

ASSESSING SLEEP QUALITY AND ITS IMPACT ON ACADEMIC PERFORMANCE AMONG UNDERGRADUATE STUDENTS OF PESHAWAR

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ABSTRACT

Objectives: To assess students' sleep quality and to find the association of students' academic performance with sleep quality.

Materials and Methods: It is a cross-sectional study conducted in three public sector institutes: Khyber Medical College Peshawar (KMC), Khyber College of Dentistry (KCD) Peshawar, and the University of Peshawar (UOP). A convenience sampling technique was used, and a sample size of 139 was calculated using the Cochran formula. Data collection was done from September 10, 2022, to October 1, 2022. A self-administered well-validated questionnaire was used to inquire about students' personal and lifestyle characteristics and academic performance and also included the Pittsburgh Sleep Quality Index (PSQI). A score equal to or greater than 5 on the PSQI scale signifies poor sleep quality. The chi-square test and Pearson correlation were applied to determine statistical significance. The data analyses were conducted using IBM's SPSS Statistical Software for Windows (IBM SPSS Version 21, Chicago, IL, USA).

Results: Out of 139 participants, 29 (20.9%) had good-quality sleep, while 110 (79.1%) were poor sleepers. However, we could find no significant association between sleep quality and academic performance ($p = 0.194$; $r = -0.049$)

Conclusion: A very high percentage of students had poor sleep quality. However, we could establish no association with academic performance.

Keywords: Sleep Quality; Academic Performance; Medical Students; Dental Students.

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INTRODUCTION

For years it is known that sleep is central to human health, and its deprivation or disruption in any manner poses severe health risks ranging from cognitive decline, lack of concentration, and poor academic performance to psychiatric disorders including anxiety and depression, traffic accidents, occupational injuries, increased risk of obesity and even some types of cancers such as breast cancer.¹

Medical students are especially prone to insufficient quantity and quality of sleep due to the extensive

workload and competitive exams that they must excel in.² Insufficient sleep duration, a delay in the onset of sleep, and the occurrence of napping episodes during the day typify their sleep pattern.³ Abundant evidence has substantiated the elevated occurrence of substandard sleep quality among medical students, with a reported prevalence of 52.7% in one study.⁴ Studies regarding the association of sleep quality with academic performance have shown conflicting results, with some claiming that poor sleep quality has a significant association with academic performance, while others have not found so.^{5,6}

The same holds for dental students, as shown by a study in a Brazilian University that dental students also suffer from poor sleep quality, with some studies reporting that poor sleep quality was associated with lower academic performance.⁷ In contrast, another study in Iran showed no association.⁸ Poor sleep quality was also seen in students of other disciplines unrelated to the medical field, as shown by different studies.⁹

Since previous studies have shown a geographic variation in sleep quality and its association with academic

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performance, only a few studies addressed this problem in dental and other specialty students. To our knowledge, this study is the first of its kind to be conducted in the Khyber Pakhtunkhwa Province of Pakistan. We aim to enunciate the prevalence of poor sleep quality among medical, dental, and students of other disciplines and also to assess its association with academic performance. This research may highlight the need for more comprehensive sleep education for students and professionals in these fields. It will also help educational institutions to develop strategies to support their students' sleep health and optimize their academic performance.

MATERIALS AND METHODS

It is a cross-sectional study conducted in three public sector institutes: Khyber Medical College (KMC) Peshawar, Khyber College of Dentistry (KCD) Peshawar, and the University of Peshawar (UOP). Convenience sampling was used, and based on a previous study, a sample size of 139 was calculated using Cochran's formula. (10) Undergraduate students, Students of 2nd-year to 5th-year MBBS and 2nd-year to 4th-year BDS, and students of 2nd to 8th semester of the University of Peshawar, both males and females were included in our study while those who did not appear in their last exam, students of UOP studying in the first semester, first-year MBBS and BDS students, students with insomnia secondary to some chronic illness, and those students who do a part-time job were excluded. Data collection was started after approval from IREB Khyber Medical College Peshawar (564/DME/KMC, 29th Aug 2022). After informed consent, the data for the sample were collected from September 10, 2022, to October 1, 2022, during active academic sessions. The following operational definitions are used: Academic performance is the percentage of marks obtained in the last professional examination for MBBS and BDS students; while for students of other specialties, it is the percentage equivalent of Grade Point Average (GPA); The classification of good and bad sleepers is according to the Pittsburgh Sleep Quality Index (PSQI) scale, a pre-made validated tool for assessing sleep quality.

