P=50, Q=50, d=10, Simple Randomisation was carried out and 100 patients were selected. Patients were individually called over the phone, and survey questionnaires which includes sociodemographic details, GAD-2, PC-PTSD-5, PHQ-2, WHO-QOL, Single item sleep quality scale were administered after getting verbal informed consent. In GAD-2, a threshold score of 8 serves as a conventional marker denoting clinically notable anxiety symptoms within the general populace. A score of 5 might signify mild anxiety, while 10 indicates a moderate level, and 15 represents severe manifestations [11]. PC-PTSD-5 a cut off 3 or more with signifies trauma exposure and cut off 4 or more says clinically notable PTSD [12]. When utilizing the PHQ-2 as a screening tool for depression, a score of 3 stands out as the recommended threshold for optimal sensitivity and specificity in identifying potential cases of major depressive disorder. Any score equal to or exceeding this cutoff suggests a higher likelihood of meeting diagnostic criteria for depression, thereby prompting further assessment and intervention [13].

Patients who did not attend, not willing to participate in study and not given consent was excluded, and the patient with next IP number was called and surveyed until the sample size of 100 is reached. Totally 119 patients were called through phone out of which 14 did not respond to phone call, 2 were not reachable through call, and 3 patients expired after discharge from hospital and they were excluded from the study.

Statistical Analysis

All statistical analysis was computed using SPSS VERSION 20.0. Descriptive statistics were used to describe study variables; Mean, standard deviation, Median, Range was used for continuous variables and Frequency & Percentages were used for categorical variables. For estimating association between independent variables and outcome, spearman correlation was used.

Results

Among 100 participants diagnosed with COVID19 pneumonia recruited for the study, mean age of participants is 46.15 years (SD, and 62% were males and 38% were females, 46 people were belonging to rural area and 54 were from urban area. ICU admission was required for 24 participants and 76 were treated at normal wards. About 43 individuals involved in the study required oxygen support, and median duration of hospital stay was 7 days and minimum duration of stay being one day and maximum being 28 days. Admitted patients had mean CT severity score of 40% lung involvement (minimum 8% and maximum score being 90%), 46 participants had mild involvement (less than 33%), 40 of them had moderate lung involvement (33-66%) and 14 of them had severe lung involvement (above 66%) (Table 1).

On analysing sleep quality using single item sleep quality scale which categorizes quality of sleep into terrible, poor, fair, good, excellent (on a scale ranging from 0-10), 51 participants found to have sleep quality describing to be excellent, 35 reported having good sleep quality, 12 were having fair range and poor sleep quality was reported by 2 participants (Table 1)

Table 1. Distribution of socio-demographic data among the study participants (N=100)

S. No	Variable	Frequency	Percentage
1.	**Age**		
	20-40	35	35%
	41-60	52	52%
	61-80	13	13%
2.	**Sex**		
	Male	62	62%
	Female	38	38%
3.	Area		
	Urban	54%	54%
	Rural	46%	46%
4.	**ICU admission**		
	Required	24	24%
	Not required	76	76%
5.	**Oxygen support**		
	Required	43	43%
	Not required	57	57%
6.	**Severity of lung involvement**		
	Mild	46	46%
	Moderate	40	40%
	Severe	14	14%
7.	**Sleep quality**		
	Terrible	0	0%
	Poor	2	2%
	Fair	12	12%
	Good	35	35%
	Excellent	51	51%

Among the participants 76% were found to have no anxiety symptoms, and 23% of participants were experiencing anxiety symptoms and 1 participant qualifying for disorder diagnosis. For assessing depression patient health questionnaire 2 was administered and 69% reported no symptoms suggestive of depression, 28% reported depressive symptoms but not amounting to disorder diagnosis and 3 participants qualified for disorder diagnosis. Among the participants 98 did not experience PTSD symptoms and 2 qualifies for the diagnosis. Of about 45% of the study participants reported very good overall quality of life, 37% reported to be good and 18% were neither satisfied nor reported to be bad. And 43% of study

participants reported to have very good health satisfaction, 34% rated it to be good, 21% were neither satisfied nor dissatisfied, 2% rated it to be poor (Table 2)

Correlation between age, CT severity, GAD, PHQ, WHO-QOL-overall, WHO-QOL -health, duration of hospital stay was established by using spearman correlation.

It was found that as the age increases there is a significant positive correlation with generalised anxiety symptoms and depressive symptoms measured by PHQ-2 and duration of hospital stay**.** As the CT severity score increases there is a significant positive correlation with sleep quality and generalised anxiety symptoms and duration of hospital stay also increases. Sleep quality was found to have significant negative correlation with GAD symptoms, depressive symptoms.

GAD has significant positive correlation with depressive symptoms, and significant negative correlation between overall quality of life and health. Depressive symptoms have significant negative correlation with overall quality of life and overall health. Overall quality of life and health and sleep have significantly positively correlation. Number of days of hospital stay has positive correlation with GAD symptoms and negative correlation with sleep and overall health (Table 3)

Table 2. Distribution of study variables among the study participants (N=100)

S.no	Variable	Frequency	Percentage
1.	**Generalized anxiety disorder**		
	Not at all	76	76%
	Anxiety symptoms	23	23%
	GAD	1	1%
2.	**Depression**		
	Not at all	69	69%
	Depressive symptoms	28	28%
	Depression	3	3%
3.	**PTSD**		
	Not at all	86	86%
	PTSD symptoms	12	12%
	PTSD	2	2%
4.	**Overall-QOL**		
	Very poor	0	0
	Poor	0	0
	Neither good nor poor	18	18%
	Good	37	37%
	Very good	45	45%
5.	**Health satisfaction**		
	Very poor	0	0
	Poor	2	2%
	Neither good nor poor	21	21%
	Good	34	34%
	Very good	43	43%

Table 3. Correlation between Age, CT Severity, sleep quality, GAD Total, PHQ Total, WHO-QOL-Overall, WHO-QOL-Health (N=100)

Variable	Age	CT severity	Sleep	GAD total	PHQ total	WHO-QOL-overall	WHO-QOL-health
Age		R=0.20 P=0.06	R=0.10 P=0.30	R=0.21* P=0.04	R=0.24* P=0.02	R= -0.17 P=0.10	R= -0.16 P= 0.11
CT severity	R=0.20 P=0.06		R=0.33** P=0.001	R=0.33** P=0.001	R=0.18 P=0.08	R= -0.12 P=0.22	R= -0.15 P=0.14
Sleep	R=0.10 P=0.30	R=0.33** P=0.001		R= -0.56** P<0.001	R= -0.55** P<0.001	R=0.48** P=0.00	R=0.63** P=0.00
GAD total	R=0.21* P=0.04	R=0.33** P=0.001	R= -0.56** P=<0.001		R=0.70** P=<0.001	R= -0.56** P=<0.001	R= -0.59** P=<0.001
PHQ total	R=0.24* P=0.02	R=0.18 P=0.08	R= -0.55** P=<0.001	R=0.70** P=<0.001		R= -0.57** P=<0.001	R= -0.68** P=<0.001
WHO-QOL-overall	R= -0.17 P=0.10	R= -0.12 P=0.22	R=0.48** P=<0.001	R= -0.56** P=<0.001	R= -0.57** P=<0.001		R=0.73** P=<0.001
WHO-QOL-health	R= -0.16 P= 0.11	R= -0.15 P=0.14	R=0.63** P=<0.001	R= -0.59** P=<0.001	R= -0.68** P=<0.001	R=0.73** P=<0.001	
Days of hospital stay	R=0.29** P=0.004	R=0.48** P=<0.001	R= -0.22** P=0.031	R=0.31** P=0.002	R=0.18 P=0.067	R= -0.121 P=0.229	R= -0.21* P=0.040

(Spearman Correlation Test)
*Correlation is significant at the 0.05 level (2- tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Discussion

Very few studies have been done regarding psychiatric morbidity in patients affected by COVID-19 in India, most of the studies were done mainly on impact of COVID-19 on mental health in general population. To our knowledge only 4 studies have been done on patients affected by COVID-19 and psychiatric mental health consequences [14-17]. Previous studies have reported majority of patients in post covid state, experience symptoms of sleep disturbances, symptoms suggestive of PTSD, depression, anxiety even after 1 month after infection [17]. These previous findings further kindle the need to evaluate the psychiatric sequalae related to COVID-19.

But in our current study only nearly 14% had problems with sleep quality, and patients with depressive, anxiety symptoms and PTSD symptoms were reported by few participants which is contradicting with previous studies done

on COVID-19 infected patients post discharge. In General population prevalence of anxiety in adults is 2.9% but in our study it comes to around 1%, depression prevalence in general population is 5-7% but in our study it is estimated to be about 3% which is quite lower in comparison, Asian countries prevalence of PTSD is about 0.5%-1% in general population which correlates with our findings which comes to about prevalence of 2%, and about 10-20% of individuals complain insomnia symptoms in primary care settings which also correlates with our findings which comes to about 12% [18-20]. So, comparing these data's, we can come to a conclusion that is there is no much increase in these symptoms as a sequel due to COVID-19 infection.

And the correlation in our study suggestive of increase in CT severity and sleep quality and GAD symptoms suggests the need for care for patients with moderate to severe lung involvement at an early stage, in parallel with COVID-19 treatment, and this impact in sleep quality has effects further on overall quality of life and overall health of participants involved in the study which further signifies the attention which needs to be given to these individuals at the earliest. Additionally, it has been found that as the age advances the occurrences of GAD and depressive symptoms were significant, which indicates the need for care in elderly populations who are infected with COVID-19 pneumonia at an early stage to curb the occurrences of these psychiatric morbidities.

It is also estimated that patients who had longer duration of hospitalisation, also had a greater probability of getting sleep disturbance [21] and anxiety symptoms and problems with their overall health satisfaction which also implies adequate interventions to be given these people who have larger duration of hospital stay at least at the time of discharge [22]. To effectively address the mental health morbidity among COVID-19 survivors, it's crucial to implement comprehensive interventions throughout the continuum of care. This begins with systematic screening for anxiety, depression, and PTSD at hospital discharge, utilizing validated assessment tools to identify those in need of immediate support. Structured follow-up care, including regular telephonic or virtual check-ins, allows for ongoing monitoring and intervention. Prompt referral to specialized mental health services ensures access to evidence-based interventions such as psychotherapy and medication management. Psychoeducation, coping strategies, and peer support groups offer additional avenues for emotional validation and social connection. Moreover, connecting survivors with community resources and adopting an integrated care approach that considers holistic needs ensures coordinated support for long-term resilience and well-being.

The strengths of our study are that the study is conducted within the Indian context, which is notable as many previous studies have been conducted outside of India. This distinction suggests that the outcomes observed in our study may differ from those reported in other settings, potentially due to cultural factors such as coping strategies and the stigma associated with discussing mental health issues. In Indian culture, there may be a greater reluctance to openly discuss mental health

problems compared to Western societies. Furthermore, this study represents one of the few conducted within the Tamil Nadu population, specifically addressing mental health issues among individuals infected with COVID-19. The use of telephonic surveys in our research methodology is particularly advantageous during the current pandemic, as it offers a convenient and safe means of data collection for both healthcare providers and patients. This approach minimizes the risk of infection transmission while allowing for efficient data gathering in a timely manner [23].

Several limitations are noted in this study. Firstly, conducting evaluations at earlier stages during hospital admission could have provided additional insights into symptom presentation and allowed for a more comprehensive understanding of psychiatric morbidity. Serial assessments at 1, 4, and 12 weeks post-discharge would have enabled a more accurate estimation of prevalence and facilitated the study of symptom evolution and progression over time. However, due to challenges in data collection during the peak of the pandemic, such assessments were not feasible. Additionally, the telephonic interview method utilized in this study may have introduced confidentiality concerns, potentially serving as a barrier for participants to openly communicate about their symptoms, despite assurances of confidentiality. While face-to-face surveys might have been perceived as more reliable from the participants' perspective, logistical constraints, such as patients being evaluated post-discharge, made in-person assessments unfeasible. Moreover, the lack of information regarding premorbid psychiatric history poses a limitation, as it could have provided valuable context for interpreting the findings. Lastly, while a diagnostic interview method could have provided definitive diagnoses, its implementation via phone calls is impractical and time-consuming. These limitations highlight the need for future research to address these methodological challenges while investigating psychiatric morbidity among COVID-19 survivors.

Conclusion

Addressing post-COVID sequelae is of paramount importance, particularly regarding mental health issues arising from this challenging infection. Early intervention strategies can play a pivotal role in mitigating these concerns. Overcoming the aforementioned limitations would significantly enhance the relevance and depth of our study. Given the scarcity of research in our country on this subject, there is a pressing need for more extensive and large-scale studies to assess the prevalence and impact of post-COVID morbidity on health and quality of life. Such studies are essential not only for preventing future occurrences of such morbidity in potential pandemics but also for informing policymakers in effectively addressing these issues.

Future Directions

Sequential assessments would help to delineate the natural course of post covid psychiatric sequalae.

Author Contribution

We confirm that this manuscript has been read and approved by all named authors. We declare that the manuscript is original and it is not being published or submitted for publication elsewhere

Ethical Declaration

Ethical clearance from the Institutional ethics committee was obtained. Ref no: KIMS/PG/2021/28, verbal informed consent and ensuring confidentiality was done through phone call.

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Ahmed MU, Hanif M, Ali MJ, Haider MA, Kherani D, Memon GM, HandSattar KA. Neurological manifestations of COVID-19 (SARS-CoV-2): a review. Front Neurol. 2020;11:518.
2. Poland GA, GandKennedy OI. SARS-CoV-2 immunity: review and applications to phase 3 vaccine candidates. Lancet. 2020;396(10262):1595–1606.
3. Lai C-C, Shih T-P, Ko W-C, TangHsueh H-JP-R. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): the epidemic and the challenges. Int J Antimicrob Agents. 2020;55(3):105924.
4. World Health Organization (2022) WHO coronavirus (COVID-19) dashboard. https://covid19.who.int. Accessed 18 March 2024
5. Zhou X, Snoswell CL, Harding LE, Bambling M, Edirippulige S, Bai X, Smith AC. The role of telehealth in reducing the mental health burden from COVID-19. Telemedicine and e-Health. 2020;26(4):377-9.
6. Li LZ, Wang S. Prevalence and predictors of general psychiatric disorders and loneliness during COVID-19 in the United Kingdom. Psychiatry research. 2020;291:113267.
7. Torales J, O'Higgins M, Castaldelli-Maia JM, Ventriglio A. The outbreak of COVID-19 coronavirus and its impact on global mental health. International Journal of Social Psychiatry. 2020;66(4):317-20.
8. Huang L, Yao Q, Gu X, Wang Q, Ren L, Wang Y et al. 1-year outcomes in hospital survivors with COVID-19: a longitudinal cohort study. Lancet. 2021;398(10302):747–758.
9. Sinclair M, O'Toole J, Malawaraarachchi M, Leder K. Comparison of response rates and cost-effectiveness for a community-based survey: postal, internet and telephone modes with generic or personalised recruitment approaches. BMC Medical Research Methodology 2012;12(1):1-8.
10. Yang R, Li X, Liu H, Zhen Y, Zhang X, Xiong Q, Luo Y, Gao C, Zeng W. Chest CT severity score: an imaging tool for assessing severe COVID-19. Radiology: Cardiothoracic Imaging. 2020;2(2):e200047.
11. Hughes AJ, Dunn KM, Chaffee T, Bhattarai JJ, Beier M. Diagnostic and Clinical Utility of the GAD-2 for Screening Anxiety Symptoms in Individuals With Multiple Sclerosis. Arch Phys Med Rehabil. 2018;99(10):2045-2049.
12. Prins A, Bovin MJ, Smolenski DJ, Marx BP, Kimerling R, Jenkins-Guarnieri MA, Kaloupek DG, Schnurr PP, Kaiser AP, Leyva YE, Tiet QQ. The primary care PTSD screen for

DSM-5 (PC-PTSD-5): development and evaluation within a veteran primary care sample. Journal of General Internal Medicine. 2016;31(10):1206-11.

13. Arroll B, Goodyear-Smith F, Crengle S, Gunn J, Kerse N, Fishman T, Falloon K, Hatcher S. Validation of PHQ-2 and PHQ-9 to screen for major depression in the primary care population. The annals of family medicine. 2010;8(4):348-53.
14. Poyraz BÇ, Poyraz CA, Olgun Y, Gürel Ö, Alkan S, Özdemir YE, Balkan İİ, Karaali R. Psychiatric morbidity and protracted symptoms after COVID-19. Psychiatry research. 2021;295:113604.
15. Liu D, Baumeister RF, Veilleux JC, Chen C, Liu W, Yue Y, Zhang S. Risk factors associated with mental illness in hospital discharged patients infected with COVID-19 in Wuhan, China. Psychiatry Research. 2020;292:113297.
16. Tomasoni D, Bai F, Castoldi R, Barbanotti D, Falcinella C, Mulè G, Mondatore D, Tavelli A, Vegni E, Marchetti G, d'Arminio Monforte A. Anxiety and depression symptoms after virological clearance of COVID-19: a cross-sectional study in Milan, Italy. Journal of medical virology. 2021;93(2):1175-9.
17. Mazza MG, De Lorenzo R, Conte C, Poletti S, Vai B, Bollettini I, Melloni EM, Furlan R, Ciceri F, Rovere-Querini P, Benedetti F. Anxiety and depression in COVID-19 survivors: Role of inflammatory and clinical predictors. Brain, behavior, and immunity. 2020;89:594-600.
18. Venkatesh BT, Andrews T, Mayya SS, Singh MM, Parsekar SS. Perception of stigma toward mental illness in South India. Journal of family medicine and primary care. 2015;4(3):449.
19. Krendl AC, Pescosolido BA. Countries and cultural differences in the stigma of mental illness: the east–west divide. Journal of Cross-Cultural Psychology. 2020;51(2):149-67.
20. Ran MS, Hall BJ, Su TT, Prawira B, Breth-Petersen M, Li XH, Zhang TM. Stigma of mental illness and cultural factors in Pacific Rim region: a systematic review. BMC psychiatry. 2021;21(1):1-6.
21. Altman MT, Knauert MP, Pisani MA. Sleep disturbance after hospitalization and critical illness: a systematic review. Annals of the American Thoracic Society. 2017;14(9):1457-68.
22. Myhren H, Ekeberg Ø, Tøien K, Karlsson S, Stokland O. Posttraumatic stress, anxiety and depression symptoms in patients during the first year post intensive care unit discharge. Critical Care. 2010;14(1):1-0.
23. Phadnis R, Wickramasinghe C, Zevallos JC, Davlin S, Kumarapeli V, Lea V, Lee J, Perera U, Solórzano FX, Vásconez JF. Leveraging mobile phone surveys during the COVID-19 pandemic in Ecuador and Sri Lanka: Methods, timeline and findings. Plos one. 2021;16(4):e0250171

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 704–715, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.007

ORIGINAL ARTICLE

A Study on Prevalence and Risk Factors of Depression Among Adolescents (16-19 years) in the Urban Area of Andhra Pradesh

Kavya Sri T,[1] Pavan Chand Donipudi,[2,]* Sravya T[1] and R Nageswara Rao[3]

[1]*Post Graduate, Department of Community Medicine, Siddhartha Medical College, Vijayawada, NTR District, Andhra Pradesh*
[2]*Assistant Professor, Department of Community Medicine, Siddhartha Medical College, Vijayawada, NTR District, Andhra Pradesh*
[3]*Professor and HOD, Department of Community Medicine, Siddhartha Medical College, Vijayawada, NTR District, Andhra Pradesh*

Accepted: 4-June-2024 / Published Online 08-July-2024

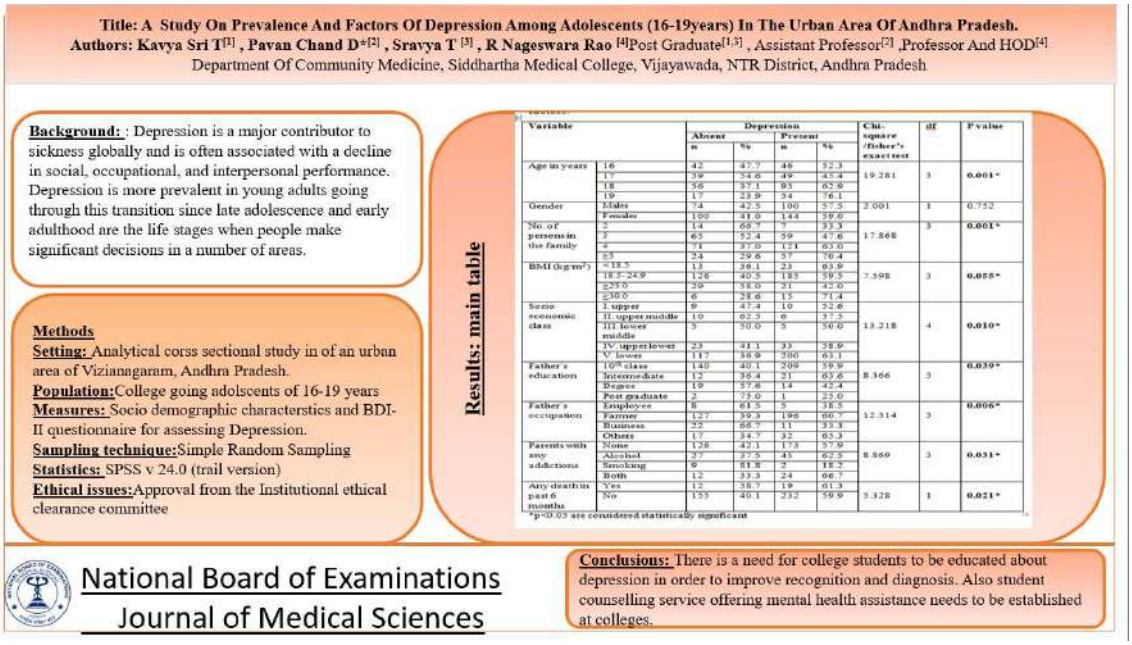
Abstract

Background: Depression is a major contributor to sickness globally and is often associated with a decline in social, occupational, and interpersonal performance. Depression is more prevalent in young adults going through this transition since late adolescence and early adulthood are the life stages when people make significant decisions in a number of areas. **Objective:** This cross sectional study was done in September-November 2023 with objective to find out prevalence of depression and risk factors associated with depression among College going Adolescents [16-19 years] in the Urban area of Vizianagaram city, Andhra Pradesh. **Methodology:** A Semi structured questionnaire was used to collect information on socio demographic characteristics. Study participants were screened using Beck's Depression Inventory Questionnaire (BDI –II) to gather information regarding depression & its risk factors. **Results:** The overall prevalence of depression was found to be 58.4%; in which 117 (28%) were having mild depression, 63 (15.3%) were having severe depression and 64 (15.1%) were having moderate depression. The study showed a highly significant association between levels of depression and selected demographic variables such as Age in years, No. of persons in their family, BMI, Socio- economic status, Father's education, Father's occupation and Parents with any addictions. **Conclusion:** There is a need for college students to be educated about depression in order to improve recognition and diagnosis. Also student counselling service offering mental health assistance needs to be established at colleges.

