Original Research

Medical Students "The Night Owls": Cross-Sectional Analysis of the Sleep Habits of Medical Undergraduates of an Institute in Northern India

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Abstract

Background and Objective: Sleep is a biological necessity and essential for optimal health. Literature suggests college students are an at-risk population for sleep deprivation; hence, the present research was undertaken to assess the sleep habits of medical student population.

Materials and Methods: The present cross-sectional study was carried out on a convenient sample of apparently healthy medical students at an institute in Northern India. Information pertaining to the usual sleep-wake habits of participants was collected through a structured questionnaire based on the Pittsburgh Sleep Quality Index (PSQI).

Results: The study sample (n = 125) comprising 95 (76%) men and 30 (24%) women had mean age of 20.59 [standard deviation (SD) = 1.21] years. Findings about sleep habits were concerning as over two-thirds (68%) of the students were found to be sleep deprived. Almost half (46%) of the participants usually went to bed past midnight (average bedtime: 1:39 AM). Difficulty in falling asleep was reported by 46% of the sample. Half of the students perceived their sleep quality as poor or fair. Female students reported sleep deprivation more frequently (83% vs. 63%, respectively); female participants had about 3 times greater odds [odds ratio (OR): 2.92, 95% confidence interval (CI): 1.02-8.31] of being sleep deprived than male students.

Conclusion: Sleep deprivation is quite prevalent among medical students with most of them staying up late at night. Difficulty in falling asleep and dissatisfaction with the sleep quality are also common. Female students seem to be more frequently sleep-restricted than male students.

Keywords: Medical students; Sleep habits; Sleep deprivation

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Introduction

Available literature examining the association between sleep habits and different facets of health suggests a key role of adequate sleep habits, at least in part, in influencing physical health, mental well-being, and overall quality of life (1). Sleep is a biological necessity and essential for optimal health. Sleep deprivation and/or poor-quality sleep are associated with adverse health outcomes (2-4). Despite the empirical evidence supporting the importance of sufficient sleep to many facets of health, some previous studies have revealed a declining trend in the average sleep duration in the general population (5, 6). Sleep deprivation and poor sleep quality are widely acknowledged major public health issues in the United States of America (USA) (7).

University/college students represent a distinct population cohort that seems to be vulnerable to sleep insufficiency (8). Enrolment in a college marks a phase of transition characterized by alterations in social environment, lifestyle, and academic demand among others that often bring a change in students' daily routines, especially sleep-wake schedule. College students often adopt an irregular sleep-wake schedule with delayed sleep phases (later bedtime and wake-up time) and short sleep length (9). It is no surprise that sleep

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insufficiency and poor sleep quality are especially common among college student populations (10). The average sleep duration of students decreased from 7.5 hours in 1969 to 6.5 hours in 1989. Normative data from 2001 indicated that sleep duration had remained unchanged since 1989 (11); however, dissatisfaction with sleep showed a marked hike from only 24% of students reporting it in 1978 to 71% in 2001 (12). One study found that sleep difficulties were twice as much common among college students as in the general population (13).

Sleep plays a crucial role in achieving success both academically and personally during college period. Lack of sleep can have negative effects on students. Research has shown a link between sleep disturbances and psychiatric conditions, as well as issues like reduced work performance and learning difficulties (14, 15). Substance use, such as marijuana and alcohol, was also reported more frequently in those complaining of excessive daytime sleepiness (EDS) (16). Sleep problems may also negatively impact academic performance (17-19). Research has shown that sleep is linked to various cognitive domains, such as attention (20), insight, divergent thinking (21), decision-making (22), speech (23), and most notably, learning and memory (24, 25). Both total and partial (chronic) sleep deprivation may impair daytime neurobehavioral functions (3). A study conducted with college students found that sleep deprivation resulted in a tendency to choose cognitive tasks that required less effort, implying that lack of sleep could limit academic, extracurricular, and even career choices for certain sleep-deprived individuals (26).

Given the poverty of sleep research especially in Indian university student populations, the current project was carried out to assess the sleep habits of medical students at a government medical college in Southern Haryana District, North India. The prevalence of sleep insufficiency and poor sleep quality in the study cohort was estimated and gender differences in sleep patterns were also explored.

Materials and Methods

Subjects: The present study following cross-sectional design was carried out on seemingly healthy students pursuing Bachelor of Medicine and Bachelor of Surgery (MBBS) course at Shaheed Hasan Khan Mewati (SHKM) Government Medical College Nuh, Haryana, North India, from August 2022 to October 2022. An estimate of adequate sample size was obtained taking the expected prevalence of poor sleep quality as 25.3%, type 1 error rate of 5%, absolute precision of 8%, and 10% non-response rate, yielding a size of n = 123. A convenience sampling technique was followed for enrolling potential participants. Medical students of either gender aged 18-25 years showing willingness to participate were considered for inclusion in the study. Those suffering from any acute or chronic somatic illness, psychiatric disorders such as depression, anxiety, etc., or taking sleep pills were excluded. Participants were explained the purpose and assessment(s) of the study and informed written consent was obtained. The Institutional Ethics Committee ratified the research protocol (SHKMGMC/IEC/2022/06/18).

