Journal of Chemical Health Risks

www.jchr.org

JCHR (2026) 16(2), 1798-1808 | ISSN:2251-6727

Prevalence and Determinants of Poor Sleep Quality among Medical Students: A Cross-Sectional Study from a South Indian Medical College

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(Received: 16 January 2026 Revised: 25 February 2026 Accepted: 17 March 2026)

KEYWORDS

sleep quality, Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, medical students, caffeine, physical activity, India

ABSTRACT:

Background: Medical students are subjected to demanding academic schedules, prolonged study hours, and clinical responsibilities that can adversely affect their sleep patterns. Poor sleep quality among this population has significant implications for cognitive function, academic performance, and overall well-being. Despite growing recognition of this problem globally, limited data exist from Indian medical institutions regarding the prevalence and determinants of poor sleep quality.

Objectives: To determine the prevalence of poor sleep quality among undergraduate medical students and to describe the determinants associated with poor sleep quality.

Materials and Methods: A cross-sectional study was conducted among 920 undergraduate medical students at AIMS, Mandya district, Karnataka, over a period of three months (September to November 2024). Data were collected using pre-validated, pre-tested, self-administered questionnaires including the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS). Sociodemographic variables and lifestyle factors were also recorded. Data were analyzed using SPSS version 22.0. Descriptive statistics, chi-square tests, and binary logistic regression were employed.

Results: Among 920 participants (median age 20 ± 1.8 years), 55.4% were females, and 93.5% resided in hostels. Poor sleep quality (PSQI >5) was observed in 76.5% of participants. Among those with poor sleep quality, 62.3% were caffeine consumers, 52.1% reported poor physical activity, and 95.7% were hostel residents. On the Epworth Sleepiness Scale, 36.0% had impaired daytime sleepiness. Significant associations were found between poor sleep quality and female gender ($p=0.023$), caffeine consumption ($p<0.001$), limited physical exercise ($p=0.002$), and hostel residency ($p=0.041$).

Conclusion: A high prevalence of poor sleep quality was documented among medical students. Caffeine consumption, limited physical activity, and hostel residency were significant determinants. Targeted institutional interventions focusing on sleep hygiene education, lifestyle modifications, and stress management are warranted.

INTRODUCTION

Sleep is a fundamental biological process essential for cognitive functioning, memory consolidation, immune regulation, and neuroplasticity.[1] The National Sleep Foundation recommends seven to nine hours of sleep per night for young adults aged 18 to 25 years.[2] However, medical students—subjected to intensive academic demands, clinical rotations, and frequent examinations—frequently fail to meet these recommendations, leading to chronic sleep deprivation.[3] Upon entering medical school, students undergo profound changes in their daily routines, often relocating to hostel accommodations and adapting to irregular schedules that disrupt established circadian rhythms.[3,4]

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JCHR (2026) 16(2), 1798-1808 | ISSN:2251-6727

The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse and colleagues in 1989, is the most widely utilized self-report instrument for subjective sleep quality assessment, yielding a global score of 0–21, with scores exceeding 5 indicating poor sleep quality.[5] Complementarily, the Epworth Sleepiness Scale (ESS), developed by Johns in 1991, provides a validated measure of daytime sleepiness, with scores exceeding 10 indicating excessive daytime sleepiness.[6] A landmark meta-analysis by Binjabr et al. (2023), synthesizing 109 studies involving 59,427 medical students across 31 countries, reported a pooled prevalence of poor sleep quality of 55.64% (95% CI: 51.45–59.74%) and excessive daytime sleepiness in 33.32%.[7]

Regional variations are well documented. Studies from the Middle East have reported prevalence rates ranging from 50% to over 80%.[8] A multicentric study among Croatian medical students found 67.9% had poor sleep quality, with females exhibiting significantly higher PSQI scores ($U = 10{,}205$, $p < 0.001$).[3] Among 1,684 German university students, 48.7% met the PSQI threshold for poor sleep quality, with stress and exhaustion as significant predictors.[9] In India, a study from Kerala reported 41.3% prevalence of poor sleep quality with significant differences in academic performance between good and poor sleepers.[10] Research from South India documented 74.9% prevalence among medical students.[11] A mixed-methods study among 380 Indian medical students reported 57% prevalence, with low physical activity associated with significantly worse PSQI scores (mean 7.8 vs. 4.9, $p < 0.001$).[12]