Keywords: Adolescent, Depression, Prevalence, Risk factors, Urban

*Corresponding Author: Pavan Chand Donipudi
Email: dr.paavan@gmail.com

Graphical Abstract



Introduction

Mental health illnesses are unlike any other in that they impact a greater number of people throughout their entire life, are more common and incapacitating, or start at a younger age. Depression is a major contributor to sickness globally and is often associated with a decline in social, occupational, and interpersonal performance [1]. Depression is more prevalent in young adults going through this transition since late adolescence and early adulthood are the life stages when people make significant decisions in a number of areas.

The adolescent age group is defined by the World Health Organization (WHO) as the years between 10 and 19 years of age [2]. Because of the physical and physiological changes that take place during this time, the early and late adolescent groups are identifiable in terms of their biological, cognitive, social, and emotional development and are at quite different life stages [3]. During the adolescent stage, puberty and cognitive and brain development result in improved social and self-awareness [4].

In 1998, the World Health Report estimated that non-communicable diseases accounted for 39% of all Disability-Adjusted Life Years (DALY) lost in low- and middle-income countries, with neuropsychiatric problems accounting for 10% of the disease burden [5].

Globally, neuropsychiatric illnesses cause the bulk of DALYs lost in people between the ages of 15 and 44. Depression is the most common psychiatric disorder among adolescents, according to research done in communities and schools across the world [6].

Due to their high incidence, associated issues, and other health-related repercussions, depression disorders are listed by the World Health Organization as one of the most common mental health illnesses affecting adolescents [7].

Adolescent depression affects 15-20% of people worldwide, and 60–70% of

those instances recur [8,9]. A 2022 Mental Health America study found that 15.08% of young people (ages 12 to 17) said they had experienced at least one major depressive episode in the year before [10]. A prospective longitudinal research conducted in Chandigarh, north India, with a community-based sample of children aged 10 to 17 years, found that the annual incidence rate of depression was 1.61 per 1000 [11].

Depression in adolescents can present with a wide range of symptoms, including eating problems, unexplained physical issues, poor academic performance, and other behavioural signs. This is one of the reasons it is often overlooked [12]. As they become older, the most catastrophic effect is suicide, which is the third highest cause of mortality for adolescents over the age of 18. They are also frequently more likely to experience increased hospitalizations, recurring depression, psychosocial impairment, substance addiction, and antisocial activities [13].

Adolescent behavioural and hormonal changes make it challenging to diagnose depression, and over 70% of affected children do not receive the proper care [14]. Depression is also one of the health issues that goes undiagnosed because affected children are unable to express their true feelings. In addition, people are hesitant to seek psychiatric assistance because of the underlying melancholy of this era of increasingly perplexing and erratic personalities.

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) lists a variety of depressed moods, psychomotor agitation or retardation, diminished interest or pleasure, insomnia, fatigue or loss of energy, diminished ability to concentrate, significant weight loss, feelings of worthlessness or excessive guilt, and recurrent thoughts of death as symptoms of depression [14]. Nearly 40–90% of the young people with depressive disorders also had symptoms of anxiety disorders, substance addiction, conduct problems, and personality disorders [15]. There is a two to four-fold probability that adolescent depression disorder will continue into adulthood, and it frequently has a chronic waxing and waning history (Pine et al., 1999) [16].

Childhood depression was once believed to be concealed by undiagnosed diseases, but doctors and psychiatrists now regard it as a serious illness that affects both young children and teenagers [17]. At the college level, academic pressures are increasing daily and at each successive level. Students are adjusting emotionally to complex life changes. Academic pressures at the college level are rising daily and with every level that follows. The difficulties of college, moving away from home for the first time, learning to live independently, forming new relationships, and irregular sleep patterns are all potential risk factors for students as they adjust emotionally to complex life changes. Depression has also been shown to be a risk factor for substance abuse, underachievement in school, and absenteeism [18].

Early diagnosis and treatment of depression may be essential for decreasing the rate of depression in youth, improving depression management, and averting detrimental consequences. Although the causes and effects of depression have been researched across a wide range of demographic groups and subgroups, little is known about the scope of the issue or

the impact of the illness on college students. Therefore, this study was undertaken to determine the prevalence of depression among college students as well as the risk factors linked to depression.

Materials and Methods

This research employed a cross-sectional study design conducted at a General Intermediate and Degree College with yearly admission of over 1000 students in Vizianagaram city of Andhra Pradesh state, between September to November 2023.

The ethical approval for conducting this study was obtained from the institutional ethical clearance committee. The purpose of the study was explained and permission to conduct the study in this college was obtained from the Head of the institution.

Individuals in the age group of 10–19 years are considered as adolescents [5]. However, for the purpose of this study, adolescents aged 16 years and above were included. The colleges were visited on a pre-informed date and the eligible students (aged above 16 years and less than 19 years) were included in the study. The selected students were explained about the objectives of the study, and assured of confidentiality, and after consent was obtained from each one of them, data collection was done.

The sample size was estimated based on a study conducted by Bharathi et al., in adolescents, Patna, Bihar, where the prevalence of depression was 51.2% [20]. With 10% relative precision and assuming 95% confidence limits, the minimum required sample size was 381. Adding 10% of the non-response rate, the sample size required for our study was estimated to be 418. Probability proportion to the size of the population statistical sampling technique was used to decide the number of adolescents to be included in the study from each class.

Pre-tested, semi-structured questionnaires were utilized to gather study participants' socio- demographic information. The B. G. Prasad Scale [21] was used to determine the level of socioeconomic status. The Beck Depression Inventory-II (BDI-II, OHSU Headache Centre), a mood-measuring tool that was first created by Dr. Aaron T. Beck, was used in this investigation to determine the prevalence of depression (Beck, 2009) [22]. The multiple-choice test consists of 21 groups of statements, each with a score between 0 and 3, adding up to 63 overall. A score of 0 to 13 is considered normal, a score of 20 to 28 is considered moderate, a score of 29 to 63 is considered severe, and a score of mild or borderline is considered clinical.

Data input and analysis were done using the statistical package for social sciences, version 24 trail version (SPSS Inc., Chicago, IL). For continuous variables, descriptive analyses were computed using mean and standard deviation, whereas percentages were employed to characterize frequency for nominal variables. Categorical variables were compared using Fischer Exact value and Pearson's chi-square. P values less than 0.05 were considered statistically significant.

Binary logistic regression was done with mental depression as a dependent variable with the dichotomous outcome and with age, education, type of family, satisfaction with their studies, BMI, socioeconomic class, parents living status, father’s education, parents with any

addiction and any history of psychological illness in their family.

Results

A total of 418 college going adolescents participated in the study, of them majority (61.9%) were aged 17 -18 years. The mean age of the participants was 17.61 ± 1 years. The proportion of males were 58.4% and females were 41.6%.Majority of the participants are from Hindu religion (94.7%). Most (88.6%) of the participants belong to nuclear families. Among the participants, 75.8% belonged to Lower socio-economic class. History of psychological illness in their families was observed in 45 (10.8%) of study participants (Table 1).

The overall prevalence of depression was found to be 58.4% in this study, of which 117 (28%) were having mild depression, 63 (15.3%) were having severe depression and 64 (15.1%) were having moderate depression (Table 2).

In the present study from Table 3, it was observed that significant association is present between levels of depression and demographic variables like Age in years (p= 0.0001), No. of persons in their family (p= 0.001), BMI in kg/m^2 (p= 0.055), Socio- economic status (p= 0.010), Father's education (p= 0.039), Father's occupation (p= 0.006), Parents with any addictions (p= 0.031) and Death of a family member in past 6 months (p= 0.021).

From Table 4, with Bivariate analysis, the risk of depression among study participants was observed to be significantly higher with more no. of persons in their family (OR 1.85), who are not satisfied with their studies (OR 1.465), with BMI >30.0 (OR 1.39), belonging to Lower socio- economic class (OR 1.21).

Table 1. Socio- demographic profile of the study participants

Variables		Frequency (n)	%
Age	16 yrs	71	17.0
	17 yrs	108	25.8
	18 yrs	151	36.1
	19 yrs	88	21.1
gender	Males	244	58.4
	Females	174	41.6
Religion	Hindu	396	94.7
	Muslim	6	1.4
	Christians	15	3.6
	others	1	0.2
Education	Inter 1st year	79	18.9
	Inter 2nd year	72	17.2
	Degree 1st year	150	35.9
	Degree 2nd year	117	28.0
Type of Family	Nuclear family	310	74.2
	Joint family	108	25.8
Socio economic class	I. Upper	19	4.5
	II. Upper middle	16	3.8
	III. Lower middle	10	2.4
	IV. Upper lower	56	13.4

	V. Lower	317	75.8
Any family history of psychological illness	Yes	45	10.8
	No	373	89.2

Table 2. Prevalence of depression among study participants

Variable		Depression				
		No (%)	Mild (%)	Moderate (%)	Severe (%)	Total (%)
Gender	Male	100 (41.0)	77 (31.6)	32 (13.1)	35 (14.3)	244 (58.4)
	female	74 (42.5)	40 (23.0)	31 (17.8)	29 (16.7)	174 (41.6)
Total		174 (41.6)	117 (28.0)	63 (15.1)	64 (15.3)	418

Table 3. Showing association of levels of depression with various socio- demographic factors

Variable		**Depression**				**Chi-square /fisher's exact test**	**df**	**P value**
		Absent		**Present**				
		n	**%**	**n**	**%**			
Age in years	16	42	47.7	46	52.3	19.281	3	**0.001***
	17	59	54.6	49	45.4			
	18	56	37.1	95	62.9			
	19	17	23.9	54	76.1			
Gender	Males	74	42.5	100	57.5	2.001	1	0.752
	Females	100	41.0	144	59.0			
No. of persons in the family	2	14	66.7	7	33.3	17.868	3	**0.001***
	3	65	52.4	59	47.6			
	4	71	37.0	121	63.0			
	≥5	24	29.6	57	70.4			
BMI (kg/m^2)	< 18.5	13	36.1	23	63.9	7.598	3	**0.055***
	18.5- 24.9	126	40.5	185	59.5			
	≥25.0	29	58.0	21	42.0			
	≥30.0	6	28.6	15	71.4			
Socio economic class	I. upper	9	47.4	10	52.6	13.218	4	**0.010***
	II. upper middle	10	62.5	6	37.5			
	III. lower middle	5	50.0	5	50.0			
	IV. upper lower	23	41.1	33	58.9			
	V. lower	117	36.9	200	63.1			
Father's education	10th class	140	40.1	209	59.9	8.366	3	**0.039***
	Intermediate	12	36.4	21	63.6			
	Degree	19	57.6	14	42.4			

	Post graduate	2	75.0	1	25.0			
Father's occupation	Employee	8	61.5	5	38.5	12.314	3	**0.006***
	Farmer	127	39.3	196	60.7			
	Business	22	66.7	11	33.3			
	Others	17	34.7	32	65.3			
Parents with any addictions	None	126	42.1	173	57.9	8.869	3	**0.031***
	Alcohol	27	37.5	45	62.5			
	Smoking	9	81.8	2	18.2			
	Both	12	33.3	24	66.7			
Any death in past 6 months	Yes	12	38.7	19	61.3	5.328	1	**0.021***
	No	155	40.1	232	59.9			

*p<0.05 are considered statistically significant

Table 4. Correlates of depression: Bivariate analysis

Variables		**Total n**	**Depression n (%)**	**OR (95% CI)**	**P value**
Overall		418	244 (58.4)	-	-
Age in years	16- 17	179	103 (57.5)	Reference	-
	18- 19	239	141 (59.0)	0.912 (0.734- 1.13)	**0.004***
Gender	Males	174	100 (57.5)	Reference	-
	Female	244	144 (59.0)	0.904 (0.581- 1.14)	0.655
No. of persons in the family	2	124	7 (33.3)	Reference	-
	3	21	57 (70.4)	6.504 (2.151- 19.66)	0.102
	4	81	121 (63.0)	3.588 (1.328- 9.26)	**0.004***
	≥5	192	59 (47.6)	1.856 (0.670- 5.13)	**0.001***
BMI (kg/m^2)	< 18.5	36	23 (63.9)	0.761 (0.345- 1.68)	**0.003***
	18.5- 24.9	311	185 (59.5)	Reference	-
	≥25.0	50	21 (42.0)	0.570 (0.300- 1.08)	0.086
	≥30.0	21	15 (71.4)	1.399 (0.510- 3.18)	**0.001***
Socio economic class	Class I/II/III	45	21 (46.7)	Reference	-
	Class IV/V	373	223 (59.8)	1.217 (0.601- 2.46)	**0.002***
Father's education	10th class	349	209 (59.9)	0.856 (0.352- 2.08)	**0.001***

	Intermediate	33	21 (63.6)	1.474 (0.651- 3.34)	**0.052***
	Degree	33	14 (42.4)	Reference	-
	Post graduate	3	1 (25.0)	1.31 (0.268- 1.68)	0.983
Father's occupation	Employee	13	5 (38.5)	Reference	-
	Farmer	323	196 (60.7)	2.319 (0.624- 8.61)	0.209
	Business	33	11 (33.3)	0.529 (0.121- 2.30)	0.396
	Others	49	32 (65.3)	3.228 (0.765- 13.61)	0.110
Self satisfaction with their study	Yes	382	221 (57.9)	Reference	-
	No	36	23 (63.9)	1.465 (0.632- 3.39)	**0.003***
Any death in past 6 months	Yes	31	19 (61.3)	0.466 (0.143- 1.51)	**0.002***
	No	387	232 (59.9)	Reference	-

*p<0.05 are considered statistically significant

Discussion

Depression is a frequent condition that affects a person's capacity to carry out daily tasks. Early-onset depression frequently lasts, recurs, and continues into adulthood, according to a recently published longitudinal prospective study. This suggests that childhood depression may also be a predictor of more severe illness in age. According to Weissman et al. (1999), depression in young people frequently co-occurs with other mental diseases, most frequently anxiety disorder with disruptive behaviour or drug misuse disorder. Depressive disorders in children and adolescents are linked to a number of negative consequences, such as difficulties in social and academic domains and physical and mental health issues in later life [22]. According to published research, almost 70% of kids with depression don't get the right care [20].

The prevalence of depression in our study was found to be 58.4%. This was comparable to the studies previously done by Malik et al. [23] from Rohtak, north India (52.9%); and by Bharathi et al. [20] in Patna, 2022 where the prevalence rate was 51.2%. However several other studies observations (Man Mohan Singh et al. [24] 2017; Johnson et al. [25] 2022; Chauhan et al. [26] 2022; A.S.Md. Al Mamun et al. [27] 2022) done among college students have reported the prevalence of depression to be varying from 30% to 40%.

The most common type of depression in our study was of mild (28%) followed by severe (15.3%) and moderate grade depression (15.1%). Moderate depression was again the commonest type of depression in a Kerala (India) based

study conducted among 10 to 19 years school/college students.

The late adolescent age group was shown to be substantially more depressed than the other age groups in the present study. Research done by Mohan Raj et al., and Chakraborthy et al. from Chennai [29] and Mangaluru [30] respectively, in southern India, revealed that adolescent depression rises with age.

Bivariate analysis in the present study revealed a significant association between the subject's family type and depression. It was shown that the number of family members had a significant association with the depressed symptoms experienced by students. A number of studies by Anjum et al. [31] 2019; Salodia et al. [32] 2017; Shelke et al. [33] 2015 supported our current conclusion.

Bivariate analysis revealed a strong positive connection between depression and low levels of self-satisfaction in the study. Two Chandigarh research groups showed similar findings that depression and low self-esteem are positively correlated. [34,35].

Additionally, a significant ($p<0.01$) association was discovered between the BMI status of students and depression symptoms. Compared to students of normal weight (59.5%), a higher percentage of underweight (63.9%) and obese (71.4%) students reported having depressed symptoms. A.S.Md. Al Mamun et al.'s study [27] from Bangladesh in 2022 showed findings similar to the present study.

Lower socioeconomic level was revealed to be the independent predictor of depression among adolescents, which is consistent with the findings published by Mojs et al. [36] .

In this study, adolescents' levels of anxiety and sadness were correlated with their parents' lower levels of education. According to Kathleen et al. [37] and Srinivasa et al. 38], adolescents were likewise found to be more susceptible to all psychiatric problems if their parents had lower educational attainment.

In this study, College students' depressed symptoms and death of family member in past 6 months were significantly correlated. Singh et al. [24] from Chandigarh, north India, and Mohan Raj et al. [28] from Chennai, south India, made similar observations.

Conclusion

It was observed from this study, that there is a significant prevalence of depression among study subjects. Most of the students were experiencing mild depression. In order to ensure that college-bound adolescents are healthy, the study's findings highlight the necessity of screening them for depression and other psychiatric morbidities through screening health programs. In order to increase diagnosis and detection, health education regarding mental health should be provided to students. This analysis emphasizes the significance of college students' access to mental health treatment facilities from a public health perspective.

Acknowledgements

We acknowledge competent authorities and student participants of this study without whose sincere co-operation we could not complete this study.

Competing Interest and Funding

There is no competing interest and no funding was received for this study.

Conflict of Interest

The authors declare that they do not have conflict of interest

Author's contribution

KST & ST: Data collection and statistical analysis. PCD: Guidance for methodology and statistical analysis. RNR: Head of the Project

References

1. Onya O.N., Stanley C.N. and Stanley P.C., Risk factors for depressive illness among elderly GOPD attendees at UPTH, Int. Res. J. Medical Sci, 2013;1(6):1-9.
2. Rutter M, Graham P, Chadwick OF, Yule W. Adolescent turmoil: Fact or fiction? J Child Psychol Psychiatry 1976;17:35-56.
3. Adolescent health.WHO.int. https://www.who.int/health-topics/ adolescent-health. [Last accessed on Sep 8]
4. Blakemore SJ. The social brain in adolescence. Nat Rev Neurosci. 2008;9:267-77.
5. Dr. Nitin Joseph. Prevalence of depression among pre-university college students in an urban area of South India. International Journal of Current Research, 2011;3(11):439-442.
6. Adolescent mental health. Available from: https://www.who.int/news-room/fact-sheets/detail/adolescent-mentalhealth. [Last accessed on 2023 Sep 10].
7. World Health Organization: Caring for children and adolescents with mental disorders. Geneva; 2003. [Last accessed on Sep 15]
8. Lewinsohn P. Depression in adolescents. Handbook of Depression. Edited by: Gotlib IH, Hammen CL, New York: Guilford Press; 2002:541-553.
9. Birmaher B, Arbelaez C, Brent D. Course and outcome of child and adolescent major depressive disorder. Child Adolesc Psychiatr Clin N Am. 2002;11:619-37.
10. Colizzi M, Lasalvia A, Ruggeri M. Prevention and early intervention in youth mental health: is it time for a multidisciplinary and trans-diagnostic model for care? Int J Ment Health Syst 2020;14:23.
11. Malhotra S, Kohli A, Kapoor M, Pradhan B. Incidence of childhood psychiatric disorders in India. Indian J Psychiatry 2009;51:101-7.
12. Gorenstein C, Andrade L, Zanolo E, Artes R. Expression of depressive symptoms in a nonclinical Brazilian adolescent
13. Centers for disease control and prevention national center for injury prevention and control. Web-based Injury Statistics Query and Reporting System (WISQARS), 2016. Available at https://www.cdc.gov/injury/wisqars/. [Last accessed on Sep 21]
14. Jha KK, Singh SK, Nirala SK, Kumar C, Kumar P, Aggrawal N. Prevalence of depression among school-going adolescent in an urban area of Bihar, India. Indian J Psychol Med 2017;39:287-92.
15. Nebhinani N, Jain S. Adolescent mental health: issues, challenges, and solutions. Ann Indian Psychiatry 2019;3(01):4.
16. Pine DS, Cohen E. and Cohen Pand Brook J. Adolescent depressive

symptoms as predictors of adult depression: moodiness or mood disorder? Am J Psychiatry, 1999;156:133–135.
17. Huq S Z, Afroz N. Depression in Adolescence. J Life Earth Science 2005;1(1):11-13.
18. Verma N., Jain M. and Roy P., Assessment of magnitude and grades of depression among adolescents in Raipur city, India, Int. Res. J. Medical Sci, 2014;2(5):10-13.
19. Bharati DR, Kumari S, Prasad N, Choudhary SK, Kumar S, Pal R. Correlates of depression among school going adolescents in the urban area of Patna in eastern India. J Family Med Prim Care 2022;11:1702-9.
20. Prasad BG. Social classification of Indian families. J Indian Med Assoc 1961;37:250-1.
21. Beck's Depression Inventory II http://www.ibogaine.desk.nl/ graphics/3639b1c_23.pdf (last accessed on Oct 2, 2023)
22. Jayashree K, Mithra PP, C. Nair MK, Unnikrishnan B, Pai K. Depression and anxiety disorders among schoolgoing adolescents in an urban area of South India. Indian J Community Med 2018;43:S28-32.
23. Malik M, Khanna P, Rohilla R, Mehta B, Goyal A. Prevalence of depression among school going adolescents in an urban area of Haryana, India. Int J Community Med Public Health 2015;2:624-6.
24. Singh et al. Prevalence & associated factors of depression among adolescents. Indian J Med Res 2017;146:205-215.
25. Johnson AR, Hanspal I, Johnson AD, Fathima FN. Prevalence of depression among young adults: Evidence from a cross-sectional study in a college in peri-urban South India. Journal of Fundamentals of Mental Health 2022;Mar-Apr;24(2):83-91.
26. Chauhan D, Patel U, Rahul K, Patel M. Depression among higher secondary students of science stream of private schools of Rajkot. J Family Med Prim Care 2022;11:3761-5.
27. A.S.Md. Al Mamun et al. The prevalence and factors associated with depressive symptoms among tertiary level students in Bangladesh: A survey in Rajshahi district. Journal of Affective Disorders Reports 2022;10:100445.
28. Jayanthi P, Thirunavukarasu M. Prevalence of depression among school going adolescents in South India. Int J Pharm Clin Res 2015;7:61-3
29. Mohanraj R, Subbaiah K. Prevalence of depressive symptoms among urban adolescents in South India. J Indian Assoc Child Adolesc Ment Health 2010;6:33-43
30. Chakraborty T, Brahmbhatt K, Madappady S, Nelliyanil M, Jayram S, Debnath S, et al. Prevalence of depression amongst adolescents in rural area of South India – A school based cross sectional study. Public Health Review: Int J Public Health Res 2016;3:65-9.
31. Anjum, A., Hossain, S., Sikder, T., Uddin, M.E., Rahim, D.A. Investigating the prevalence of and factors associated with depressive symptoms among urban and semi-urban school adolescents in Bangladesh: a pilot study. Int. Health

2019:1–9. https://doi.org/10.1093/inthealth/ihz092.

