

Sleep Quality and Its Associated Factors among Undergraduate Medical Students

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Abstract

Background: Sleep quality is defined as a multidimensional construct encompassing sleep duration, latency (the time taken to fall asleep), continuity, and subjective satisfaction. The prevalence of poor sleep quality among medical students is a global public health concern, with international literature reporting rates that significantly exceed those of the general population.

Objectives: To access sleep quality among undergraduate medical students of Jhalawar using Pittsburgh Sleep Quality Index (PSQI).

Methods: A cross-sectional analytical study was conducted among 690 undergraduate medical students of Jhalawar Medical College. Data was collected through pretested predesigned questionnaire consisting questions regarding sociodemographic and academic factors, personal habits and Pittsburg sleep quality index (PSQI). Responses were then compiled in Excel spreadsheet and analyzed using statistical software SPSS 23.0 trail version.

Results: Study depicts 58.7% of the students reported good sleep, while 41.3% suffered from poor sleep quality. Poor sleep was most common among first-year students (51.28%). Students who had irregular attendance (63.51%), those admitted under the NRI quota (72.73%), those who had bad relationships with their peers (64.81%), reported significantly higher rates of poor sleep. Regular intake of caffeinated drinks (54.4%) and abnormal eating habits particularly undereating (57.4%), also predicted poor sleep. Conversely, regular exercise was a major protective factor, with 65.2% of active students reporting good sleep.

Conclusion: This study confirms that poor sleep quality is highly prevalent among undergraduate medical students affecting nearly half of the examined population. The primary drivers of sleep disruption are academic factors, physical inactivity along with abnormal eating habits, substance use and smartphone addiction.

Keywords: PSQI, Sleep Quality, Undergraduate, Medical Students.

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Introduction

Sleep is a fundamental physiological process essential for maintaining cognitive performance, physical health, and emotional stability [1]. It is a highly regulated, active function that preserves systemic homeostasis by regulating multiple biological systems, including neurological, cardiovascular, metabolic, and immune functions [2,3]. For individuals engaged in intellectually demanding professions such as medicine, adequate sleep is critical for sustaining the attention, memory retention, and critical thinking abilities required for clinical competence [4].

Sleep quality is defined as a multidimensional construct encompassing sleep duration, latency (the time taken to fall asleep), continuity, and subjective satisfaction [5,6]. Good sleep quality is characterized by the ability to fall asleep easily, maintain uninterrupted rest, and wake up feeling refreshed, whereas poor sleep quality involves difficulty initiating or maintaining sleep, frequent awakenings, and non-restorative sleep [7]. While approximately one-third of the general adult population reports insomnia, global estimates for medical students suggest that between 50% and 80% suffer from poor sleep quality.

A large systematic review and meta-analysis involving over 54,000 medical students identified a pooled prevalence of poor sleep quality at 55.64%, with one-third of students experiencing excessive daytime sleepiness. The average sleep duration in this population was found to be 6.5 hours per night, which is below the recommended 7-9 hours for adults. [8,9] In India, the burden of poor sleep is particularly alarming. Research conducted across various Indian medical institutions reveals a consistent trend of inadequate sleep. A 2025 study in Himachal Pradesh classified 76.75% of medical students as "poor sleepers" based on the Pittsburgh Sleep Quality Index (PSQI) [5]. Similar high prevalence rates have been observed in other regions, including Maharashtra (69.3%) and Manipur (55.5%), suggesting that the current structure of medical education in India is fundamentally incompatible with healthy sleep habits [10,11]. By conducting this study, we aim to provide a valuable insight into the factors influencing sleep quality in this population.

Objectives

- To access sleep quality using Pittsburgh Sleep Quality Index (PSQI) among undergraduate medical students of Jhalawar Medical College.
- To determine factors associated with it.

Material and Method

A cross-sectional analytical study was conducted among undergraduate medical students in Jhalawar Medical College, Jhalawar, and Rajasthan from May 2025 -July 2025 to access their sleep quality.

Inclusion Criteria:

1. Undergraduate medical students studying in all professional years in Jhalawar Medical College.
2. Those who has given written consent to participate in the study.

Exclusion Criteria:

1. Students with diagnosed case of sleep disorder or taking medications for it.
2. Incompletely filled questionnaires.

Sample Size and Sampling Technique: Complete enumeration of students studying in all professional

year (1st Proff=200, 2nd Proff = 197, 3rd Proff Part I = 220, 3rd Proff Part II = 184)

Total students = 200+197+220+184=801

Out of 801 students 24 were absent, 60 students did not give consent, 13 were already under treatment for mental illness and 14 had filled the questionnaire incompletely. So, 111 students were excluded from the study as per exclusion criteria. Hence 690 students were included in the study. Hence, Sample Size= 690

Study Tools and Method: Pretested predesigned questionnaire (google forms) is used for collecting information from study participants. Questionnaire consist of 2 parts;

Student related information like sociodemographic and academic profile, dietary habits, addiction, hours of smart phone use etc.