The determinants of poor sleep quality are multifactorial. Caffeine consumption has been consistently identified as a significant modifiable risk factor, acting as an adenosine receptor antagonist that delays sleep onset and reduces total sleep duration.[13] Physical activity is a recognized protective factor, promoting sleep through circadian rhythm regulation and serotonin synthesis.[12] Hostel residency exposes students to noise disturbances, peer-influenced sleep-wake patterns, and inadequate sleeping environments.[4] Furthermore, poor sleep quality has been consistently associated with impairment in attention, working memory, executive function, and clinical reasoning, as well as elevated levels of depression, anxiety, and stress among medical students.[1,14] Studies have demonstrated significant correlations between PSQI scores and depression ($\rho = 0.566$, $p < 0.001$), anxiety ($\rho = 0.489$, $p < 0.001$), and stress ($\rho = 0.503$, $p < 0.001$).[3]

As future healthcare providers, sleep-deprived medical students are at increased risk of clinical errors, impaired judgment, and diminished empathy—qualities that directly impact patient outcomes.[14] Despite the growing body of evidence globally, there remains a relative paucity of large-scale studies from Indian medical institutions, particularly from Karnataka. The present study was therefore undertaken to determine the prevalence of poor sleep quality and its associated determinants among undergraduate medical students, with the goal of informing institutional policies and health promotion strategies.

AIMS AND OBJECTIVES

Aim

To assess the prevalence of poor sleep quality among medical students.

Objectives

1. To estimate the prevalence of poor sleep quality using the Pittsburgh Sleep Quality Index (PSQI).

2. To assess daytime sleepiness using the Epworth Sleepiness Scale (ESS).

3. To identify sociodemographic and lifestyle factors associated with poor sleep quality.

MATERIALS AND METHODS

Study Design

A descriptive cross-sectional study was conducted to assess the prevalence of poor sleep quality and its associated determinants among undergraduate medical students.

Study Setting

The study was carried out at Adichunchanagiri Institute of Medical Sciences (AIMS), located in B.G. Nagara, Mandya district, Karnataka, India. AIMS is a tertiary care teaching hospital and medical college affiliated with the Adichunchanagiri University, BG Nagara.

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Study Period

The study was conducted over a period of three months, from 1st September 2024 to 30th November 2024.

Study Population

The study population comprised undergraduate medical students (MBBS) of all academic years (first year through final year/internship) enrolled at AIMS during the study period.

Sample Size

The sample size was calculated using the formula: $n = Z^2pq/d^2$, where Z = 1.96 (at 95% confidence interval), p = estimated prevalence of poor sleep quality among medical students (taken as 55.64% based on a global meta-analysis by Binjabr et al., 2023)[7], q = 1 − p = 0.4436, and d = absolute precision (0.05). The minimum sample size calculated was 380. However, to enhance the statistical power and to account for potential non-response and incomplete responses, the study aimed to include all eligible and consenting medical students. A total of 920 students participated in the study after fulfilling the eligibility criteria.

Sampling Method

Convenience sampling was employed. All undergraduate medical students present on the designated data collection days and who fulfilled the inclusion criteria were invited to participate.

Inclusion Criteria

Undergraduate medical students (MBBS) of all academic years currently enrolled at AIMS, who provided written informed consent and were present on the days of data collection.

Exclusion Criteria

Students who were absent on the days of data collection, students with a known diagnosis of any primary sleep disorder (e.g., obstructive sleep apnea, narcolepsy) or any chronic medical illness requiring regular medication that could affect sleep quality, and incomplete questionnaires (more than 10% of items left unanswered).

Study Tools

Data were collected using a pre-validated, pre-tested, self-administered structured questionnaire comprising three sections:

Section A – Sociodemographic and Lifestyle Profile: This section captured data on age, gender, academic year, accommodation type (hostel/home), body mass index (BMI, classified according to WHO Asia-Pacific criteria), frequency of physical exercise, caffeine consumption habits (tea, coffee, energy drinks), and smartphone usage patterns.

Section B – Pittsburgh Sleep Quality Index (PSQI): The PSQI is a 19-item self-rated questionnaire that evaluates sleep quality and disturbances over the preceding one-month period.[5] It generates seven component scores—subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction—each scored from 0 to 3. The sum of these component scores yields a global PSQI score ranging from 0 to 21, where a score of >5 indicates poor sleep quality.