32. Salodia, U.P., Roy, N., Kumari, S., Kishore, J. Prevalence and factors associatedwith depression in school-going adolescents of India. Indian J. Youth Adolesc. 2017;3(4):5.
33. Shelke, U.S., Kunkulol, R.R., Phalke, V.D., Narwane, S.P., Patel, P.C. Study of depression among adolescent students of rural Maharashtra and its association with socio-demographic factors: a cross-sectional study. Int. J. Med. Res. Health Sci. 2015;4(1):41–45.
34. Singh MM, Gupta M, Grover S. Prevalence & factors associated with depression among schoolgoing adolescents in Chandigarh, North India. Indian J Med Res 2017;146:205-15.
35. Sandal RK, Goel NK, Sharma MK, Bakshi RK, Singh N, Kumar D. Prevalence of depression, anxiety and stress among school going adolescent in Chandigarh. J Family Med Prim Care 2017;6:405-10.
36. Mojs E, Warchoł BK, Głowacka MD, Strzelecki W, Ziemska B, Marcinkowski JT. Are students prone to depression and suicidal thoughts? Assessment of the risk of depression in university students from rural and urban areas. Ann Agric Environ Med. 2012;19(4):770-4.
37. Kathleen RM, Jian-ping H. Marcy B, Sonja AS, Shelli A, Lihong C, et al. Lifetime prevalence of mental disorders in US adolescents: Results from the national comorbidity study-adolescent supplement (NCS-A). J Am Acad Child Adolesc Psychiatry 2010;49:980-9.
38. Srinivasa S, Chaithanya C. Nair, Ravindra LS. A study on prevalence of anxiety disorders among higher secondary school students. J Evolution Med Dent Sci 2015;4:4473-8.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 716-723, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.008

ORIGINAL ARTICLE

Study on Effects of Probiotics on Severity of Allergic Rhinitis

Sama Rizvi,[1] Stuti Shukla,[2,*] Saurabh Singh[3] and Somya Gupta[1]

[1]*Senior Resident, Department of ENT, School of Medical Sciences and Research, Sharda Hospital Sharda University, Knowledge Park III, Greater Noida, Uttar Pradesh 201310*
[2]*Assistant Professior, Department of ENT, School of Medical Sciences and Research, Sharda Hospital, Sharda University, Knowledge Park III, Greater Noida, Uttar Pradesh 201310*
[3]*Post Graduate, Department of ENT, School of Medical Sciences and Research, Sharda Hospital, Sharda University, Knowledge Park III, Greater Noida, Uttar Pradesh 201310*

Accepted: 12-May-2024 / Published Online 08-July-2024

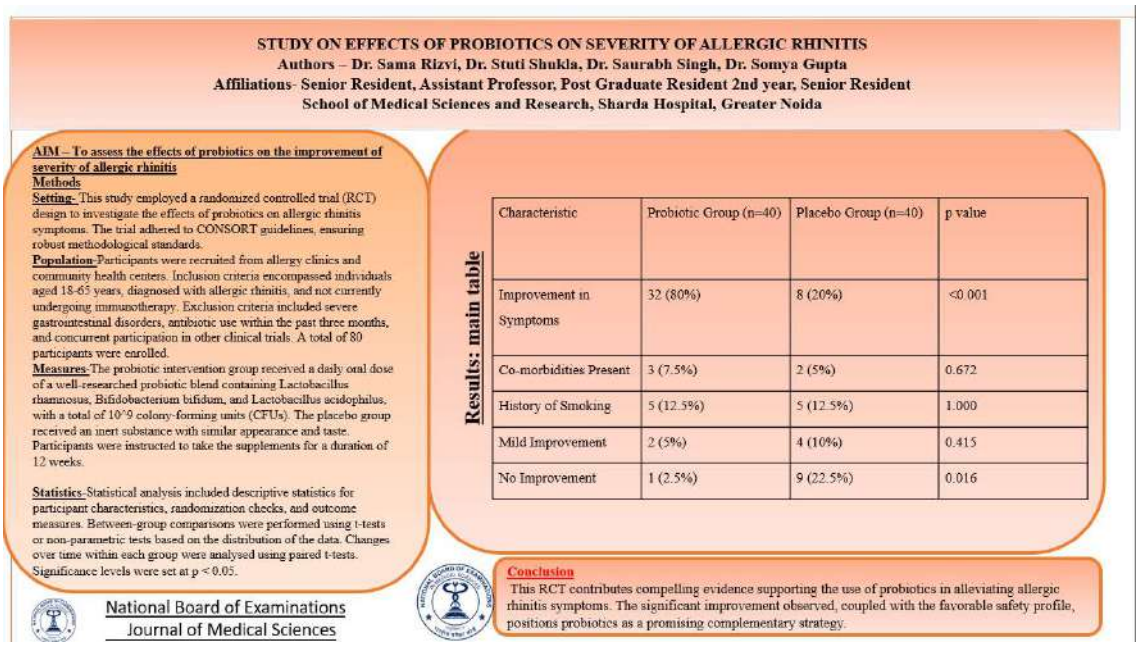
Abstract

Introduction: Allergic rhinitis, a common and often debilitating condition affecting millions globally, remains a challenge for clinicians and patients alike. As we venture into the realm of probiotics and allergic rhinitis, it becomes imperative to unravel the multifaceted ways in which these microorganisms may influence immune modulation, inflammation, and the overall balance of the microbiome. In this exploration, we navigate the microbial frontier, seeking to unravel the intricate connections between probiotics and the management of allergic rhinitis. **Methods:** This study employed a randomized controlled trial (RCT) design to investigate the effects of probiotics on allergic rhinitis symptoms. The trial adhered to CONSORT guidelines, ensuring robust methodological standards. Participants were recruited from allergy clinics and community health centres. Inclusion criteria encompassed individuals aged 18-65 years, diagnosed with allergic rhinitis, and not currently undergoing immunotherapy. Exclusion criteria included severe gastrointestinal disorders, antibiotic use within the past three months, and concurrent participation in other clinical trials. A total of 80 participants were enrolled. **Results:** The probiotic group demonstrated a significantly higher improvement rate, with 32 participants (80%) showing improved allergic rhinitis symptoms compared to 8 participants (20%) in the placebo group ($p < 0.001$). **Conclusion:** In conclusion, this RCT contributes compelling evidence supporting the use of probiotics in alleviating allergic rhinitis symptoms. The significant improvement observed, coupled with the favourable safety profile, positions probiotics as a promising complementary strategy.

Keywords: Allergy, Type1 Hypersensitivity, Allergic rhinitis, immune boosters, probiotics

*Corresponding Author: Stuti Shukla
Email: stuti2188@gmail.com

Graphical Abstract



Introduction

Allergic rhinitis, a common and often debilitating condition affecting millions globally, remains a challenge for clinicians and patients alike. Characterized by inflammatory responses to environmental allergens, its manifestations range from nasal congestion and sneezing to pruritus and rhinorrhea [1]. While conventional treatments have provided symptomatic relief, the quest for innovative and holistic management approaches has led to the exploration of the human microbiome. Within this burgeoning field, probiotics, live microorganisms known for their health-promoting effects, have emerged as potential modulators of immune responses and agents capable of reshaping the microbial landscape within the body [2,3].

This introduction serves as a preamble to delve into the evolving narrative of allergic rhinitis management, with a particular focus on the interplay between probiotics and the intricate immune mechanisms underlying this condition. The immune system's response to allergens is a complex orchestration involving various cells and mediators, and recent scientific attention has turned towards the gut microbiota's role in immune regulation – a realization that lays the foundation for exploring probiotics as agents of therapeutic promise [4].

As we venture into the realm of probiotics and allergic rhinitis, it becomes imperative to unravel the multifaceted ways in which these microorganisms may influence immune modulation, inflammation, and the overall balance of the microbiome [5]. From their anti-inflammatory properties and impact on immunoglobulin production to their potential in fortifying the gut barrier, probiotics present a diverse array of mechanisms that could redefine our strategies for allergic rhinitis management [6,7].

Moreover, the concept of using probiotics not only for symptomatic relief but also as a preventive measure introduces a paradigm shift in our understanding of allergic rhinitis. Early-life exposures and personalized approaches to probiotic supplementation may usher in a new era of tailored interventions aimed at addressing the root causes of allergic rhinitis and shaping immune resilience from the outset [8-10].

In this exploration, we navigate the microbial frontier, seeking to unravel the intricate connections between probiotics and the management of allergic rhinitis. Through an in-depth analysis of current research findings, we strive to illuminate the potential benefits, challenges, and future directions in leveraging probiotics as a complementary or alternative strategy in the comprehensive management of allergic rhinitis. As we embark on this scientific journey, the promise of probiotics unveils a path towards innovative, personalized, and sustainable approaches in the quest for enhanced well-being amidst the challenges of allergic rhinitis.

Materials and method

Study Design

This study employed a randomized controlled trial (RCT) design to investigate the effects of probiotics on allergic rhinitis symptoms. The trial adhered to CONSORT guidelines, ensuring robust methodological standards.

Participants

Participants were recruited from allergy clinics and community health centers. Inclusion criteria encompassed individuals aged 18-65 years, diagnosed with allergic rhinitis, and not currently undergoing immunotherapy. Exclusion criteria included severe gastrointestinal disorders, antibiotic use within the past three months, and concurrent participation in other clinical trials. A total of 80 participants were enrolled.

Randomization and Blinding

Participants were randomly assigned to either the probiotic intervention group or the placebo group. Randomization was achieved using computer-generated codes, and both participants and investigators were blinded to group assignments. The probiotic and placebo formulations were identical in appearance and taste, ensuring double-blinding.

Probiotic Intervention

The probiotic intervention group received a daily oral dose of a well-researched probiotic blend containing Lactobacillus rhamnosus, Bifidobacterium bifidum, and Lactobacillus acidophilus, with a total of 10^9 colony-forming units (CFUs). The placebo group received an inert substance with similar appearance and taste. Participants were instructed to take the supplements for a duration of 12 weeks.

Outcome Measures

1. **Primary Outcome: Symptom Severity**
   - Participants self-reported nasal congestion, sneezing, rhinorrhea, and itching using a validated allergic rhinitis symptom scoring system.
2. **Secondary Outcomes: Immunological and Microbiome Analysis**
   - Blood samples were collected to assess serum immunoglobulin E (IgE) levels.

- Stool samples were collected for microbiome analysis using next-generation sequencing to evaluate changes in gut microbial composition.

Intervention Duration

The study spanned a 12-week period, with participants adhering to their assigned interventions throughout. Follow-up assessments were conducted at 4-week intervals.

Statistical Analysis

Statistical analysis included descriptive statistics for participant characteristics, randomization checks, and outcome measures. Between-group comparisons were performed using t-tests or non-parametric tests based on the distribution of the data. Changes over time within each group were analysed using paired t-tests. Significance levels were set at $p < 0.05$.

Compliance and Adverse Events Monitoring

Participants were provided with detailed instructions for intervention adherence. Compliance was assessed through daily logs and returned supplement containers. Adverse events were systematically recorded and evaluated for severity and relation to the intervention.

Sample Size Calculation

The sample size was calculated based on an estimated effect size from pilot studies, ensuring adequate power to detect significant differences in primary and secondary outcomes.

Result

Below is a summary of the results based on the provided information for a randomized controlled trial (RCT) with a sample size of 80 participants investigating the impact of a probiotic intervention on allergic rhinitis symptoms (Table 1).

Table 1. RCT Study Results: Impact of Probiotics on Allergic Rhinitis

Characteristic	Probiotic Group (n=40)	Placebo Group (n=40)	p value
Improvement in Symptoms	32 (80%)	8 (20%)	<0.001
Co-morbidities Present	3 (7.5%)	2 (5%)	0.672
History of Smoking	5 (12.5%)	5 (12.5%)	1.000
Mild Improvement	2 (5%)	4 (10%)	0.415
No Improvement	1 (2.5%)	9 (22.5%)	0.016

Interpretation

Improvement in Symptoms: The probiotic group demonstrated a significantly higher improvement rate, with 32 participants (80%) showing improved allergic rhinitis symptoms compared to 8 participants (20%) in the placebo group ($p < 0.001$).

Co-morbidities Present: The occurrence of co-morbidities was similar between the probiotic (7.5%) and placebo (5%) groups, with no statistically significant difference observed ($p = 0.672$).

History of Smoking: Both groups had a similar history of smoking, with 5 participants (12.5%) in each group. The presence of a history of smoking was not a significant differentiator between the groups ($p = 1.000$).

Mild Improvement: The proportion of participants showing only mild improvement did not differ significantly between the probiotic (5%) and placebo (10%) groups ($p = 0.415$).

No Improvement: The probiotic group had a significantly lower rate of participants with no improvement (2.5%) compared to the placebo group (22.5%) ($p = 0.016$) (Figure 1).

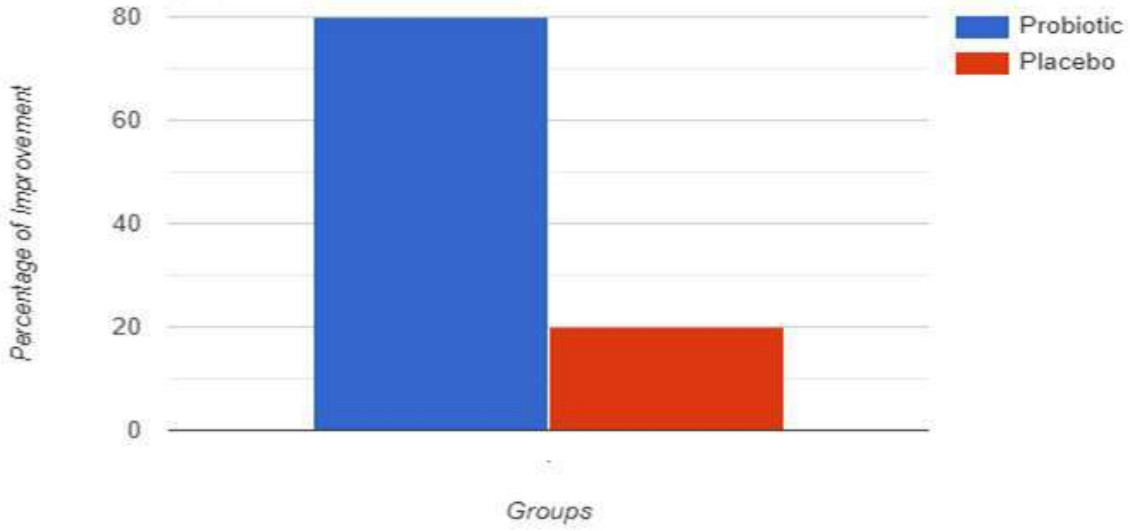


Figure 1. The percentage of participants showing improvement in allergic rhinitis symptoms in the probiotic and placebo groups.

Discussion

There has been many studies in the literature showing benefits of probiotics and prebiotics in improving clinical symptoms of allergic rhinitis [11].

As atopic disease have seasonal variation of symptoms, the results could have been affected by time period of a particular study. Three studies reported effects of probiotics on allergic symptoms induced during pollen season of Japanese cedar pollen (JCP) in patients with history of such allergy (confirmed by symptoms and laboratory tests) [10,12]. In these trials, participants were administered probiotics on/ before the onset of pollen season and were continued until the completion of the pollen season. BB536-supplemented yogurt has been demonstrated to have a pronounced promoting effect on intestinal

environments after 2 weeks of intake at a dose of 100 g per day [13].

The effects of probiotics to modulate blood/immunologic parameters associated with allergic symptoms should be elucidated as some studies found beneficial effect on clinical parameters without significant change in the immunologic parameters. In this review, we found no significant overall change in immunologic parameters in the probiotics group. In all the trials, subjects were advised to continue antiallergic medications during symptomatic period. In contrast to other treatments such as histamine release inhibitors or antihistamines, the effects of probiotics are expected to be mild, with a lag period in the expression of their effect. Uses of medications vary from patient to patient and some has carried over effects (eg, steroids). Caution should be exercised during interpretation of results because of probiotic bacteria effects per se.

The findings from this randomized controlled trial (RCT) provide valuable insights into the role of probiotics in managing allergic rhinitis symptoms. The discussion below delves into key aspects of the study results, their implications, and considerations for future research.

Improvement in Symptoms

The most notable outcome of this RCT is the substantial improvement in allergic rhinitis symptoms observed in the probiotic group. The 80% improvement rate significantly surpassed the placebo group, emphasizing the potential efficacy of probiotics as a therapeutic intervention. This result aligns with emerging evidence suggesting the immunomodulatory properties of specific probiotic strains.

Co-morbidities and Smoking History

The presence of co-morbidities and a history of smoking did not significantly impact the observed outcomes. The similar rates of co-morbidities and smoking history in both the probiotic and placebo groups suggest that these factors may not be major contributors to the observed improvements. However, the limited sample size might hinder the detection of subtle effects, warranting further investigation in larger cohorts.

Mild Improvement and No Improvement

The distribution of participants showing only mild improvement did not significantly differ between the probiotic and placebo groups. However, the probiotic intervention resulted in a significantly lower rate of participants with no improvement compared to the placebo group. This suggests that while probiotics may not universally lead to marked improvement, they appear to mitigate the occurrence of non-responders.

Clinical Implications

The high adherence to the intervention, coupled with the significant improvement in symptoms, suggests that incorporating probiotics into allergic rhinitis management may be a well-tolerated and effective strategy. This has meaningful implications for clinicians seeking alternative or complementary approaches, especially for patients who may be reluctant to rely solely on pharmacotherapy.

Limitations and Future Directions

Despite the promising outcomes, several limitations merit consideration. The relatively small sample size may limit the

generalizability of the findings. Future research with larger cohorts could further validate these results and explore potential subgroups that may benefit more from probiotic interventions. Additionally, a longer-term follow-up would provide insights into the sustainability of the observed improvements.

Conclusion

In conclusion, this RCT contributes compelling evidence supporting the use of probiotics in alleviating allergic rhinitis symptoms. The significant improvement observed, coupled with the favorable safety profile, positions probiotics as a promising complementary strategy. Further research, including larger trials and long-term follow-ups, will refine our understanding of probiotic interventions, paving the way for more tailored and effective approaches in allergic rhinitis management. As we navigate this frontier, the potential of probiotics to enhance patient outcomes and quality of life remains an exciting avenue for exploration.

Ethical Approval and Informed Consent

The study protocol was reviewed and approved by the Institutional Review Board, ensuring adherence to ethical standards. Informed consent was obtained from all participants, emphasizing voluntary participation, confidentiality, and the right to withdraw from the study at any time.

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Allergic rhinitis and its impact on Asthma. ARIA workshop report. J Allergy Clin Immunol. 2001;108 (Suppl):S147–S276.
2. Reid G, Sanders ME, Gaskins HR, Gibson GR, Mercenier A, et al. New scientific paradigms for probiotics and prebiotics. J Clin Gastroenterol. 2003;37:105–118.
3. Allen SJ, Okoko B, Martinez E, et al. Probiotics for treating infectious diarrhoea. Cochrane Database of Systematic Rev. 2007;1: CD003048.
4. D'souza AL, Rajkumar C, Cooke J, Bulpitt CJ. Probiotics in preventing of antibiotic associated diarrhoea: Meta-analysis. BMJ. 2002;324:13611364.
5. Othman M, Meilson JP, Alfirevic Z. Probiotics for preventing preterm labour. Cochrane Database of Systematic Reviews. 2007;1:CD005941.
6. Jadad AR, Moore RA, Carroll D, et al. Assessing the quality of reports of randomized clinical trials: is blinding necessary? Controlled Clin Trials. 1996;17:1–12.
7. Peng G-C, HsuC-H. TheEfficacy and safety of heat-killed Lactobacillus paracasei for treatment of perennial allergic rhinitis induced by housedust mite. Pediatr Allergy Immunol. 2005;16:433–438.
8. Wang MF, Lin HC, Wang YY, Hsu CH. Treatment of perennial allergic rhinitis with lactic acid bacteria. Pediatr Allergy Immunol. 2004;15:152158.