Each participant received a self-administered questionnaire that had been validated for accuracy. The questionnaire was face and content validated by subject experts and pilot testing on students, who were then ex-

cluded from the study to minimize bias. It included sections on students' personal and lifestyle characteristics, the Pittsburgh Sleep Quality Index (PSQI), and academic performance. Academic performance was assessed by asking participants about their percent marks obtained or grade point average (GPA) for the last exam before the study period. The Pittsburgh Sleep Quality Index (PSQI) is a self-report instrument used to assess sleep quality and detect disturbances experienced during the month preceding the survey. It assigns scores ranging from 0 to 21. A score equal to or greater than 5 signifies poor sleep quality. The application of the chi-square and Pearson correlation tests allowed for the evaluation of statistical significance and correlation between the variables. The data analyses were conducted using IBM's SPSS Statistical Software for Windows (IBM SPSS Version 21, Chicago, IL, USA).

RESULTS

A total of 139 students from various universities filled out the questionnaire, out of which 42 students belonged to KMC, 38 students to KCD, and 59 students from the UOP. Out of the 139 students who completed the questionnaires, 79 (56.8%) were males, and 60 (43.2%) were females.

Overall, 29 (20.9%) participants had good-quality sleep, while 110 (79.1%) were poor sleepers (Figure 1). The maximum number of students (74) fell in the "Good (Percentage 70 to 79% or GPA 3.2 to 3.6)" category. The sleep quality of this group was such that 11 (7.9%) were good sleepers, while 63 (45.3%) were poor sleepers. A total of 36 students fell in the "Outstanding (Percentage > 80% or GPA >3.7) category. Among these, 11 (7.9%) were good sleepers, and 25 (18%) were poor sleepers. The third largest group according to academic performance was "Average (Percentage 50 to 69% or GPA 2.0 to 3.1)". A total of 27 students had an average score, of which 6 (4.3%) participants had good sleep quality, while 21(15.1%) had poor sleep quality. Only two students had poor academic performance (Percentage < 50% or GPA < 2.0), out of which one was a good and one bad sleeper (Table 1, Figure 2).

Additionally, 136 i.e., 97.8% of students used mobile phones in the 2 hours before going to sleep. 27(19.4%)

Table 1: Demographics of included participants

No of participants	Gender		Age (Mean ± SD)	No of participants, according to discipline			No of participants according to academic performance
	Male	Female		MBBS	BDS	Other disciplines	
139	79	60	1.39 ± 21.27	42	38	59	Outstanding: 36
							Good: 74
							Average: 27
							Poor: 2

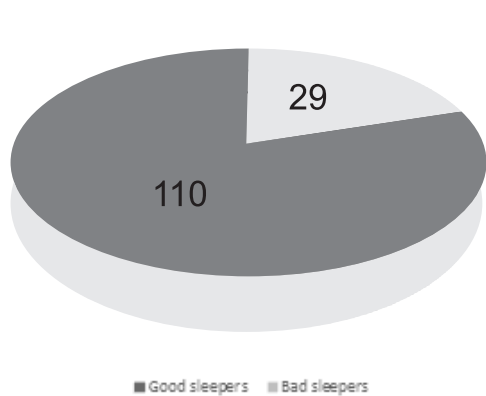


Fig 1: Study participants having good and bad sleep patterns

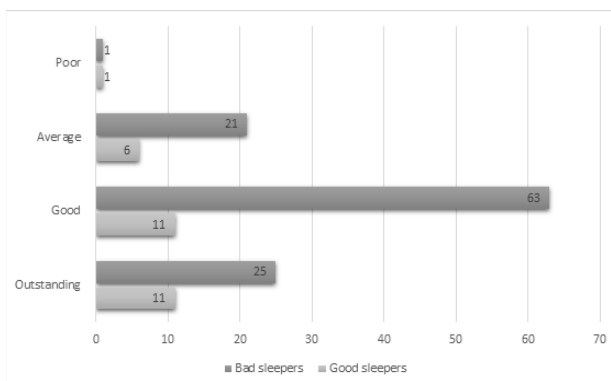


Fig 2: Relationship between sleep quality and academic performance

students' sleep was disturbed up to the level that they were taking sleep-inducing medication. Thirty-three out of the total 38 (86.8%) students from KCD were poor sleepers, which is the highest figure among the three institutes included in the study.

