ORIGINAL RESEARCH ARTICLE

A Study to Assess Insomnia and Sleep Quality Among Post-Graduate Residents of a Medical College in Urban Bengaluru

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Abstract

Background Sleep quality plays a crucial role in maintaining overall well-being. Postgraduates, due to their demanding academic and clinical responsibilities, are prone to sleep disturbances. Hence, in this context, this study was conducted among postgraduate residents using the Pittsburgh Sleep Quality Index to examine their sleep quality. To evaluate the proportion of Insomnia and assess sleep quality among postgraduate residents of a medical college in Urban Bengaluru.

Methods A total of 126 postgraduate students studying at a medical college were included in our cross-sectional study, which employed a simple random sampling method. Data was obtained by the interview method using a pretested semi-structured questionnaire that included the PSQI Scale and information on the socio-demographic profile of the participants. Participants were grouped into categories of varying sleep quality, such as Good Sleep Quality, Poor Sleep Quality, Sleep Disturbance, and Severe Sleep Disturbance.

Results The mean age of the participants was 29 ± 2 years. Poor sleep quality was observed in 78 (62%) participants, and sleep disturbance was seen in 21 (17%) participants. The most common age group affected was 25–29 years. Males, clinical department postgraduates, unmarried participants, those from nuclear families, and those with night duties at least once a week had higher proportions of poor sleep quality and sleep disturbances. There was no statistically significant association seen between age, gender, type of family, department, marital status, socioeconomic status, and sleep quality.

Conclusion Poor sleep quality was observed in two-thirds of the participants, and sleep disturbance was observed in one-fifth of the participants.

Keywords Insomnia, Postgraduates, PSQI, Sleep quality

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1 Introduction

Sleep disorders affect an estimated 16.6% to 40% of individuals globally among medical trainees. The incidence of poor-quality sleep among residents and medical students is far higher than in the general population. These individuals are generally subjected to lengthy working hours, night shifts, and significant amounts of psychological pressure, all of which can disrupt normal sleeping patterns and lead to insomnia.[1]
Insomnia is both a symptom and a clinical disorder characterize by insomnia, or the inability to sleep or to maintain sleep. Insomnia is underdiagnosed and is often greater than chronic diseases such as diabetes and cardiovascular disease in population-level burden.[2]
Factors such as urbanization, irregular work schedules, and academic pressure further exacerbate sleep disturbances, particularly among healthcare workers and postgraduate medical trainees.
In India, postgraduate training involves two to three years of intensive clinical and academic responsibilities. Residents are expected to balance patient care, thesis work, seminars, coursework, and district postings, often with limited rest and recovery time. Previous studies across India and other countries have shown that sleep deprivation in this group leads to poor concentration, impaired judgment, and increased risk of medical errors.[3,4]

Given the reported effect of poor resident sleep on resident performance and health, there are limited South Indian studies, particularly in Bengaluru, assessing sleep and insomnia quality in postgraduate medical residents using validated tools.
This study aims primarily to quantify the prevalence of insomnia among participants and secondarily to assess their sleep quality using the Pittsburgh Sleep Quality Index (PSQI).

2 Methods

Study Design and Setting

This three-month cross-sectional study was conducted at Rajarajeswari Medical College and Hospital in Bengaluru, Karnataka, India, between September and November 2024.

Study Population and Sample Size

The target group included all the postgraduate residents who were pursuing MD/MS/DNB courses across pre-clinical, para-clinical, and clinical departments. The following formula was used to determine the sample size of 126 out of 278 eligible residents:

- Z = 1.96 (for 95% confidence)
- P = 0.91 (prevalence of poor sleep quality from a prior study in Benghazi University)[3]
- D = 0.05 (absolute precision)

$$n = \frac{P\,(1-P)\,Z^2}{D^2}$$

Sampling Method

A list of all postgraduate residents was provided by the administrative office. Using computer-generated random numbers, 126 residents were selected by simple random sampling, and the same number was sampled from each specialty and department.
Each resident was assigned a unique identification number. Using a computer-generated random number table (via Microsoft Excel's RAND function), participants were randomly selected from this list without replacement until the required sample size was achieved. This ensured that each eligible resident had an equal and independent chance of being included in the study, thereby minimizing selection bias.

Inclusion Criteria

The study included participants who were willing to provide informed consent and were available throughout the study duration were considered eligible for participation.