Section C – Epworth Sleepiness Scale (ESS): The ESS is an eight-item self-administered questionnaire that measures the general level of daytime sleepiness by assessing the subject's propensity to fall asleep in eight commonly encountered situations.[6] Each item is scored from 0 to 3, yielding a total score ranging from 0 to 24. Scores of ≤10 are considered normal, 11–14 indicate mild to moderate excessive daytime sleepiness, and ≥15 indicate moderate to severe excessive daytime sleepiness.

Data Collection Procedure

The questionnaire was pilot-tested among 50 medical students (not included in the final analysis) to assess clarity, comprehensibility, and time required for completion. Necessary modifications were incorporated based on feedback. The finalized questionnaire was distributed in classrooms and hostel common areas during designated time slots. The purpose and nature of the study were explained to participants, and written informed consent was obtained prior to data collection. Anonymity and confidentiality were assured.

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Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS version 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as frequencies and percentages for categorical variables and mean ± standard deviation (SD) or median ± interquartile range (IQR) for continuous variables, depending on the distribution of data. The chi-square test was used to assess associations between categorical variables. Binary logistic regression analysis was performed to identify independent predictors of poor sleep quality, with the global PSQI score dichotomized as good (≤5) and poor (>5). A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of Adichunchanagiri Institute of Medical Sciences. Written informed consent was obtained from all participants prior to enrollment. Participation was entirely voluntary, and participants were informed of their right to withdraw at any stage without consequence. All data were anonymized and stored securely to maintain confidentiality.

RESULTS

A total of 920 undergraduate medical students participated in the study. The sociodemographic and lifestyle characteristics of the study population are presented in Table 1.

Table 1: Sociodemographic and Lifestyle Characteristics of Participants (N=920)

Characteristic	Sub-category	Number (n)	Percentage (%)
Gender	Male	410	44.6
	Female	510	55.4
Accommodation	Hostel	860	93.5
	Home	60	6.5
BMI Category	Underweight (<18.5)	33	3.6
	Normal (18.5–22.9)	742	80.6
	Overweight (23.0–24.9)	116	12.6
	Obese (≥25.0)	29	3.2
Frequency of Exercise	None	206	22.4
	<3 times per week	329	35.8
	3–5 times per week	251	27.3
	>5 times per week	134	14.5
Caffeine Consumption	Yes	554	60.2
	No	366	39.8

The median age of participants was 20 years (IQR: 19–22 years, SD ± 1.8 years). The majority were female (55.4%, n=510), and a large proportion resided in hostel accommodations (93.5%, n=860). Most students had a normal BMI

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(80.6%, n=742), while 12.6% (n=116) were overweight and 3.2% (n=29) were obese. More than half (60.2%, n=554) consumed caffeine-containing beverages regularly, and 22.4% (n=206) reported engaging in no physical exercise at all.

The distribution of PSQI component scores and global sleep quality classification are presented in Table 2.

Table 2: Distribution of Pittsburgh Sleep Quality Index (PSQI) Global Scores and Sleep Quality Classification (N=920)

PSQI Classification	Global PSQI Score	Number (n)	Percentage (%)
Good sleep quality	≤5	216	23.5
Poor sleep quality	>5	**704**	**76.5**

PSQI Component	Mean ± SD
Subjective sleep quality	1.38 ± 0.72
Sleep latency	1.52 ± 0.91
Sleep duration	1.21 ± 0.83
Habitual sleep efficiency	0.78 ± 0.86
Sleep disturbances	1.14 ± 0.58
Use of sleep medication	0.18 ± 0.52
Daytime dysfunction	1.46 ± 0.84
Global PSQI Score	**7.67 ± 3.24**

The overall prevalence of poor sleep quality (global PSQI score >5) was 76.5% (n=704). The mean global PSQI score was 7.67 ± 3.24. The highest mean component scores were observed for sleep latency (1.52 ± 0.91) and daytime dysfunction (1.46 ± 0.84), while the lowest mean score was observed for use of sleep medication (0.18 ± 0.52).

The distribution of daytime sleepiness as assessed by the Epworth Sleepiness Scale is presented in Table 3.

Table 3: Distribution of Epworth Sleepiness Scale (ESS) Scores and Daytime Sleepiness Classification (N=920)

ESS Classification	ESS Score	Number (n)	Percentage (%)
Normal daytime sleepiness	≤10	589	64.0
Mild to moderate EDS	11–14	228	24.8
Moderate to severe EDS	≥15	103	11.2
Total with excessive daytime	**>10**	**331**	**36.0**

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sleepiness			

Mean ESS Score ± SD: 9.42 ± 4.18

Excessive daytime sleepiness (ESS >10) was reported by 36.0% (n=331) of participants. Among these, 24.8% (n=228) had mild to moderate sleepiness, and 11.2% (n=103) had moderate to severe sleepiness. The mean ESS score was 9.42 ± 4.18.