9. Giovannini M, Agostoni C, Riva E, Salvini F, Ruscitto A, et al. A randomized prospective double blind controlled trial on effects of long-term consumption of fermented milk containing Lactobacillus casei in pre-school children with allergic asthma and/or rhinitis. Pediatr Res. 2007;62:215–220.
10. Tamura M, Shikina T, Morihana T, Hayama M, Kajimoto O, et al. Effects of probiotics on allergic rhinitis induced by Japanese cedar pollen: randomized double-blind, placebo-controlled clinical trial. Int Arch Allergy Immunol. 2007;143:75–82.
11. Xiao JZ, Kondo S, Yanagisawa N, et al. Effect of probiotic Bifidobacterium longum BB536 in relieving clinical symptoms and modulating plasma cytokine levels of Japanese cedar pollinosis during the pollen season. A randomized double-blind, placebo controlled trial. J Investig Allergol Clin Immunol. 2006a;16:86–93.
12. Xiao JZ, Kondo S, Yanagisawa N, et al. Probiotics in the treatment of Japanese cedar pollinosis: a double-blind placebo-controlled trial. Clin Exp Allergy. 2006b;36:1425–1435.
13. Ishida Y, Nakamura F, Kanzato H, Sawada D, Hirata H, et al. Clinical effects of Lactobacillus acidophilus strain L-92 on perennial allergic rhinitis: a double-blind, placebo-controlled study. J Dairy Sci. 2005;85:527–533.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 724–729, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.009

REVIEW ARTICLE

COVID-19 Food Pyramid: A Novel Approach

N Divya Lalitha,[1] Harsh Priya,[2,*] Bharathi M Purohit,[3] Deepika Mishra[4,*] and Ritu Duggal[5]

[1]*Ex Research Officer, National Oral Health Program, Centre for Dental Education and Research, All India Institute of Medical Sciences, New Delhi - 110 029, India*
[2]*Additional Professor, Division of Public Health Dentistry, Centre for Dental Education and Research, All India Institute of Medical Sciences, New Delhi - 110 029, India*
[3]*Associate Professor, Division of Public Health Dentistry, Centre for Dental Education and Research, All India Institute of Medical Sciences, New Delhi - 110 029, India*
[4]*Additional Professor, Division of Oral Pathology, Centre for Dental Education and Research, All India Institute of Medical Sciences, New Delhi - 110 029, India*
[5]*Chief, Professor and Head, Division of Orthodontics and Dentofacial Deformities, Centre for Dental Education and Research, All India Institute of Medical Sciences, Ansari Nagar, New Delhi- 110029, India*

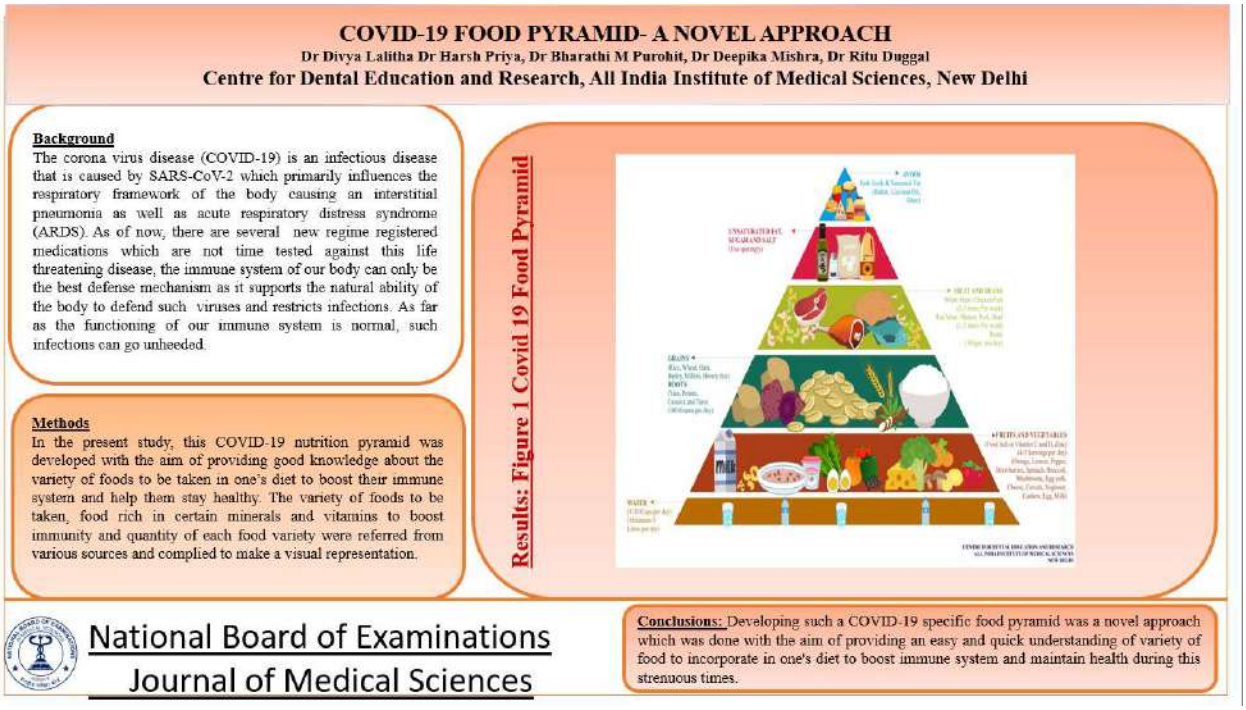
Accepted: 22-April-2024 / Published Online 08-July-2024

Abstract
COVID-19 is an infectious disease that is caused by SARS-CoV-2 which affects the respiratory framework of the body and continues to devastate the world's health as well as economy. This disease is said to adversely affect the nutritional status of the people. Healthy eating habits as well as lifestyle changes are essential to protect us from this virus. Now, there is a gradual increase in researches and nutritional recommendations on immunity boosting diets for COVID-19. However, there is still no such food pyramid has been specifically designed for COVID-19 period. Therefore, this study aimed to develop a COVID-19 specific food pyramid to illustrate the foods to be consumed on daily basis by a person to maintain health during this pandemic. Such visual representation of the nutritional guideline will help common people also to easily understand and adapt it to their day to day healthy eating behavior.

Keywords: COVID-19, Food Pyramid, Disease Control and Prevention (CDC)

*Corresponding Author: Harsh Priya
Email: drharshpriya@gmail.com

Graphical Abstract



COVID-19 and Nutrition

The corona virus disease (COVID-19) is an infectious disease that is caused by SARS-CoV-2 which primarily influences the respiratory framework of the body causing an interstitial pneumonia as well as acute respiratory distress syndrome (ARDS) [1]. As of now, there are several new regime registered medications which are not time tested against this life threatening disease, the immune system of our body can only be the best defense mechanism as it supports the natural ability of the body to defend such viruses and restricts infections. As far as the functioning of our immune system is normal, such infections can go unheeded [2].

This being a communicable disease, continues to devastate the world's health as well as economy. There is critical concern that this COVID-19 reactions adversely affect the nutritional status of the people [3]. It is progressively clear that nutritional considerations such as the identification of nutritional risk factors and use of additional nutrition support should become a basic part of management for COVID-19 [4]. Healthy eating habits as well as lifestyle changes are essential to protect us from the virus that is threatening our health. Maintaining a proper nutritional status is vital now, especially in such a period wherein the immune system might need to fight back to defend us [5].

The USDA Food Pyramid

In 1992, based on the Dietary Guidelines put forward by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services, a Food Guide Pyramid was developed [6]. The food pyramid was a visual representation of the recommended daily food intake for a

population. It was developed to depict the nutritional requirement in a population [7].

Now there is a gradual increase in researches and nutritional recommendations on immunity boosting diets for COVID-19. But still no such food pyramid has been specifically designed for COVID-19 yet. Such visual representation of the nutritional guideline will help common people also to easily understand and adapt it to their day to day healthy eating behavior. Therefore, this study aimed to develop a COVID-19 specific food pyramid to illustrate the foods to be consumed on daily basis by a person to maintain health during this pandemic.

Recent nutritional recommendations on COVID-19 by leading organizations were collected from the World Health Organization (WHO), the Centre for Disease Control and Prevention (CDC), Ayush.gov.in, Fao.org and nhs.uk to develop the COVID-19 specific food pyramid. We did a thorough web based review of all the national dietary guidelines for Covid-19 worldwide, using all openly available information. These included the dietary guidelines, its associated food pyramids and all other supporting documents, publications and general literature on this topic including scientific research papers as well as reports.

We mainly focused on official recommendations, wherein we also consider few 'quasi-official' recommendations also. These are the recommendations which are developed and distributed by the institutions that are Government accredited but do not fall under any ministerial department. Their recommendations does not comprise any official policy. Additionally our analysis also included some guidelines given by academic as well as non-governmental organizations which are non-official but had good level of scientific evidences and also illustrate helpful and interesting approaches in integrating sustainable nutritional advices. We believe that the inclusion of these will be useful in the way that they highlight the growing academic and institutional interest in this issue. Visual representation and graphical designing of the compiled data in the form of pyramid to make it enthralling were performed in the present study finally to develop the Covid-19 specific food pyramid.

COVID-19 Specific Food Pyramid

In the present study, this COVID-19 Nutrition Pyramid was developed with the aim of providing good knowledge about the variety of foods to be taken in one's diet to boost their immune system and help them stay healthy. The variety of foods to be taken, food rich in certain minerals and vitamins to boost immunity and quantity of each food variety were referred from various sources and complied to make a visual representation [8-15].

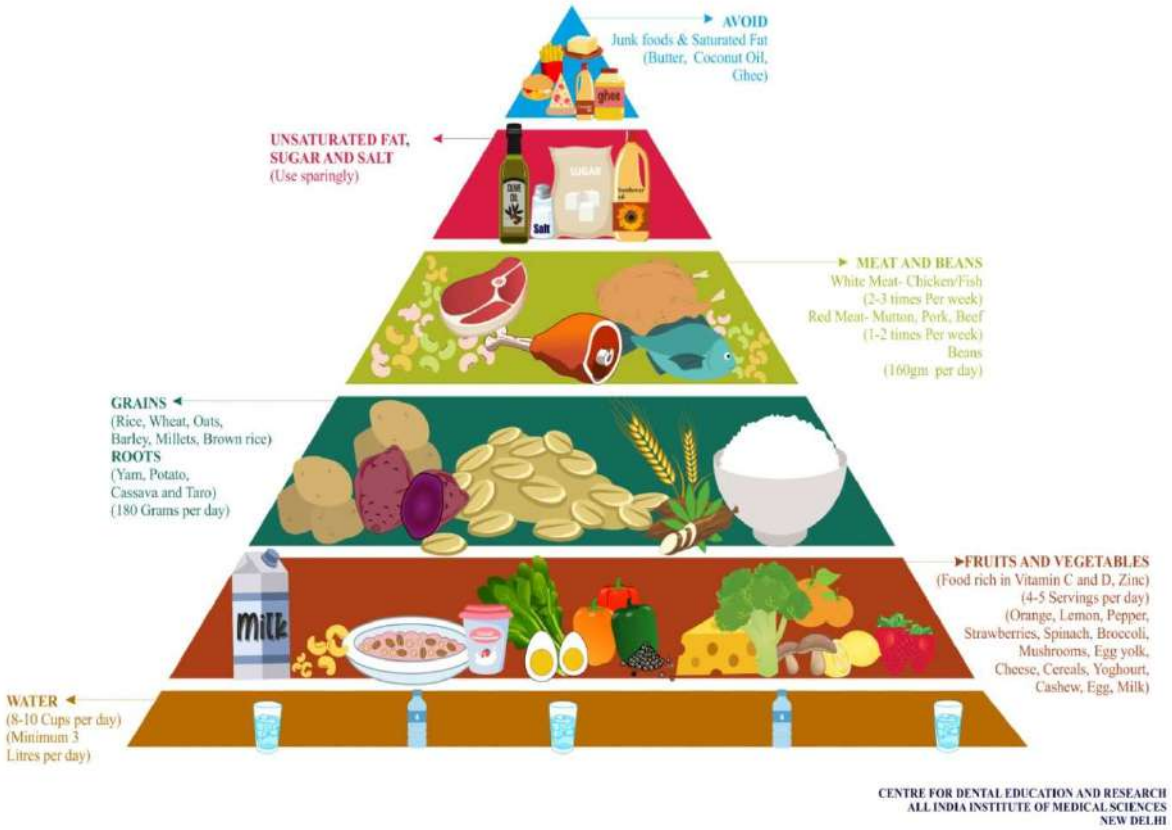


Figure 1. COVID-19 Food Pyramid

This pyramid explains the variety of foods to be taken with the quantity arranged in six shelves. This allows an individual to choose the preferred food variety from each shelf every day. The most important shelf starts from the bottom of the pyramid.

As already known, water is the basic component of life. The first shelf describes that it is necessary to drink minimum 3 liters of water per day to keep yourself well hydrated. As per WHO's recommendation for COVID-19, it is necessary to drink 8-10 cups of water every day [8].

The second shelf contains fruits and vegetables. It is necessary to incorporate foods rich in Vitamin C, D and Zinc during COVID-19 [10,11,14]. This helps to boost the immune system of the body. The foods rich in Vitamin C, D and Zinc are Orange, Lemon, Pepper, Strawberries, Broccoli, Mushrooms, Egg yolk, Cheese, Tuna, Beef Liver, spinach, Cashew, Egg, Milk, Foods fortified with vitamin D such as Soy Milk, Cereals, Yoghurts. All these should be taken about 4-5 Servings per day in your diet [9,15].

The third shelf has grains such as Rice, Wheat, Oats, Barley, Millets, Brown rice or roots such as Yam, Potato, Cassava and Taro(180 Grams per day) in it [8,12]. All grains constitute the fiber rich foods that we have in everyday's diet for keeping our digestive system healthy.

The fourth shelf contains meat. It explains that white meat such as chicken and fish can be taken 2-3 times per week and red meat such as mutton, pork, beef can be taken 1-2 times per week in your diet. It is better to take white meat which are low in fat rather than red meat [8,12].

The fifth shelf describes unsaturated fat, sugar and salt which are to be used only sparingly. The top most sixth shelf explains that it is always better to avoid saturated fats and junk or processed food as they are nutrient less and are not needed for good health [8,12].

Changes in Food Pyramid in View of the Pandemic

The USDA food pyramid consisted of bread, cereals, rice and pasta in the bottom most part of the shelf as they were important to be consumed as a part of healthy diet. Also, fruits and vegetables were placed in the shelf above it; whereas the COVID-19 food pyramid includes foods rich in Vitamin C, D and Zinc in the bottom shelf after water as they play an important role in nutritional requirement pertaining to COVID-19. Grains and roots are placed in the shelf above it as they provide the dietary fiber needed for the digestive system to stay healthy. Meat is placed in the shelf above it as in the US Food pyramid followed by unsaturated fat, sugar and salt which are to be used sparingly only. An extra shelf in the top of COVID-19 food pyramid has been added emphasizing on the fact that the intake of saturated fats and junk or processed food are always better to be avoided.

Prudent care was taken to consider all key factors into account while designing the COVID-19 food pyramid to provide a nutritious meal pyramid for better health during COVID-19. The major limitation encountered was that the uniformity of measurements of variety of foods could not be maintained as the forms of foods were different in each shelf that is, water is mentioned in liters/cups, fruits and vegetables as servings and grains as grams.

Developing such a COVID-19 specific food pyramid was a novel approach which was done with the aim of providing an easy and quick understanding of variety of food to incorporate in one's diet to boost immune system and maintain health during this strenuous times. When medication or treatment is still being studied for this deadly virus, our immune system being our body's warrior, if kept healthy and functioning properly by eating proper nutritious food can combat and abate it.

Acknowledgement

We thank Mr. Ashish Kumar for the illustration development.

Conflict of interest

Authors declare no conflict of interest

Funding

There is no funding and sponsorship availed in the current manuscript.

Author Contribution

All the above included authors have worked and have contributed equally in conducted and formulating this research.

References

1. Gemelli Against COVID-19 Post-Acute Care Study Group. Post-COVID-19 global health strategies: the need for an interdisciplinary approach. Aging Clin Exp Res. 2020:1-8.
2. Chowdhury MA, Hossain N, Kashem MA, et al. Immune response in COVID-19: A review. J Infect Public Heal. 2020;13(11): 1619-1629.
3. Akseer N, Kandru G, Keats EC, et al. COVID-19 pandemic and mitigation strategies: implications for maternal and child health and nutrition. Am J Clin Nutr. 2020;112(2):251-6.
4. Cawood AL, Walters ER, Smith TR, et al. A Review of Nutrition Support Guidelines for Individuals with or Recovering from COVID-19 in the Community. Nutrients. 2020;12(11):3230.
5. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. J Transl Med. 2020;18:1-5.
6. Russell RM, Rasmussen H, Lichtenstein AH. Modified food guide pyramid for people over seventy years of age. The Journal of nutrition. 1999;129(3):751-3.
7. Mettler S, Mannhart C, Colombani PC. Development and validation of a food pyramid for Swiss athletes. Int J Sport Nutr Exerc Metab. 2009;19(5):504-18.
8. WHO EMRO | Nutrition advice for adults during the COVID-19 outbreak | COVID-19 | Nutrition site. Emro.who.int. 2021. Available from: http://www.emro.who.int/nutrition/nutrition-infocus/nutrition-advice-for-adults-during-the-covid-19-outbreak.html.
9. Ayush.gov.in. 2021. Available from: https://www.ayush.gov.in/docs/naturopathy-guidelines.pdf
10. Souza AC, Vasconcelos AR, Prado PS, et al. Zinc, Vitamin D and Vitamin C: Perspectives for COVID-19 With a Focus on Physical Tissue Barrier Integrity. Front Nutr. 2020;7:295.
11. De Faria Coelho-Ravagnani C, Corgosinho FC, Sanches FL, et al. Dietary recommendations during the COVID-19 pandemic. Nutr Rev. 2021;79(4):382-93.
12. Aman F, Masood S. How Nutrition can help to fight against COVID-19 Pandemic. Pak J Med Sci. 2020;36(COVID19-S4):S121.
13. Fao.org. 2021. Maintaining a healthy diet during the COVID-19 pandemic. Available from: http://www.fao.org/3/ca8380en/ca8380en.pdf
14. COVID-19 and Your Health. Centers for Disease Control and Prevention. 2021. Available from: https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/food-and-COVID-19.html
15. Vitamins and minerals. nhs.uk. 2021. Available from: https://www.nhs.uk/conditions/vitamins-and-minerals.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 730-742, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.010

REVIEW ARTICLE

Transforming Lives Through Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB-PMJAY): A Review

Omkarnath Sivarchaka[1,*] and Himadri Mamgain[2]

[1]*Senior Resident, Department of Community Medicine, ESIC Medical College & Hospital, Hyderabad, India*
[2]*Quality Executive, Himalayan Hospital, Swami Rama Himalayan University, Dehradun, India*

Accepted: 23-May-2024 / Published Online 08-July-2024

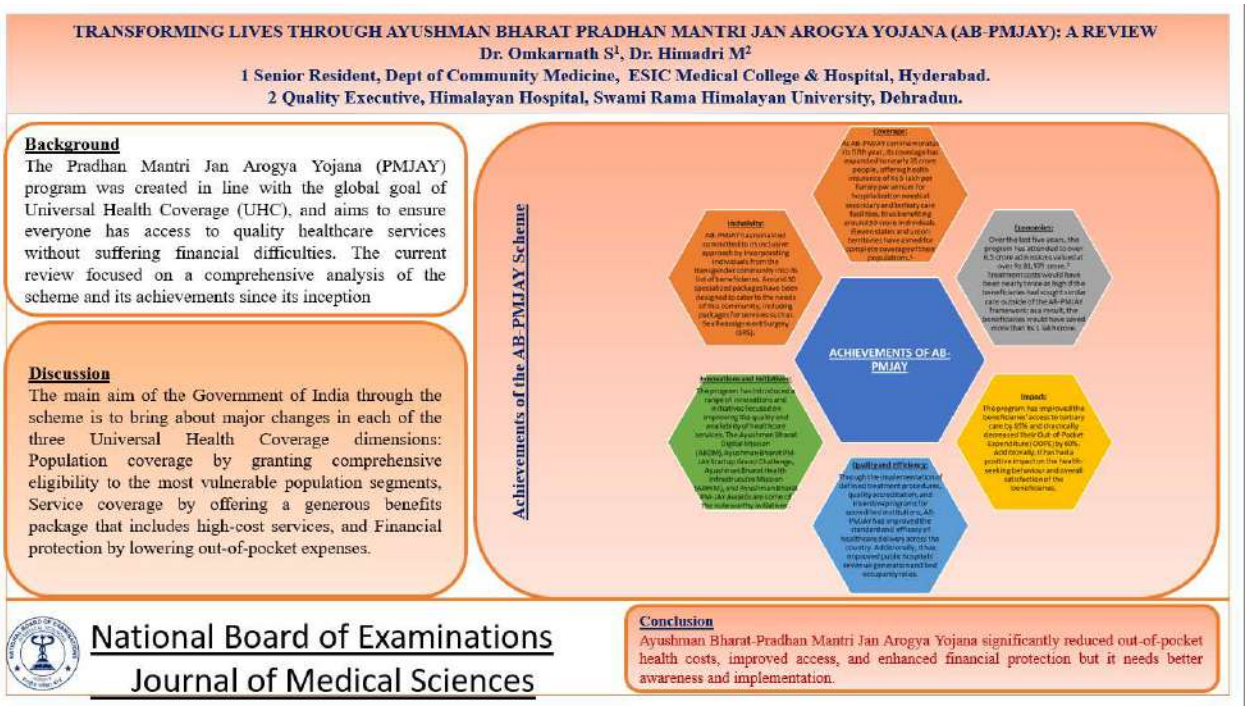
Abstract

Background: The Pradhan Mantri Jan Arogya Yojana (PMJAY) program was created in line with the global goal of Universal Health Coverage (UHC), and aims to ensure everyone has access to quality healthcare services without suffering financial difficulties. In India, over 60% of healthcare spending is still borne by households, and a significant portion of the population lacks any form of health protection coverage. **Discussion:** The High-Level Expert Group (HLEG) recommended a shift from supply-side healthcare financing to demand-side financing, leading to the introduction of government-sponsored health insurance schemes. To achieve Universal Health Coverage (UHC), the Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana (PMJAY) was launched following the recommendations of the National Health Policy 2017. The PMJAY program is the world's largest publicly sponsored social health insurance program, delivering comprehensive healthcare services covering primary, secondary, and tertiary care levels. The scheme covers approximately 12 crore households, including more than 50 crore beneficiaries, offering healthcare coverage of up to Rs. 5 lakh per family annually. PMJAY operates nationwide in India, covering all states and union territories except for a few.. **Conclusion:** To move forward, PMJAY can play a transformative role in the healthcare landscape, integrate with primary healthcare, contribute to economic development, and expand its scope to include more healthcare services.

Keywords: Ayushman Bharat, Global Healthcare System, Out-of-Pocket Expenditure (OOPE), Public Funded Health Insurance, Universal Health Coverage (UHC)

*Corresponding Author: Omkarnath Sivarchaka
Email: dromkar24@gmail.com

Graphical Abstract



Background

The major policy goal in the health sector globally is to achieve Universal Health Coverage (UHC). The World Health Organization defines Universal Health Coverage (UHC) as providing all people with access to needed health services, including prevention, promotion, treatment, and palliation, of sufficient quality to be effective while ensuring that the use of these services doesn't cause financial hardships for the users [1,2]. Despite India's policy-level acceptance of UHC, more than 47% of healthcare spending in the country is still borne by households [3]. According to the recent National Sample Survey (NSS-75th round) report, only 19.1% of the urban population and 14.1% of the rural population are covered by any form of health protection [4] (Table 1).

Table 1. Percentage breakdown of individuals by type of health expense coverage [4]

Sector	Percentage of population not covered	Percentage of Population Covered by					
		Government-sponsored insurance schemes	Government/PSU as an employer	Employer-supported health protection (excluding PSU)	Arranged by households with insurance companies	Others	Total
Rural	85.9%	12.9%	0.6%	0.3%	0.2%	0.1%	100.0
Urban	80.9%	8.9%	3.3%	2.9%	3.8%	0.2%	100.0

Traditionally, in India, financing for healthcare has primarily been allocated to the supply side, with an emphasis on building infrastructure and people resources. The High-Level Expert Group (HLEG) of the Planning Commission recommended a model for achieving Universal Health Coverage (UHC), whereby residents would have broad access to free medical services provided by a combination of both private and public healthcare providers. As a result, the government began to focus more on demand-side funding methods, such as publicly funded health insurance programs, rather than its previous emphasis on supply-side approaches. Historically, the Central Government and several State Governments have introduced a variety of government-sponsored healthcare insurance systems to improve demand-side funding. Since 2007, several publicly financed health insurance schemes have been launched in India both at the state level such as Rajiv Aarogyasri Health Insurance Scheme (RAS) in Andhra Pradesh, Rajiv Gandhi Jeevandayee Arogya Yojana (RGJAY) in Maharashtra, Chief Minister's Comprehensive Health Insurance scheme (CMCHIS) in Tamil Nadu, and Rashtriya Swasthya Bima Yojana (RSBY) at the Central level. The Rashtriya Swasthya Bima Yojana (RSBY) was introduced with annual coverage of INR 30,000 per family at the government level, primarily catering to secondary care hospitalization, while various State programs addressed tertiary care issues [5]. The fact that these programs operated apart from the nation's wider healthcare system contributed to the risk pools' further fragmentation. Furthermore, there was no connection between any of these programs and primary healthcare. In response to this shortcoming, the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana AB-PMJAY scheme was introduced as per the guidance provided in the National Health Policy of 2017 with obtaining Universal Health Coverage as the main goal. The current review focused on a comprehensive analysis of the scheme and its achievements which are highlighted in Figure 2.

