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## Sleep quality using Pittsburgh Sleep Quality Index among preclinical undergraduate medical students: A descriptive cross-sectional study from Chitwan Medical College

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### Abstract

**Introduction:** The demanding academic rigours of stressful medical studies can cause circadian rhythm disturbances that negatively impact students' mental and physical health. Improper sleep affects academic performance and overall well-being. Studies report a higher prevalence of sleep disturbances among medical students. This study examines sleep habits of preclinical undergraduate medical students at a private medical college in Nepal.

**Method:** This descriptive cross-sectional study was conducted among 186 preclinical undergraduate medical students at Chitwan Medical College, Nepal between Apr to May 2024. Data for demographic variables and sleep quality using the Pittsburgh Sleep Quality Index (PSQI) was collected using links generated via Google Forms following ethical clearance (Ref- CMC-IRC/080/081-087). The chi-square test was used to explore the association between sleep habits and demography of students (gender, academic years one and two). The level of significance was set at 5%.

**Result:** Out of 186 students, PSQI score >5 (indicating poor sleep quality) was found in 116(62.4%). The median bedtime was 11:00 PM and the wakeup time was 07:00 AM. The mean sleep hours were 6.63±1.19 hours. About 10% of study participants took medicine for sleep-related issues.

**Conclusion:** In this study, the prevalence of poor-quality sleep was high among preclinical undergraduate medical students at Chitwan Medical College. Sleep hygiene education may improve the sleep quality of medical students.

### How to cite

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## Introduction

Sleep is an active, repetitive and reversible behaviour serving multifunctional bodily activities including learning and memory consolidation.<sup>1</sup> It is a basic human need that defines a person's overall health and well-being. Normally adults are recommended to sleep for 7-9 hours and any deviation from this range diminishes the quality of sleep. Sleep quality is defined as "one's satisfaction with the sleep experience, which integrates aspects of sleep initiation, sleep maintenance, sleep quantity, and awakening refreshment".<sup>2</sup> Sleep can be affected by physical, mental, and environmental factors. Lack of sleep is a major public health problem in modern society.

Preclinical undergraduate medical students are in a critical phase of acquiring the necessary knowledge useful for the rest of their careers and education necessitating complete physical and mental health.<sup>3</sup> It is imperative to have good sleep quality to attain optimum cognitive function, memory, and decision-making to excel and master their learning needs. They are generally a healthy subset of the population, but vulnerable to various sleeping problems including sleep deprivation owing to the burden of a humongous curriculum, constant assessment pressure and lack of personal time. Sleep deprivation can have deleterious consequences on future doctors as it is associated with fatigue, daytime sleepiness, and reduced neurocognitive performance<sup>4</sup>; thus, producing incompetent doctors.<sup>5</sup> The primary objective of this study was to determine sleep habits among medical students and to investigate the relationship between sleep quality and participant demographic variables.

## Method

This descriptive cross-sectional study was conducted among preclinical undergraduate medical students at Chitwan Medical College,

Nepal upon obtaining ethical clearance from the institutional review committee (Ref- CMC-IRC/080/081-087). All 200 students (MBBS 14<sup>th</sup> and 15<sup>th</sup> batch) were invited through personal email addresses and dedicated batch WhatsApp groups to complete a questionnaire between Apr - May 2024. The forms were made available through links generated via Google Forms. A gentle reminder was circulated every Friday for 4 weeks during the data collection processes using the same platforms. An electronic consent was obtained and the participants were informed that their responses were subjected to analysis and would be published with anonymity. They were also informed that incomplete or non-participation would not bear any academic consequences.

The first part of the questionnaire included demographic information while the second part contained the validated PSQI<sup>6</sup> questionnaire (Cronbach's alpha=0.86). The PSQI measures the quality and patterns of sleep using seven domains including subjective sleep quality, latency, duration, habit, disturbances, use of medication and daytime dysfunction over the past one month differentiating poor and good sleep. The subjects self-rated all seven areas of sleep on a 9-PSQI questionnaire using a 4-point (0 to 3) Likert scale. A global PSQI obtained from a cumulative 7-components of the questionnaire score of greater than 5 indicates poor sleep. The obtained data was imported to SPSS and analysis was carried out. Descriptive statistics included means, standard deviations, frequencies, and percentages. Chi-squared test was used to seek associations between demographic variables and sleep quality. A  $p \leq 0.05$  was considered statistically significant.

