Prevalence of Insomnia and Its Association with Attention Control among Undergraduate Medical Students in West Bengal: A Cross-sectional Study

[1] Dr. Debayan Bhattacharya; [2] Dr. Arunima Chaudhuri;
[3] Dr. Dharmendra Kumar Gupta

[1] Junior resident, Department of Medicine, Burdwan Medical College, Burdwan
[2] Professor, Department of Physiology, Burdwan Medical College, Burdwan, West Bengal, and Adjunct Faculty, IHPE, Department of Health Professions Education, Sri Balaji Vidyapeeth, Puducherry, India
[3] Junior Resident, Department of Physiology, Burdwan Medical College, Burdwan, West Bengal, India
[2] ORCID: 0000-0001-9884-4436, [3] ORCID: 0009-0006-6308-4493

Corresponding Author: Arunima Chaudhuri

Abstract

Background: Insomnia is a common concern among university students, especially in medical education. This study examined the prevalence of insomnia among undergraduate medical students and its association with attention control and screen time. **Materials and Methods:** A cross-sectional survey was conducted among 609 MBBS students (first to fourth year) at Burdwan Medical College, West Bengal, during August–September 2025. Data were collected using the Insomnia Severity Index (ISI) and the Attention Control Scale–Short Format (ATTC). Statistical analyses included ANOVA, t-tests, Pearson's correlation and multiple linear regression analysis. **Results:** The mean ISI score was 6.2 ± 4.8. Overall, 34% of students experienced insomnia (27% sub threshold, 7% clinical), with severity increasing across academic years ($p = 0.004$). Hostel residents had a higher prevalence than day-scholars (9% vs. 4%, $p = 0.03$). No significant gender differences were observed. Attention control was highest in first-year students and lowest in third-year students. Insomnia was a significant predictor of lower attention control after adjusting for gender, year, and residence ($\beta = -0.27$, $p < 0.001$).Higher screen time showed a clear dose–response relationship with insomnia severity. **Conclusion:** ISI was a significant predictor of lower attention control after adjusting for demographic variables. These findings suggest that addressing sleep disturbances may be crucial for preserving cognitive function in medical students.

Keywords: Insomnia; Medical students; Attention control; Screen time; Sleep health; Cognition

Introduction

Insomnia is a major public health concern characterized by difficulty initiating sleep, maintaining sleep, or experiencing non-restorative sleep. Among university students, it is increasingly recognized as one of the most common mental health challenges, with medical students being particularly vulnerable due to their heavy academic workload, irregular schedules, and high-stress environment. [1,2]

The American Academy of Sleep Medicine classifies insomnia into chronic insomnia disorder, short-term insomnia disorder, and other specified insomnia disorders. It is frequently comorbid with psychiatric conditions such as depression and anxiety, and is associated with impaired social functioning, reduced academic performance, and increased risk of accidents. Beyond behavioural consequences, chronic sleep disturbances affect neuroendocrine and immune functions, thereby exerting broad physiological impact. [3]

Epidemiological evidence suggests that 30–50% of the adult population experiences insomnia symptoms, while 10–15% meet criteria for chronic insomnia disorder. [3] Recent systematic reviews indicate even higher prevalence rates among university students, ranging between 18–45%, with certain groups such as medical students reporting higher vulnerability due to academic demands and psychosocial stressors. [1,3]

Of particular concern is the impact of insomnia on cognitive performance. Sustained attention, defined as the ability to maintain focus on a task for extended periods, is crucial for medical students during lectures, clinical duties, and examinations. Research consistently shows that sleep deprivation impairs attention control, information processing, and executive functioning. [2,4] Contrary to outdated claims that attention span lasts several hours, contemporary cognitive neuroscience highlights that sustained attention typically fluctuates within minutes, making it highly sensitive to sleep quality and fatigue. [2]

Given the demanding nature of medical education and the critical role of attention control in learning and clinical practice, this study aimed to determine the prevalence of insomnia among undergraduate medical students in West Bengal and explore its relationship with attention regulation abilities.

Materials and Methods

Study Design and Setting

This study employed a cross-sectional observational design and was conducted at Burdwan Medical College, Purba Bardhaman, West Bengal, during the months of August and September 2025. Ethical approval for the study was obtained from the Institutional Ethics Committee (Approval No.: BMC/IEC/618; Dated: 14/08/2025).