Introduction to AB-PMJAY

AB-PMJAY, the world's largest publicly funded social health insurance initiative was officially launched on September 23, 2018. The main objective of this program is to implement a revolutionary policy that thoroughly addresses the whole range of healthcare services, including prevention, promotion, and ambulatory care, across all three levels primary, secondary, and tertiary [2]. Ayushman Bharat uses a continuum of care framework that is comprehensive and consists of two interrelated parts:

1. Health and Wellness Centers (HWCs): to provide comprehensive primary healthcare.
2. Pradhan Mantri Jan Arogya Yojana (PM-JAY): to provide secondary and tertiary levels of healthcare.
3. The vision of PMJAY is to achieve the Sustainable Development Goal (SDG) 3.8 which ensures everyone has access to affordable, high-quality healthcare as well as financial insurance against catastrophic medical expenses. The scheme was recommended mainly based on the five (5) major challenges being faced by Indians which include:

- Poverty
- Triple burden of diseases
- Lack of affordable healthcare
- Increased out-of-pocket expenditure and
- No portability of state health schemes.

Salient Features of AB-PMJAY

The PM-JAY scheme is fully funded by the Government, with the Central and State Governments sharing the implementation costs. The program is currently operational in all states and Union territories in India, except for West Bengal, Odisha, and Delhi [2].

- PM-JAY provides secondary and tertiary hospitalization coverage up to Rs. 5 lakh per household every year. This coverage includes almost 50 crore beneficiaries and covers about 10.74 crore families who are marginalized and underprivileged. It covers over 1950 medical procedures and includes pre-hospitalization and post-hospitalization charges for three days and fifteen days, respectively. Additionally, the program is adaptable across the nation.
- PM-JAY is organized as a claim-based initiative, targeting underprivileged and vulnerable families based on criteria related to deprivation and occupation, as specified in the Socio Economic and Caste Census (SECC 2011) database.
- The scheme ensures beneficiaries' cashless and paperless access to public and private services empanelled hospitals throughout India. This means the program is transferable across different states in the country.
- PM-JAY places no restrictions on family size, guaranteeing coverage for all members of eligible families, including girl children and senior citizens.
- To facilitate its implementation, PM-JAY has established a robust IT system, incorporating real-time transaction data for efficient operation.

Beneficiaries of the PMJAY Scheme

PM-JAY has been extended to benefit the least affluent 40 percent of the poor and vulnerable population, or about 100.74 million households in total. In both rural and urban areas, families are selected based on the deprivation and occupation criteria specified in the 2011 Socio-Economic Caste Census (SECC 2011) [2].

Structure & Functioning of PMJAY Scheme

The main aim of the Government of India through the scheme is to bring about major changes in each of the three UHC dimensions (Figure 1):

1. Population coverage (by eliminating formal enrollment procedures and granting comprehensive eligibility to the most vulnerable population segments);
2. Service coverage (by offering a generous benefits package that includes high-cost services provided by a large network of PMJAY accredited and empaneled providers); and

3. Financial protection (by lowering out-of-pocket expenses with the cashless provision and high insurance ceiling).

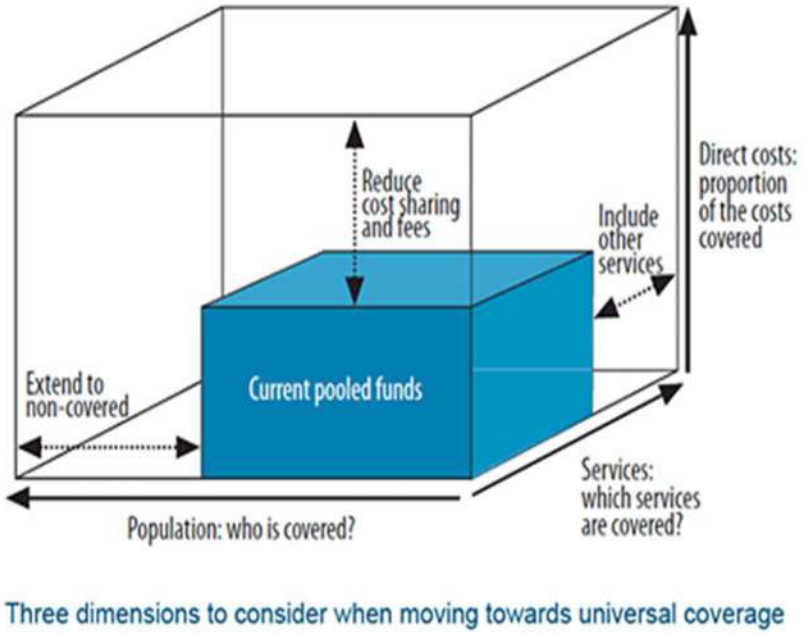


Figure 1. Universal Health Coverage Cube

The National Health Authority (NHA) oversees the program at the national level, while the State Health Agency (SHA) is responsible for its implementation in each state. Existing insurance firms, publicly run autonomous trusts or nodal agencies, or a combination of these strategies known as mixed models—which allow for state-specific adjustments—can carry out this implementation. Currently, the initiative is in place in 33 of India's 36 states and union territories. PM-JAY aims to achieve dual objectives: enhancing healthcare accessibility and financial security while also fostering efficiency, transparency, and accountability through the utilization of output-based financing mechanisms [2].

Mode of Implementation of the Scheme

Different states utilize a range of models to implement their individual assurance and health insurance programs. Some states collaborate with insurance companies, while others handle the scheme directly.

Given the differences in the readiness and capabilities of states to manage such programs, PM-JAY offers states the liberty to select the implementation model that best suits their needs. They can decide to use an insurance model, a mixed model, or an assurance/trust approach to implement the plan.

A. Assurance Model/Trust Model

In many states, this is the implementation model that is most frequently used. In this

framework, insurance firms are not involved in the scheme's administration; instead, the State Health Agency (SHA) does so directly. This model establishes the financial responsibility of carrying out the program on the government. Healthcare providers get direct reimbursement from the SHA. The State Health Agency (SHA) employs an Implementation Support Agency (ISA) to handle tasks such as claim processing, despite the absence of an insurance company. The SHA is responsible for various functions, including hospital empanelment, beneficiary identification, claims management, audits, and other related activities, alongside the daily management and administration of the program [2].

B. Insurance Model

According to the insurance model, an insurance company gets selected through a competitive tendering procedure by the SHA to manage PM-JAY throughout the state. The insurance company handles claims settlement and payments of service providers, while the insurance company is paid a premium by the SHA for each qualified family during the policy period, based on an amount set by the insurance sector. Under this strategy, the insurance provider bears the financial risk of executing the strategy. The plan has a system that restricts the proportion of the premium that insurance firms can keep for profit and administrative expenses to prevent them from making an unjustified profit. The insurer shall immediately reimburse any excess to the SHA within 30 days of deducting specified expenses from executives (excluding only service tax and any relevant fees) and resolving any claims [2].

C. Mixed Model

Under the mixed model, the SHA achieves flexibility and cost-efficiency while enabling alignment with current state schemes by combining aspects of both the assurance trust and insurance models stated above in different capacities. States using this model usually have existing programs that serve a larger group of people [2].

Financing of the Scheme

The Central and State Governments divide the costs of PM-JAY, which is fully supported by the Government. The maximum amount of the central contribution is determined by the national limit per household set by the Indian government. The Central Government and the States/Union Territories will split the actual premium, which will be decided through an open tendering process or, if lower, the highest ceiling of the determined premium imposed by the Government of India for PM-JAY implementation, by the Ministry of Finance's periodically updated directives. Furthermore, the scheme also covers the administrative costs of executing the scheme at the State level, with the Central and State governments splitting the costs in accordance with the same sharing pattern. The current funding ratio for PMJAY between the Central Government and the States is at a ratio of 60:40, with the exception of the North-Eastern States and the three Himalayan States (Jammu & Kashmir, Himachal Pradesh, and Uttarakhand), where the ratio is 90:10. For Union Territories without legislatures, the

Central Government may provide up to 100% funding, determined on a case-by-case basis [2].

Hospitals

More than 30,000 accredited hospitals are part of the program's nationwide network. Of these, the majority, totaling 17,300, are public healthcare institutions, while the rest, numbering 12,884, are privately empaneled hospitals with over 6.5 crores of authorized admissions to date [3].

Discussion

The central and state governments have implemented numerous publicly funded health insurance schemes in India. Many studies were conducted to assess the implementation and functioning of these schemes. Highlighted below are some studies conducted on implementing the AB-PMJAY scheme which showed mixed findings.

A cross-sectional study by Kanwal et al. (2024) examined the impact of the Ayushman Bharat-Pradhan Mantri Jan Aarogya Yojna (AB-PMJAY) on health expenditure among poor patients admitted to a public tertiary care hospital in Himachal Pradesh from August 2020 to October 2021. The study found that the out-of-pocket expenditure (OOPE) share of total medical family expenditure (TMFE) decreased from 76.1% before admission to 30.0% after admission. The study concluded that the AB-PMJAY scheme effectively reduced health expenditure among the poor [7].

Khan A (2021) conducted a study among 160 patients registered at the Ayushman Bharat cell of a tertiary care hospital in Srinagar and found that distress financing and catastrophic health expenditure were reduced to zero in patients availing benefits of the PMJAY scheme. It was also mentioned that previous studies conducted at the same center before the launch of AB-PMJAY showed the prevalence of distress financing in cancer and chronic kidney disease (CKD)patients was over 70%. This study found that the patient didn't have to pay for the hospital expenses because the prevalence of catastrophic healthcare costs had again dropped to zero [8].

Joseph (2021) conducted a secondary analysis using cross-sectional administrative program data for 30 Indian states that were made available to the public on the PM-JAY webpage. They discovered that, of all the facilities enrolled in the plan (N = 20,257) in 2020, the majority (56%) were in the public sector, followed by private for-profit facilities (40%) and private not-for-profit organizations (4%). The study found that five states (Karnataka 14.9%, Gujarat 13.3%, Uttar Pradesh 13.3%, Tamil Nadu 11.5%, and Rajasthan 10.4%) made up more than 60% of the PMJAY facilities. 40% of the facilities had two to five specialties, and 14% had 21 to 24 specialties. The study found that most of the hospitals that are part of the scheme are in states that have already tried to set up public health insurance programs [9].

Rajiv (2021) conducted a qualitative examination of the obstacles and enablers to the private hospitals in Kerala's Pradhan Mantri Jan Arogya Yojana Empanelment. It was shown that social commitment and an increase in patient flow were the main facilitators for private hospital empanelment in the system. Because there aren't enough claim rates, hospitals must cut back on the

quality of care because of a lot of patients, the government doesn't want to do anything about it, and hospitals have had bad experiences in the past [10].

Dash U et al. (2020) evaluated the degree of awareness throughout the scheme's first implementation phase in 2019 across three states: Bihar, Haryana, and Tamil Nadu. It was found that the primary source of information was the PM-JAY letter received by households. In Bihar, only 9.84% of beneficiaries were aware of the PM-JAY program, while in Haryana, 12.41% of beneficiaries had awareness. In Tamil Nadu, where PM-JAY was integrated with the pre-existing state program, 59% of beneficiaries were aware of the program [11].

Kranthi et al. (2020) conducted a cross-sectional study on the awareness and readiness of healthcare workers in a tertiary care hospital in Rishikesh, India, during the implementation of the Pradhan Mantri Jan Arogya Yojana scheme. The study found that faculty members scored considerably higher on awareness than senior residents, and it also made clear how important it is to hold PMJAY training for hospital stakeholders [12].

Pugazhenthi (2020) conducted a study on awareness of the PMJAY scheme in the Thanjavur district of Tamil Nadu. They assessed various details about the scheme among 200 beneficiaries and found that awareness regarding coverage was 65%, awareness regarding grievance redressal was 15%, and awareness regarding PM Arogya Mitra was 21%. They concluded that there was a partially higher degree of awareness recorded for the scheme's coverage amount than for the monitoring of the scheme's execution, which was followed by the grievance redressal system's operation. The degree to which the beneficiaries are aware of the various components of the program will determine the system's overall performance [13].

Garg et al. (2020) conducted three repeated cross-sectional studies in Chhattisgarh. They used two of the cross-sections of the (NSS) year 2004 when there were no publicly funded health insurance (PFHI) schemes and in 2014, during the operation of the older Publicly Funded Health Insurance scheme, primary data was collected in 2019 to cover the first year of PM-JAY implementation and it was used to make the third cross-section. It found that the incidence of catastrophic health costs did not go down with enrollment in PMJAY or other PFHI programs [14].

Sriee et al. (2020) conducted a cross-sectional survey in 2020 among 300 residential units in the Thiruvallur district of Tamil Nadu revealed that only about 42.33% of the 300 households were receiving benefits from the Ayushman Bharat. Only 10% of the Ayushman Bharat scheme-eligible households have incurred additional costs for medical care in the last year, out of the 47.24% of homes who are covered by the program. Medical costs could have put 39.88% of households without access to the Ayushman Bharat scheme in a difficult financial position. They added that households covered by the health insurance program had a smaller financial burden from medical expenses. Currently, this program does not include the middle class of society. Therefore, many families may become impoverished because of significant or

unforeseen medical costs [15].

Saxena (2019) conducted a study in 14 hospitals in Gujarat and Madhya Pradesh. In addition, a household survey with 100 beneficiaries was carried out by each state. The PMJAY system was shown to have required out-of-pocket payments from about 27% of recipients. Beneficiaries from Gujarat (89%) reported "zero payment" at a higher rate than those from Madhya Pradesh (57%), and from public hospitals (80%) than from private hospitals (66%). In Madhya Pradesh, OOP payments were more common among patients in private hospitals. They also provided an explanation for any out-of-pocket expenses. For pre-operative diagnostic treatments, many hospitals demand money because they worry that the patient could not be admitted if the results are unfavorable. Before admitting a patient, several private hospitals require that they complete this at a public hospital [16].

Monitoring and Evaluating the Scheme

The program incorporates an accountability and transparency-upholding monitoring and evaluation system. It provides a dashboard that is open to the public where everyday progress on implementation can be tracked. Also, the scheme provides beneficiary information for those who have utilized its services while safeguarding their privacy. Furthermore, all claim processing is conducted in a completely anonymous manner.

Convergence

The alignment of National Health Authority (NHA) and Employee's State Insurance Corporation (ESIC): A cooperation partnership has been established between the National Health Authority (NHA) and the Employee's State Insurance Corporation (ESIC). Through this partnership, the Employee's State Insurance Scheme (ESIS) and Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana (AB PM-JAY) would create an ecosystem that will allow ESIC participants to access services at hospitals that are a part of AB PM-JAY and vice versa. Currently, the PM-JAY is extending its platform, to reach ESIC beneficiaries across 157 districts in India [17]. The NHA is also working on convergence with the Central Government Health Services (CGHS) and Central Armed Police Forces (CAPF) for the provision of health services to the employees in the PMJAY empaneled facilities [2].

Figure 2. Achievements of AB-PMJAY

Challenges in the Implementation of the PMJAY Scheme

Awareness Deficiency

The program grapples with a limited level of awareness, particularly in rural areas, among potential beneficiaries. Many eligible individuals remain unaware of their entitlements and how to access them. Enhancing outreach and communication efforts is essential to raise knowledge and stimulate demand.

Supply-Side Constraints

This program faces supply-side challenges, mainly arising from the uneven allocation and accessibility of healthcare resources and personnel nationwide. There is a scarcity of recognized hospitals in many states, especially in rural and tribal areas.

Reimbursement Challenges

The program has difficulties in ensuring that empaneled hospitals, especially those in the private sector, receive adequate

and timely reimbursement for their claims. Many hospitals have expressed worries about long processing times, low package rates, high rejection rates, and payment delays. To keep the program viable and sustainable, it is essential to expedite and streamline the procedure for settling claims and to examine package rates on a regular basis.

Fraud and Misuse

The program tackles the problem of preventing and identifying fraud and abuse by fraudulent individuals trying to benefit themselves. Remarkably, a recent finding from the audit that has been conducted by the Comptroller and Auditor General of India indicated that a single mobile phone number, (9999999999), was linked to around 7.5 lakh beneficiaries. It is crucial to strengthen anti-fraud measures and impose strict penalties on individuals engaged in fraudulent or malpractice within the program.

Way Forward

Transformation

Around half of India's population will now have universal health coverage, the initiative has the potential to completely transform the national healthcare system. Additionally, it can help achieve Goal 3.8 of the Sustainable Development Agenda states that everyone should have access to healthcare by 2030.

Continuum of Care

By establishing interconnections with the primary care systems, the initiative might act as an inspiration for improving the nation's basic healthcare system. It can also improve the quality, affordability, and accessibility of healthcare services by utilizing the potential of digital health technologies.

Encouraging Private Healthcare Facilities for Empanelment

The network of the empaneled hospitals in the tier-II and tier-III cities may be enhanced and some additional incentives may be given to motivate the hospitals in those cities to get empaneled under the scheme.

Follow-up Packages

From the available literature, it has been observed that a major portion of Out-of-Pocket expenditure is being spent on follow-up investigations and purchasing medicines after the discharge of the patients. The provision for follow-up packages and continued supply of medicines till the required duration may be ensured to reduce the OOPE among the patients.

Reduce Indirect OOPE

A significant proportion of indirect OOPE can be reduced by compensating for the wage loss during the hospital stay and provision of transport facilities to and from the health facilities. Strategies may be developed to curb these by providing indemnity coverage to the patients under the scheme for the loss of wages by Direct Benefit Transfer to the patients and to compensate for the transportation charges, the beneficiaries may be paid a fixed amount per visit to meet the transportation expenses like in other schemes i.e., RSBY and Arogya Sri scheme in Andhra Pradesh and Telangana states.

Convergence

To escape repetition and fragmentation, the program must develop its integration and alignment with some additional health programs and initiatives at the state and national levels. Additionally, it needs to encourage collaboration and cooperation with a wide range of stakeholders, including academic institutions, commercial enterprises, and civil society organizations, to maximize the leverage of their expertise and resources.

Conclusion

The Ayushman Bharat-Pradhan Mantri Jan Aarogya Yojna (AB-PMJAY) represents a significant step towards achieving universal health coverage in India. This review highlights the scheme's positive impact on reducing out-of-pocket expenditure and catastrophic health expenditures for the poor, enhancing financial protection, and improving access to quality healthcare services. Despite these successes, challenges such as the need for increased awareness, efficient implementation, and addressing regional disparities remain. Overall, AB-PMJAY has shown promising results in its early stages, and with continued refinement and robust policy support, it has the potential to transform India's healthcare landscape and ensure equitable health care access for all.