Instrument: Demographic and sleep-wake habit information of the subjects was collected using a structured questionnaire based on one of the most commonly used and well-validated tools, the Pittsburgh Sleep Quality Index (PSQI) (27). An orientation class was held explaining the items of the questionnaire to the potential participants and clarifying their doubts, if any, about the same. A pilot test of the questionnaire on a sample of 20 students revealed an acceptable level of internal consistency (Cronbach's $\alpha = 0.72$) and a high degree of test-retest reliability ($r = 0.84$). The questionnaire comprised two sections: section I encompassed items pertaining to the anthropometric and demographic attributes of the study subjects and section II sought information about the usual sleep habits of the participants during the preceding month. Section II items included: bedtime, wake-up time, time to fall asleep (sleep latency), and sleep quality to be rated as "*Poor", "Fair", or "Good"* by the subjects. Sleep variables computed from the responses to the aforementioned items were: time in bed (difference between bedtime and wake-up time), sleep duration (subtracting the sleep latency from time in bed), and sleep efficiency (sleep duration/time in bed * 100). A total of seven sleep variables were derived from the questionnaire.

Questionnaires were distributed to the students during a typical teaching week not overlapping with the examination period or any festive event. Duly filled forms were collected and screened for any missing or invalid responses. Those complying with the inclusion criteria and

passing the initial screening process were considered for the data analysis.

Data analysis: Data were collected, compiled, and analyzed using SPSS software (version 20, IBM Corporation, Armonk, NY, USA). Mean and standard deviation (SD) were presented for quantitative data and categorical variables were expressed as frequency (percentage). Differences in sleep variables concerning gender were tested for statistical significance using an independent samples t-test. Correlations among sleep variables and the influence of gender on sleep variables were determined using Pearson's chi-squared test and expressed using appropriate measures of association. $P < 0.05$ was considered statistically significant.

Results

Our study sample encompassed 125 apparently healthy medical students of either gender (about three-fourths were men) within the age range of 18-25 years. The mean body mass index (BMI) of the sample was 22.54 (SD = 4.32) kg/m^2 with about two-thirds of the students falling within the healthy weight category. Demographic and anthropometric attributes of the participants are depicted in table 1.

Table 1. Demographic and anthropometric attributes of the study participants (n = 125)

Variable		Value
Gender	Men	95 (76)
	Women	30 (24)
Age (year)		20.59 ± 1.21
Height (cm)		170.95 ± 32.89
Weight (kg)		64.14 ± 11.79
BMI (kg/m^2)		22.54 ± 4.32
	Under weight	15 (12)
	Normal weight	84 (67)
	Over weight	26 (21)

Data are expressed as mean ± standard deviation (SD) or frequency (%)
BMI: Body mass index

Sleep habits of participants: Table 2 shows the descriptive statistics of the sleep habits of participating students. The average bedtime of the students was a little over half past one (1:39 AM) with almost half (46%) of them reporting to have usually gone to bed past midnight. 52 (42%) students reported to have usually woken up in the morning before or by 7 o'clock. Participants were found to have spent on average about 7 hours in bed and taken almost half an hour to fall asleep. Frequency analysis of the sample about the actual time spent asleep revealed that 85 (68%) students got sleep of less than 7 hours on most nights (Figure 1). Stratification of the sample based on sleep latency showed that 57 (46%) students took more than 30 minutes to fall asleep.

Table 2. Descriptive statistics of the sleep habits of participants (n = 125)

Sleep variables	Value
Bedtime (hour: minute ± minute)	1:39 AM (72.21)
Wake-up time (hour: minute ± minute)	7:30 AM (73.07)
Time in bed (minute)	417.00 ± 84.97
Sleep latency (minute)	27.04 ± 20.21
Time asleep (minute)	389.00 ± 83.33
Sleep efficiency (%)	93.00 ± 5.00
Sleep quality (self-rated)	
Poor	15 (12.0)
Fair	48 (38.4)
Good	62 (49.6)

Data are presented as mean ± standard deviation (SD) or frequency (%)

Of the 125 participants, only 10 (8%) were found to have sleep efficiency below 85%. Half of the sample rated the sleep quality as poor or fair. Correlations among sleep variables revealed the presence of a moderate, significant ($r = 0.58$, $P < 0.0001$), and positive relationship between self-rated sleep quality and sleep duration (Table 3).

