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Prevalence of poor sleep quality and its association with body mass index among undergraduate medical students

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Abstract

Introduction: Sleep quality is a crucial determinant of physical and mental health, and poor sleep is commonly reported among medical students due to academic stress and lifestyle factors. This study aimed to assess the prevalence of poor sleep quality among medical students and its association with body mass index (BMI) and gender.

Method: A cross-sectional study was conducted among undergraduate medical students of Kathmandu Medical College, Nepal, from Jun to Aug, 2025. Ethical approval was obtained. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). Normally distributed continuous variables were presented as mean±SD, categorical variables are presented as n(%). The IBM-SPSS was used for statistical analysis to find out associations between sleep quality, BMI, and gender using the Chi-square test, with a significance level set at $p<0.05$.

Result: Among 269 participants, 117(43.5%) reported poor sleep quality, while 152 (56.5%) had good sleep quality. The prevalence of poor sleep quality was slightly higher among overweight students (29/53, 54.7%) compared to normal-weight (68/175, 38.9%) and underweight students (20/41, 48.8%), though association was not statistically significant (p=0.095). Gender showed a significant association with sleep quality: males had a higher prevalence of poor sleep quality (75/151, 49.7%) than females (43/118, 36.4%), p=0.047.

Conclusion: Poor sleep quality affects nearly half of medical students in this study, more in males, highlighting the need for targeted interventions to promote healthy sleep habits.

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Introduction

Sleep is an essential determinant of overall health and well-being, with recommendations that adults should regularly get at least seven hours of sleep per night.[1] Obesity is a public health challenge and a well-established risk factor for cardiovascular disease (CVD). Evidence in young adults suggests an association between short sleep duration, poor sleep quality, and the risk of obesity.[2] Short sleep duration has been linked not only to obesity but also to diabetes mellitus, cardiovascular disease, and increased mortality. Recently, there has been growing interest in the relationship between sleep duration, sleep quality, and body mass index (BMI); however, findings across studies remain inconsistent.[3] Sleep restriction has been shown to disrupt the regulation of key hormones, including ghrelin, leptin, and cortisol. These hormonal changes may contribute to increased appetite and, in many instances, reduced energy expenditure, promoting weight gain.[4]

Medical students are particularly vulnerable to poor sleep due to the high academic workload, irregular schedules, and frequent nighttime study or clinical duties. Their sleep deprivation and poor sleep quality have been associated with impaired cognitive performance, decreased academic achievement, and long-term health consequences.[5-8,]

Medical studies (medicine and dentistry) are among the most sought-after careers for young adults in Nepal. Given the demanding lifestyle of medical students, understanding the prevalence of poor sleep quality and its relationship with BMI is important to help in targeted interventions and preventive strategies to mitigate these health risks.

Method

This was an observational, descriptive, cross-sectional study designed to assess the sleep quality of undergraduate medical students (MBBS and BDS) using a standardized questionnaire survey. Ethical approval was obtained from the Institutional Review Committee of Kathmandu Medical College (Ref: 25052025/07). The research was conducted from Jun to Aug, 2025. The study population consisted of first- and second-year students from undergraduate MBBS and BDS programs of Kathmandu Medical College. Purposive sampling, with stratification based on year of study (first or second year), ensuring minimum required sample size was fairly proportionately distributed across these strata.

Sample size was calculated using the following formula: $n=Z^2p(1-p)/d^2$, $p=80\%$[3], $Z=1.96$, d=margin of error=5%. Therefore, n=245, non-response=10%=~24. Required n=245+24=269

Exclusion of participants who had previously been diagnosed with a sleep disorder, were on medication, had a recent history of any illness, or had a history of metabolic, cardiovascular, respiratory, digestive, or other disorders.

After obtaining written, informed consent from eligible participants, they were provided with a data collection form that included sociodemographic information and the Pittsburgh Sleep Quality Index (PSQI) questionnaire. The standardized tool used to evaluate overall sleep quality has seven key domains: sleep duration, sleep disturbance, sleep latency, daytime dysfunction due to sleepiness, sleep efficiency, overall sleep quality, and the need for sleep medications. Each component is scored from 0 to 3 points, in which a lower score denotes no problems, while a higher score denotes worsening problems. The score has a scale from 0 to 21 points. For the present study, we dichotomized the result into two categories: ≤5 (good sleep quality) vs. >5 (poor sleep quality).[9]

Weight was recorded in kilograms (kg) and height was measured in centimetres (cm). Standing height was measured using a stadiometer. Participants stood with heels together and toes slightly apart, ensuring that the back of the head, buttocks, and heels were in contact with the backboard. The head was positioned so that the participant was looking straight ahead. A horizontal bar was then

placed on the top of the head, and the height was recorded to the nearest centimetre. Weight was measured by using a digital weight scale; the result was determined when the gradation was stabilized after a set zero on the scale with no load.

Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. Based on BMI, participants were grouped into four categories: underweight (BMI<18.5), normal (BMI range 18.5- 24.9), overweight (BMI range 25- 29.9), and obese (BMI≥30).[10]

The data was entered and analysed using IBM SPSS (Statistical Product and Service Solutions) version 23.0. Continuous variables were summarized using the mean and standard deviation, while categorical variables were presented as frequencies and percentages. The data were effectively presented in tables. Student's t-test was done to compare mean values, and a chi-square test was done to determine the associations. A p-value <0.05 was considered statistically significant.

Result

The study included 269 medical students, of whom 56.1% (n=151) were male and 43.9% (n=118) were female. The mean age of the participants was 19.92±1.87 years, with no significant difference between males and females (p=0.223). Male students had significantly greater mean height (1.69±0.60 m) compared to females (1.57±0.06 m) (p<0.05) and higher mean body weight (64.42±9.72 kg vs. 53.38±7.50 kg, p<0.05). The mean BMI was also significantly higher in males than in females (p=0.013).