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. National Health Accounts | National Health Systems Resource Centre. Available from: https://nhsrcindia.org/national-health-accounts-records
2. Official Website Ayushman Bharat | PMJAY | National Health Authority. Available from: https://pmjay.gov.in/
3. NHA | Setu Dashbaord.. Available from: https://dashboard.pmjay.gov.in/publicdashboard/#/
4. Executive Summary on Report- Health in India, NSS 75th round | Ministry of Statistics and Program Implementation | Government Of India. Available from: https://mospi.gov.in/announcements/executive-summary-report-health-india-nss-75th-round
5. Rashtriya Swasthya Bima Yojana| National Portal of India. Available from: https://www.india.gov.in/spotlight/rashtriya-swasthya-bima-yojana
6. Universal health coverage (UHC). Available from: https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc)
7. Kanwal, Shweta; Kumar, Dinesh; Chauhan, Raman; Raina, Sunil Kumar. Measuring the Effect of Ayushman Bharat-Pradhan Mantri Jan Aarogya Yojna (AB-PMJAY) on Health Expenditure among Poor Admitted in a Tertiary Care Hospital in the Northern State of India. Indian Journal of

Community Medicine 2024;49(2):342-348. DOI: 10.4103/ijcm.ijcm_713_22

8. Khan A, Yatoo G, Mir M. Impact of Ayushman Bharat Scheme on the Prevalence of Distress Financing and Catastrophic Health Expenditure Among Patients Attending a Tertiary Care Teaching Hospital. 2021;1:1–05.
9. Joseph J, Sankar D H, Nambiar D. Empanelment of health care facilities under Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PM-JAY) in India. PLoS One. 2021 May 27;16(5):e0251814. doi: 10.1371/journal.pone.0251814.
10. Rajiv M, George LS, Mainu CR, Raj A, Aravind MS. Facilitators and Barriers for Pradhan Mantri Jan Arogya Yojana Empanelment by Private Hospitals in Kerala: A Qualitative Analysis. Ann Comm Health. 2021;9(1):157–62.
11. Dash U, Muraleedharan V, Rajesh M. Accessing Ayushman Bharat- Pradhan Mantri Jan Arogya Yojana (PM-JAY): A case study of three states (Bihar, Haryana and Tamil Nadu). Chennai; Available from: https://pmjay.gov.in/sites/default/files/2020- 06/WP_IITM_study_1.pdf
12. Reddy NKK, Bahurupi Y, Kishore S, Singh M, Aggarwal P, Jain B. Awareness and readiness of health care workers in implementing Pradhan Mantri Jan Arogya Yojana in a tertiary care hospital at Rishikesh. Nepal J Epidemiol. 2020;10(2):865-870. doi: 10.3126/nje.v10i2.27941.
13. V.Pugazhenthi. A study on awareness on AB-PMJAY for treatment of diseases with special reference to cancer care in Thanjavur district of Tamil Nadu. Epra. 2021;25:202–6.
14. Garg S, Bebarta KK, Tripathi N. Performance of India's national publicly funded health insurance scheme, Pradhan Mantri Jan Arogaya Yojana (PMJAY), in improving access and financial protection for hospital care: findings from household surveys in Chhattisgarh state. BMC Public Health. 2020;20(1):949.
15. Sriee G.V, Vishnu Priya, Maiya, G. Rakesh. Coverage, utilization, and impact of Ayushman Bharat scheme among the rural field practice area of Saveetha Medical College and Hospital, Chennai. Journal of Family Medicine and Primary Care: 2021;10(3):1171-1176 doi: 10.4103/jfmpc.jfmpc_1789_20
16. Saxena A, Trivedi M, Shroff ZC, Sharma M. Improving hospital-based processes for effective implementation of Government funded health insurance schemes: evidence from early implementation of PM-JAY in India. BMC Health Services Research. 202;22(1):73.
17. AB PM-JAY. Available from:https://www.esic.gov.in/ab-pm-jay

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 743–751, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.011

CASE REPORT

Beaten to Blindness: Battered Baby Syndrome

Nishanth V.S,[1,*] Niranjanaa, N.M.,[2] Soma Ram Reddy,[3] Naga Mohan Rao, B. V.,[4] Sudha, R.,[5] Gollapudi Sridevi Naga Rajeswari,[6] Boddepalli Devaraj[7] and Kattamreddy Ananth Rupesh[8]

[1]*Resident, Department of Forensic Medicine and Toxicology, GMC, Nizamabad*
[2]*Resident, Department of ENT, GMC, Nizamabad*
[3]*Resident, Department of Pediatrics, GMC, Nizamabad*
[4]*Professor & Head, Department of Forensic Medicine and Toxicology, GMC, Nizamabad*
[5]*Associate Professor, Department of Forensic Medicine and Toxicology, GMC, Nizamabad*
[6]*Resident, Department of Pediatrics, Kilpauk Medical College, Chennai*
[7]*Resident, Department of Forensic Medicine and Toxicology, Andhra Medical College, Visakhapatnam*
[8]*Assistant Professor, Department of Forensic Medicine and toxicology, Andhra Medical College, Visakhapatnam*

Accepted: 06-May-2024 / Published Online 08-July-2024

Abstract

Introduction: A battered child is one who sustains repetitive physical injuries due to non-accidental violence inflicted by a parent or guardian. Child abuse encompasses behaviors exposing the child to various forms of physical or sexual abuse, neglect, or emotional misconduct. Typically, battered child syndrome is diagnosed through a disparity between the history provided by the child's caregivers and the findings of clinical examination. **Case details:** An 18-month-old girl child was admitted to a tertiary care hospital, presenting with a four-day history of fever, vomiting for two days and a seizure episode. The child had a history of head injury one week ago, resulting in transient unconsciousness. Upon examination, multiple healed and fresh injuries were observed on the face, hands, and right thigh. CT brain revealed hypodensity areas with a mildly displaced fracture of the left frontal bone. Fundus examination identified bilateral multiple intraretinal hemorrhages and papilledema. X-ray showed a fracture of the right proximal tibia. The child required ventilator support during the hospital stay, and subsequently, developed retinal blindness. The child was managed accordingly. **Discussion:** The classical feature of Battered Baby Syndrome is the discrepancy between the nature of injuries and the history provided, and the delay between the injury and medical attention. The parental risk factors for child abuse are poverty, social isolation, drug addiction, violent environment, family history of abuse, communication skills deficit and the child related risk factors are children with special needs, children with behavior problems, bonding deficit. etc. **Conclusion:** The current case sheds light on the unfortunate prevalence of this condition within the Indian context, urging point-of-care health providers to stay vigilant and informed about child abuse patterns in the community. It serves as a crucial reminder of the responsibility we all share in safeguarding the well-being of children.

Keywords: Battered Baby Syndrome, Child abuse, Head injury, Blindness, Fracture.

*Corresponding Author: Nishanth V.S.
Email: nishanthsenthilvel@gmail.com

Introduction

Battered Baby Syndrome, also known by various names such as Caffey's syndrome, Caffey-Kempe syndrome, Maltreatment syndrome, and Non-Accidental Injury of Childhood, is a clinical condition wherein young children, typically under 3 years of age, are subjected to repeated beatings over the most trivial provocations. A battered child is one who is exposed to repeated purposeful acts of sublethal physical abuse or prolonged deprivation of food and water or a combination of both [1]. Injuries due to physical abuse would be usually present in regions concealed by clothing and in anatomically protected regions like trunk, lumbar region, buttocks, inner aspect of thighs, cheeks and scalp [2]. The child abuse cases may present as physical abuse, starvation abuse or a combination of both[3]. The most common types of child abuse are physical abuse, neglect, sexual abuse, emotional and psychological abuse. Child abuse is mostly caused by the family members [3]. Epidemiologically, Battered Baby Syndrome tends to affect males more frequently, particularly unwanted, disabled, or stepchildren, as well as those conceived due to contraceptive failures. The parents involved are typically young, aged between 20 and 30, with low IQ, limited education, unemployed, belonging to a low socio-economic class and often having psychiatric co-morbidities.

Battered Baby Syndrome is characterized by distinctive features. The abuse often occurs without any provocation, with the child's seemingly trivial actions serving as the precipitating factor. Moreover, these children commonly experience deprivation in terms of nutrition, care, and affection. Additionally, there is a notable delay between the occurrence of injuries and seeking medical attention. Furthermore, the history provided by the parents is often inconsistent with the injuries observed, adding a layer of complexity to the diagnostic conundrum.

Violence against children comprises physical, sexual, or emotional harm, as well as neglect, inflicted by parents, caregivers, peers, romantic partners, or strangers, affecting those under 18 years old. Globally, an alarming estimate indicates that up to 1 billion children aged 2 to 17 experienced such violence in 2021 (Reference: WHO, 2021). Addressing this pervasive issue, Target 16.2 of the 2030 Agenda for Sustainable Development explicitly aims to *"end abuse, exploitation, trafficking, and all forms of violence against, and torture of, children"* (United Nations, 2030 Agenda) [4].

Case Report

An 18-month-old female child, whose father was a daily wage worker engaged in construction works and the mother being a housewife, was admitted to a tertiary care hospital in Nizamabad with a four-day history of fever, accompanied by a seizure episode and vomiting for the past two days. The child had a head injury one week prior, resulting in a transient unconsciousness. On admission, the child appeared emaciated, and her weight was recorded at 10 kg. On examination, the child was gasping, with a GCS – 3/15, abdominal type respiration, peripheries were cold, pulse was not felt, BP was not recordable. Capillary refill time was found to be >3sec, on systemic examination, CVS- S1, S2 present, RS – bilateral air entry present, bilateral crepitations present, P/A – distended, CNS – unconscious. The lab data at admission were GRBS – 137mg/dl, Hb- 8.6g/dl, WBC- 7800

cells/mm^3, Platelets – 4.76 lakh/mm^3, FiO2 – 75%, Respiratory Rate – 34/min. In view of impending respiratory failure, the child was intubated and connected to a ventilator.

The antenatal history of child was uneventful, and the immunisation was incomplete as per universal immunisation program. On physical examination, a partly healed ulcer, indicative of cigarette burns, measuring 3x2 cm is present over the right cheek, with partly healed marguins brown in colour and the base of the ulcer, partly healed and red in colour. (Figure 1). Adittionally, a partly healed ulcer measuring 2x2 cm was observed over the left side of the face with black brown scab present over the margins and base of the ulcer, red in colour, positioned 1 cm anterior to the ear (Figure 2). A partly healed scar of size 2.5 cm was noted on left ear lobule as shown in figure 2. A contusion measuring 5x3 cm was present over the outer aspect of the right arm in the middle 1/3rd, black in colour. Further examination revealed partly healed abrasions of varying sizes over an area of 10x4 cm on the lower part of outer aspect of the right arm with black scab, extending to the right forearm. A contusion measuring 6x3 cm over the outer aspect of the middle 1/3rd of the right forearm. A bite mark was evident over the outer aspect of the left forearm in the middle 1/3rd. A partly healed scald measuring 2x1 cm was observed on the dorsum of the left hand (Figure 3). Multiple nail mark abrasions were present on the front of the chest wall. Healed scars, likely scalds, of varying sizes covered an area of 5x3 cm over the anterior chest wall. Additionally, there were healed scars (scalds) measuring 7x5 cm and 6x4 cm over the epigastric region of the anterior abdominal wall (Figure 4). Multiple partly healed bite marks of varying sizes covered an area of 10x6 cm over the upper 1/3rd of the right thigh. A swelling was noted over the anterior aspect of the upper 1/3rd of the right leg, with an underlying old unhealed fracture of the right tibia (Figure 5), for which an above-knee slab was applied.

Figure 1. Showing a partly healed ulcer on right side of face.

Figure 2. Showing partly healed ulcers on left side of face and left ear lobule

Figure 3. Showing a partly healed scald scar

Figure 4. Showing partly healed scars

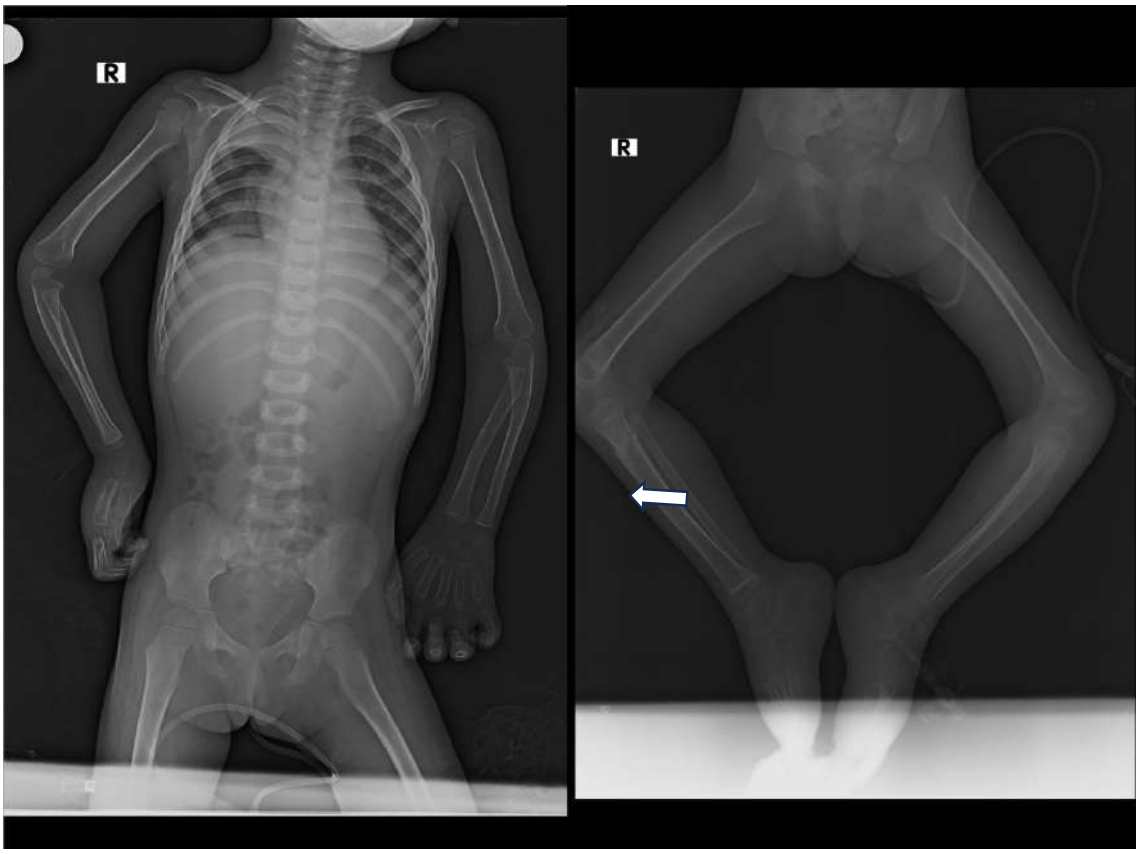


Figure 5. Showing fracture of right tibia in the upper part.

Initially, the child's condition led to suspicions of acute encephalitis, child abuse, or hypotensive shock. Subsequently, the patient was diagnosed as a victim of child abuse and was placed on a ventilator for management. An ophthalmologist's examination revealed multiple intraretinal hemorrhages throughout the fundus and surrounding arteries in the right eye, along with the presence of roth spots. In the left eye, blurry nasal margins of the disc and hemorrhages on the nasal side of the disc were observed, accompanied by multiple intraretinal hemorrhages around the arteries. The child eventually developed *retinal blindness*. A CT scan of the brain indicated hypodensity areas in the bilateral frontal lobes and bilateral capsulo-ganglionic regions, indicative of chronic infarcts. Additionally, a mildly displaced fracture of the frontal bone was noted.

On admission day 3, GCS improved to 8/15. The laboratory parameters during day 8 of admission were: Blood urea – 26mg/dl, S.Creatinine- 0.7mg/dl, S. Bilirubin – 0.8mg/dl, SGPT – 19U/L, SGOT – 21U/L, Hb- 11.0g/dl, TLC – 15,200 cells/mm^3, Platelets- 1.74 lakh/mm^3, DLC- Neutrophil: 80, Lymphocytes: 17, Eosinophils: 01, Monocytes: 02, Basophils: 00, and Na – 139 mEq/L, K – 3.9 mEq/L, Cl- 99 mEq/L.

The child showed further improvement and was successfully weaned off ventilatory support. Consultation with a psychiatrist uncovered that the parents lacked awareness of the severity and consequences of the child's condition. Both

parents exhibited a lack of interest in the child's well-being, with mild to moderate intellectual disabilities noted in both. Despite counseling, they struggled to grasp essential aspects of baby care. Subsequently, the child was transferred to the child protection wing, which then relocated the child to an orphanage.

Discussion

The classical feature of Battered Baby Syndrome (BBS) lies in the disparity between the nature of injuries and the provided history, coupled with a delay in seeking medical attention. A constant feature is the repetition of injury infliction over an extended timeline. Injuries in BBS primarily result from direct violence, frequently manifesting as injuries to the eye and orbital region. The possibility of non-accidental trauma must be considered in any child presenting with ecchymosis or laceration of the lids, hemorrhage in or around the eye, cataract or dislocated lens, retinal detachment, or orbit fracture.

A tear of the frenulum is the most typical injury in cases of Battered Baby Syndrome (BBS). Soft tissue injuries constitute the most common type of manifestations in BBS, such as abrasions resulting from dragging, bite marks on the cheek, neck, and back, bruises like six-penny bruises, butterfly-shaped bruises due to pinching, slap marks, and lacerations caused by hitting with blunt objects may be observed. In some cases, bruises may be found on the chest, abdomen, lower back, buttocks, genitals, inner thighs, arms, and face. The presence of bruises with various colours indicates repeated abuse [2]. Due to hair pulling, subgaleal hematoma and traumatic alopecia may be observed.

Inflicted childhood neurotrauma (shaken baby syndrome) occurs secondary to violent, nonaccidental, repetitive, unrestrained acceleration-deceleration head and neck movements, with or without blunt head trauma in children typically younger than 3 years of age. Inflicted childhood neurotrauma accounts for approximately 10% of all cases of child abuse and carries a mortality rate of up to 25%. The ocular manifestations are numerous and may have a prominent role in recognition of this syndrome. Retinal hemorrhage is the most common ophthalmic finding and occurs at all levels of the retina. Retinal haemorrhages can occur without associated intracranial pathology. The pattern of hemorrhage helps distinguish this disorder from other causes of retinal hemorrhage or from accidental injuries. It is often associated with anterior chamber hemorrhages, luxation of lens, retinal detachment and failing to recognize and treat the same promptly may result in permanent loss or impairment of sight.

Fractures are the second most common manifestation of child abuse after soft tissue injuries. Skull fractures, fractures of ribs (Nobbing fractures – string of beads appearance on X ray), periosteal hematomas, avulsion of metaphysis, epiphyseal separation, Sub dural hemorrhage, post traumatic pulmonary pseudo cysts are seen in cases of child abuse. Child abuse should be suspected in non-ambulatory children with lower-extremity long-bone fractures. However, no fracture pattern or types are pathognomonic for child abuse. A full skeletal survey (as opposed to a “babygram”) is essential in every suspected case of child abuse. Abdominal injuries like laceration of liver, spleen, rupture of stomach, intestines, urinary bladder, transection of second part of duodenum and jejunum may also be noted.

Detection of abuse is not only important in order to treat the pathology that is discovered but also to prevent further abuse or even death. Most common cause of death is head injury followed by rupture of abdominal organs. The effects of abuse are failure to thrive and psychosocial dwarfism. Several studies were carried out where dating of fractures with radiological surveys when done using certain criteria can give the time of injury [5-8].

Dating of fractures in cases of suspected child abuse [9]:

- A fracture that does not show the formation of periosteal bone is usually <7-10days old and seldom >20days old.
- A fracture with mild periosteal formation may be 4-7 days old.
- A fracture that shows an exuberant periosteal reaction or the formation of a callus is >14 days old.
- The disappearance of the fracture line requires more time than the formation of new bone, approximately 14-21 days.

Specificity of location of fractures in child abuse (modified from Kleinman 2015) [1011]:

Based on the location of fractures we can determine the specificity of the case and group them into high, moderate, and low specificity namely.

- If the fractures are present over classic metaphyseal regions, multiple ribs mainly of posterior side in the paravertebral gutter, scapula, spinous process, and sternum, it implies it is of high specificity.
- If there are multiple fractures which are bilateral, and a combination of recent and previous fractures, any epiphyseal separations, fractures and separations of vertebral bodies, fracture of digits and complex skull fractures are an indication of moderate specificity.
- The presence of sub periosteal new bone tissue formation, clavicular fractures, long bone fractures, linear skull fractures are of low specificity.

Various imaging modalities play crucial roles in diagnosing the constellation of findings associated with battered baby syndrome. X-rays are instrumental in identifying fractures, particularly those in various stages of healing. MRI scans provide detailed images, aiding in distinguishing fractures from conditions like Rickets or osteogenesis imperfecta. Technetium 99 methylene diphosphonate bone scintigraphy assists in detecting bone abnormalities indicative of trauma. Fluoride 18 labelled sodium fluoride positron emission tomography can uncover metaphyseal lesions, aiding in differential diagnosis from conditions like scurvy or Menkes syndrome.

Differential diagnosis [5-8]

There are many differential diagnoses for Battered baby syndrome and are discussed below. They are grouped under various headings for ease of understanding.

1. Acute abdomen comprises of conditions like intestinal gastrointestinal disease viz: peritonitis, inflammatory bowel disease etc., intrinsic urinary tract diseases, genital problems like torsion of spermatic cord, sickle cell crisis and these can be differentiated from BBS with investigations like radiographs, stool tests, culture, USG, intravenous

pyelogram, laparoscopy, angiography, and sickle cell studies etc.

2. Bruising can also be due to conditions like hemophilia, von Willebrand's disease, Henoch Schoenlein purpura, Purpura fulminans, Ehler Danlos syndrome, Mongolian spot. These conditions can be differentiated from BBS by doing prothrombin time, partial thromboplastin time, von Willebrand's panel etc.
3. Fractures of BBS can be confused with osteogenesis imperfecta, rickets, birth trauma, hypophosphatasia, leukemia, neuroblastoma, osteomyelitis, septic arthritis and are distinguished with radiology, decreased alkaline phosphatase, CBC, bone marrow biopsy etc.
4. Skin lesions like Bacterial cellulitis, Pyoderma gangrenosum, Staphylococcal impetigo, herpes zoster/ simplex, epidermolysis bullosa, allergic or irritant contact dermatitis which can be differentiated from BBS by culture, gram stain, scrapings, skin biopsy etc.
5. Metaphyseal lesions of BBS have a close resemblance to those caused by scurvy, Menkes syndrome, syphilis, Birth trauma, physiological striae which are differentiated by decreased copper and ceruloplasmin levels etc.

There are numerous risk factors for violence against children, stemming from causes at individual, close relationship, community, and societal levels. At the individual level, biological and personal aspects such as age, sex, lower levels of education, low income, disabilities, mental health problems, and identification as lesbian, gay, bisexual, or transgender, as well as the use of alcohol or drugs, and a history of exposure to violence, all contribute to vulnerability. At the close relationship level, factors such as lack of emotional bonding between children and parents or caregivers, poor parenting practices, family dysfunction, separation, and witnessing violence between parents or caregivers, along with early or forced marriage, heighten the risk.

On a broader scale, at the community level, issues like poverty, high population density, and easy access to alcohol and illicit drugs exacerbate the problem. At the societal level, social and gender norms that normalize violence, policies perpetuating economic, gender, and social inequalities, inadequate social protection, post-conflict situations or natural disasters, weak governance, and poor law enforcement all contribute to a climate where violence against children can thrive. Addressing these multifaceted issues at their respective levels is crucial to creating a safer world for our children, who represent the future of mankind.

Conclusion

In conclusion, this case underscores the alarming persistence of violent manifestations in various forms of child abuse. It highlights the critical role of the initial clinical encounter, where physicians must remain vigilant and cognizant of the potential for child abuse, particularly when discrepancies exist between the reported history and nature of injuries, as well as their timing. Moreover, when the caregiver is implicated as the perpetrator, identifying, and addressing instances of abuse becomes even more challenging. Hence, pediatricians must maintain a heightened level of suspicion to effectively recognize and intervene in cases of child abuse, thereby safeguarding vulnerable

individuals from further harm and preventing tragic outcomes.

Ethical concerns

All ethical concerns to be addressed to the authors.

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

Acknowledgements

We would like to express our gratitude to Vinay Sheel, Resident in the Department of Pediatrics at GMC, Nizamabad.