Exclusion Criteria

Residents with pre-diagnosed psychiatric or neurological disorders, as well as those providing incomplete responses, were not considered for the study.

Data Collection Tools

Data collection was conducted using a pre-tested, structured questionnaire consisting of two sections. Section I captured information related to the academic and sociodemographic profiles of the participants.
While Section II included standardized tools to assess sleep. The PSQI was employed in this section to evaluate the overall quality of sleep.[5]
Ten residents participated in a pilot study of the questionnaire to ensure its clarity before some minor linguistic changes were made. The instruments' internal consistency was shown (Cronbach's alpha > 0.8).

Study Tool

A standardized and pre-tested questionnaire was used to gather data that included sociodemographic details, lifestyle, educational and occupational variables, and sleep variables. The PSQI was used to evaluate insomnia and sleep quality. A well-validated self-report tool called the PSQI is used to determine historical sleep quality over a one-month period in seven areas:

1. Subjective sleep quality
2. Sleep latency

3. Sleep duration
4. Habitual sleep efficiency
5. Sleep disturbances
6. Use of sleep medications
7. Daytime dysfunction

Every item has a rating between 0 and 3, and the overall PSQI score ranges from 0 to 21. The quality of sleep decreases as the score rises. According to the established criteria, a PSQI global score of greater than five was used as the cut-off for poor sleep quality.

Participants' PSQI responses were analysed to identify patterns of insomnia, delayed sleep latency, short sleep duration, and other sleep disturbances. The PSQI tool enabled a comprehensive and standardized assessment of both the quality and disturbances related to sleep among postgraduate medical residents.

Data Collection Procedure

Data was collected through in-person interviews during breaks in specific secluded areas. Participation was voluntary, and informed consent was obtained. Researchers ensured confidentiality and anonymity throughout the process. The final analysis only included responses that were completely filled out. Ten incomplete responses were recorded and excluded from the analysis.

Data Analysis

IBM SPSS version 23 was used for analysis after the collected data was converted to Microsoft Excel. Data analysis was performed using both descriptive and inferential statistics. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data.

For inferential analysis, the Chi-square test was applied to establish associations between categorical variables, with a p-value of < 0.05 considered statistically significant. Continuous variables, such as sleep duration, were tested for normality, and Analysis of Variance (ANOVA) was employed to compare sleep quality between departments.

3 Results

Figure 1 illustrates the distribution of sleep quality among postgraduate students, highlighting the proportion of participants with good sleep quality compared to those experiencing insomnia.

The study included 65 male and 61 female postgraduate participants, with insomnia affecting 78% of males and 80% of females. The majority of postgraduates were aged 25-35 years, with 86% of those in the 30-35 age group reporting insomnia, the highest among all age groups. In terms of socioeconomic status (SES), 83% of upper-middle-class postgraduates experienced insomnia, compared to 76% in the upper class and 50% in the lower middle class. Among different departments, the pre-clinical group had the highest insomnia rate (88%), followed by the clinical (81%) and para-clinical (75%) groups. Additionally, night duty was a significant factor, as 81% of those with night duties experienced insomnia, compared to 74% of those without night duty. These findings highlight the high burden of insomnia among postgraduate students, especially among those in the pre-clinical department, aged 30-35 years, and those with night duty (Table 1).

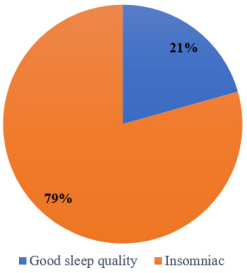

Figure 1 Proportion of insomnia among postgraduates

The overall distribution of sleep quality among 126 postgraduate students (65 females and 61 males) reveals a concerning prevalence of sleep issues, as shown in Figure 2. The majority of participants fall into the categories of poor sleep quality (62%) and sleep disturbance (16.7%), with only 20.6% of students reporting good sleep quality and just one case of severe sleep disturbance.

The overall distribution of sleep quality among 126 postgraduate students (65 females and 61 males) reveals a concerning prevalence of sleep issues, as shown in Figure 2.