Participants

Burdwan Medical College admits approximately 200 MBBS students each year. The MBBS program spans four and a half years of academic training, resulting in a total undergraduate population of about 800 students at any given time (across first to final year). An additional ~200 students undergo a one-year compulsory rotating internship (CRRI) after completing the final MBBS examinations; however, interns were excluded from this study due to their clinical postings and training commitments.In this study, the term 'fourth year' refers to the final MBBS academic year (prior to internship).

For this study, all undergraduate MBBS students from first to final year were eligible. Of the ~800 eligible students, 609 completed the survey, yielding a response rate of 76%.

Inclusion criteria

- Enrolled undergraduate MBBS students (first year to final year)
- Provided informed consent

Exclusion criteria

- Interns (CRRI), due to their mandatory clinical postings and rotational training
- Students with previously diagnosed major psychiatric disorders
- Non-responders after two reminders
- Individuals directly involved in conducting the study

Sample Size Calculation

The minimum required sample size was calculated using a prevalence of 70% insomnia among medical students, as reported in a recent study from Tbilisi State Medical University.[5] Based on this prevalence, with a 5% margin of error and 95% confidence interval, the required sample size was 322. After adjusting for a 10% anticipated non-response rate, the target sample size was 358. In practice, 609 students participated, exceeding the requirement and enhancing the robustness of the study.

Data Collection

Data were collected using a structured Google Form that included the study questionnaire and consent form. The form link was distributed during classroom sessions, where students were first briefed about the study objectives and assured of anonymity and confidentiality. Students were then provided 20 minutes to complete the form on their personal devices under the supervision of the research team. To ensure balanced representation across batches and minimize clustering bias, data collection was organized on four separate days, with each academic year scheduled independently. Responses were automatically captured in Google Sheets and later exported to Microsoft Excel for analysis.

Study Instruments

Two validated instruments were used in this study. The Insomnia Severity Index (ISI) is a seven-item scale that assesses both nighttime sleep difficulties and their daytime consequences. Standard scoring thresholds were applied: 0–7 (no clinically significant insomnia), 8–14 (subthreshold insomnia), 15–21 (moderate clinical insomnia), and 22–28 (severe clinical insomnia).[6]

Attention control was measured using the Attention Control Scale–Short Format (ATTC), a ten-item self-report instrument. Items 1–3 assess attentional focusing, while items 4–10 measure attentional shifting. Responses are rated on a four-point Likert scale, and higher scores indicate better attentional control. Validated scoring procedures, including forward and reverse coding, were strictly followed.[7]

Statistical Analysis

All completed questionnaires were compiled and data were entered into Microsoft Excel. Statistical analyses were carried out using JAMOVI, an open-source statistical software. Means, standard deviations, frequencies, and percentages were among the descriptive statistics that were computed.Differences in mean ISI and ATTC scores across academic years were tested using one-way ANOVA, while subgroup comparisons by gender and residential status were analysed using independent t-tests. Pearson's correlation coefficients were computed to explore associations between insomnia severity and attention control. Results were displayed using tables, charts, and correlation plot for clarity and ease of interpretation.

Additionally, a multiple linear regression was conducted with ATTC score as the dependent variable and ISI score as the primary predictor. Gender, academic year, and residence were included as covariates. All assumptions for linear regression (normality, linearity, and homoscedasticity) were verified.Statistical significance was set at $p < 0.05$.

Results

Of the 800 eligible undergraduate medical students, 609 participated in the study, yielding a response rate of 76%. Among them, 389 (63.9%) were male and 220 (36.1%) were female. The majority (67.5%) were hostel residents, while the remainder (32.5%) were day-scholars. The distribution across academic years was broadly representative of the undergraduate program: first year (26.1%), second year (28.7%), third year (28.2%), and fourth year (16.9%) (Table 1).

Insomnia Prevalence and Severity

When stratified by academic year, the highest mean ISI scores were observed among fourth-year students (7.04 ± 5.09), while first-year students reported the lowest scores (4.82 ± 3.90). This upward trend across academic years was statistically significant

(ANOVA, p = 0.0042), with an effect size suggesting a small but meaningful progression of insomnia severity with advancing study years (Table 2).

