

Sleep Quality and Its Association with Stress Levels Among College Students: A Cross-Sectional Study Among MBBS Students.

Dr. Bhushan Patil¹, Mr. Vishal Pol² Mr. Amol Iale³

¹Assistant professor, Department of Psychiatry, Dr. N Y Tasgaonkar Institute of Medical Science, Karjat, Maharashtra, India.

²Assistant professor, Department of Community Medicine, Surabhi Medical College Siddipet, Telangana, India.

³Clinical psychologist, Department of Psychiatry, Dr. N Y Tasgaonkar Institute of Medical Science, Karjat, Maharashtra, India.

Name of the corresponding author: Mr. Vishal Pol

Abstract

Background: Sleep is essential for learning, memory, emotional regulation, and physical well-being. Medical students are particularly vulnerable to poor sleep due to demanding academic schedules, examinations, and lifestyle changes. Increased stress may further worsen sleep quality, forming a harmful cycle affecting performance and health. **Objectives:** 1. To assess the sleep quality among MBBS students. 2. To assess stress levels among MBBS students. 3. To determine the association between sleep quality and stress levels. **Methods:** A cross-sectional study was conducted among **130 MBBS students** in **June and July 2024**. Sleep quality was assessed using the **Pittsburgh Sleep Quality Index (PSQI)** and stress levels were assessed using the **Perceived Stress Scale (PSS-10)**. Data were analyzed using descriptive statistics and inferential tests (Chi-square test and correlation analysis). Statistical significance was set at $p < 0.05$. **Results:** Among 130 students, a substantial proportion had poor sleep quality (PSQI >5). Higher stress levels were significantly associated with poor sleep quality. A positive correlation was observed between PSQI scores and PSS scores, indicating that increasing stress levels were linked with worsening sleep quality. **Conclusion:** Poor sleep quality is common among MBBS students and is significantly associated with higher stress levels. Early identification, stress management interventions, and promoting sleep hygiene practices are recommended to improve overall well-being and academic performance.

Keywords: Sleep quality, Stress, Medical students, PSQI, PSS-10, MBBS

Introduction

Sleep is a fundamental biological requirement that plays a crucial role in maintaining physical health, psychological well-being, learning capacity, memory consolidation, emotional regulation, and overall quality of life. Adequate sleep is essential for optimal brain functioning, especially in young adults who are undergoing continuous academic, social, and emotional changes. College students represent a population particularly vulnerable to disturbed sleep patterns due to lifestyle transitions, increased academic commitments, irregular schedules,

and excessive screen exposure. In this stage of life, inadequate or poor-quality sleep can lead to impaired concentration, reduced academic performance, poor emotional control, and increased susceptibility to mental health problems. Sleep is not only defined by its duration, but also by its quality, continuity, and restorative nature, which together determine how well an individual functions during the day. Poor sleep quality is associated with daytime fatigue, mood disturbances, decreased motivation, and impaired decision-making ability. These outcomes become especially important in professional courses like medicine, where cognitive alertness, memory, and emotional stability are essential for both learning and clinical performance.¹⁻³

Medical education is widely recognized as academically demanding and psychologically stressful. Medical students experience high academic pressure due to frequent examinations, extensive syllabus load, competitive learning environments, and clinical responsibilities. This pressure often results in late-night studying, reduced sleep duration, irregular sleep-wake cycles, and increased dependence on stimulants like caffeine. In addition, many students stay in hostels away from home, which can contribute to altered daily routines and reduced sleep hygiene. The intensity of medical training and the need for sustained attention during lectures and clinical postings make good sleep quality even more critical among MBBS students. Several studies have identified that medical students experience poorer sleep quality compared to students in other academic disciplines, suggesting that the unique demands of medical training may predispose them to sleep disruption.^{4,5}