Chi-Square test was applied to determine the effect of sleep quality on academic performance. However, as reported by other studies, we could find no significant association between sleep quality and academic performance ($p = 0.194$). A bivariate Pearson correlation was also run, and it showed a statistically non-significant correlation ($p > 0.05$; $r = -0.049$)

DISCUSSION

In the modern era where multiple psychosocial factors, a sedentary lifestyle, and excessive use of smartphones signify our daily routine, the importance of sleep becomes of much relevance. Apart from cognitive impairment, and a decrease in productivity and safety in the workplace, Sleep cycle disturbances have been linked to multiple serious health conditions including Parkinson's disease, Multiple system atrophy, depression, and bipolar disorder among others.¹¹ A striking 79.1% of students had

poor while 20.9% had good sleep quality, regardless of their academic performance. However, we could not establish an association between sleep quality and academic performance.

Ojeda-Paredes et al. conducted a study akin to ours, encompassing 65 male and 53 female medical students, and found that 98.11% of women and 90.76% of men experienced a subjective perception of poor sleep quality; No association was found between sleep quality and academic performance.⁶ A research conducted in Saudi Arabia by Malak A. Al Shammari et al. involved a sample population consisting of 36.7% males and 63.30% females. The results revealed that 80.60% of the participants reported poor sleep quality, with 37.80% of the students indicating excessive daytime sleepiness. The odds of having poor academic performance were significantly higher in individuals who reported excessive sleepiness.¹²

In an Iranian study in which 177 medical students were enrolled, 36.6% of participants had poor sleep quality; similar to our findings, a higher ratio of females had poor sleep quality, but in contrast to our results, abnormal PSQI scores were significantly associated with lower academic achievement.¹³ Abdullah D Alotaibi et al. demonstrated that medical students in their pre-clinical years exhibited poor sleep quality and elevated levels of stress, with a significant association observed between these two variables.¹⁴

According to a study by K. Ahrberg et al., there is a connection between academic performance and sleep quality as well as stress specifically before exams. The findings reveal that poor academic performance is associated with low sleep quality and high levels of stress during this particular period. However, this relationship was not observed during other time points; but they contend that among medical students, it is not the overall poor sleepers who demonstrate inferior performance in medical board exams. Rather, it is those students who experience higher levels of stress and exhibit poor sleep quality who tend to fare worse on their exams. Nonetheless, it should be acknowledged that inadequate sleep quality can negatively affect test performance, thereby contributing to a cycle of underperformance.¹⁵

Dental students are no exception to being the victims of poor sleep quality, with one study reporting poor sleep quality in 65% while another in 35%; however, contradicting our findings, sleep quality was associated with academic performance.^{7,16}

Contrary to the paradigm that sleep is central to achieving good academic results, we did not observe any significant relationship between sleep quality and academic performance., specifically during the examination period. This difference is surprising, as it suggests that temporary disturbance in sleep during examination times

may not affect academic performance, or it may even improve performance if that time is allocated for studying; in fact, some studies report that poor sleepers had better academic performance than good sleepers.¹⁷ In our study also, the majority of the participants in the outstanding and good category performers were poor sleepers. A possible reason might be that the good performers give less time to sleep yet give more time to study and thus perform better than good sleepers.

To summarize, this study investigated exam performance and sleep quality interrelationships. A staggering majority of the participants were poor sleepers and only a small proportion were good sleepers. We could not show any significant association between sleep quality and exam performance.

Using a cross-sectional study design and convenient sampling limits the power of our study. We also did not consider the students' anxiety, stress, smoking status and marital status. Still, our findings are similar to studies conducted across many other countries, and our results are accurate and generalizable to the study population.

CONCLUSION

A very high percentage of students had poor sleep quality. However, we could establish no association with academic performance. Further research is needed on how much disruption in sleep is tolerable and does not affect academic performance. Large-scale cohort studies with a larger sample size should be conducted to determine the long-term effects of poor sleep quality on academic performance.

Further studies can also identify potential confounders such as stress level, study habits, marital status, smoking, and physical activity. Although a short-term academic performance was not affected, the deleterious effects of poor sleep quality have been well entrenched in the literature and this issue needs to be addressed appropriately. Special educational sessions on the importance of sleep can be arranged for students. The competent authorities should take steps to reduce the workload on students especially those related to health care, so that they can optimize their sleep and be more productive and efficient in the workplace.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

AM and **IH** conceived and designed the study and are responsible for the integrity of the study.

All authors contributed to the acquisition, analysis, or interpretation of data.

All authors critically revised the manuscript and approved it for publication.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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