## Result

Out of 200 preclinical undergraduate medical students invited to participate in the study through links shared via Google Forms, 186 forms (89 Year I and 97 Year II) were received

within the allocated time of 30 days (response rate 93%). Out of 186 participants, 123(66.12%) were females and 63(33.88%) were males. The majority 162(87.09%) went to bed from 10 pm to 12:00 midnight and 169(90.87) students woke up between 6:00 am to 8:00 am. In the current

study, 70(37.6%) of the total study participants were good sleepers, Table 1. The average hours in bed were  $7.61\pm 1.11$  and the global PSQI score was  $6.88\pm 3.63$ , Table 2. There was no association between gender and year of study with sleep quality, Table 3.

**Table 1. Characteristics of preclinical undergraduate medical students surveyed for sleep quality using Pittsburgh sleep quality index (PSQI) scale, n=186**

Variables	n(%)
<b>Sex</b>	
Male	63(33.88)
Female	123(66.12)
<b>Bedtime</b>	
Before 10 PM	20(10.76)
10 PM to 12:00 Midnight	162(87.09)
After 12:00 Midnight	4(2.15)
<b>Wake up time</b>	
Before 6:00 AM	12(6.45)
Between 6:00 AM to 8:00 AM	169(90.87)
After 8:00 AM	5(2.68)
<b>Sleep Latency</b>	
<15 minutes	97(52.16)
15-30 minutes	72(38.70)
>30 minutes	17(9.14)
<b>Sleep Quality</b>	
Good	70(37.6)
Poor	116(62.4)
<b>Taking medication for sleep-related issues</b>	
Yes	19(10.2)
No	167(89.8)

**Table 2. Average hours in beds and global PSQI score of preclinical undergraduate medical students surveyed for sleep quality using PSQI scale, n=186**

Variables	mean $\pm$ SD
<b>Hours in bed</b>	
Total	7.61 $\pm$ 1.11
Male	7.50 $\pm$ 1.36
Female	7.66 $\pm$ 0.95
<b>Global PSQI Score</b>	
Total	6.88 $\pm$ 3.63
Male	7.38 $\pm$ 4.01
Female	6.63 $\pm$ 3.40
Year I	7.31 $\pm$ 3.91
Year II	6.49 $\pm$ 3.32

**Table 3. Comparison of demographic characteristics between good and poor sleepers according to the PSQI scale, n=186**

Variables	Sleep quality, n(%)		p-value
	Good sleepers (n=70)	Poor sleepers (n=116)	
<b>Gender</b>			
Male	21(33.33)	42(66.67)	0.386
Female	49 (39.83)	74(60.17)	
<b>Academic Year</b>			
Year I	31(34.83)	58(65.17)	0.450
Year II	39(40.20)	58(59.80)	

## Discussion

In this study, a majority of preclinical medical students of Chitwan Medical College experienced poor sleep quality, with only 70(37.6%) classified as good sleepers. This is consistent with a growing body of literature that highlights the prevalence of sleep disturbances among medical students, suggesting that the demanding nature of medical education may be a significant contributing factor.<sup>4,5</sup>

Sleep quality and duration among medical students have been extensively studied worldwide because of their repercussions on various aspects including academic performance. Sleep is influenced by age as older individuals have various sleep-related issues; however, the present study suggests that younger people are also vulnerable to sleep issues. This could be because of the inability to adapt to the changed environment, internet and smartphone addiction and the burden of the vast medical curriculum among medical students.

Studies report contrasting results on gender-wise variation in quality of sleep with females having a worse quality of sleep than men due to genetic, endocrinal or social factors.<sup>7-9</sup> However the present study did not find any association between gender and poor sleep. As most of the students were staying away from families, social obligation could have been less, nonetheless, separation anxiety, genetic and endocrinal factors could play a role in sleep hygiene. These

parameters were not considered in the present study.

In contrast to some previous studies, the present study observed a higher percentage (67.2%) of male poor-sleepers over females (60.17%).<sup>7-9</sup> Nevertheless, our findings was concurrent with some previous studies.<sup>10</sup> Phubbing and playing mobile games till late hours could have been a reason for poor sleep among males as smartphone addiction was reported in a higher number of males in a similar setting.<sup>11,12</sup>

Adolescents are commonly suggested for 8-9 hours of daily sleep. Our study reports a decreased sleep time among medical students compared to the global normal recommendation.<sup>13</sup> It was found to be about 6 and a half hours in both males and females similar to reports from earlier studies among medical students.<sup>14</sup> As suggested earlier the burden of the curriculum and stress of not performing well in assessment could be a predisposing factor. The literature shows variabilities of sleep hours between 5 to 8 hours among medical students.

Medical students throughout the world usually sleep poorly.<sup>10,15-17</sup> This is similar to the present study where about 2/3<sup>rd</sup> of participants were poor sleepers (62.40%). Some other studies from China (19%),<sup>18</sup> Lebanon (37.1%),<sup>19</sup> and Egypt (55.7%)<sup>20</sup> report a lower prevalence. Earlier studies from Nepal among similar study populations reported a much lower percentage of poor sleepers.<sup>21</sup> We cannot produce an explanation behind discrepancies with such findings, nevertheless it could be associated with

sampling technique, year of medical school, and exposure to a social environment.