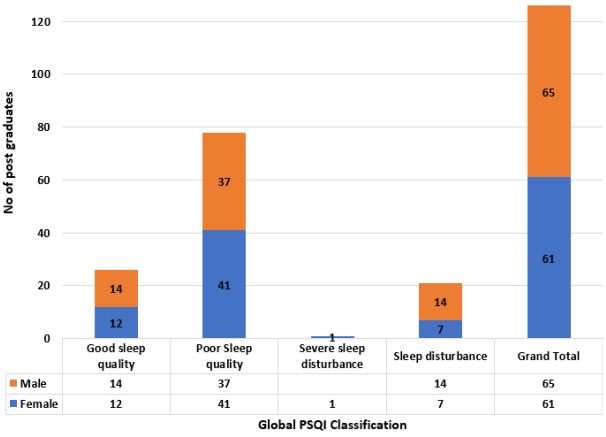

Figure 2 Distribution of sleep quality among postgraduates based on global PSQI categories

The majority of participants fall into the categories of poor sleep quality (62%) and sleep disturbance (16.7%), with only 20.6% of students reporting good sleep quality and just one case of severe sleep disturbance.

Table 1 Sleep quality and disturbance across different socio-demographic factors

Socio-demographic factors	Good sleep quality	Poor sleep quality	Sleep disturbance	Severe sleep disturbance	Total no of post-graduates	Number of insomniacs	Percentage of insomniacs	Chi square	P-value
Age (in years)									
25-29 years	16	36	10	1	63	47	75%	0.354	6.647
30-35 years	8	41	10	0	59	51	86%		
36-38 years	2	1	1	0	4	2	50%		
Gender									
Male	14	37	14	0	65	51	78%	3.496	0.321
Female	12	41	7	1	61	49	80%		
Type of family									
Nuclear	18	60	18	1	97	79	81%	9.178	0.163
Joint	4	16	3	0	23	19	83%		
3-Generation	4	2	0	0	6	2	33%		
Department									
Pre-clinical	1	5	2	0	8	7	88%	3.936	0.685
Para-clinical	11	27	5	1	44	33	75%		
Clinical	14	46	14	0	74	60	81%		
Duty									
Night duty	19	62	17	1	99	80	81%	0.848	0.837
No night duty	7	16	4	0	27	20	74%		
Socio-economic status									
Lower middle class	1	1	0	0	2	1	50%	2.975	0.811
Upper middle class	12	45	11	1	69	57	83%		
Upper class	13	32	10	0	55	42	76%		
Marital status									
Married	10	29	12	0	51	41	80%	3.568	0.311
Unmarried	16	49	9	1	75	59	79%		

Figure 3 illustrates the number of postgraduates experiencing issues across different components of the PSQI scores among postgraduates, highlighting various aspects of sleep quality.[5]

According to Figure 3, subjective sleep quality was defined by just 1% of the participants, which means the majority do not feel that their sleep is poor. Prolonged sleep latency (difficulty falling asleep) affected 35%, suggesting a significant proportion struggles to initiate sleep. The most prevalent issue was short sleep duration, affecting 53%, indicating that more than half of the participants do not get adequate sleep. Poor sleep efficiency (difficulty maintaining sleep) was reported by 39%, while frequent sleep disturbances impacted 28% of postgraduates, showing moderate sleep disruptions. A concerning 44% of postgraduates reported the frequent use of sleep medication, indicating a high reliance on external aids for sleep. However, significant daytime dysfunction (daytime sleepiness or reduced productivity due to poor sleep) was reported by only 3%, suggesting a relatively lower impact on daily activities. Overall, the findings highlight that short sleep duration and reliance on sleep medication are the most common sleep-related issues among postgraduates, while subjective sleep quality and daytime dysfunction remain less frequently reported concerns.

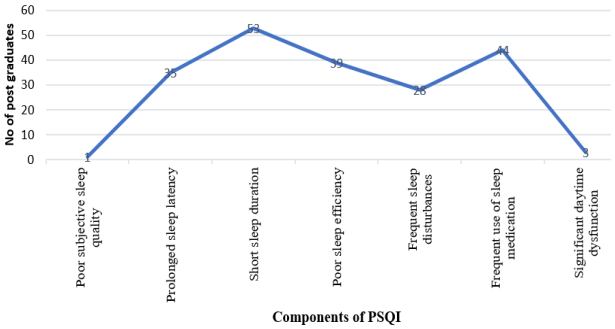

Figure 3 Component-wise PSQI scores among the study subjects

Table 2 presents the results of the ANOVA test, comparing sleep quality across preclinical, paraclinical, and clinical departments to determine whether significant differences exist among them. There was no statistically significant difference between the different departments and sleep quality.