The mean PSQI score was 5.73±2.57 for all participants, with no significant gender difference (males: 5.81±2.27; females: 5.62±2.91; p=0.536). Average bedtime was significantly earlier in females (7.52±1.10 hours) than in males (7.21±0.92 hours) (p=0.013). Mean sleep duration was 6.79±1.14 hours overall, with no significant difference between males (6.70±1.21 hours) and females (6.91±1.02 hours) (p=0.121).

Out of the 269 medical students included in the study, 56.5% (n=152) had good sleep quality, while 43.5% (n=117) had poor sleep quality. The distribution of sleep quality according to BMI categories showed that 48.8% of underweight participants, 38.9% of those with normal BMI, and 54.7% of overweight participants had poor sleep quality. However, the association between BMI and sleep quality was not statistically significant (p=0.095).

Regarding gender, poor sleep quality was reported in 49.7% of male students compared to 36.4% of female students. This difference was statistically significant (p=0.047), indicating a higher prevalence of poor sleep quality among male students.

Table 1. Demographics of undergraduate medical students surveyed for sleep quality, n=269

Parameters	Total mean±SD	Male, 151(56.1%) mean±SD	Female, 18(43.9%) mean±SD	p-value t-test
Age	19.92±1.87	20.0±1.26	19.82±1.0	0.223
Height	1.64±0.08	1.69±0.6	1.57±0.06	0.000
Weight	59.58±10.37	64.42±9.72	53.38±7.50	0.000
BMI	22.05±3.28	22.49±3.08	21.49±3.44	0.013
PSQI score	5.73±2.57	5.81±2.27	5.62±2.91	0.536
Bed hour	7.35±1.01	7.21±0.92	7.52±1.10	0.013
Sleep hour	6.79±1.14	6.70±1.21	6.91±1.02	0.121

Table 2. Sleep quality according to BMI and Gender among undergraduate medical students, n=269

Parameters	n	%	Good sleep quality	Poor sleep quality	p-value Chi-Square test
BMI					0.095
Underweight	41	15.2	21	20	
Normal	175	65.1	107	68	
Overweight	53	19.7	24	29	
	269	100	152(56.5%)	117(43.5%)	
Gender					0.047
Male	151	56.1	77	75	
Female	118	43.9	74	43	
	269	100	152(56.5%)	117(43.5%)	

Discussion

In the present study, the overall prevalence of poor sleep quality was 43.5%. The prevalence observed in our study is comparable to previous research conducted among medical students in similar academic settings, where rates of poor sleep have been reported between 30% and 50%.[8,10,14,15] The higher prevalence may be attributed to factors such as prolonged study hours, irregular academic schedules, high stress levels, and increased screen time. Some similar studies have reported higher rates of poor sleep quality. For instance, research conducted in Nepal and other countries has documented prevalence rates ranging from 60% to 80% among medical and healthcare students, suggesting that sleep disturbances are a widespread concern in this population.[3,12,13] In contrast, a similar study done among nursing students has reported a prevalence rate of 21.6%, which is substantially lower than our study.[11] Cultural and environmental differences, including living conditions, dietary habits, and lifestyle patterns, may also contribute to variations in sleep quality among different student populations.

The relationship between body mass index (BMI) and sleep quality among the participants was assessed. The findings indicate that sleep quality did not vary significantly across BMI categories (p=0.095). Although the proportion of poor sleep quality was slightly higher among overweight individuals (54.7%) compared to those with normal BMI (38.9%) and underweight participants (48.8%), these differences were not statistically significant. This suggests that BMI alone may not be a major determinant of sleep quality in this population. Similar observations have been reported in other studies where BMI did not show a consistent association with sleep disturbances, possibly due to the influence of confounding factors such as stress, lifestyle habits, and academic pressure.[3,8,15] However, another study reported an association of poor sleep quality with BMI among medical students of KIST Medical College.[10] In a study among young adults of South Korea, short sleep duration was associated with BMI.[4]

Regarding gender, a statistically significant association was observed between gender and sleep quality (p=0.047). Poor sleep quality was more common among males (49.7%) compared to females (36.4%). This contrasts with certain previous studies that reported poorer sleep among females,[8] often attributed to hormonal fluctuations, psychosocial stressors, and higher prevalence of anxiety and depression. The higher proportion of poor sleep among males in our study could be due to differences in daily routines like significantly late bedtime (p=0.013), late-night screen exposure, or irregular sleep schedules. There was no statistical difference between the sleep quality of males and females in a study at Chitwan Medical College.[12]

This study has several limitations. The cross-sectional design, though informative, cannot establish causality between sleep quality, BMI, and gender. The single-centre sample may limit generalizability. Self-reported sleep data is subject to (recall) bias. Important confounders

like stress, physical activity, and diet were not assessed, which might influence the relationship between sleep quality and BMI.

Conclusion

Overall, while BMI did not appear to influence sleep quality significantly, gender differences were evident, highlighting the need for targeted interventions addressing sleep hygiene, especially among male students. Further research with larger sample sizes and assessment of additional variables such as physical activity, dietary patterns, and stress levels is warranted to better understand the multifactorial nature of sleep quality in this population.

Author contribution

Conception, design: PKK; Data acquisition: PKK, GK, BS, KG; Data analysis, interpretation: PKK; Drafting: PKK, GK, BS, KG; Revision: PKK, GK; Final approval of the version to be published: All; Agreement to be accountable for all aspects of the work: All.

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Conflict of interest

None

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Supplementary material

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

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