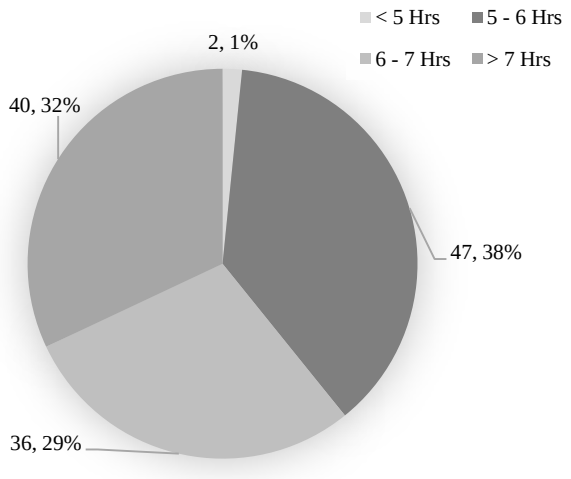

Figure 1. Distribution of participants based on sleep duration (n = 125)

Gender differences: Differences in sleep habits about gender are depicted in table 4. Female students slept about half an hour less than male students and this was largely due to earlier awakening time in women as compared to men. A significant [3%, 95% confidence interval (CI): 2.97-3.02] difference in sleep efficiency was observed with female participants having lower sleep efficiency.

Table 3. Correlation matrix showing correlations between sleep variables

Sleep variables	Sleep quality	Sleep latency	Sleep duration	Sleep efficiency
Sleep quality	1			
Sleep latency	0.185	1		
Sleep duration	0.583*	0.217	1	
Sleep efficiency	-0.002	0.257	0.056	1

*Statistically significant

A significant difference in the percentage of female students sleeping for less than 7 hours as compared to male students was seen (83% vs. 63%, respectively). Women had 2.9 times greater odds [odds ratio (OR): 2.92, 95% CI: 1.02-8.31] of not getting sufficient sleep (≥ 7 hours) in comparison to men. No significant differences in frequency distribution concerning sleep quality and sleep latency were observed.

Discussion

Adequate sleep has been shown to have a positive relationship with physical, psychosocial, and general health life satisfaction and performance (28). Good quality sleep is key to optimal health. The current research which aimed to assess the sleep habits of medical undergraduates revealed some worrying information about the quantity and quality of sleep obtained by study participants. It found that the average usual bedtime of the students was well past midnight (mean bedtime = 1:39 AM) with about a little less than half of the participants reporting going to bed past midnight. Two in five students agreed to have usually woken up in the morning before or by 7 o'clock (mean wake-up time = 7:30 AM). These results are in agreement with previous studies also reporting later bedtimes (delayed sleep phase) among college student populations (13, 29). Buboltz et al. in their study found that delayed sleep phase syndrome was twice as prevalent in college students as in the general adult population (9). One study among undergraduates in Palestine found that 42% of the students reported usually going to bed past midnight in coherence with the present study (46%). The same study revealed that about 47% of the students habitually woke up in the morning between 6 and 8 AM (30). In our study, it was found that about two in five students (42%) woke up before or by 7 o'clock regularly. Although in the present study, sleep-wake habits were not determined separately for weekdays and weekends/Sundays, previous research indicates an irregularity in sleep-wake patterns of college students with later bedtime and wake-up time on weekends than weekdays.

The above findings were somewhat expected as social media use and/or web browsing has become a kind of night-time ritual among youth especially college students who are free to follow such routine in the absence of the watchful eyes of parents during their hostel stay. Bedtime so late in the night coupled with an early fixed rise time due to restrictions imposed by the teaching schedule; not surprisingly, the majority (68%) (n= 85) of the students in our sample were found not getting the recommended amount of sleep of 7-9 hours duration (31). Participants were found to usually get an average of 6.5 (1.4) hours of sleep. Almost similar results had been obtained in previous studies conducted in Asian, African, and Western countries. An earlier cited study among Palestinian undergraduates reported mean sleep duration of 6.4 (1.1) hours (30). One study among Korean college students found the average sleep duration to be 6.7 (1.3) hours (32). A comparable study conducted with Chinese college students found that the average sleep duration on weekdays was 6.9 hours (33). A similar study conducted among African college students in Nigeria found an average sleep duration of 6.2 hours (34). A relatively large-size (n = 400) study conducted in a similar regional population reported an average sleep duration of 7.1 (1.2) hours (35).

