

Comparison of quality of sleep between medical and non-medical undergraduate Pakistani students

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Abstract

Objective: To compare the quality of sleep between medical and non-medical undergraduate students.

Methods: The comparative cross-sectional study was conducted from March to May 2017 at different universities and colleges of Rawalpindi/Islamabad cities in Pakistan. Pittsburgh sleep quality index questionnaire was distributed among undergraduate students. Comparison was made between the global and component scores of medical and non-medical students. Excel 2013 was used for data analysis.

Results: Of the 606 students approached, 520(85.8%) responded. Among them, 266(51.1%) were medical students and 254(48.9%) were non-medical. Also, 327(62.9%) were females and 193(37.1%) males. Overall mean age of the subjects was 20.25 ± 1.54 years. Among the medical students, 179(67.3%) and among the non-medical 128(50.4%) subjects were classified as poor sleepers with mean score of 6.386 ± 2.923 . The scores were significantly higher among medical students, indicating poorer sleep quality and were higher still among female medical students ($p < 0.05$). However, no gender difference was found among non-medical students.

Conclusion: A considerable proportion of Pakistani undergraduate students have disturbed sleep patterns that tend to deteriorate further among medical students.

Keywords: Sleep quality, Pittsburgh sleep quality index, Undergraduate students, Pakistan. (JPMA 68: 1465; 2018)

Introduction

Sleep is defined as a cyclical state of rest and restoration during which consciousness of the surrounding world is halted. Maintenance of optimal health and homeostasis is largely dependent upon the cognitive, reparative and regenerative processes that accompany sleep.¹ Sleep deprivation is closely linked to coronary heart disease (CHD), hypertension (HT), hypercholesterolaemia and diabetes mellitus (DM).²

Sleep quality among college students is an area of particular interest. Optimal sleep quantity, quality, regularity and phase scheduling are significant and independent predictors of academic performance.³ Studies on college students around the globe indicate that on an average, more than half of them are poor sleepers⁴ as assessed using Pittsburgh sleep quality index (PSQI). Today's university students are exposed to great psychological stress due to academic load, lack of leisure time, social demands and competitive career market. A predisposition to sleep disorders among this population can also be attributed to biological factors like over-activation of hypothalamic-pituitary-adrenal axis and

hyper arousal autonomic nervous system, while rumination, anxiety and pre-sleep cognitions can serve to perpetuate sleep problems.⁵

Extensive researches have shown that sleep problems are further aggravated among medical students.⁶⁻¹³ This population experiences a greater ordeal of having to cope with substantial amounts of course load, time restrictions, unending examinations, stress about grades, peer pressure and highly competitive environment of a medical school. Sleep-loss not only results in depression, but also adversely affects specific neurocognitive domains like executive attention and working memory which are mandatory for a student of medicine.¹⁴ A review article¹⁵ discussed various studies demonstrating association between sleep problems and academic performance of medical students, and showed that poor-quality sleep is linked to poor academic performance. In addition to being detrimental to mental and physical health, sleep deprivation has been linked to negative effects on emotional intelligence, including the propensity to exhibit empathy.¹⁶

PSQI is an instrument developed with the aim of quantifying sleep quality. It has a diagnostic sensitivity of 89.6% and specificity of 86.5% in distinguishing good and poor sleepers.¹⁷ PSQI has been validated in Indian university students.¹⁸ Numerous studies have been conducted around the globe to statistically correlate

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sleep quality between medical and non-medical students using PSQI. But no such study has been carried out in Pakistan. The current study was planned to fill that gap by assessing sleep quality and statistically comparing it between medical and non-medical students. We hypothesised that sleep quality would be strikingly more deranged among medical students.

Subjects and Methods

This comparative cross-sectional study was conducted from March to May, 2017. Data was collected from Rawalpindi Medical College (RMC), Rawalpindi; Federal Medical and Dental College (FMDC), Islamabad; Ayub Medical College (AMC), Abbottabad; King Edward Medical University (LEMU), Lahore; and Shifa College of Medicine (SCM), Islamabad. Non-medical colleges selected for data-collection were the National University of Computer and Emerging Sciences (FAST), Islamabad, Institute of Space Technology (IST), Islamabad; National University of Science and Technology (NUST), Islamabad; Arid Agricultural University, Rawalpindi; Islamabad Model College For Girls (IMCG) F-7/2, Islamabad; and Islamic International University Islamabad (IIUI). Participation was voluntary and informed consent was obtained from all the subjects. Design and ethical aspects of the study were approved by the ethics review committee of Army Medical College, Rawalpindi.