Table 2 ANOVA table showing the comparison between different departments and sleep quality

Source	DF	Sum of squares	Mean square	F statistic	P-value
Groups (Between Preclinical, Paraclinical, and Clinical Branches)	2	546	273	1.5903	0.2562
Error (Within Preclinical, Paraclinical, and Clinical Branch)	9	1545	171.6667		

Table 3 shows findings of sleep patterns and disturbances among postgraduate students based on the PSQI.

Table 3 Responses of study subjects to Pittsburgh Sleep Quality Index (PSQI) Self-report questionnaire of the last month's sleep quality and disturbance [5]

Questions asked on PSQI	**Number of students (%)**
Usual bedtime	
09-11 PM	50 (40%)
>11 PM	60 (48%)
>12 AM	16 (13%)
During the past month, how long (in minutes) has it usually taken you to fall asleep each night? (number of minutes)	
1-10 mins	18 (14%)
11-30 mins	73 (58%)
31-60 mins	34 (27%)
> 1 hour	1 (1%)
Usual getting up time	
04:00-07:00 AM	95 (75%)
>07:00 AM	28 (22%)
>04:00 AM	3 (2%)
Hours of sleep per night	
< 4 hours	1 (1%)
4-7 hours	105 (83%)
>7 hours	20 (16%)
During the past month, how often have you had trouble sleeping because you [cannot get to sleep within 30 minutes]?	
Less than once a week	22 (17%)
Not during the past month	28 (22%)
Once or twice a week	62 (49%)
Three or more times a week	14 (11%)
During the past month, how often have you had trouble sleeping because you wake up in the middle of the night or early morning?	
Less than once a week	42 (33%)
Not during the past month	28 (22%)
Once or twice a week	43 (34%)
Three or more times a week	13 (10%)
During the past month, how often have you had trouble sleeping because you have to get up to use the bathroom?	
Less than once a week	23 (18%)
Not during the past month	51 (40%)
Once or twice a week	50 (40%)
Three or more times a week	2 (2%)
During the past month, how often have you had trouble sleeping because you cannot breathe comfortably?	
Less than once a week	18 (14%)
Not during the past month	99 (79%)
Once or twice a week	9 (7%)
During the past month, how often have you had trouble sleeping because you - cough or snore loudly	
Less than once a week	16 (13%)
Not during the past month	102 (81%)
Once or twice a week	1 (1%)
Three or more times a week	7 (6%)
During the past month, how would you rate your sleep quality overall?	
Fairly bad	60 (48%)
Fairly good	57 (45%)
Very bad	1 (1%)
Very good	8 (6%)

During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?	
Less than once a week	2 (2%)
Not during the past month	80 (63%)
Once or twice a week	41 (33%)
Three or more times a week	3 (2%)
During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	
Less than once a week	47 (37%)
Not during the past month	58 (46%)
Once or twice a week	19 (15%)
Three or more times a week	2 (2%)

The majority of students (48%) indicated that their sleep time was after 11 PM, and 75% woke up between 4:00 and 7:00 AM. Most students (83%) get 4-7 hours of sleep per night, indicating a potential risk of sleep deprivation. Regarding sleep onset, 58% take 11-30 minutes to fall asleep, while 27% take 31-60 minutes, showing that delayed sleep initiation is a common issue.

Sleep disturbances are widespread; 34% of students got up in the middle of the night with the same frequency, and 49% of students reported having trouble sleeping twice or more each week. A total of 40% also got up once or twice a week to go to the bathroom. However, 79% of respondents said they had no breathing problems, and 81% said they did not frequently cough or snore, making respiratory-related sleep disturbances less common.

When evaluating their overall sleep quality, 48% rated it as "fairly bad," while 45% considered it "fairly good." The use of sleep medication was low, with 63% reporting no use, while 33% take medication once or twice a week. Daytime dysfunction was moderate, as 46% reported never feeling excessively sleepy during daily activities, while 37% experienced it less than once a week. Overall, the data suggest that postgraduate students commonly experience poor sleep quality, delayed sleep onset, and frequent night-time awakenings, leading to insufficient sleep duration. However, the reliance on sleep medication and significant daytime dysfunction remains relatively low.