The mean Insomnia Severity Index (ISI) score for the entire cohort was 6.20 ± 4.79, indicating that most students reported no clinically significant insomnia. However, 34% of students experienced some form of insomnia, with 27% reporting subthreshold symptoms and 7% meeting criteria for clinical insomnia (6% moderate, 1% severe). The remaining 66% reported no clinically significant insomnia (Table 3).

Attention Control Assessment

On the Attention Control Scale–Short Format (ATTC), first-year students demonstrated the highest mean overall scores (27.65 ± 3.88), while third-year students reported the lowest (25.84 ± 4.33). The differences across academic years were statistically significant (p< 0.001).

Breaking down by subdomains, attention focusing (ATTC_F) was strongest in first-year students (8.49 ± 1.53) and weakest in third-year students (7.42 ± 1.98), while attention shifting (ATTC_S) followed a similar but less pronounced pattern (range: 18.41–19.16). The effect sizes here suggest that attention focusing is more strongly impacted by academic progression than attention shifting (Table 2).

Residential Status

Residence was also an important determinant. Hostelites had significantly higher ISI scores (6.48 ± 4.92) compared to day-scholars (5.63 ± 4.45, p = 0.03). The prevalence of clinical insomnia was more than twice as high among hostelites (9%) than among day-scholars (4%). While the absolute difference in mean scores was modest, the findings highlight the role of environmental and lifestyle factors in influencing sleep quality (Table 4).

Gender Differences

Female students reported a slightly higher prevalence of clinical insomnia (7.7%) compared to males (6.2%), with mean ISI scores of 6.42 ± 4.93 versus 6.08 ± 4.68, respectively. However, this difference was not statistically significant (p = 0.40), suggesting that gender, in isolation, may not be a strong determinant of insomnia severity in this cohort (Table 4).

Correlation between Insomnia and Attention Control

A significant negative correlation was observed between insomnia severity and attention control scores. Specifically:

- Overall ATTC vs. ISI: r = −0.170, p < 0.001
- Attention focusing vs. ISI: r = −0.223, p < 0.001
- Attention shifting vs. ISI: r = −0.091, p = 0.025

Although the correlation coefficients indicate weak effect sizes, the consistent pattern across domains suggests that higher levels of insomnia are reliably associated with poorer attention control. The strongest association was with attentional focusing, implying that the ability to sustain concentration is particularly sensitive to sleep disturbances. (Figure1.)

Multivariable Regression Analysis

A multiple linear regression was conducted to predict attention control based on insomnia severity, controlling for gender, academic year, and residence type. The model was statistically significant ($F(5, 249) = 6.00$, $p < 0.001$) and explained 10.8% of the variance in attention control ($R^2 = 0.108$).

ISI score was a significant negative predictor of attention control ($\beta = -0.27$, $p < 0.001$, 95% CI: −0.39 to −0.14). Academic year also had a significant effect: second-year students had lower ATTC scores than first-year students ($\beta = -1.70$, $p = 0.028$), while third-year students showed a marginal decrease ($p = 0.068$). Gender and residence were not significant predictors. Regression results are presented in Table 5.

Screen Time and Sleep Health

Screen time was significantly associated with insomnia severity. Students reporting <2 hours of non-academic daily screen use had the lowest mean ISI scores (4.24 ± 3.14). ISI scores progressively increased with higher screen time: 2–4 hours (6.09 ± 3.28), 4–6 hours (7.22 ± 3.27), and >6 hours (8.65 ± 3.83). This dose–response pattern suggests that greater non-academic screen exposure is linked with higher insomnia severity (Figure 2).

Discussion

Medical education is widely recognized as one of the most academically and emotionally demanding training programs. The heavy workload, irregular schedules, and clinical exposure place medical students at a high risk of poor sleep quality. Consistent with this, our study found that one-third of students experienced some degree of insomnia, although only a small proportion met criteria for clinical insomnia. These findings align with international literature reporting prevalence rates between 20% and 40% among medical students.[8-10]

Prevalence and Severity Patterns

The prevalence of insomnia in our cohort (34%) was lower than earlier reports from Tbilisi State Medical University (70%) and Chennai (37%).[11,12]Variations in prevalence may reflect institutional differences, methodological choices, or changing stress levels among students. Importantly, we observed a progressive increase in ISI scores from first to fourth year, a trend reported in several other Indian studies. [11-13]This suggests a

cumulative effect of academic stress and clinical responsibilities, with fourth-year students facing the greatest sleep burden.