References

1. Adelson L, Adelson. Pathology of Homicide. Thomas, Charles C, Publisher; Illinois 1994.
2. Biswas G. Recent advances in forensic medicine and toxicology - 2: Good practice guidelines and current medicolegal issues. New Delhi, India: Jaypee Brothers Medical; 2018. 465–502 p.
3. Mason et al J. Pathology of Trauma. 3rd edition. Taylor & Francis; 2000. 155–173 p.
4. Hillis S, Mercy J, Amobi A, Kress H. Global prevalence of past-year violence against children: A systematic review and minimum estimates. Paediatrics 2016;137. https://doi.org/10.1542/peds.2015-4079.
5. Gilbert Barness E, Debich Spicer DE, Steffensen TS. Handbook of pediatric autopsy pathology. 2nd edition. New York: springer; 2014. p 7-83.
6. Ignatius et al P. Textbook of Forensic Medicine and Toxicology. 5th edition. Elsevier; 2022. pp. 420-421.
7. Aggrawal A. Textbook of Forensic Medicine and Toxicology. 2nd edition. APC publishing company; 2021. pp. 483-485.
8. Kleinman PK. Diagnostic imaging of child abuse. 2nd ed. London, England: Mosby; 1998. pp. 168-177.
9. Prosser I, Maguire S, Harrison SK, Mann M, Sibert JR, Kemp AM. How old is this fracture? Radiologic dating of fractures in children: a systematic review. AJR Am J Roentgenol. 2005;184(4):1282–6. Available from: http://dx.doi.org/10.2214/ajr.184.4.01841282
10. Kleinman PK, editor. Diagnostic imaging of child abuse. 3rd ed. Cambridge, England: Cambridge University Press; 2015. pp. 393-494.
11. Kliegman RM, Stanton B, Geme J, Schor NF, Behrman RE. Nelson textbook of paediatrics. 19th ed. London, England: Grune & Stratton; 2011.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 752–755, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.012

CASE REPORT

Rare Case of Annular Pancreas

Poojitha D,[1] Jameel Akther[2] and Sudarsan S[3,*]

[1]*Surgery Resident, Apollo Main Hospitals, Chennai, Tamailnadu*
[2]*Senior Consultant, General and Minimal Access Surgery, Apollo Main Hospitals, Chennai, Tamailnadu*
[3]*Academic Registrar, Minimal Access Surgery, Apollo Main Hospitals, Chennai, Tamilnadu*

Accepted: 17-May-2024 / Published Online 08-July-2024

Abstract
One of the rare disorders noted during birth is Annular pancreas. In this disorder a slender band of pancreatic tissue engulfs the duodenum. This congenital anomaly in children produces symptoms like duodenal obstruction but mostly they produce symptoms in later stages of life. This is one of the rare clinical diagnosis. But once diagnosed immediate treatment can reduce the morbidity risk.

Keywords: Annular Pancreas, Down’s syndrome

*Corresponding Author: Sudarsan Srikanth
Email: sudarsansrikanth.1991@gmail.com

Introduction

The main pathophysiology behind this disease is the circular encasement of second part of duodenum by the pancreatic tissue due to migration of ventral pancreatic bud. This may be associated with other congenital defects, including Down's syndrome, malrotation, intestinal atresia and cardiac malformation.

This disorder can be classified as complete and incomplete type based on the location (Figure 1).

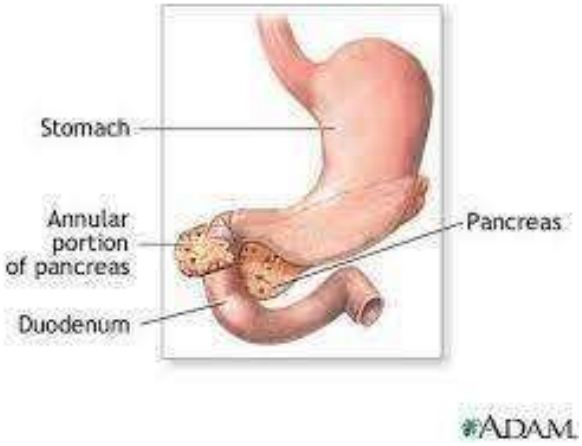


Figure 1.

COMPLETE TYPE:

This type on gross inspection we can notice the second part of duodenum being completely engulfed by the pancreatic tissue.

INCOMPLETE TYPE

This type the engulfing is noted partially and this is difficult to be made out and confirmed by MRCP or diagnostic laparoscopy

Epidemiology

True prevalence of annular pancreas is unknown. Before the availability of imaging techniques it was 3 of 20,000 in post-mortem reports and 3 of 24,519 in diagnostic abdominal surgeries [1].

Better imaging modalities have lead more significant identification of the disease which has come to 1 in 1000 cases [2,3].

Case report

A 54 year old male presented with complaints of abdominal bloating post prandially associated with loss of appetite and weight. Patient has lost 8kgs in 4 months.

Patient was advised a contrast enhanced CT of the abdomen which revealed second part of duodenum was compressed by pancreatic parenchyma and was also causing mild luminal narrowing of D2.

There was no significant volume loss of the pancreatic parenchyma, no calculi or calcification seen. The pancreatic duct was also normal (Figure 2).

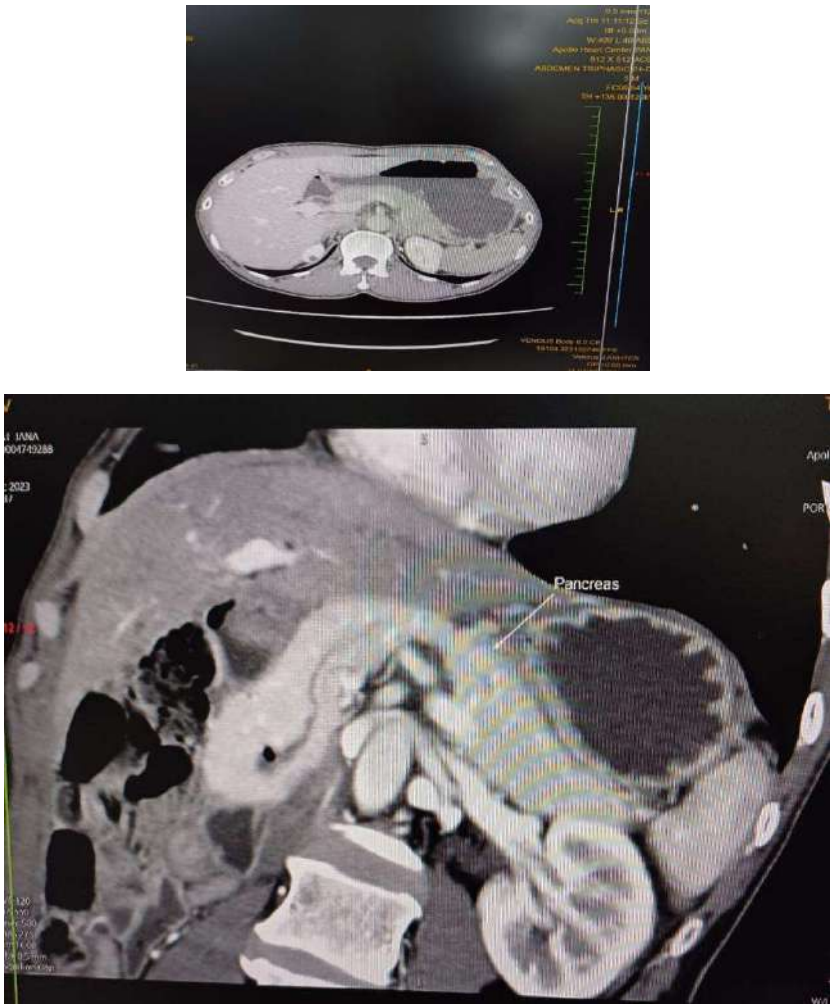


Figure 2.Contrast enchanced CT scan showing the encircling of second part of duodenum by pancreatic parenchyma

After pre-anesthetic evaluation the patient underwent laparoscopic loop gastrojejunostomy + Braun jejunojejunostomy. Patient tolerated the procedure well and recovered well post operatively (Figure 3).

Figure 2: Intraoperative Picture of Gastro - Jejunostomy

Discussion

This disorder of annular pancreas usually has a late presentation in adult hood where it produces significant symptoms [4].

In intrauterine life during the fifth week of gestation, an outgrowth develops from primitive foregut and that further grows in to single dorsal and two ventral buds from which the pancreas develops. The fusion of ventral buds takes place at a rapid pace .ventral bud fuses with dorsal bud during seventh week of gestation as duodenum expands causing the ventral buds to rotate and fuse with the opposite side. A part of uncinate process and inferior head of pancreas is from ventral bud .The body of pancreas and tail is formed by dorsal bud. Main pancreatic duct is formed by fusion of duct from dorsal and ventral bud. The encirelent of duodenum takes place in annular pancreas due to the reason of non rotation of ventral bud along with duodenum. Many of the patients are usually asymptomatic .The patient in age group of 30 yrs-60 years usually presents with symptoms rarely patients can have biliary obstruction. The usual common symptoms are vague abdominal pain, fullness after a meal, vomiting, hematemesis, acute or chronic pancreatitis [5].

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Nobukawa, Bunsei; Otaka, Masahiko; Suda, Koichi; Fujii, Hideki; Matsumoto, Yoshiro; Miyano, Takeshi. An Annular Pancreas Derived from Paired Ventral Pancreata, Supporting Baldwin's Hypothesis. Pancreas 2000;20(4):408-410.
2. Chevillotte G, Sahel J, Raillat A, Sarles H. Annular pancreas: report of one case associated with acute pancreatitis and diagnosed by endoscopic retrograde pancreatography. Digestive diseases and sciences. 1984;29:75-7.
3. Glazer GM, Margulis AR. Annular pancreas: etiology and diagnosis using endoscopic retrograde cholangiopancreatography. Radiology. 1979;133(2):303-6.
4. Ravitch MM, Woods AC Jr. Annular pancreas. Ann Surg. 1950 Dec;132(6):1116-27. doi: 10.1097/00000658-195012000-00011.
5. England RE, Newcomer MK, Leung JW, Cotton PB. Annular pancreas divisum—a report of two cases and review of the literature. The British Journal of Radiology. 1995;68(807):324-8.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 756–760, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.013

CASE REPORT

Capillary Haemangioma of Fallopian Tube: Usual Tumor at Unusual Site

Subashree K[1], Margaret Theresa J,[2] Kalaivani,[1] Jonathan Arnold[1] and Sukanya J.S.[1]

[1]*Department of Pathology, Sri Venkateshwaraa Medical College Hospital and Research Centre, Pondicherry, India*
[2]*Department of Pathology, Aarupadai Veedu Medical College and Hospital, Vinayaka Mission's Research Foundation (Deemed to be university), Kirumampakkam, Puducherry, India*

Accepted: 12-May-2024 / Published Online 08-July-2024

Abstract

Fallopian tube neoplasms are uncommon, accounting to approximately 1-2% of all female genital tract neoplasms**.** Hemangiomas are the most common soft tissue neoplasms**.** We present an unusual case of capillary hemangioma of fallopian tube which was incidentally detected in a patient who underwent abdominal hysterectomy with salphingo-oophorectomy.

Keywords: Capillary hemangioma, fallopian tube, female genital tract neoplasms, benign tumors

*Corresponding Author: Margaret Theresa J
Email: margitheresa@gmail.com

Introduction

Fallopian tube neoplasms are uncommon, which encounter approximately 1-2% of neoplasm in female genital tract [1]. Vascular malformations are heterogeneous in nature which are congenital defects in the vessel morphogenesis [2]. Haemangiomas of the fallopian tube are extremely rare and even more rare are capillary hemangiomas [3]. Rangins et al in 1947, first reported a case of capillary haemangioma of the fallopian tube. Since then very few cases of capillary haemangioma have been reported in the literature [4,5]. Etiology of haemangioma at female genital tract is unknown. In the present study, we present an unusual case of capillary hemangioma of fallopian tube which was incidentally detected in a patient who underwent abdominal hysterectomy with salphingo-oophorectomy for the complaints of dysmenorrhea.

Case Report

A 45 year old female visited the gynaecology outpatient department with the complaints of dysmenorrhea for past 6 months. Physical examination showed features of anemia. Per speculum and per vaginal examination were unremarkable. Routine laboratory investigations revealed decreased haemoglobin, red blood cell count, haematocrit and RBC indices, WBC count and platelet count were with in normal range. Peripheral smear finding showed features of microcytic hypochromic anaemia. Radiological examination revealed multiple fibroids. Patient underwent total abdominal hysterectomy with salphingo-oophorectomy. Gross examination revealed hypertrophic cervix. Endometrium was unremarkable. Myometrium showed multiple intramural and subserosal fibroids. Right and left ovaries and right fallopian tube appeared unremarkable. External surface of left fallopian tube showed a well circumscribed nodule on the serosal surface measuring 0.6x0.5x0.4cm. Cut surface the nodule was grey brown to grey black in colour, soft to firm in consistency. Lumen was patent. On microscopic examination cervix showed chronic papillary endocervicitis with focal squamous metaplasia and nabothian cysts. Endometrium in proliferative phase. Myometrium showed leiomyomata with degenerative changes. Right fallopian tube, right and left ovary appeared unremarkable. Left fallopian tube showed a well circumscribed neoplasm composed of blood filled spaces lined by flattered endothelial cells. Some of the spaces showed fibrin thrombi. No evidence of increased mitosis and necrosis. Immunohistochemistry (IHC) using CD 34, a vascular endothelial cell marker was performed which showed membrane positivity (Figure 1).

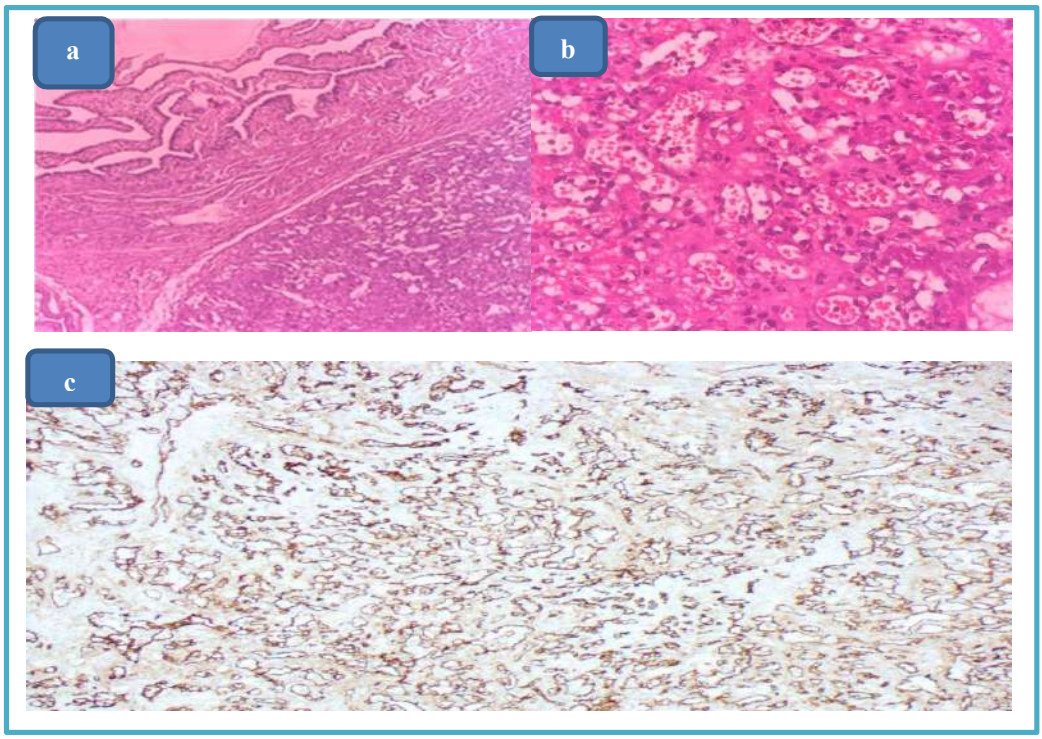


Figure 1. a) Wall of fallopian tube showing a well circumscribed tumor composed of numerous vascular spaces (H&E, 10X) .b) Small calibre blood vessels lined by plump endothelial cells. (H&E, 40X). c) Immunohistochemical staining for CD34 showing membrane positivity on endothelial cells (10X)

Discussion

Neoplastic lesions of fallopian tube are extremely rare in female genital tract. Non-neoplastic lesions are more common when compared to neoplastic lesion. Most of the fallopian tube neoplasms are detected incidentally by the surgical pathologist [6]. The most common neoplastic lesions of fallopian tube are Adenomatoid tumors, which are benign tumors of mesothelial origin. Hemangiomas are most common benign tumors of soft tissue. These tumors are commonly seen in of head and neck. Very few cases of fallopian tube hemangiomas have been reported [7]. Hemangiomas are often congenital or develop in the neonatal period and grow rapidly. Two main forms of hemangiomas are recognized: Capillary and Cavernous [8]. Etiology of haemangioma in female genital tract is unknown. The clinical presentation are usually asymptomatic but variable presentation has been documented. In the present study patient had complaints of dysmenorrhea for past 6 months. The gross presentation of capillary haemangioma of fallopian tube is usually tiny nodular lesion on the walls of the fallopian tube [9]. In the present study left fallopian tube showed a well circumscribed nodule on the serosal surface measuring 0.6x0.5x0.4 cm. Cut surface of the nodule was grey brown to grey black in colour, soft in consistency. The lumen was patent. The microscopic features of hemangioma are well circumscribed vascular lesion,

composed of thin walled proliferating capillary sized vessels filled with blood and were lined by plump endothelial cells [10]. In the present study left fallopian tube showed a well circumscribed neoplasm composed of blood filled spaces lined by flattered endothelial cells. Some of the spaces also showed fibrin thrombi. One of the important differential diagnosis that we would like to highlight is adenomatoid tumor of fallopian tube. The microscopic feature of adenomatoid tumor also shows a well circumscribed lesion composed of tubules, glands and cystic spaces lined by single layer of low cuboidal or flat epithelial like cells which contain abundant eosinophilic cytoplasm with vacuoles and round, bland nuclei. The supporting stroma appears fibroblastic or loosely edematous with lymphocytic sprinkling. Both the lesions are well circumscribed and are composed of cystic spaced which makes the diagnosis more challenging. In capillary hemangiomas the dilated spaces are lined by plump endothelial cells filled with RBCs whereas adenomatoid tumor show dilated spaces which are empty or filled with pale fluid and lined by epithelial like cells. In the present case report, initial sections showed dilated spaces but very few spaces were filled with RBCs. Hence extensive sampling helped us to confirm the diagnosis of capillary hemangioma. Immunohistochemical staining of CD34 highlights the endothelial lining of vascular channels.[10] In the present case report, Immunohistochemical staining for CD 34 showed membrane positivity on endothelial cells which also helped us to differentiate hemangioma from adenomatoid tumor. Treatment of hemangioma of fallopian tube is surgical excision of the lesion. In the present study abdominal hysterectomy with salphingo-oophorectomy was performed in view of dysmenorrhea since 6 months. Some of the complications of vascular neoplasm in the female genital tract are rupture of hemangiomas which can cause hemoperitoneum and other fatal consequences. In the literature, few cases of hemagioma have been reported, but most of them were cavernous hemangiomas. From the published literature it has been observed that capillary hemagioma of fallopian tubes are extremely rare in there occurrence and are usually identified incidentally.

Conclusions

In Female genital tract, vascular lesions like capillary hemangioma are very uncommon. In the present study capillary hemangioma was incidentally detected, hence extensive sampling and careful examination is essential.

This case is presented to emphasise the rarity of capillary hemangioma in the female genital tract.

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Huang CC, Chang DY, Chen CK, Chou YY, Huang SC (1995) Adenomatoid tumor of the female genital tract. Int J Gynaecol Obstet 50: 275-280.
2. Deb P, Singh V, Dutta V, Kapoor K. An unusual case of cavernous haemangioma of the Fallopian tube. Journal of Cancer Research and Therapeutics. 2014 Apr 1;10(2):363-4.

3. Merrow AC, Gupta A, Patel MN, Adams DM. 2014 revised classification of vascular lesions from the international society for the study of vascular anomalies: Radiologic-pathologic update. Radiographics 2016;36:1494-516.
4. Katiyar R, Patne SC, Bharti S, Jain M. Capillary hemangioma of the fallopian tube. J Clin Diagn Res. 2016;10:QD01-2.
5. Yoon G, Kim HS. Characterization of clinicopathological features of tubal cavernous hemangioma. Int J Clinic Experiment Pathol. 2016;9:7476-81.
6. Vang R, Wheeler JE. Diseases of the fallopian tube and paratubal region. In:Kurman RJ, Ellenson LH, Ronnett BM, eds. Blaustein's pathology of the female genital tract. 6th edition Springer Science +Business Media, New York 2011.
7. Merrow AC, Gupta A, Patel MN, Adams DM. 2014 revised classification of vascular lesions from the international society for the study of vascular anomalies: Radiologic-pathologic update. Radiographics 2016;36:1494-516
8. Gowri R, Soundararaghavana S, Oumachigui A, Iyengar KR. Fallopian tube haemangioma. J Obstet Gynecol Ind 2004;54:85-6.
9. Yadav SK, Bhoj M, Salhan S, Sarin N, Singh S. Capillary haemangioma of fallopian tube: a rare but dangerous incidental finding. Int J Reprod Contracept Obstet Gynecol 2019;8:747-50
10. DiOrio J Jr., Lowe LC. Hemangioma of the ovary in pregnancy: A case report. J Reprod Med 1980;24:232-4.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 761–765, July 2024
DOI 10.61770/NBEJMS.2024.v02.i07.014

CASE REPORT

A Rare Case of a Large Aortopulmonary Window with Anomalous Right Pulmonary Artery From Ascending Aorta in a Young Adult

Vaibhavi P. Patel,[1,*] Paras V. Busa,[1] Aum Kotak[1] and Siddharth Parmar[1]

[1]*Apollo Hospitals International Limited, Plot No – 1A, Bhat, GIDC, Gandhinagar, Gujarat – 382428, India*

Accepted: 07-May-2024 / Published Online 08-July-2024

Abstract

Background: The aortopulmonary window, a rare congenital condition, is an abnormal communication between the ascending aorta and the major pulmonary artery. This anomaly often necessitates early surgical intervention because its prognosis is unfavorable. Cases of adult survival without treatment are exceedingly rare. This condition is typically fatal in childhood if left untreated. In rare instances, it may manifest in adults, presenting symptoms similar to those of pulmonary hypertension. These patients exhibit clinical presentations that are indistinguishable from those of more common conditions characterized by a left-to-right shunt. Through careful transthoracic echocardiography, it is possible to identify the defect in the aortopulmonary septum. **Results:** We present a unique case of a 23-year-old adult diagnosed with a large, unrepaired aortopulmonary window, illustrating the challenges in diagnosing and managing such rare adult presentations.

Keywords: Aortopulmonary window, Adult congenital heart disease, Echocardiography, Rare cardiac anomalies

*Corresponding Author: Vaibhavi P. Patel
Email: vaibh93@gmail.com

Introduction

The aortopulmonary (AP) window, or aortopulmonary septal defect, is an uncommon congenital heart condition, constituting only 0.2–0.6% of all congenital heart diseases [1]. This defect involves an atypical connection between the ascending aorta and pulmonary trunk caused by abnormal embryonic development of the aortopulmonary trunk. Most patients with this condition experience congestive heart failure in infancy due to a left-to-right shunt. Without treatment, survival past infancy and early childhood is rare [2]. However, in patients with a minor defect, symptoms of pulmonary arterial hypertension (PAH) may emerge in adulthood. A notable case involves an adult with a large AP window. The prognosis for untreated cases, especially those with a large AP window, is poor, with a high mortality rate within the first year [3,4]. Rarely do some patients reach adulthood. A reported case involves a 23-year-old man with a large AP window, an anomalous origin of the right pulmonary artery from the aorta (AORPA), and Eisenmenger syndrome, who had not undergone surgery.