4 Discussion

This research found that 62% of postgraduate residents had poor sleep quality, and 17% expressed quantifiable sleep disruptions, consistent with the literature, which has already shown sleep deprivation in healthcare trainees. This high prevalence of insomnia may be attributed to academic pressure, stress, irregular schedules, and other lifestyle factors common among postgraduates.

Our findings align closely with those of Yousuf and Qazi, and Alshehri et al., who reported poor sleep quality in 75% and 70.5% of residents in Jammu and Kashmir and Saudi Arabia, respectively, using PSQI scores.[4,6] Similarly, Sahly et al. noted that Poor sleep quality was experienced by 76.6% of Libyan medical students, with slightly higher prevalence in females than in males.[3] Our study also showed no significant gender difference, although marginally more females (80%) than males (78%) reported insomnia.

The mean age of our participants was 29 ± 2 years, which closely resembles populations in similar studies from Libya and Kathmandu.[3,7] Residents aged 30–35 years reported the highest prevalence of insomnia, likely due to increasing responsibility in the later stages of training. This research found that 62% of postgraduate residents suffered from two of the most common issues: short sleep duration and sleep latency. A total of 53% of the participants slept for less than seven hours at night, and 35% had trouble promoting sleep. These patterns match findings by Alshehri et al. and Carpi et al., who documented similar problems among medical students and university populations.[6,8]

The high prevalence of short sleep duration suggests potential risks, including fatigue, poor cognitive performance, and overall health decline. Only one person with severe sleep disturbance was observed in this study. Moreover, 44% of our sample indicated that they consumed sleep medication at least once or twice a week—a concerning trend also observed in studies by Sundas et al. and Babicki et al., which highlighted increasing reliance on pharmacological interventions.[7,9] Interestingly, daytime dysfunction was reported by only 3%, suggesting that most participants managed to maintain daytime productivity despite poor sleep—a finding echoed by Islam et al. in their study on Bangladeshi university students.[10] However, this could indicate adaptive coping or underreporting.

In this study, the average duration of night sleep was approximately 5.88 ± 1.07 hours, similar to a study conducted among postgraduate residents in Kathmandu Medical College, Sinamagal, students slept for an average of 6.7 ± 1.6 hours each night.[7]

Male participants working in clinical departments exhibited slightly higher sleep disturbances in this current study. This is in line with Alshehri et al., where stressors associated with seniority and clinical workload negatively affected sleep quality[6] Similarly, in the present study, male participants in the clinical department had slightly higher sleep disturbances.

This study also found that postgraduate residents with

night duties experienced significantly poorer sleep quality. This aligns with a study done by Sundas et al., which identified irregular work hours as a key factor contributing to disrupted sleep patterns among medical students.[7] Short sleep duration was the most common issue (42%), resonating with findings by Yousuf et al., where a median PSQI score of 8.46 highlighted inadequate sleep duration across specialties.[4]

Furthermore, 35% of participants reported frequent use of sleep medication, raising concerns about dependency in the present study. Similar studies have emphasized the importance of non-pharmacological interventions for sleep management.[7]

Our findings concur with Carpi et al., who conducted a latent profile. A study of Italian university students found that there were reports of a high frequency of both severe insomnia and poor sleep quality.[8]

Babicki et al., in a global study involving over 20,000 college students from 60 countries, highlighted a significant burden of insomnia and daytime sleepiness affecting quality of life.[9] This correlates with the findings of our study, where 3% of participants reported daytime dysfunction due to poor sleep quality.

According to this study, using electronic devices for more than two hours before bed was strongly linked to poor sleep quality. Similarly, Islam et al. found that excessive internet use was significantly associated with poor sleep quality among Bangladeshi university students, and they suggested lifestyle issues as potential causes of sleep issues.[10]

In addition, Chaitra et al. noted that individuals with cardiovascular disease frequently experienced poor sleep quality and severe insomnia, highlighting the connection between sleep disturbances and long-term conditions.[11] Similarly, Jain et al. reported a strong association between poor sleep quality and low quality of life in individuals with hypertension.[12] This corroborates our study's conclusion that comorbid conditions like diabetes and hypertension are positively correlated with poor sleep quality.