Attention Control and Cognitive Impact

A central contribution of this study lies in its examination of attention control as a cognitive correlate of insomnia. The regression analysis confirmed that insomnia severity independently predicted lower attention control, even after adjusting for gender, residence, and academic year ($\beta = -0.27$, $p < 0.001$). These findings strengthen the evidence that even mild sleep disturbances may compromise cognitive regulation in medical students. The strongest association was with attentional focusing, highlighting that sustained concentration — essential during lectures, patient examinations, and assessments — is particularly vulnerable to sleep disruption. Although effect sizes were modest, their consistency underscores the clinical and educational relevance.

These findings align with neurobiological evidence linking sleep deprivation to impaired prefrontal cortex functioning and altered neurotransmitter regulation, particularly in dopamine and norepinephrine systems.[14]Such changes compromise executive functions, including sustained attention and cognitive flexibility.

Residential and Gender Differences

Residence emerged as an important determinant: hostelites had significantly higher insomnia severity than day-scholars. While the mean difference was modest, the doubling of clinical insomnia prevalence in hostelites (9% vs. 4%) highlights the importance of environmental factors such as noise, irregular schedules, peer influence, and lack of family support. Interventions targeting sleep hygiene in hostels may therefore be particularly impactful.

Gender differences, though observed numerically (7.7% in females vs. 6.2% in males), were not statistically significant in our study. While previous research suggests that female medical students often report higher stress and related sleep problems, our findings suggest that gender alone may not be a strong predictor once other factors are accounted for. [13,15]It is therefore important not to overgeneralize gender disparities without stronger statistical support.

Screen Time and Sleep Health

A significant dose–response relationship was observed between screen exposure and insomnia severity, with the highest ISI scores among students reporting >6 hours of daily screen use. These findings are consistent with prior evidence that excessive screen time, particularly during evening hours, disrupts circadian rhythms and delays melatonin release, thereby worsening sleep quality. [2,3]Although screen time was analysed collectively rather than stratified by year or gender, the consistency of this trend highlights its importance as a modifiable risk factor. Incorporating screen

hygiene awareness into student wellness programs may therefore help reduce the burden of insomnia among medical students.

Comparison with International Literature

Our results are consistent with global studies that report poor sleep quality in medical students across diverse cultural contexts. For example, studies from the United States and Europe report insomnia prevalence between 25% and 45%, while Asian studies frequently show comparable or higher rates. [9,10]This convergence suggests that sleep problems in medical education are a near-universal challenge, shaped more by the demands of the profession than by geography alone.

Implications for Medical Education

The implications extend beyond student well-being. Sleep disturbances among medical students have been linked to impaired academic performance, reduced clinical judgment, and an increased risk of medical errors.[10,12,14] Addressing sleep health is therefore not only a matter of supporting students but also of ensuring patient safety and quality of care.

Educational institutions should consider integrating sleep hygiene education into their curricula, providing counselling and mental health support, and reviewing academic schedules to reduce avoidable sleep disruption. Hostel management policies should address environmental contributors, including noise control and structured rest periods.

Limitations

This cross-sectional study limits causal inference. Social desirability bias and recollection errors may affect self-reported data. Although we controlled for key demographic variables, other potential confounders such as anxiety, depression, academic workload, and stimulant use were not assessed. The use of online forms could exclude those with limited internet access or low engagement. Lastly, the moderate R^2 value in our regression suggests that insomnia explains only part of the variance in attention control, highlighting the multifactorial nature of cognitive functioning.

Conclusion

This study confirms that insomnia affects approximately one-third of undergraduate medical students, with severity increasing across academic years and higher rates among hostel residents. Importantly, even after controlling for key confounders, insomnia severity independently predicted lower attention control — particularly in sustained focusing. These findings highlight the cognitive costs of sleep disturbances in medical education and underscore the importance of integrating sleep hygiene strategies, screen time management, and student wellness initiatives into academic environments to support cognitive performance and mental health.