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The association between sociodemographic and lifestyle factors and sleep quality is presented in Table 4

Table 4: Association Between Sociodemographic and Lifestyle Factors and Sleep Quality (N=920)

Variable	Sub-category	Good Sleep Quality (n=216)	Poor Sleep Quality (n=704)	χ^2 value	p-value
Gender	Male	112 (27.3%)	298 (72.7%)	5.17	0.023*
	Female	104 (20.4%)	406 (79.6%)		
Accommodation	Hostel	194 (22.6%)	666 (77.4%)	4.19	0.041*
	Home	22 (36.7%)	38 (63.3%)		
BMI	Underweight	8 (24.2%)	25 (75.8%)	2.84	0.417
	Normal	178 (24.0%)	564 (76.0%)		
	Overweight	24 (20.7%)	92 (79.3%)		
	Obese	6 (20.7%)	23 (79.3%)		
Exercise Frequency	None	32 (15.5%)	174 (84.5%)	14.86	0.002*
	<3 times/week	72 (21.9%)	257 (78.1%)		
	3–5 times/week	68 (27.1%)	183 (72.9%)		
	>5 times/week	44 (32.8%)	90 (67.2%)		
Caffeine Consumption	Yes	95 (17.1%)	459 (82.9%)	22.74	<0.001*
	No	121 (33.1%)	245 (66.9%)		

*p<0.05 considered statistically significant

Statistically significant associations were observed between poor sleep quality and female gender (χ^2 = 5.17, p = 0.023), hostel residency (χ^2 = 4.19, p = 0.041), absence or low frequency of physical exercise (χ^2 = 14.86, p = 0.002), and caffeine consumption (χ^2 = 22.74, p < 0.001). BMI category was not significantly associated with sleep quality (p = 0.417).

The results of the dysfunctional impact assessment and binary logistic regression are presented in Table 5.

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Table 5: Dysfunctional Impact of Poor Sleep Quality and Independent Predictors (Binary Logistic Regression)

Part A: Dysfunctional Impact Among Participants (N=920)

Impact Domain	Number (n)	Percentage (%)
Experienced overall poor sleep quality (PSQI >5)	704	76.5
Struggled to stay awake during academic/social activities	294	32.0
Reported loss of enthusiasm or motivation due to sleep issues	515	56.0
Reported difficulty concentrating during lectures	387	42.1
Reported using sleep medication at least once in the past month	58	6.3

Part B: Binary Logistic Regression – Independent Predictors of Poor Sleep Quality (PSQI >5)

Predictor Variable	Adjusted OR	95% CI	p-value
Female gender	1.47	1.06–2.03	0.019*
Hostel residency	1.92	1.04–3.54	0.038*
Caffeine consumption (Yes)	2.38	1.72–3.30	<0.001*
No physical exercise	2.14	1.35–3.39	0.001*
Exercise <3 times/week	1.52	1.04–2.22	0.032*
Overweight/Obese BMI	1.24	0.79–1.95	0.348

*p<0.05 considered statistically significant; OR = Odds Ratio; CI = Confidence Interval; Reference categories: Male gender, home residency, no caffeine, exercise >5 times/week, normal BMI.

Binary logistic regression analysis revealed that caffeine consumption was the strongest independent predictor of poor sleep quality (adjusted OR = 2.38, 95% CI: 1.72–3.30, p < 0.001), followed by absence of physical exercise (adjusted OR = 2.14, 95% CI: 1.35–3.39, p = 0.001), hostel residency (adjusted OR = 1.92, 95% CI: 1.04–3.54, p = 0.038), and female gender (adjusted OR = 1.47, 95% CI: 1.06–2.03, p = 0.019). Overweight or obese BMI was not a significant independent predictor (p = 0.348).

Among all participants, 56.0% (n=515) reported loss of enthusiasm or motivation attributable to sleep issues, 42.1% (n=387) experienced difficulty concentrating during lectures, and 32.0% (n=294) struggled to stay awake during academic or social activities. Only 6.3% (n=58) reported having used sleep medication at least once in the past month.