The study sample comprised undergraduate students enrolled in medical, dental, business, computer sciences, electrical engineering, aerospace engineering, mechanical engineering, civil engineering, environmental engineering and architecture courses. The calculated sample size was 384 for a confidence level of 95% and confidence interval (CI) of 5%, but we used a larger sample to improve the study power. Non-probability convenience consecutive sampling technique was employed.

PSQI, a self-report inventory, was administered to the enrolled subjects. The questionnaires were filled in by the students themselves. The PSQI is a 19-item questionnaire that evaluates sleep quality over the preceding month. It yields seven sleep components related to sleep habits, including duration of sleep, sleep disturbance, sleep latency, habitual sleep efficiency, use of sleep medicine, daytime dysfunction, and overall sleep quality. The sleep components yield a score ranging from 0 to 3, with three indicating the greatest dysfunction.¹³ The seven component scores yield a composite global score that ranges from 0-21; higher the score, poorer is the sleep quality. Following the PSQI protocol, respondents with a global score above 5 were labelled as poor sleepers; and

those with a score of 5 or less were classified as good sleepers.

Excel 2013 was used for statistical analysis of the collected data. Composite global PSQI scores and the seven sleep component scores were calculated. Means and standard deviations of sleep latency, sleep duration, habitual sleep efficiency, subjective sleep quality scores, sleep disturbances scores, sleep medication scores, daytime dysfunction scores and PSQI global composite scores were computed. Median and mode values were also reported where variables were not normally distributed. Furthermore, frequency distribution for these variables was generated. Finally, poor and good sleepers were differentiated and their frequencies along with percentages were computed. Sleep quality was statistically associated with fields of study and gender. Student's t-test was used to assess whether the mean values for sleep components and PSQI global scores among medical and non-medical subjects were statistically different. Student's t-test was also employed to compare these variables among the two genders. $P < 0.05$ was considered statistically significant.

Results

Of the 606 students approached, 520(85.8%) responded. Among them, 266(51.1%) were medical students and 254(48.9%) were non-medical. Also, 327(62.9%) were females and 193(37.1%) males. Overall mean age of the participants was 20.25 ± 1.5 years (range: 17-29 years).

Sleep quality was predominantly poor as indicated by mean global PSQI score of 6.4 ± 2.9 . Among the medical students, 179(67.3%) and among the non-medical 128(50.4%) subjects were classified as poor sleepers (Table-1). In terms of gender, sleep quality among females was lower than males (Table-2). Sleep quality among female medical students was even more substandard ($p=0.015$) compared to their male peers (Table-3).

Besides, 201(75.6%) medical and 194(76.4%) non-medical students reported very/fairly good subjective sleep quality, but, among them, 117(58.2%) medical and 78(40%) non-medical students turned out to be overall poor-quality sleepers. Subjective sleep quality was significantly worse ($p=0.03$) among medical students compared to non-medical students.

Sleep onset latency was ≤ 15 minutes for 113(42.5%) medical and 141(55.5%) non-medical students while it was 16-30 minutes for 101(38%) medical and 71(27.9%) non-medical students. Sleep latency was significantly delayed ($p=0.003$) among medical students compared to non-medical students. However, gender was not a

Table-1: Comparison of PSQI scores between medical and non-medical students.