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Socio-demographic variables						
		1st Year	2nd Year	3rd Year	4th year	Total
No.of students (%)		159(26)	175(29)	172(28)	103 (17)	609
Gender	Male	99(25)	119(31)	108(28)	63(16)	389
	Female	60(27)	56(25)	64(29)	40(18)	220
Current residence	Hostelites	94(23)	108(26)	120(29)	89(22)	411
	Day scholar	65(33)	67(34)	52(26)	14(7)	198
Age (range)		18-25	18-26	20-29	21-25	-

Table 1. Socio-demographic variables of the study participants

cale			1st Year	2nd Year	3rd Year	4th year	UG Medical Students	p-value
ISI		Mean ± S.D.	4.82± 3.9	6.67± 5.02	6.51± 4.87	7.04± 5.09	6.20± 4.79	**0.004**
		Max. Attained Score	19	23	26	23	26	
		No. of students (%)	1	1	1	1	1	
		Min. Attained Score	0	0	0	0	0	
		No. of students (%)	15	13	12	7	47	
ATTC	ATTC_F	Mean ± S.D.	8.49± 1.53	7.74± 1.77	7.42± 1.98	7.83± 1.75	7.86± 1.81	**0.03**
		Max. Attained Score	12	12	12	12	12	
		No. of students (%)	3	1	1	2	7	
		Min. Attained Score	4	3	3	3	3	
		No. of students (%)	2	6	6	3	15	
	ATTC_S	Mean ± S.D.	19.16± 3.17	18.45± 3.07	18.41± 3.11	18.64± 3.08	18.66± 3.11	0.1
		Max. Attained Score	28	27	28	27	28	
		No. of students (%)	1	2	1	1	2	
		Min. Attained Score	11	11	10	11	10	
		No. of students (%)	1	2	2	1	2	
	ATTC	Mean ± S.D.	27.65± 3.88	26.19± 3.84	25.84± 4.33	26.47± 3.84	26.52± 4.05	**p < 0.001**
		Max. Attained Score	38	37	38	37	38	
		No. of students (%)	1	1	1	1	2	
		Min. Attained Score	17	14	13	14	13	
		No. of students (%)	1	1	2	1	3	

Table 2. Scores obtained on ISI and ATTC scales (*p value<0.05 considered as statistically significant)

ISI Scores	UG Medical Students	No. of students	%
0-7	No clinical Insomnia	404	66
8-14	Subthreshold insomnia	164	27
15-21	Clinical insomnia (moderate)	37	6
22-28	Clinical insomnia (severe)	4	1
		609	100

Table 3. Prevalence of insomnia among UG Medical students

	ISI Scores		p value
	Mean ± SD	Median (Range)	
Hostelites	6.48 ± 4.92	6 (0-26)	**0.03***
Day Scholars	5.63 ± 4.45	5 (0-23)	
Male	6.08 ± 4.68	5 (0-23)	0.4
Female	6.42 ± 4.93	6 (0-26)	

Table 4. Comparison of ISI scores based on residence and gender (*p value<0.05 considered as statistically significant)

Predictor	Regression Coefficient (β)	Std. Error	t-value	p-value	95% CI Lower	95% CI Upper
Intercept	28.31	0.591	47.938	P <0.001	27.147	29.474
C(Gender)[T.Male]	-0.299	0.526	-0.568	0.57	-1.334	0.737
C(AcademicYear)[T.2.0]	-1.695	0.765	-2.217	0.028*	-3.201	-0.189
C(AcademicYear)[T.3.0]	-1.279	0.698	-1.832	0.068	-2.654	0.096
C(Residence)[T.Urban]	0.783	0.502	1.56	0.12	-0.205	1.77
ISI_Total	-0.266	0.064	-4.173	<0.001	-0.391	-0.14

Table 5. Results from multiple linear regression predicting total attention control (ATTC) scores based on insomnia severity (ISI), gender, academic year, and residence type