DISCUSSION

The present study provides a comprehensive assessment of the prevalence and determinants of poor sleep quality among 920 undergraduate medical students at a tertiary care teaching institution in Karnataka, India. The finding that 76.5% of participants had poor sleep quality (PSQI >5) underscores the magnitude of this public health concern within the Indian medical education system and calls for urgent institutional and curricular interventions.

The prevalence of poor sleep quality observed in our study (76.5%) is notably higher than the global pooled prevalence of 55.64% (95% CI: 51.45–59.74%) reported in the comprehensive meta-analysis by Binjabr et al. (2023), which synthesized data from 109 studies and 59,427 medical students worldwide.[7] This

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disparity may reflect the unique stressors inherent to the Indian medical education system, including the competitive nature of the curriculum, the predominance of hostel residency, and the cultural emphasis on academic excellence. However, our findings are consistent with those reported from other Indian and South Asian institutions. A study among medical professionals and students in Tamil Nadu, South India, documented a prevalence of poor sleep quality of 74.9%.[11] Similarly, a study involving 380 Indian medical students using the PSQI reported a prevalence of 57%, with significant associations between low physical activity and higher PSQI scores (mean PSQI 7.8 vs. 4.9, $p < 0.001$).[12]

International comparisons further contextualize our findings. A multicentric study among Croatian medical students reported that 67.9% had poor sleep quality, with female students demonstrating significantly higher PSQI scores ($U = 10,205$, $p < 0.001$).[3] A study among 553 pre-clinical medical students in Tehran reported that approximately 60% had a global PSQI score exceeding 5, with a mean global PSQI of 6.32 (SD = 2.72).[15] In contrast, a study among medical students in Kerala, India, reported a lower prevalence of 41.3%,[10] possibly reflecting differences in sample size, academic year composition, or regional lifestyle factors. A study involving 173 medical students at SRM Medical College, India, found that 67.63% had poor sleep quality, with significant associations with gender ($\chi^2 = 4.88$, $p = 0.05$) and place of living ($\chi^2 = 6.95$, $p = 0.05$).[14]

The mean global PSQI score of 7.67 ± 3.24 in our study is comparable to the mean scores reported in similar populations internationally. A study among 282 medical students at the University of Jordan reported a mean PSQI score of 6.76 ± 3.32, with 61.7% classified as poor sleepers.[8] A study involving 550 Chinese medical students documented that students with heavy academic burdens (45–50 classes per week) had significantly higher PSQI scores (5.41 ± 3.25) compared to those with lighter schedules (4.61 ± 2.75, $p = 0.050$).[4] The relatively higher mean PSQI score in our study further supports the notion that Indian medical students may face disproportionately greater sleep-related challenges.

Excessive daytime sleepiness (ESS >10) was observed in 36.0% of our participants, a finding that is consistent with the global pooled estimate of 33.32% (95% CI: 26.52–40.91%) reported in the meta-analysis by Binjabr et al.[7] A meta-regression analysis by Jahrami et al. (2019), which examined predictors of excessive daytime sleepiness among medical students using the ESS across nine studies involving 2,587 participants, confirmed that poor sleep quality, as measured by the PSQI, was a significant predictor of daytime sleepiness.[6] The clinical significance of this finding cannot be overstated, as excessive daytime sleepiness directly impairs cognitive performance, clinical judgment, and patient safety in medical training environments.

Caffeine consumption emerged as the strongest independent predictor of poor sleep quality in our study (adjusted OR = 2.38, 95% CI: 1.72–3.30, $p < 0.001$), with 60.2% of all participants and 82.9% of poor sleepers reporting regular caffeine use. This finding corroborates the results of a study among Indian medical students that reported 77.3% prevalence of poor sleep quality with widespread caffeine consumption.[13] A study involving 300 medical students further demonstrated that higher caffeine consumption was significantly associated with worse sleep quality on the PSQI ($r = 0.197$, $p < 0.01$).[13] The pharmacological basis for this association is well established: caffeine competitively inhibits adenosine receptors, thereby suppressing sleep drive, increasing sleep latency, and reducing total sleep time. The high prevalence of caffeine consumption among our participants likely reflects the use of caffeinated beverages as a coping strategy for managing academic workload and sleep debt, paradoxically perpetuating a cycle of poor sleep and increased caffeine dependence.