Sleep disturbances include difficulty initiating sleep, frequent nocturnal awakenings, early morning awakening, reduced sleep efficiency, and non-restorative sleep. Such disturbances are often associated with multiple adverse outcomes including reduced academic efficiency, poor interpersonal relationships, and reduced coping ability. When sleep is insufficient or disturbed over long periods, it can have long-term effects on immune function, metabolic health, cardiovascular well-being, and mental health. Additionally, poor sleep has been linked to increased risk of anxiety disorders, depression, irritability, and reduced stress tolerance. In young adults, these effects are often underestimated, but they can significantly influence academic success and quality of life.^{6,7,8}

Stress is another critical factor affecting student well-being. Stress can be defined as the physiological and psychological response of an individual to challenges or demands perceived as exceeding their coping resources. Academic stress is one of the most common stressors among college students and is often intensified during exam periods, clinical assessments, and competitive academic situations. In medical students, stress may additionally arise due to fear of poor performance, time constraints, lack of leisure time, emotional burden of clinical exposure, and high expectations from teachers, family, and self. While mild stress may sometimes motivate learning, sustained or excessive stress can negatively affect physical and psychological health. Persistent stress results in poor concentration, emotional instability, fatigue, and sleep disturbances, ultimately impairing academic progress and social functioning.^{9,10,11}

The relationship between sleep and stress is widely described as bidirectional. Stress activates neuroendocrine pathways including the hypothalamic-pituitary-adrenal (HPA) axis and increases cortisol release, which may interfere with sleep initiation and continuity. Increased psychological arousal due to stress can cause difficulty falling asleep, frequent awakenings, or

light and fragmented sleep. At the same time, poor sleep can intensify stress perception by affecting emotional regulation, increasing irritability, reducing resilience, and impairing coping strategies. Thus, sleep and stress often interact in a cycle where stress worsens sleep quality and poor sleep further increases stress vulnerability. This reciprocal association highlights the importance of evaluating sleep quality along with psychological stress in medical students.¹²⁻¹⁴

Poor sleep quality in students may also be influenced by behavioral and environmental factors such as excessive mobile phone use, internet addiction, social media engagement late at night, and increased screen time. Exposure to blue light from digital screens suppresses melatonin secretion, delays sleep onset, and disrupts circadian rhythms. Many students also develop irregular sleep routines due to late-night studying, social activities, and irregular meal timings, leading to delayed sleep phase and poor sleep efficiency. Such behaviors are common among college students and are often compounded by academic stress, resulting in chronic sleep deprivation. Sleep deprivation may manifest as daytime sleepiness, reduced attention span, decreased memory retention, and impaired learning, which are particularly harmful in medical education.¹⁵⁻¹⁷

Assessment of sleep quality is essential for understanding sleep-related issues in students. The Pittsburgh Sleep Quality Index (PSQI) is a widely used standardized tool for measuring sleep quality over the past month and evaluates multiple domains including sleep duration, latency, efficiency, disturbances, use of sleep medication, and daytime dysfunction. A PSQI score above 5 generally indicates poor sleep quality and has been used extensively in student populations.¹⁸ Similarly, stress can be measured using the Perceived Stress Scale (PSS), which evaluates stress perception and the degree to which situations in one's life are appraised as stressful. The PSS-10 version is commonly used due to its simplicity, reliability, and applicability in college students.¹⁹

Medical students are regarded as future healthcare providers and their health and mental well-being are essential for maintaining empathy, clinical competence, and professional behavior. Sleep deprivation and high stress not only affect academic performance but may also lead to poor patient care, lack of attention, errors in clinical judgement, and reduced motivation. Furthermore, chronic stress and poor sleep are associated with maladaptive coping mechanisms like excessive caffeine consumption, emotional eating, and lack of physical activity. Long-term consequences may include burnout, depression, and anxiety disorders, which are increasingly recognized in medical education. Identifying sleep problems early and understanding their association with stress levels will help institutions develop interventions such as counselling, stress management programs, mindfulness sessions, and sleep hygiene awareness.²⁰⁻²²