Sleep Components	Statistical Characters	Medical Students n=266	Non-Medical Students n= 254	All Students n=520	p-value
Subjective Sleep Quality	PSQI Component Score Mean \pm SD	1.102 \pm 0.797	0.968 \pm 0.814	1.036 \pm 0.807	0.03*
Sleep Disturbances	PSQI Component Score Mean \pm SD	1.12 \pm 0.5	1.154 \pm 0.552	1.136 \pm 0.526	0.236
Sleep Medication	PSQI Component Score Mean \pm SD	0.199 \pm 0.578	0.271 \pm 0.678	0.235 \pm 0.629	0.096
Daytime Dysfunction	PSQI Component Score Mean \pm SD	1.492 \pm 0.891	1.272 \pm 0.881	1.385 \pm 0.892	0.002*
Sleep Latency	Mean Sleep Latency (minutes) \pm SD	26.820 \pm 23.539	21.67 \pm 18.432	24.30 \pm 21.34	0.003*
	[Median (minutes)]	[20]	[15]	[18]	
	[Mode (minutes)]	[30]	[10]	[20]	
Sleep Duration	Mean Sleep Duration (hours) \pm SD	6.117 \pm 1.63	6.783 \pm 1.838	6.442 \pm 1.764	<0.001*
	[Median (hours)]	[6]	[6.5]	[6]	
	[Mode (hours)]	[6]	[6]	[6]	
Habitual Sleep Efficiency	Mean Habitual Sleep Efficiency (%)	96.729	93.78	95.32	0.243
	[Median (%)]	[96.424]	[92.308]	[93.33]	
	[Mode (%)]	[100]	[100]	[100]	
PSQI Global Score	PSQI Global Score Mean \pm SD	6.808 \pm 2.809	5.945 \pm 2.98	6.386 \pm 2.923	<0.001*
	[Median]	[7]	[6]	[6]	
	[Mode]	[6]	[6]	[6]	

*: p<0.05 is considered as statistically significant.

SD: Standard Deviation

PSQI: Pittsburgh Sleep Quality Index

Table-2: Comparison of PSQI scores between male and female medical students.

Sleep Components	Statistical Characters	Female Students n= 192	Male Students n= 74	All Students n=266	p-value for gender
Subjective Sleep Quality	PSQI Component Score Mean \pm SD	1.161 \pm 0.806	0.946 \pm 0.757	1.102 \pm 0.797	*0.021
Sleep Disturbances	PSQI Component Score Mean \pm SD	1.156 \pm 0.528	1.027 \pm 0.404	1.120 \pm 0.500	*0.017
Sleep Medication	PSQI Component Score Mean \pm SD	0.198 \pm 0.581	0.203 \pm 0.573	0.199 \pm 0.578	0.476
Daytime Dysfunction	PSQI Component Score Mean \pm SD	1.5 \pm 0.904	1.473 \pm 0.864	1.492 \pm 1.121	0.411
Sleep Latency	Mean Sleep Latency (minutes) \pm SD	26.698 \pm 23.097	27.135 \pm 24.807	26.820 \pm 23.539	0.448
	[Median (minutes)]	[20]	[20]	[20]	
	[Mode (minutes)]	[30]	[30]	[30]	
Sleep Duration	Mean Sleep Duration (hours) \pm SD	6.017 \pm 1.596	6.378 \pm 1.696	6.118 \pm 1.630	0.058
	[Median (hours)]	[6]	[6]	[6]	
	[Mode (hours)]	[6]	[6]	[6]	
Habitual Sleep Efficiency	Mean Habitual Sleep Efficiency (%)	97.728	94.365	96.792	0.183
	[Median (%)]	[96.276]	[98.148]	[96.424]	
	[Mode (%)]	[100]	[100]	[100]	
PSQI Global Score	PSQI Global Score Mean \pm SD	7.036 \pm 2.825	6.216 \pm 2.696	6.808 \pm 2.809	*0.015
	[Median]	[7]	[6]	[7]	
	[Mode]	[6]	[5]	[6]	

*: p<0.05 is considered as statistically significant.

SD: Standard Deviation

PSQI: Pittsburgh Sleep Quality Index.

significant predictor of sleep latency in either group (p>0.05).

Mean nocturnal sleep period was greater than 7 hours for 83(31%) medical and 118(46.5%) non-medical students. It was 6-7 hours for 79(30%) medical and 73(28.7%) non-medical students; 5-6 hours for 63(24%) medical and

40(15.8%) non-medical students. Also, 41(15%) medical and 23(9%) non-medical students had asleep duration even below 5 hours. Mean nocturnal sleep period was significantly shorter (p<0.001) among medical students compared to non-medical students.