Pittsburg sleep quality index (PSQI) consisting 18 self-reported questions, which belong to one of the seven subcategories: subjective sleep quality ,sleep latency ,sleep duration, habitual sleep efficiency ,sleep disturbances ,use of sleeping medication and daytime dysfunction. The questionnaire consists of a combination of Likert type and open-ended questions (later converted to scaled scores).

Respondents are asked to indicate how frequently they have experienced certain sleep difficulties over the past month and to rate their overall sleep quality. Scores for each question range from 0 to 3, with higher scores indicating more acute sleep disturbances. The sum of the 7 subcategories scores yields a global PSQI score that ranges from 0 to 21.A cut-off score of ≥ 5 point represents poor sleep quality. The Cronbach's alpha coefficient of PSQI scale is 0.83.[12]

Statistical Analysis: All collected data was entered in Microsoft excel and was analyzed using SPSS 23.0 trial version. Pearson's Chi-square inferential statistics is used to determine association between the sleep qualities with their associated variables. p value <0.05 is considered statistically significant.

Results

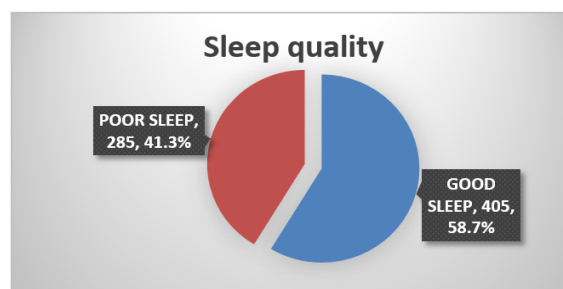


Figure 1: Distribution of sleep quality among participants (n=690)

Table 1: Association between Sociodemographic and Academic Profile with Sleep Quality

Sociodemographic Profile	Parameter	Good Sleep n (%)	Poor Sleep n (%)	Total n (100%)	χ^2 (p-value)
Gender	Female	165 (56.70)	126 (43.30)	291	0.826 (0.363)
	Male	240 (60.15)	159 (39.85)	399	
Religion	Hindu	380 (58.91)	265 (41.09)	645	1.606 (0.448)
	Jain	16 (50.00)	16 (50.00)	32	
	Muslim	9 (69.23)	4 (30.77)	13	
Socioeconomic status (Modified B.G. Prasad Scale)	Class I	288 (57.83)	210 (42.17)	498	3.147 (0.370)
	Class II	48 (60.76)	31 (39.24)	79	
	Class III	65 (59.63)	44 (40.37)	109	
	Class IV	1 (25.00)	3 (75.00)	4	
Professional Year	1st Prof	95 (48.72)	100 (51.28)	195	13.376 (0.004*)
	2nd Prof	102 (67.11)	50 (32.89)	152	
	3rd Prof (Part I)	99 (58.93)	69 (41.07)	168	
	3rd Prof (Part II)	109 (62.29)	66 (37.71)	175	
Quota of Admission	Government	220 (63.22)	128 (36.78)	348	16.761 (0.001*)
	Management	176 (57.14)	133 (42.86)	309	
	NRI	9 (27.27)	24 (72.73)	33	
Regularity in College	No	27 (36.49)	47 (63.51)	74	16.864 (0.001*)
	Yes	378 (61.36)	238 (38.64)	616	
Academic Worry	No	310 (68.74)	141 (31.26)	451	54.142 (0.001*)
	Yes	95 (39.75)	144 (60.25)	239	
Relationship with Peers	Bad	19 (35.19)	35 (64.81)	54	13.357 (0.001*)
	Good	386 (60.69)	250 (39.31)	636	

*p value $\leq$ 0.05**Table 2: Association between Personal Habits and Sleep Quality**

Personal Habits	Parameter	Good Sleep n (%)	Poor Sleep n (%)	Total n (100%)	χ^2 (p-value)
Consumption of Caffeinated Drinks	No	338 (62.2)	205 (37.8)	543	13.258 (0.001*)
	Yes	67 (45.6)	80 (54.4)	147	
Abnormal Eating Habits	No	336 (62.9)	198 (37.1)	534	17.521 (0.001*)
	Overeating	40 (45.5)	48 (54.5)	88	
	Undereating	29 (42.6)	39 (57.4)	68	
Regular Exercise	No	197 (53.1)	174 (46.9)	371	10.365 (0.001*)
	Yes	208 (65.2)	111 (34.8)	319	
Tobacco Consumption	No	349 (60.4)	229 (39.6)	578	4.170 (0.041*)
	Yes	56 (50.0)	56 (50.0)	112	
Alcohol Consumption	No	337 (61.2)	214 (38.8)	551	6.860 (0.009*)
	Yes	68 (48.9)	71 (51.1)	139	
Total Smartphone Use (hours/day)	Less than 2	50 (69.4)	22 (30.6)	72	10.896 (0.004*)
	2-4	139 (64.7)	76 (35.3)	215	
	More than 4	216 (53.6)	187 (46.4)	403	
Smartphone Use After Going to Bed (hours)	<1	245 (66.9)	121 (33.1)	366	24.121 (0.001*)
	1-2	111 (52.4)	101 (47.6)	212	
	2-3	21 (44.7)	26 (55.3)	47	
	>3	28 (43.1)	37 (56.9)	65	