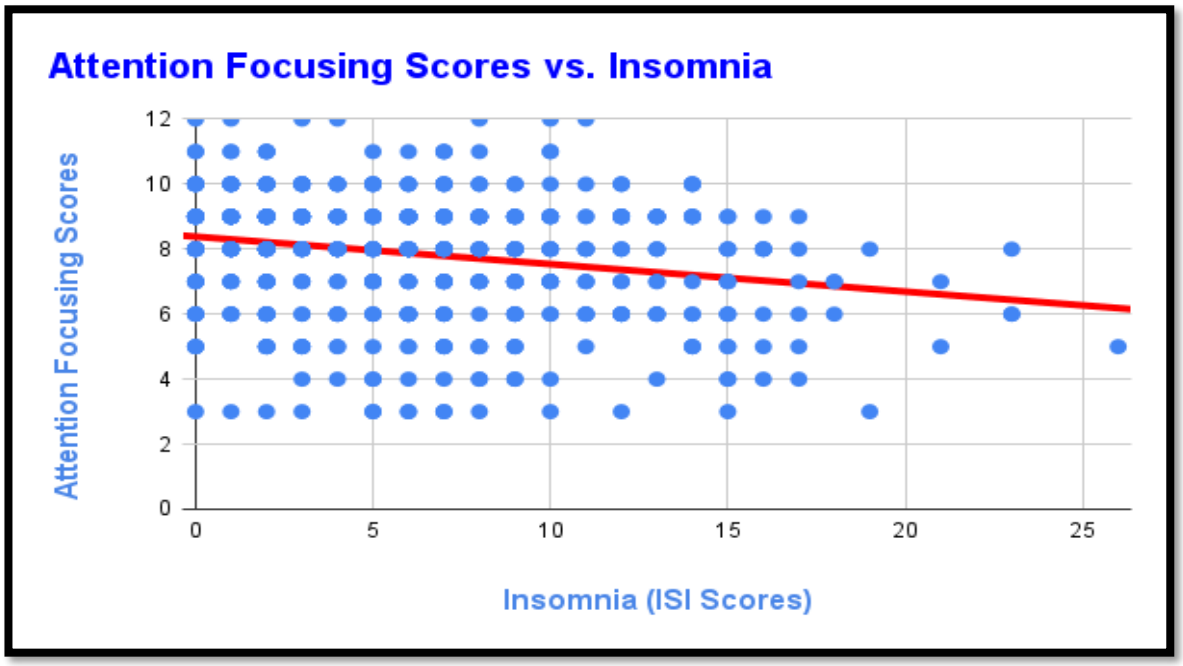

Figure 1. Correlation between ATTC_F and ISI scores

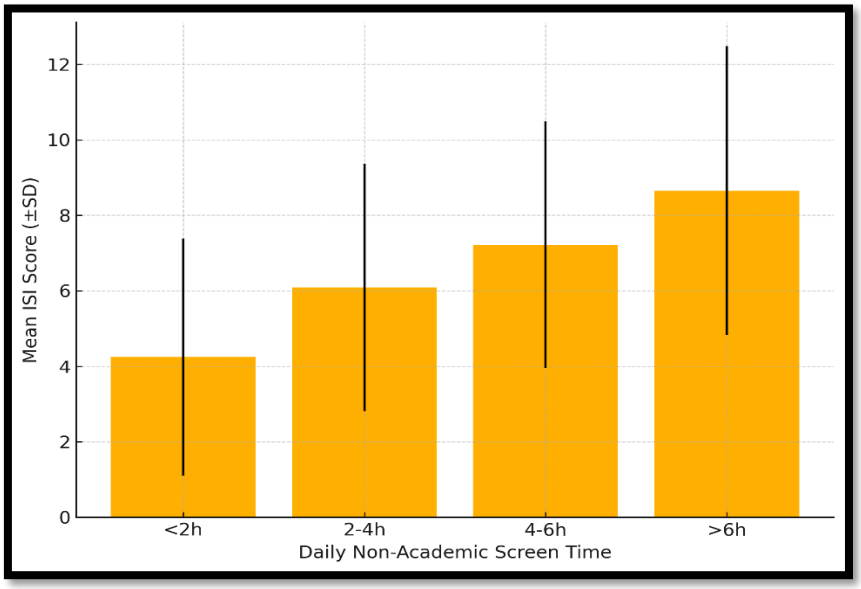

Figure 2. Mean Insomnia Severity Index (ISI) scores by daily non-academic screen time among undergraduate medical students (n = 609). Error bars represent standard deviations