Moreover, 212(80%) medical and 184(72.4%) non-medical

Table-3: Comparison of PSQI scores between male and female non-medical students.

Sleep Components	Statistical Characters	Female Students n= 135	Male Students n= 119	All Students	p-value for gender
Subjective Sleep Quality	PSQI Component Score Mean \pm SD	0.963 \pm 0.832	0.975 \pm 0.797	0.968 \pm 0.814	0.454
Sleep Disturbances	PSQI Component Score Mean \pm SD	1.185 \pm 0.575	1.118 \pm 0.524	1.154 \pm 0.552	0.164
Sleep Medication	PSQI Component Score Mean \pm SD	0.237 \pm 0.625	0.311 \pm 0.734	0.272 \pm 0.678	0.196
Daytime Dysfunction	PSQI Component Score Mean \pm SD	1.244 \pm 0.842	1.303 \pm 0.926	1.272 \pm 0.881	0.302
Sleep Latency	Mean Sleep Latency (minutes) \pm SD	20.83 \pm 17.375	22.622 \pm 19.593	21.669 \pm 18.432	0.222
	[Median (minutes)]	[15]	[15]	[15]	
	[Mode (minutes)]	[10]	[10]	[10]	
Sleep Duration	Mean Sleep Duration (hours) \pm SD	7.046 \pm 1.793	6.485 \pm 1.850	6.783 \pm 1.838	*0.008
	[Median (hours)]	[7]	[6.5]	[6.5]	
	[Mode (hours)]	[6]	[7]	[7]	
Habitual Sleep Efficiency	Mean Habitual Sleep Efficiency (%)	90.186	97.863	93.782	0.166
	[Median (%)]	[92.308]	[92.308]	[92.308]	
	[Mode (%)]	[100]	[100]	[100]	
PSQI Global Score	PSQI Global Score Mean \pm SD	5.83 \pm 3.058	6.076 \pm 2.897	5.945 \pm 2.98	0.256
	[Median]	[5]	[6]	[6]	
	[Mode]	[5]	[6]	[6]	

*: $p < 0.05$ is considered as statistically significant.

SD: Standard Deviation

PSQI: Pittsburgh Sleep Quality Index.

students reported habitual sleep efficiency (HSE) to be greater than 85%. It did not differ significantly either between genders or between medical/non-medical student populations ($p > 0.05$).

Frequency of sleep disturbances for 196(73.7%) medical and 183(72%) non-medical students was less than once a week ($p > 0.05$). Female medical students experienced more perturbed sleep ($p = 0.017$) in contrast to their male peers.

Daytime dysfunction was more pronounced among medical students ($p = 0.002$) with 189(71%) medical and 155(61%) non-medical students reporting their bedtime to be at/after midnight.

Discussion

The current study has the distinction of being the first in Pakistan that sought to assess sleep quality among Pakistani undergraduate student population and to have statistically correlated it with fields of study using the PSQI inventory. A study⁶ conducted on 141 students of the University of Lahore assessed sleep patterns among medical and non-medical students, but it neither used PSQI to scale sleep quality nor distinguished between poor and good sleepers. However, the study⁶ reported that medical students had more disturbed sleep patterns than the comparing non-medical group, including delaying sleep time at night, noise interruption, nightmares and daytime sleepiness. The study⁶ further

reported that 66.2% medical and 46.6% non-medical students slept after midnight. In contrast, our study found that 71% medical and 61% non-medical students delayed sleep time till midnight.

A national study⁷ was conducted using the PSQI inventory. Study setting was Combined Military Hospital (CMH), Lahore and the sample size was 263. However, their⁷ sample consisted solely of medical students from one institute in contrast to our sample of students perusing wide range of courses. Mean PSQI score was reported to be 8.1 ± 3.12 with a poor sleep quality prevalence rate of 77% which was higher than that found by our study. The study⁷ did not report any gender differences among sleep quality of medical students, which is in contrast to our study that found significant correlation between poor sleep quality and female gender of medical students.

Another study⁸ on medical students ($n = 504$) of five different colleges in Karachi reported that 39.5% students were poor sleepers as per PSQI scoring standards.