*p value $\leq$ 0.05

Fig 1 illustrates the distribution of sleep quality among the study participants (n = 690). The majority of the study population 407(58.7%) reported having good sleep quality. Conversely, a substantial proportion of the cohort exhibited sleep disturbances, with 283(41.3%) of the participants categorized as suffering from poor sleep quality. Table 1 depicts the analysis of sociodemographic

and academic profile with sleep quality. It indicates that Gender, Religion and Socioeconomic status did not show statistically significant association with sleep quality in this study population. Poor sleep was more commonly seen in 1st professional students (51.28%) followed by 3rd professional part I (41.07%) followed by 3rd professional part II (37.71%) followed by 2nd professional (32.89%). A

significant difference was observed based on the quota of admission ($p=0.001$), notably (72.73%) students in the NRI quota reported poor sleep, the highest among all admission categories. Students who were irregular in college showed high percentage of poor sleepers (63.51%). Regarding academic worry, majority of the students (60.25%) who were worried about their academics reported poor sleep. Peer dynamics play a critical role in nocturnal rest. Students reporting a bad relationship with peers ($p = 0.001$) had significantly higher rates of poor sleep (64.81%).

Table 2 shows the analysis of personal habits which reveals that regular consumption of caffeinated drinks and abnormal eating habits (both overeating and undereating) were strongly associated with poor sleep quality ($p = 0.001$). Specifically, over half of those using caffeinated drinks (54.4%) and those with undereating habits (57.4%) reported poor sleep. Conversely, regular exercise was found to be a significant protective factor ($p = 0.001$), with (65.2%) of physically active students enjoying good sleep compared to only (53.1%) of sedentary students. The analysis of addiction habits reveals a significant negative impact of substance use on sleep quality. Both tobacco consumption ($p = 0.041$) and alcohol consumption ($p = 0.009$) were statistically significant predictors of poor sleep quality. Specifically, (50%) of tobacco users and (51.1%) of alcohol users reported poor sleep, compared to significantly lower rates in non-users (39.6%) and (38.8%) respectively. These results indicate that the physiological and psychological effects of nicotine and alcohol are likely contributing to poor sleep in this population, making addiction habits a key modifiable risk factor for poor sleep quality.

Regarding duration of daily smartphone uses and the specific habit of using a phone after going to bed are significant determinants of sleep quality. Total daily smartphone use showed a significant association with sleep quality ($p = 0.004$), with those using their phones for more than 4 hours a day exhibiting the highest rate of poor sleep (46.4%). Even more significant was the impact of smartphone use after going to bed ($p = 0.001$), which shows as the hours spent on a smartphone in bed increased, the percentage of students having good sleep declined sharply from (66.9%) for <1 hour to just (43.1%) for >3 hours. These findings suggest that late-night screen exposure, likely through blue light emission and cognitive stimulation, is a major contributor to poor sleep quality in this population.

Discussions

The demanding nature of medical education subjects' undergraduate medical students to immense academic, psychological, and social

pressures. This study evaluated the sleep quality of 690 medical undergraduates using standardized, globally validated Pittsburgh Sleep Quality Index (PSQI). By exploring the complex interplay between sociodemographic baselines, academic environments, personal habits and digital engagements, this study provides a foundational cross-sectional map of student well-being.

When compared with past and recent regional literature, Giri et al.[13] reported a poor sleep prevalence of 57.2% among medical students in Western Maharashtra and Fatehpuria et al.[14] reported a 62.6% of poor sleep quality using the PSQI scale among medical students in Udaipur, Rajasthan, which is much higher than the rate observed in our study (41.3%).

On a global scale, our prevalence rate is lower than the recent international data. In a systematic review and meta-analysis of 109 studies involving 59,427 participants, Binjabr et al.[15] estimated a global pooled prevalence of sleep problems among medical students at approximately 55.64%. Similarly, recent cross-sectional study by Carpi et al.[16] in Italian universities found a total of 65% of the participants were having poor sleep quality. This difference could be attributed to evolving lifestyle changes, localized academic schedules, institutional infrastructure, and regional conditions which can directly impact students' sleep patterns.