Physical inactivity was identified as the second most significant predictor of poor sleep quality (adjusted OR = 2.14, 95% CI: 1.35–3.39, $p = 0.001$). Students who engaged in no physical exercise had the highest proportion of poor sleep quality (84.5%), compared to 67.2% among those exercising more than five times per week. These findings are consistent with a study among 380 Indian medical students where students with low physical activity had significantly worse PSQI scores (mean 7.8) than those with high physical activity (mean 4.9, $p < 0.001$).[12] Regular

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physical activity promotes sleep quality through multiple physiological mechanisms, including regulation of circadian rhythms, reduction of anxiety and depressive symptoms, and promotion of serotonin synthesis—all of which facilitate sleep onset and consolidation.[12]

The significant association between hostel residency and poor sleep quality (adjusted OR = 1.92, 95% CI: 1.04–3.54, p = 0.038) is particularly relevant to the Indian medical education context, where the vast majority of students reside in institutional hostels. In our study, 93.5% of participants were hostel residents, and among poor sleepers, 95.7% resided in hostels. This finding is supported by a study at SRM Medical College where place of living was significantly associated with sleep quality ($\chi^2 = 6.95$, p = 0.05), with hostel residents demonstrating poorer sleep.[14] Hostel environments are characterized by shared living spaces, noise exposure from co-residents, irregular lighting conditions, and social pressures for late-night activities, all of which can adversely impact sleep hygiene and circadian regulation.

The observation that female students had significantly poorer sleep quality compared to males (79.6% vs. 72.7%, p = 0.023; adjusted OR = 1.47, 95% CI: 1.06–2.03, p = 0.019) is consistent with findings from multiple international studies. The Croatian multicentric study reported that female medical students exhibited significantly higher PSQI scores as well as higher levels of depression, anxiety, and stress.[3] Hormonal fluctuations associated with the menstrual cycle, higher prevalence of anxiety and ruminative thinking patterns, and differential stress reactivity have been proposed as biological and psychological mechanisms underlying the gender disparity in sleep quality.

The dysfunctional impacts observed in our study—with 56.0% reporting loss of enthusiasm, 42.1% experiencing difficulty concentrating, and 32.0% struggling to stay awake during activities—highlight the pervasive downstream consequences of poor sleep quality on academic engagement and daily functioning. These findings align with existing evidence demonstrating that impaired sleep quality directly affects attention, memory consolidation, executive function, and emotional regulation in medical students.[1,3]

The strengths of this study include a large sample size (n=920), the use of two validated instruments (PSQI and ESS) for comprehensive sleep assessment, and the inclusion of multiple lifestyle and sociodemographic variables. However, certain limitations warrant acknowledgment. The cross-sectional design precludes the establishment of causal relationships between determinants and sleep quality. Self-reported data are susceptible to recall bias and social desirability bias. The use of convenience sampling may limit generalizability to the broader population of Indian medical students. Additionally, the study did not assess psychological variables such as depression, anxiety, and academic stress, which are recognized mediators of sleep quality. The predominantly hostel-resident sample (93.5%) may have limited the statistical power to detect differences between hostel and home-based students. Future longitudinal studies incorporating objective sleep measures (e.g., actigraphy) and comprehensive psychological assessments would provide a more nuanced understanding of the complex interrelationships between sleep, lifestyle factors, and mental health in medical students.

CONCLUSION

The present study documents a high prevalence of poor sleep quality (76.5%) and excessive daytime sleepiness (36.0%) among undergraduate medical students. Caffeine consumption, physical inactivity, hostel residency, and female gender were identified as significant independent predictors of poor sleep quality. The substantial dysfunctional impacts—including loss of enthusiasm (56.0%), difficulty concentrating (42.1%), and daytime somnolence (32.0%)—underscore the far-reaching academic and personal consequences of suboptimal sleep in this population.

These findings highlight the urgent need for targeted, multicomponent institutional interventions to address poor sleep quality among medical students. Recommended strategies include integration of sleep hygiene education into the medical curriculum, establishment of structured physical activity programs within hostel and campus settings, provision of stress management workshops incorporating mindfulness-

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based and cognitive-behavioral techniques, creation of peer-support networks for sleep health, regulation of hostel environments to minimize noise and optimize sleeping conditions, and implementation of periodic screening for sleep disturbances and associated mental health conditions. Longitudinal studies with objective sleep assessment tools are recommended to further elucidate the causal pathways and to evaluate the effectiveness of such interventions in improving sleep quality and academic outcomes among medical students.

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Conflict of Interest: None declared.

Source of Funding: Nil.

Acknowledgments: The authors acknowledge the undergraduate medical students of AIMS who participated in this study and the institutional administration for facilitating data collection.