Globally, 72.5% of Saudi students ($n = 546$),⁹ 59% of Indian medical students ($n = 50$),¹⁰ 32.5% of Nigerian medical students ($n = 261$),¹¹ 38.9% of Brazilian medical students ($n = 27$)¹² and 50.9% of American medical students ($n = 314$)¹³ were classified as poor sleepers.

Epidemiological data on sleep quality trends among college students pursuing a wide range of courses reveal

that more than half the students are poor sleepers.⁴ Our study found that 59% of the Pakistani undergraduate student population (n=520) had poor sleep quality with mean PSQI scores of 6.4 ± 2.9 . This prevalence rate is higher compared to the rates reported by previous studies. A Thai¹⁹ study (n=1,055) reported that 42.4% of undergraduate students experienced poor sleep with mean PSQI scores of 5.5 ± 2.5 . Another Ethiopian study²⁰ comprising 2,551 university students revealed that 55.8% of students were poor sleepers as indicated by their mean PSQI scores of 6.2 ± 2.9 . A Nepali study on 937 undergraduate students²¹ found that 35.4% of them had poor sleep quality.

A review¹⁵ of different studies indicated that 24% of university students in the United Kingdom²² and 49% in Taiwan²³ reported a mean nocturnal sleep period below 7 hours; it was 61.4% in the current study.

One Indian study⁴ comprising 112 medical and 102 non-medical students demonstrated results that were quite similar to the findings of our study, though our sample size was much larger. The prevalence of poor sleep quality in this study⁴ was 62.6% which is very close to our rate of 59%. Their⁴ mean PSQI score was 6.4 ± 2.8 which was comparable to our average score of 6.4 ± 2.9 . Besides, 20% of students in the Indian⁴ study had nocturnal sleep period below 5 hours a day, while it was 12.3% in our case. When comparing medical and non-medical students, the other study⁴ found that 72.9% of medical and 51.9% of non-medical students were poor sleepers which was comparable to our rates of 67.3% among medical and 50.4% among non-medical student population. This study⁴ also found that sleep duration among medical students was significantly lesser and subjective sleep quality was significantly more deranged than that among the non-medical students which was the case in our study too.

The current study manifests a high prevalence rate of poor sleep quality among Pakistani undergraduate student population. It infers that the quality of sleep among medical students is even more substandard than that among non-medical students. Its prevalence is higher than that reported by most of the international studies cited above. This might be attributed to socioeconomic conditions and cultural demands placed on students in Pakistan. Our study also shows that female medical students experience significantly poorer sleep quality compared with their male peers; this is in consonance with another study from Karachi.⁸ A possible explanation could be that females usually undergo greater academic stresses²⁴ which can negatively impact their sleep. We infer this because studies⁷ have shown

significant association between stress and poor sleep quality.

Interestingly, poor sleep quality was greatly under-reported in the current study as 58.2% of medical and 40% of non-medical students, who perceived that the quality of their sleep was good, actually turned out to be poor sleepers as indicated by their global PSQI scores. This conflict between self-perception and factual scores indicates lack of sleep education among the students and ignorance on their part. They are probably unable to see the larger picture and relate their symptoms to sleep problems. Apart from its implication in various metabolic, hormonal and neural disorders, poor sleep quality is a chief concern among college students. Inadequate sleep has detrimental effects on the three brain processes associated with learning: acquisition, consolidation and recall.²⁵ Thus, it is vital to carry out further studies with the intent to identify factors responsible for such deranged sleep patterns so that effective planning can be done to target and resolve them. Several introductory measures can be taken that include increasing sleep education among students, emphasising upon the significance of stress and time management, making course schedules more accommodative and student-friendly; and introducing an overall healthy environment where our future professionals can thrive and flourish.

Our study has its limitations too. PSQI is a self-report inventory which was used for data collection, thus, the existence of social desirability bias and recall bias cannot be overlooked. Also, voluntary participation of the subjects may result in non-random sampling bias. Thus, our findings cannot be generalised to the entire target population and further studies are required to confirm the findings.

Conclusion

Sleep quality among Pakistani undergraduate student population was found to be generally poor. It was even more inferior among medical students.

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Conflicts of Interest: None.

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