Table 4. Sleep habits in relation to gender

Sleep variable	Men (n = 95)	Women (n = 30)	P-value
Bedtime (hour: minute)	1:40 AM (73.89)	1:35 AM (68.12)	0.45
Wake-up time (hour: minute)	7:36 AM (72.53)	7:13 AM (72.93)	0.09
Time in bed (minute)	424.00 ± 83.01	396.00 ± 89.37	0.15
Sleep latency (minute)	25.89 ± 19.14	30.67 ± 23.26	0.34
Time asleep (minute)	396.00 ± 78.15	364.00 ± 98.41	0.12
Sleep efficiency (%)	94.00 ± 5.00	91.00 ± 6.00	0.04

Data are presented as mean ± standard deviation (SD)
Data examined for statistical significance using independent samples t-test

Sleep difficulty in the form of taking more than 30 minutes to fall asleep was present in a little less than half (46%) of the students. These findings align with research from the National Sleep Foundation and studies of college students in the USA, which have shown that over 40% of Americans struggle with falling asleep or experience frequent awakenings during the night (36, 37). A study conducted with Palestinian college students revealed that 36.3% of participants took over 30 minutes to fall asleep (30). An earlier cited study conducted among medical undergraduates in various phases at a medical college in Northern Haryana, India, reported a figure of 31.1% for those having sleep latency of more than 30 minutes (35). A majority (92%) of the students in the present study were found to have good sleep efficiency (≥ 85%). Half of the participants in our study sample rated their sleep quality as poor or fair. Significantly large differences in prevalence rates of poor sleep quality in previous studies among college students have been observed. A systematic review indicated that between 25% and 72% of Indian university students reported experiencing poor sleep quality (38). An earlier cited study among Palestinian university students found the prevalence of poor or satisfactory sleep quality at around 28% (30). One relatively recent large-size (n = 557) study among university undergraduates in the USA found that 70% of students had clinically poor sleep quality (39). Another study found an alarmingly high prevalence of poor sleepers as only 11% of the surveyed students satisfied the criteria for good sleep quality (13). These variations may be due to ethnocultural differences among studied populations as well as the evaluation method used (subjective vs. objective) in those studies. The current study also found a significant positive relationship between self-reported sleep quality and sleep duration implying students who slept for fewer hours were more likely to rate their sleep quality poor. Thus, an awareness was present among students about the importance of the amount of sleep and sleep quality; despite that, sleep deprivation was found to be quite prevalent in our study sample.

Our study found no significant gender differences in the majority of the sleep variables except sleep efficiency (female students were found to have significantly lower efficiency). However, a significantly higher percentage of female participants reported getting insufficient sleep (< 7 hours) as compared to male students (83% vs. 63%, respectively). Previous research on college students has found inconsistent gender differences in sleep patterns. One study found that gender differences were not linked to time spent in bed, frequency of awakenings, or sleep quality (40). Another study revealed no gender differences in sleep onset latency (9). In contrast, conflicting findings have been reported, with men showing both shorter and longer sleep durations, as well as poorer and better sleep quality than women (16, 32, 41). For sleep disturbances, both significantly lower and higher rates have been reported in men compared to women (13, 32). These inconsistencies in results could be partly due to cultural differences in student samples or confounding effects of age, as most studies included college students across a broad age range. Other factors such as lifestyle, stress, biological maturational processes, and sleep perception could also contribute to these discrepancies. Further well-designed studies controlling for potential confounders are needed to get clarity about the gender effect on sleep patterns and sleep disturbances in college student populations.

Strength and limitations: As far as we know, this is one of the few regional studies conducted in Northern India to assess the sleep habits of medical students and estimate the extent of sleep deprivation in this specific cohort. However, the findings of this study should be considered in the context of its limitations. Firstly, sample size was small with subjects recruited from a single institute, thereby limiting the generalizability of the findings to the culturally diverse Indian population. In addition, the presence of recall bias in responses cannot be ruled out. Despite the above-mentioned limitations, the present study gives valuable insight into the sleep habits of an at-risk cohort of medical students and hopefully provides an impetus for further studies preferably on large-scale assessment of sleep patterns and sleep disturbances objectively.

Conclusion

The present study revealed concerning information about the sleep habits of medical students as the majority (around two-thirds) of them were found not getting a sufficient amount of sleep. Nearly half of the students reported usually going to bed well after midnight. Participants seemed to be aware of sleep insufficiency as half of them rated their sleep quality as poor or fair. Sleep dep-

rivation was found to be more prevalent among female students than male students; however, no significant gender differences were observed among other sleep variables except sleep efficiency. Hopefully, these results will serve as a wake-up call for university educators to pay greater heed to the sleep health of students.

Conflict of Interests

Authors have no conflict of interests.

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Ethical compliance: The study has been conducted in compliance with the national and international (Declaration of Helsinki) regulations for biomedical research involving human participants.

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