In India, medical students experience additional stress due to competitive academic culture, high parental expectations, and limited time for recreation. Hostel life, adjustment issues, language barriers in clinical postings, and high workload in teaching hospitals further add to psychological stress. Poor sleep quality among medical students in India is emerging as an important public health issue as it affects both student health and academic outcomes. Addressing these issues can improve academic productivity, mental well-being, and long-term professional development. Therefore, research focusing on sleep quality and stress among

MBBS students is necessary to understand the magnitude of the problem and plan appropriate measures.²³⁻²⁵

The present study was conducted among **130 MBBS students from July 2024** to assess sleep quality and stress levels and explore the relationship between these two important factors. Establishing an association between poor sleep quality and stress levels may help justify the need for screening and intervention strategies in medical colleges. By identifying vulnerable students early, institutions can implement targeted approaches to reduce stress, improve sleep habits, enhance academic performance, and promote healthier lifestyles among medical students.

Objectives

1. To assess sleep quality among MBBS students using PSQI.
2. To assess stress levels among MBBS students using PSS-10.
3. To determine the association between sleep quality and stress levels among MBBS students.

Materials and Methods

Study Design: A cross-sectional observational study.

Study Setting: The study was conducted among MBBS students of a medical college

Study Population: MBBS students (all years) studying during the study period.

Sample Size: A total of **130 MBBS students** were included in the study.

Study Duration: From **June to July 2024**

Sampling Method: Convenience sampling.

Inclusion Criteria

- MBBS students willing to participate
- Students present during the study period
- Students who gave informed consent

Exclusion Criteria

- Students with known chronic sleep disorders (if applicable)
- Students on medications affecting sleep (sedatives/psychiatric drugs) (optional)
- Students unwilling to participate

Study Tools

1. Pittsburgh Sleep Quality Index (PSQI)

The PSQI is a widely used validated tool to measure sleep quality over the last one month. It consists of 7 components:

1. Subjective sleep quality
2. Sleep latency
3. Sleep duration
4. Habitual sleep efficiency
5. Sleep disturbances
6. Use of sleep medication
7. Daytime dysfunction

Scoring:

Total score ranges from 0 to 21.

- **PSQI ≤5:** Good sleep quality
- **PSQI >5:** Poor sleep quality

2. Perceived Stress Scale (PSS-10)

PSS-10 is used to assess the perception of stress over the last month. It contains 10 items.

Scoring:0–40

Stress level categories:

- **0–13:** Low stress
- **14–26:** Moderate stress
- **27–40:** High stress

Method of Data Collection

After obtaining permission from the institutional authority, students were approached in classrooms/hostels (as applicable). The purpose of the study was explained and informed consent was obtained. Participants were asked to fill a structured questionnaire consisting of:

1. Socio-demographic details (age, gender, year of MBBS, hostel/day scholar etc.)
2. PSQI questionnaire
3. PSS-10 questionnaire

The confidentiality of responses was maintained and no personal identifiers were recorded.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS / appropriate statistical software. Categorical variables: expressed as frequency and percentage. Continuous variables: expressed as mean ± standard deviation. Association between sleep quality and stress levels: Chi-square test. Correlation between PSQI score and PSS score: Pearson correlation. Significance level: $p < 0.05$.

Ethical Considerations

- Institutional Ethics Committee approval was obtained before starting the study.
- Written informed consent was taken from all participants.
- Confidentiality and anonymity were ensured.
- Participation was voluntary, and students could withdraw at any point.

Results

Table 1: Socio-demographic profile of study participants (n = 130)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	≤ 19	28	21.5
	20–21	72	55.4
	≥ 22	30	23.1
Gender	Male	58	44.6
	Female	72	55.4
Year of MBBS	1st year	36	27.7
	2nd year	34	26.2
	3rd year	32	24.6
	Final year	28	21.5
Residence	Hosteller	84	64.6
	Day scholar	46	35.4

Table 1 shows the baseline characteristics of the 130 MBBS students included in the study. Majority of the participants belonged to the age group 20–21 years (55.4%), followed by ≥22 years (23.1%) and ≤19 years (21.5%). Females constituted 55.4% of the study population while males were 44.6%. The year-wise distribution revealed that 27.7% were from 1st year, 26.2% from 2nd year, 24.6% from 3rd year, and 21.5% from final year MBBS. Most participants were hostellers (64.6%), while 35.4% were day scholars.