A study by Guo et al. demonstrated that teenagers' depressed symptoms were substantially correlated with poor sleep quality[13] and supported the significance of mental health in our research, which found that 28.7% of respondents with poor sleep quality also experienced depressive symptoms. Furthermore, Fond et al. highlighted the occupational health burden associated with sleep disturbances by finding that poor sleep quality among healthcare workers during the COVID-19 pandemic was associated with high levels of stress and burnout.[14]

Rathi et al. and Jain et al.[1,12] found no association between demographic factors (age, gender, department, and SES) and sleep quality. Even though it wasn't statistically significant, night duties were linked to a higher prevalence of insomnia (81%).

The data suggest a high prevalence of inadequate sleep, frequent sleep disturbances, and mild to moderate insomnia symptoms. Many students experienced delayed sleep, night-time awakenings, and daytime sleepiness, which may impact their daily functioning. Sleep hygiene education and possible interventions (such as lifestyle modifications, stress management, and reducing screen time before bed) may be beneficial for this population.

Overall, the findings identify short sleep, elevated sleep latency, and excessive use of sleep medications as the most significant sleep issues among postgraduates. Interventions should prioritize improving sleep duration, reducing sleep latency, and minimizing dependence on medication to enhance overall sleep health.

Our study contributes to the body of literature by demonstrating the burden of insomnia in South Indian postgraduate medical trainees using validated tools and rigorous methodology. The broader implication suggests that chronic sleep disruption may lead to fatigue, burnout, and clinical errors if unaddressed.

Because of the limited sample size, the results cannot be extrapolated to the entire population. The study's generalizability to other institutions or contexts may be restricted because it was carried out in a single medical college in urban Bengaluru. Accuracy may be impacted by recollection bias and subjective interpretation in self-reported sleep quality data.

Other sleep determinants, such as eating habits, physical activity patterns, and illnesses, were not controlled in the study and could have better accounted for sleep disturbances.

To improve sleep quality and overall health among medical residents, institutions should implement stress management programs incorporating mindfulness, meditation, and counselling. Work-life balance initiatives, such as reforming duty hours, mandatory rest periods, and structured schedules, can help prevent excessive workloads and burnout. Educational workshops on sleep hygiene, fatigue management, and time management should be regularly conducted.

Additionally, providing access to mental health support, including counselling and peer support, can help residents manage stress-related sleep disturbances. Hospitals should also optimize workplace environments by creating quiet, comfortable rest areas for short naps during extended shifts. Promoting healthy lifestyle habits, such as exercise and diet, can also improve the quality of sleep. These measures collectively can help reduce fatigue-related errors and improve the overall well-being of medical residents.

5 Conclusion

The study illustrates the high prevalence of poor sleep quality among postgraduate residents, with 62% experiencing inadequate sleep, primarily influenced by factors such as workload, night duties, and stress. These are consistent with global trends indicating that medical professionals are disproportionately vulnerable to sleep disorders. The prevalence of poor quality of sleep in two-thirds of the subjects of the present study highlights the urgent need for systemic reforms within medical education to prioritize the well-being of residents. To address this pervasive issue, targeted interventions focusing on workload management, stress reduction strategies, and sleep hygiene education are essential.

Declarations

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Artificial Intelligence Disclosure
The authors declare that no artificial intelligence (AI) tools were used in the preparation or writing of this manuscript.

Authors' Contributions
Nitish Kumar Dhal contributed to the conceptualization, data collection, and manuscript writing. Manasa A R was involved in manuscript writing, provided guidance, and supervised and critically reviewed the manuscript. Shashikala Manjunatha provided conceptual inputs, overall supervision, and critical review. Chandrakala C contributed to data analysis and interpretation and provided statistical support.

Availability of Data and Materials
Upon reasonable request, the corresponding author will provide the supporting data for the study's conclusions. Because participant data is sensitive and must be kept private for ethical and confidentiality reasons, it is not publicly available.

Conflict of Interest
The authors declare that they have no conflicts of interest.

Consent for Publication
Informed consent to participate and have anonymized data published was sought from all the participants before collecting data. The participants were assured confidentiality of identity and that their information would be used for academic and research purposes only.

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Ethical Considerations
The current study was conducted in compliance with the Declaration of Helsinki's ethical guidelines. The Rajarajeswari Medical College & Hospital's Institutional Ethics Committee in Bengaluru granted ethical clearance under the code of ethics RRMCH-IEC/340/2024.

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