Case Report

A male patient, age 23, arrived at our hospital's outpatient department complaining of dyspnea (NYHA class II) for the previous year, which included chest heaviness, chest pain, and shortness of breath. There was no history of paroxysmal nocturnal dyspnea or orthopnea. Additionally, the patient had a history of frequent palpitations during periods of activity dating back five years, during which time he did not seek medical attention. There was evidence of a history of recurrent chest infections in childhood. Abdominal fullness, cyanosis, or pedal edema were not present in the past.

The patient had a systemic examination and showed 149/90 mmHg of blood pressure, 89 beats per minute of pulse, and 19 breaths per minute of respiration. In the indoor air, his saturation level of oxygen was 95%. A detectable second heart sound (P2) and a notable grade 3 parasternal heave were discovered during a cardiovascular test. Auscultation revealed a discernibly louder second heart sound. Furthermore, over the left parasternal area, notably in the second and third intercostal spaces, a grade 3/6 systolic murmur was detected. Aortic and tricuspid valve failure was indicated by the presence of an additional pan systolic murmur over the lower left parasternal region, which become more intense during inspiration.

The findings of the laboratory tests were normal for complete blood count, B-type natriuretic peptide levels, liver and renal function, and urinalysis. The ECG showed enlarged atria and a normal sinus rhythm. The left ventricular ejection percentage was determined to be 59%, and the left ventricular end-diastolic diameter was within normal ranges. Cardiomegaly was discovered by chest radiography. In the parasternal long-axis view, echocardiography also revealed a significant void measuring roughly 22 mm between the ascending aorta and the main pulmonary artery bifurcation, along with evidence of bidirectional shunting on colour Doppler flow imaging. a right pulmonary artery that rises prominently from the ascending aorta. One could observe the main

pulmonary artery giving rise to the left pulmonary artery.

The results of the echocardiography revealed congenital cardiac disease with an AP window and an abnormal origin of the ascending aorta of the right pulmonary artery. A thickened tri-leaflet aortic valve, severe aortic stenosis, peak/mean 160/100 mmHg, mild sub-valvular and valvular pulmonary stenosis, and dilated branch pulmonary arteries were among the other findings. The aorta-pulmonary artery connection was further established by contrast-enhanced CT images of the lungs. The ascending aorta, which seems dilated (44mm), is the source of the right pulmonary artery, whereas the pulmonary trunk continues as the left main pulmonary artery. Surgery was ruled out in light of the final diagnosis, which included an AP window along with an aberrant origin of the right pulmonary artery (AORPA) from the ascending aorta (Figure 1), severe pulmonary arterial hypertension, and Eisenmenger syndrome. The patient was advised to take medication to help lower the pulmonary arterial pressure.

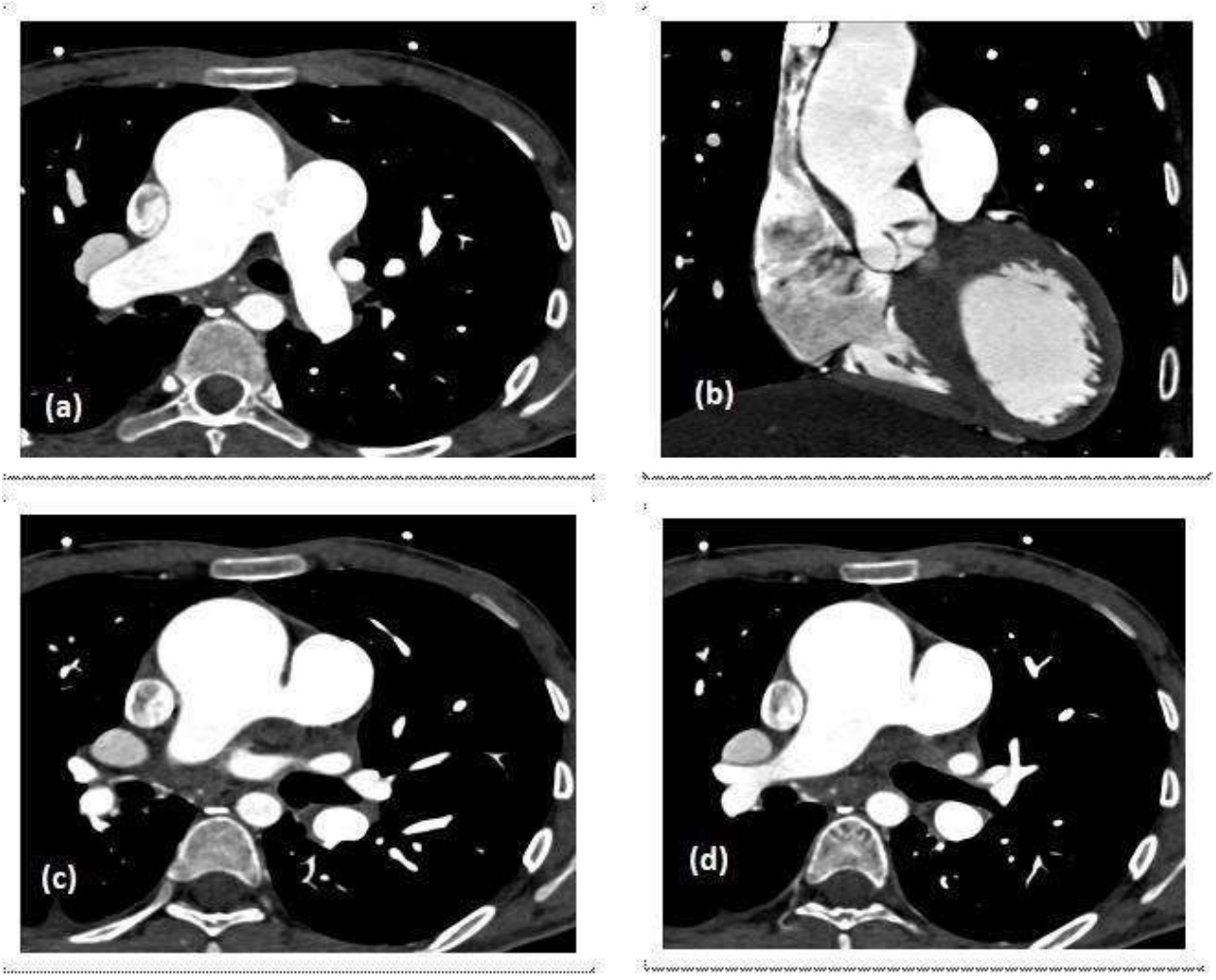


Figure 1. Contrast-enhanced computed tomography images showing a large aortopulmonary window in axial(a) and coronal sections. (b) Right pulmonary artery arising from the ascending aorta. (c) Left pulmonary artery continuation of the main pulmonary artery.

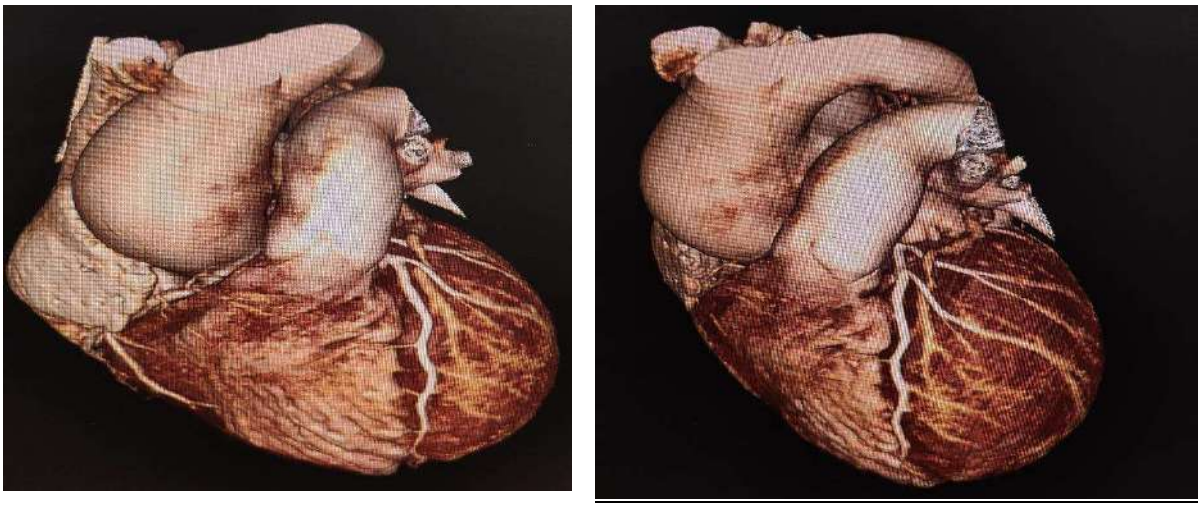


Figure 2. 3D VR image showing aortopulmonary window between ascending aorta and pulmonary artery. Note Anomalous right pulmonary artery arising from ascending aorta.

Discussion

The ascending aorta and the pulmonary artery are directly connected in the aortopulmonary septal defect (APSD), an uncommon congenital cardiac disease that accounts for 0.2%–0.6% of congenital cardiac malformations. This is caused by inadequate embryonic separation of these arteries [1]. It can happen on its own or in conjunction with other cardiac conditions such patent ductus arteriosus or ventricular septal defect. Problem size influences the clinical presentation, which can range from early childhood congestive heart failure to long-term adult survival with Eisenmenger syndrome consequences, especially if the problem is left untreated [3].

One of the most essential diagnostic methods for determining APSD is echocardiography. Surgery is the recommended course of action, ideally performed in early childhood. The most popular technique is transaortic patch closure, while minor lesions with distinct edges may benefit from a transcatheter approach. Pulmonary vascular disease (PVD) can be avoided with urgent surgery, which also has good short- and long-term results. On the other hand, further congenital abnormalities may complicate surgery and have an impact on the outcome [7].

Untreated APSD in adult patients is rare, with survival into adulthood without developing irreversible PVD being exceptionally rare. In such cases, medical management focuses on symptom relief, especially for pulmonary hypertension, using medications such as endothelin receptor antagonists and phosphodiesterase inhibitors, and for heart failure. The management of these patients is challenging, especially when irreversible PVD and Eisenmenger's syndrome are present, which eliminates surgical options [4].

The prognosis of APSD varies; early detection leads to better outcomes. Delayed diagnosis can result in severe complications, including irreversible PVD and Eisenmenger syndrome, which significantly impact patient prognosis [5,8]. Therefore, early detection and management of APSD are essential for effective treatment.

Conclusion

This case report underscores the uncommon occurrence of an aortopulmonary septal defect coexisting with an anomalous origin of the right pulmonary artery from the aorta in a young adult. It emphasizes the indispensable role of advanced imaging studies, particularly computed tomography angiography, as critical techniques for unveiling detailed cardiac structures essential for appropriate surgical planning [2]. The report brings to light adult presentations of congenital heart disease, which have been less prominent in medical literature, and advocates for a multidisciplinary forum for discussing the diagnosis and management of such patients.

Statements and Declarations

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Law MA, Mahajan K. Aortopulmonary Septal Defect. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan.
2. Grünenfelder J, Zünd G, Vogt PR, Turina MI. Aortopulmonary Window with Anomalous Origin of the Right Coronary Artery. Ann Thorac Surg 1999;67:233-5. doi: 10.1016/s0003-4975(98)01145-x.
3. Rajagopal R, Sinha M, Pandey NN, Bhambri K, Kumar S. Tetralogy of Fallot with Pulmonary Atresia and Aortopulmonary Window: Or is it Truncus Arteriosus? J Cardiovasc Comput Tomogr. 2020 Sep-Oct;14(5):e20-e21. doi: 10.1016/j.jcct.2018.10.022.
4. Nischal N., Arya S., Gupta R., Goyal N., & Puri S. K. Aortopulmonary Window: Case Report of Survival in Untreated Adult Patient. Journal of Clinical and Diagnostic Research. 2018 Jan 1. https://doi.org/10.7860/jcdr/2018/35037.11410.
5. Yüksel IO, Köklü E, Arslan S, Üreyen CM, Küçükseymen S. Aortopulmonary Window in Adulthood: Surviving at 22 Years without Intervention or Pulmonary Vascular Disease. Turk Kardiyol Dern Ars. 2016;44(4):332-34.
6. Nadig S, Kapoor A, Kumar S, Gaharwar S, Phadke RV. A Rare Case of Large Aortopulmonary Window with Eisenmenger Syndrome and Adult Survival. J Cardiol Cases. 2014 Aug 19;10(5):193-195. doi: 10.1016/j.jccase.2014.07.008.
7. Su-Mei AK, Ju-Le T. Large Unrepaired Aortopulmonary Window--Survival into the Seventh Decade. Echocardiography. 2007 Jan;24(1):71-3. doi: 10.1111/j.1540-8175.2006.00353.x.
8. Cui M, Xia B, Wang H, Liu H, Yin X. A Rare Case of Adult Aortopulmonary Window Combined with Anomalous Origin of the Right Pulmonary Artery from the Aorta Leading to Eisenmenger Syndrome. J Int Med Res. 2021 Jan;49(1):300060520984656. doi: 10.1177/0300060520984656.

National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 7, Pages 766–769, July 2024
DOI 10.61770/NBEJMS.2024.v02.i04.015

CASE REPORT

Exploring Uncharted Waters: A Unique Case of Accidental Rectal penetration of Health Faucet

Dickey Lamu Sherpa,[1] Somdev Sil,[1] Sanjay Maitra[2] and Utpal De[3,*]

[1]*Senior Resident, Department of General Surgery, NRS Medical College and Hospital, Kolkata, India.*
[2]*Associate Professor, Department of General Surgery, NRS Medical College and Hospital, Kolkata, India.*
[3]*Professor, Department of General Surgery, NRS Medical College and Hospital, Kolkata, India.*

Accepted: 25-March-2024 / Published Online 08-July-2024

Abstract
Rectal foreign bodies require careful diagnosis amid patient embarrassment. Timely assessment is crucial to manage complications. Removal methods vary, including trans-anal, endoscopic, or surgical approaches. Our case highlights successful trans-anal extraction of health faucet from rectum, emphasizing the need for sensitive and efficient management.

Keywords: rectum, foreign body, surgical treatment, extraction

*Corresponding author: Utpal De
Email: utpalde9@gmail.com

Introduction

Rectal foreign bodies pose a challenging scenario in emergency departments, with their incidence showing an upward trend, among urban populations. While motivations for rectal foreign body insertion vary, including sexual gratification, concealment (as seen in body packers), sexual assault, and accidental causes, the predominant reason remains autoeroticism, often involving unconventional objects for anal stimulation [1]. In this case report, we present a rare occurrence of an accidental health faucet which got inadvertently inserted into the rectum.

Case (Figure 1)

A 70-year-old man had an accidental fall onto a health faucet while anal ablution after defecation, resulting in the faucet along with the hose becoming lodged in his rectum. Despite efforts to remove it, the patient was unsuccessful. Examination upon arrival at the emergency department revealed the cut end of the water hose protruding through the anal canal. The patient had a medical history of hypertension and benign prostatic hyperplasia, with no psychiatric issues.

Physical examination showed stable vital signs and a normal abdomen, with no signs of peritonitis. Perineal examination revealed the hose protruding through the anal opening, with minimal laceration and tenderness. Rectal examination was hindered due to the obstruction. X-rays confirmed the presence of the faucet in the pelvis, with additional imaging ruling out perforation.

After initial assessment, the patient underwent exploration under general anesthesia. Anal stretching was performed, followed by lubrication of the anal canal. Under C-arm guidance, a controlled traction was given on the protruding hose with right hand while the thumb of the left hand kept the trigger pressed. After overcoming initial resistance successful extraction was achieved. Further evaluation showed intact sphincter complex. Post-operative recovery was uneventful, with subsequent normal anal function observed at follow-up three weeks later.

Discussion

Rectal foreign bodies present a distinct and challenging facet of colorectal trauma, with historical accounts tracing back to the 16th century and modern case reports emerging in 1919 [2,3]. While typically observed around the age of 44, occurrences range from individuals in their 20s to those over 90, with males predominating [2]. Objects encountered vary widely, encompassing household items like bottles and glasses to a diverse assortment including toothbrushes, food items, and even sex toys and cocaine packets [4,5].

Patients with rectal foreign bodies often experience embarrassment, potentially concealing their condition during emergency visits. Hence, a high index of suspicion and professionalism are crucial for accurate diagnosis. Initial evaluation should prioritize assessing for peritonitis, with simple abdominal imaging aiding in object localization and assessing for complications.

A comprehensive digital rectal examination is vital, and various classification systems exist for rectal injuries, facilitating tailored management approaches. Extraction methods vary based on injury nature and location, ranging from transanal and endoscopic to

operative techniques [6]. Follow-up evaluations post-extraction are imperative to assess sphincter function, with delayed sphincteroplasty offering positive outcomes for incontinence management [7].

This case highlights the rarity of a health faucet as a rectal foreign body and underscores the unconventional yet successful per anal extraction method, offering insights for surgeons managing similar presentations in the future. Such unique cases emphasize the importance of a tailored approach to foreign body removal in clinical practice.

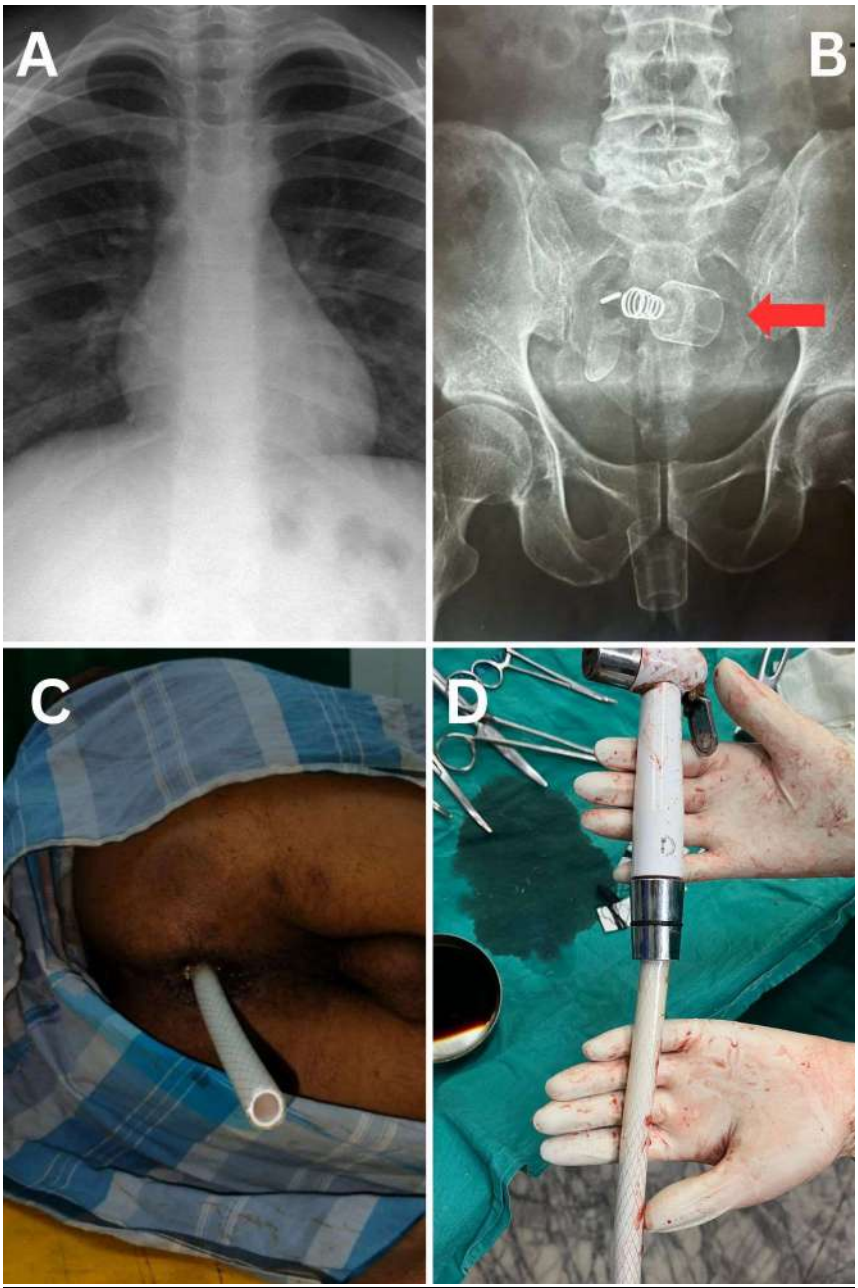


Figure 1. A – Normal Chest X ray without any free gas under diaphragm, B – X ray pelvis showing health faucet (red arrow) stuck in the rectum, C – Clinical presentation, D – Health faucet with water hose following removal.

Disclosures and Declarations

Funding

The authors declare they have no financial interests.

Conflicts of Interest

The authors declare they have no conflicts of interest.

Data accessibility

All data pertaining to the patient are stored with the author and would be made available when required.

References

1. Ploner M, Gardetto A, Ploner F, Scharl M, Shoap S, Bäcker HC. Foreign rectal body - Systematic review and meta-analysis. Acta Gastroenterol Belg. 2020;83:61-65.
2. Kokemohr P, Haeder L, Frömling FJ, Landwehr P, Jähne J. Surgical management of rectal foreign bodies: a 10-year single-center experience. Innov Surg Sci. 2017;2:89-95. doi:10.1515/iss-2017-0021.
3. Kim JH, Um E, Jung SM, Shin YC, Jung SW, Kim JI, Heo TG, Lee MS, Jun H, Choi PW. The Management of Retained Rectal Foreign Body. Ann Coloproctol. 2020;36:335-343. doi: 10.3393/ac.2019.10.03.1.
4. Cinar H, Berkesoglu M, Derebey M, Karadeniz E, Yildirim C, Karabulut K, Kesicioglu T, Erzurumlu K. Surgical management of anorectal foreign bodies. Niger J Clin Pract. 2018; 21: 721-725. doi: 10.4103/njcp.njcp_172_17.
5. Sharma H, Banka S, Walton R, Memon MA. A novel technique for nonoperative removal of round rectal foreign bodies. Tech Coloproctol 2007;11:58–59
6. Brungardt JG, O'Dell RJ, Eaton SR, Bennett AW. Rectal foreign bodies: national outcomes after the operating room. Int J Colorectal Dis. 2021;36:265-269. doi:10.1007/s00384-020-03756-y.
7. Coskun, A., Erkan, N., Yakan, S., Yıldirim, M., & Cengiz, F. Management of rectal foreign bodies. World journal of emergency surgery 2013;8:11. https://doi.org/10.1186/1749-7922-8-11