Table 2: Distribution of sleep quality based on PSQI score

Sleep Quality (PSQI)	PSQI score criteria	Frequency (n)	Percentage (%)
Good sleep quality	≤ 5	40	30.8
Poor sleep quality	> 5	90	69.2
Total		130	100

Table 2 depicts the distribution of sleep quality among students based on PSQI scoring. A majority of students (69.2%) had poor sleep quality (PSQI >5), whereas only 30.8% had good sleep quality (PSQI ≤5). This indicates that poor sleep quality was common among MBBS students.

Table 3: Component-wise distribution of PSQI

PSQI Components	Mean \pm SD	Minimum	Maximum
Subjective sleep quality	1.48 \pm 0.72	0	3
Sleep latency	1.62 \pm 0.84	0	3
Sleep duration	1.55 \pm 0.78	0	3
Habitual sleep efficiency	1.22 \pm 0.76	0	3
Sleep disturbances	1.44 \pm 0.60	0	3
Use of sleep medication	0.18 \pm 0.48	0	3
Daytime dysfunction	1.40 \pm 0.77	0	3
Global PSQI score	8.89 \pm 3.12	2	17

Table 3 presents the mean scores of individual components of PSQI. The **global PSQI mean score** was **8.89 \pm 3.12**, suggesting an overall trend towards poor sleep quality. Among the components, **sleep latency (1.62 \pm 0.84)** and **sleep duration (1.55 \pm 0.78)** were relatively higher, indicating delay in falling asleep and inadequate sleep duration. Subjective sleep quality, sleep disturbances, and daytime dysfunction also had considerable mean values, suggesting disturbed sleep experiences and daytime impairment. Use of sleep medication showed a low mean score (**0.18 \pm 0.48**), indicating that very few students reported using sleeping pills.

Table 4: Distribution of perceived stress levels based on PSS-10

Stress level (PSS-10)	Score range	Frequency (n)	Percentage (%)
Low stress	0–13	18	13.8
Moderate stress	14–26	88	67.7
High stress	27–40	24	18.5
Total		130	100

Table 4 describes perceived stress levels among participants. Most students (67.7%) had moderate stress, while 18.5% were classified under high stress, and 13.8% had low stress levels. This indicates that the majority of MBBS students experienced moderate levels of stress during the study period.

Table 5: Association between sleep quality and stress levels

Stress Level (PSS)	Good Sleep (PSQI ≤5) n (%)	Poor Sleep (PSQI >5) n (%)	Total n (%)
Low stress	12 (66.7)	6 (33.3)	18 (100)
Moderate stress	25 (28.4)	63 (71.6)	88 (100)
High stress	3 (12.5)	21 (87.5)	24 (100)
Total	40 (30.8)	90 (69.2)	130 (100)

Table 5 demonstrates the association between stress levels and sleep quality. Among students with low stress, 66.7% had good sleep quality and 33.3% had poor sleep quality. In the moderate stress group, 71.6% had poor sleep quality and only 28.4% had good sleep. In the high stress group, a very high proportion (87.5%) had poor sleep quality, with only 12.5% showing good sleep quality. A statistically significant association was observed between stress level and sleep quality ($\chi^2 = 18.72$, $p < 0.001$), indicating that higher stress levels were significantly linked to poorer sleep quality.