A notable finding of this study is the lack of statistically significant associations between basic sociodemographic parameters such as gender, religion, and socioeconomic status and sleep quality. This contradicts several published studies like Vidović et al.[17] conducted a multicentric cross-sectional study in Croatia which conclude female students exhibited higher PSQI scores ($U = 10,205$, $p < 0.001$). Also, Huang et al.[18] surveyed 11,972 Chinese students which found out that females experienced more pronounced sleep problems.

Regarding academic year, our study shows 1st professional students experiencing highest rate of poor sleep (51.28%). This represents the difficult transition from high school to an intensive medical curriculum, a phenomenon also observed by Lalithamma et al.[19] and Verma et al.[10] Additionally, the admission quota showed a strong association with sleep disturbances ($p = 0.001$). Students admitted under the NRI quota experienced exceptionally high rates of poor sleep (72.73%). This subgroup often faces unique challenges, including cultural adaptation, and immense financial burden. Our study also highlights students who were irregular in college and who reported academic worries were significantly associated with poor sleep ($p=0.001$). Khoro et al.[20] and

Fatehpuria et al.[14] in their studies identified similar findings that high levels of academic stress were significantly correlated with poor sleep architecture.

Interpersonal relationships within the institution also significantly influenced student well-being. Poor relationships with peers ($p = 0.001$) were strongly associated with poor sleep quality (64.81%).

The lifestyle and behavioural choices of medical students play a major role in shaping their sleep architectures. The use of caffeinated drinks ($n = 147$, 21.3%) was strongly associated with poor sleep outcomes ($p = 0.001$), with 54.4% of users reporting poor sleep quality. This pattern matches the findings of Javed et al.[21] and Rao et al.[22] regarding caffeine-induced sleep disturbances.

Dietary consistency was another important lifestyle factor. Abnormal eating habits ($p = 0.001$), particularly undereating ($n = 68$), were strongly linked to poor sleep (57.4%). In a similar study by Hammad A et al.[23] healthy dietary habits were strongly associated with good sleep (71.9% vs. 48.8%, $p < 0.001$).

On the other hand, regular physical exercise emerged as a vital protective factor ($p = 0.001$). Active students ($n = 319$) reported significantly higher rates of good sleep (65.2%). Exercise helps regulate hypothalamic-pituitary-adrenal (HPA) axis activity, lowers systemic cortisol levels, and promotes slow-wave sleep. Similar findings were seen in a study conducted by Rao et al.[22] among medical undergraduates in Karnataka India and by Plesea-Condratovici et al.[24] among 277 Romanian medical students.

Regarding substance use, both tobacco consumption ($p = 0.041$) and alcohol consumption ($p = 0.009$) were statistically significant predictors of poor sleep quality. Similar results were found in the studies conducted by Chatterjee A et al.[25] in medical college Kolkata, India and Sleiy et al.[26] in Syria. These findings suggest that addiction habits are closely intertwined with psychological morbidity in this population, either as a contributing factor to diminished well-being or as a form of self-medication for underlying emotional distress.

Our statistical analysis demonstrated a clear, highly significant association between excessive screen time and poor sleep outcomes ($p = 0.001$). Mishra et al.[27] revealed that students spending ≥ 8 h screen time/day (AOR: 2.02, 95%: 1.12-3.66), were more likely to report poor sleep quality. Students using their smartphones for over 4 hours a day had the highest rate of poor sleep (46.4%). Shad R, et al.[28] also got a similar finding highlighting the growing impact of digital engagement on sleep

architecture. This negative trend was even more pronounced when examining late-night phone usage in bed, as the hours spent on a device increased, good sleep quality dropped sharply from 66.9% (<1 hour) to 43.1% (>3 hours). Javed et al.[21] also found that using electronic gadgets immediately before sleep, was a significant predictor of poor sleep quality. This clearly illustrates that prolonged screen use in bed delays sleep onset through multiple mechanisms: blue light emissions that suppress melatonin secretion, cognitive stimulation from social media or academic content, and a reduction in total sleep time.

Conclusion

This study confirms that poor sleep quality is highly prevalent among undergraduate medical students, affecting nearly half of the examined population. The statistical analysis demonstrates that baseline sociodemographic profiles specifically gender, religion, and socioeconomic status do not significantly influence the outcome.

The primary drivers of sleep disruption are academic and behavioural factors. First-year transitional worry, clinical training pressures, NRI status are strongly associated with poor sleep quality. Behaviourally, the use of caffeinated drinks, poor eating habits and excessive late-night smartphone use in bed show a clear negative relationship with diminished sleep quality. Conversely, regular exercise serves as a vital protective factor.

These findings emphasize the urgent need for targeted institutional interventions, such as structured peer-mentorship programs, digital wellness campaigns, and accessible sleep and health hygiene counselling to protect student well-being.

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