Year-I students were poor-sleepers than Year-II students in the present study similar to previous studies.<sup>22</sup> In Nepal, adolescents usually are under parental supervision living under family guidance before starting medical school. This stress of familial separation could be a reason for poor sleep among medical students.<sup>9,23</sup> Some studies report sleep quality to decrease over the years as medical students progress to senior years.<sup>9,24</sup>

Most study participants attended school all day as Chitwan Medical College follows the national standard of 6 working days (Sunday–Friday) from 9:00 AM –5:00 PM. This study therefore presumes that the students did not take afternoon or evening naps because of a tight academic schedule, however, we did not consider student attendance to verify the fact. Also, PSQI does not evaluate the daytime nap and only questions if daily activities were affected. Late school start time has been reported to improve sleep hygiene and academic performance,<sup>25, 26</sup> supporting the institutional policy of starting academic activities at 9:00 AM. The time to go to bed and the wake-up time play a greater role in academic performance<sup>27,28</sup> This study did not explore the academic performance of the students.

Sleep regulation is a combined equilibrium of both circadian rhythm and external regulators as sleep duration and quality have been reported to depend on a variety of factors including the timing of the study.<sup>29</sup> This study was conducted The study also did not look into the participant's coffee, tobacco and alcohol consumption or any other dietary status.

## Conclusion

The prevalence of poor sleep is strikingly high among preclinical undergraduate medical students of the academic years I and II at Chitwan Medical College. The majority of students had poor sleep quality and short sleep duration to the recommendation of 7-9 hours. The overall global score of the Pittsburgh Sleep

during the time of the year when a batch of students were appearing for the final university exams. As students tend to sleep less during the board exams as a part of examination preparation, there could have been some discrepancies in sleeping time and wake-up time data. Some studies report no association between PSQI scores and academic performance.<sup>30,31</sup>

We found that 19(10.2%) study participants were taking medication for sleep-related issues. Among these, 11(5.9%) were consuming sleep medication once a week, 2(1.1%) twice a week and 6(3.2%) up to three times a week consistent with similar reports.<sup>14</sup> Sleep disturbance can be a nuisance and people usually seek medication for such issues.

The results of this study are congruent with previous research on sleep habits and quality. Based on these findings, it is worthwhile introducing some intervention methods such as sleep education, behavioural changes, and relaxation techniques to address the factors that contribute to poor sleep quality. It is also recommended that the study be continued further exploring various aspects of sleep and its consequences on medical students. The present study did not investigate whether the study participants sought medical attention or purchased over-the-counter medication for sleep-related issues. The study also did not investigate the type of medicine used by those individuals. Sleep problems could be tackled by providing more information about sleep hygiene and its consequences to avoid drug dependence.

Quality Index indicated moderate sleep disturbances across the cohort, with no significant differences observed between gender and academic years. Although females spent slightly more time in bed and had longer sleep durations compared to males, these differences did not translate into better sleep quality.

## Author contribution

Concept design: ST, SK2, SD, VK, YB, KPN; Literature search: ST, SK2, SD, VK, YB, KPN, AB; Data collection: SD, AB, AT, ST, SK1, YB; Data

analysis: ST, SK2, YB, VK; Draft manuscript: All; Final manuscript and accountability: All.

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### Conflict of interest

None

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None

### Supplementary material

The data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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### Questionnaire/tools

Name: \_\_\_\_\_ Roll No: \_\_\_\_\_ Batch \_\_\_\_\_

Age: \_\_\_\_\_ Gender: \_\_\_\_\_ Date: \_\_\_\_\_

### Pittsburgh Sleep Quality Index (PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month.

**Please answer all questions.**

1. During the past month, what time have you usually gone to bed at night?.....

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?.....

3. During the past month, what time have you usually gotten up in the morning? .....

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.) .....

5. During the <u>past month</u> , how often have you had trouble sleeping because you...	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe:				
6. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
8. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?				
	Very good	Fairly good	Fairly bad	Very bad
9. During the past month, how would you rate your sleep quality overall?				
	No bed partner or room mate	Partner/room mate in other room	Partner in same room but	Partner in same bed

			not same bed	
10. Do you have a bed partner or roommate?				
If you have a roommate or bed partner, ask him/her how often in the past month you have had:	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Loud snoring				
b. Long pauses between breaths while asleep				
c. Legs twitching or jerking while you sleep				
d. Episodes of disorientation or confusion during sleep				
e. Other restlessness while you sleep, please describe:				