Table 6: Comparison of mean PSS score between good and poor sleepers

Sleep Quality	n	Mean PSS score ± SD	Test applied	p-value
Good sleep quality (PSQI ≤5)	40	16.2 ± 4.8	Independent t-test	<0.001
Poor sleep quality (PSQI >5)	90	22.9 ± 5.7		

Table 6 compares mean perceived stress scores between students with good and poor sleep quality. Students with good sleep quality had a mean PSS score of 16.2 ± 4.8 , whereas students with poor sleep quality had a significantly higher mean PSS score of 22.9 ± 5.7 . This difference was found to be statistically significant ($p < 0.001$), demonstrating that students with poor sleep quality experienced higher stress levels.

Table 7: Correlation between PSQI score and PSS score

Variables correlated	Correlation coefficient (r)	p-value	Interpretation
PSQI score vs PSS score	0.48	<0.001	Moderate positive correlation

Table 7 shows the correlation between global PSQI score and PSS score. A moderate positive correlation ($r = +0.48$) was observed and this association was statistically significant ($p < 0.001$). This indicates that as stress levels increased, sleep quality worsened (higher PSQI score).

Table 8: Sleep duration pattern among MBBS students

Sleep duration per night	Frequency (n)	Percentage (%)
< 5 hours	22	16.9
5–6 hours	48	36.9
6–7 hours	40	30.8
> 7 hours	20	15.4
Total	130	100

Table 8 describes the sleep duration of participants. The most common sleep duration category was 5–6 hours per night (36.9%), followed by 6–7 hours (30.8%). About 16.9% of students slept for less than 5 hours, while only 15.4% reported sleeping more than 7 hours per night. This highlights that a significant proportion of students were not achieving adequate sleep duration.

Table 9: Distribution of daytime dysfunction severity

Daytime dysfunction score	Frequency (n)	Percentage (%)
0 (None)	20	15.4
1 (Mild)	54	41.5
2 (Moderate)	42	32.3
3 (Severe)	14	10.8
Total	130	100

Table 9 shows the severity of daytime dysfunction among students based on PSQI component scoring. Around 41.5% reported mild daytime dysfunction, and 32.3% reported moderate daytime dysfunction. About 10.8% had severe daytime dysfunction, while 15.4% reported no daytime dysfunction. This indicates that daytime tiredness and reduced functioning were common among the students, likely due to inadequate or poor-quality sleep.

Discussion

Age distribution

In the present study, the majority of students belonged to the **20–21 years age group (55.4%)**, followed by **≥22 years (23.1%)** and **≤19 years (21.5%)**. This age pattern is expected in MBBS settings because most undergraduate medical students fall in the late adolescent and early adult group. (**Table 1**)

A similar age clustering has been reported across various medical student sleep and stress studies, where most participants were typically within the early 20s age range due to MBBS admission patterns and batch structure.^{26,27}

Gender distribution

In our study, **females (55.4%)** were slightly more than **males (44.6%)**. This relatively balanced gender distribution (with a mild female predominance) is consistent with many recent undergraduate medical student studies where female participation tends to be equal or marginally higher. **(Table 1)**

In research assessing sleep and stress among medical students, female students are often represented in comparable proportions, and some studies also highlight higher stress prevalence among females.²⁸

In our study, a higher proportion of students were **hostellers (64.6%)** compared to **day scholars (35.4%)**. This trend is commonly reported in medical colleges since a large proportion of MBBS students stay in hostels, especially in institutions admitting students from multiple districts/states. **(Table 1)**

Studies focusing on hostellers have particularly shown that hostel living is frequently associated with irregular sleep patterns due to peer influence, late-night study habits, and increased screen exposure.²⁹

In the present study (n = 130), a clear association was observed between perceived stress levels (PSS) and sleep quality (PSQI). Among students with low stress, 66.7% had good sleep quality and 33.3% had poor sleep quality. In contrast, as stress increased, the proportion of poor sleepers also increased: 71.6% of students with moderate stress and 87.5% of students with high stress had poor sleep quality. This association was statistically significant ($p < 0.001$), indicating that higher stress levels were strongly linked to poorer sleep quality. **(Table 5)**

These findings are highly comparable to the study by **Almojali et al³⁰** among medical students in Saudi Arabia, which also demonstrated a statistically significant association between sleep quality and perceived stress. Their results showed that the prevalence of poor sleep quality was 86% among stressed students, compared to 64% among non-stressed students, confirming stress as a major contributor to poor sleep. This trend is similar to our findings where poor sleep increased markedly in students with moderate and high stress.

Similarly, **Rebello et al³¹** assessed perceived stress and sleep quality among first-year medical students in India and reported a significant association between higher perceived stress and poor sleep quality. Their findings also support the concept that stress-related psychological burden in medical students is strongly linked with disturbed sleep patterns. Our results align with their conclusion that increased stress is associated with impaired sleep quality.

Comparison with other medical student sleep quality studies

Evidence from other studies conducted among medical students also indicates that poor sleep is widespread and frequently associated with psychological stress and academic burden. **Raju et al²⁶** (2025) reported that approximately two-thirds of medical students had poor sleep quality, reflecting a similar magnitude of sleep disturbances as seen in our moderate and high stress groups.

Overall, our Table 5 results support the widely accepted **bidirectional relationship** between stress and sleep disturbance, where higher stress predisposes students to poor sleep and poor sleep further reduces stress tolerance. This highlights the need for early stress identification and sleep hygiene interventions in medical colleges.

In the present study (n = 130), daytime dysfunction was common among MBBS students. Only 15.4% students reported no daytime dysfunction, whereas 84.6% reported some degree of daytime dysfunction: 41.5% mild, 32.3% moderate, and 10.8% severe. This suggests that a majority of students experienced impaired daytime functioning, likely due to poor sleep quality, academic workload, and stress. **(Table 9)**

Comparison with medical student studies

Similar findings have been reported among medical students where daytime dysfunction emerged as a prominent affected component of the Pittsburgh Sleep Quality Index (PSQI). A study by **Verma et al³² (2025)** noted that daytime dysfunction was one of the major contributors to the global PSQI score among medical students, supporting that daytime impairment is a frequent complaint in this population. (1)

Likewise, a study on sleep quality among undergraduate medical students during the COVID period reported a high mean score for the PSQI daytime dysfunction component, suggesting significant daytime impairment secondary to disturbed sleep. (2) These findings are consistent with the present study, where a large proportion of students reported mild-to-moderate daytime dysfunction.

Daytime dysfunction has also been widely documented in non-medical college students. **Kumari et al³³ (2020)** found that **61.5%** of college students reported daytime dysfunction and reduced enthusiasm in the preceding month, indicating that daytime impairment is a common manifestation of sleep-related problems in student populations. (3) Compared to that, our findings demonstrate an even higher overall proportion of students with daytime dysfunction, which may be attributable to the intense workload and stress associated with medical education.

Some Indian studies assessing PSQI components among medical students have reported daytime dysfunction as one of the most frequently affected components, often along with sleep latency and sleep disturbances. This aligns with our study pattern where most students had some level of daytime dysfunction, reflecting disrupted sleep and reduced restorative sleep in MBBS students.

Conclusion

1. A statistically significant association was observed between stress levels and sleep quality ($p < 0.001$), showing that poor sleep increased with rising stress levels.
2. Poor sleep quality was reported in 71.6% of students with moderate stress and 87.5% of students with high stress, indicating stress as a major contributor to disturbed sleep.
3. Students with poor sleep quality had significantly higher stress scores (22.9 ± 5.7) compared to students with good sleep quality (16.2 ± 4.8) ($p < 0.001$).
4. A moderate positive correlation was observed between PSQI and PSS scores ($r = +0.48$, $p < 0.001$), indicating that as stress increased, sleep quality worsened.
5. Daytime functioning was affected in most students, with 84.6% reporting some degree of daytime dysfunction (mild/moderate/severe), suggesting that poor sleep significantly impacted daily academic and routine activities.

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