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Original Article

Impact of Academic Stress on Sleep Patterns among Medical Students of Army Medical College, Rawalpindi, Pakistan

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ABSTRACT

Objective: To estimate the frequency and association between academic stress and sleep quality among medical students of Army Medical College, Rawalpindi, Pakistan.

Study Design: Cross-sectional analytical study.

Place and Duration of Study: Army Medical College, Rawalpindi Pakistan, from Jul to Sept 2023.

Methodology: Data from 280 students were obtained using non-probability convenience sampling. Medical students at Army Medical College, Rawalpindi, Pakistan, aged 18 to 25 years were included in the study. Students having anxiety disorders and diagnosed cases of sleep disorders were excluded. An online questionnaire was used to evaluate academic stress and sleep patterns.

Results: Out of the 280 participants of the study, 246(87.8%) reported that they experienced academic stress. Academic stress scores showed that 161(57.5%) respondents experienced high levels of academic stress. Poor sleep (PSQI score 5-21) was seen in 225(80.3%) participants. A significant association was found between academic stress and sleep quality (p=0.009), sleep latency (p=0.045), sleep duration (p=0.015), sleep disturbances (p=0.024), daytime dysfunction (p=0.043), and subjective sleep quality (p=0.001).

Conclusion: A large proportion of participants from the study setting experience academic stress and have disturbed sleep patterns with poor sleep quality. Both variables are seen to be associated with each other. A greater percentage of females experienced academic stress than males, but subjects having poor sleep quality comprised almost equal percentages of males and females.

Keywords: Academic Stress, Medical students, Sleep quality.

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INTRODUCTION

Medical education is known for its heavy workload, rigorous curriculum and academic stress. These stressors have a remarkable impact on the sleep patterns of students. Poor sleep quality affects physical and cognitive health of students, especially memory retention.

Sleep is a major aspect of overall well-being and plays a key role in cognitive functioning, memory consolidation, emotional regulation, and has neuroprotective benefits.[1,2] The importance of ample sleep can further be stressed by the fact that it lowers the chances of developing depression and other psychiatric disorders.[3,4] In addition, sleep is vital for brain development, cognition, vigilance, and mental clarity.[5] Sleep quality can be judged by the following four characteristics: sleep efficiency, sleep latency, sleep duration, and wake after sleep onset.[6] The quality of sleep may be affected by various physiological, environmental, and psychological factors, including academic stress.

Academic stress is a prevalent issue among medical students, given the demanding nature of their education and training. This can be attributed to the high workload, difficulty in time management, competition among peers, uncertainty about the future of their careers, societal pressure, and disturbed social life.[7] In addition to academics, personal, family, and financial stressors add up and contribute to increased stress levels in medical students.[8]

The impact of academic stress on the sleep patterns of medical students can have several consequences, which include impaired academic performance, inability to focus and reason, decreased emotional well-being, deterioration of physical health, burnout and attrition, and poor social behavior. Inadequate sleep negatively affects learning, memory consolidation, and information processing, leading to reduced academic performance. Sleep deprivation can

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hinder the ability of medical students to retain and recall critical medical knowledge.[9]

Therefore, the study aimed to deduce a relationship between academic stress and sleep patterns among medical students. In addition, it is important to identify the stressors leading to poor sleep quality so that appropriate steps can be taken to improve sleep quality, which in turn could enhance both academic performance and overall health, thus providing a more balanced and productive academic environment for medical students.

METHODOLOGY

The cross-sectional analytical study was conducted from July to September 2023 at the Army Medical College, National University of Medical Sciences (NUMS), Rawalpindi, Pakistan. Raosoft Calculator was used to calculate sample size, using population size of medical students studying at Army Medical College as 1270, and previous prevalence of poor sleep among medical students in Pakistan as 63%; thus, resulting in a sample size of 280. Ethical approval for the study was obtained from the Ethical Review Committee (ERC) of Army Medical College with reference number ERC/ID/305.

Inclusion Criteria: Undergraduate medical students from various levels of their academic years, of either gender, with age range from 18 to 25 years, were included.

Exclusion Criteria: Students having anxiety disorders and diagnosed cases of sleep disorders were excluded.

Using a non-probability convenience sampling technique, a total of 280 medical students aged 18-25 years were analyzed based on a closed-ended questionnaire. The questionnaire consisted of 3 portions; a demographic section was included, which consisted of closed-ended questions about age, gender, and year of MBBS. A pre-validated Academic Stress Scale was used in the second section, which included 10 self-reported questions regarding academic stress. The Pittsburgh Sleep Quality Index (PSQI) scale was included in the third section to assess the sleep quality of the subjects.[10] PSQI scale consists of 7 components: subjective sleep quality, sleep latency (the length of time it takes for a person to fall asleep), sleep duration, Habitual Sleep Efficiency (the proportion of the total time spent asleep in a night to the total amount of time spent in bed), sleep disturbances, use of sleeping medications and daytime dysfunction. PSQI scores from 0-4 indicate good sleep quality, and from 5-21 indicate poor sleep quality.[11]

Participants were asked to fill out the questionnaire via Google Forms. Following a brief explanation of the purpose of the study, informed consent was obtained from the participants. The data was not identified through any personal names, and the confidentiality and privacy of the data were ensured using password-protected computers.

Data was exported to an Excel Sheet and coded. The total scores of the academic stress scale, ranging from 0-40, were categorized into low stress (0-20) and high stress (21-40). PSQI scales ranging from 0-21 were categorized into good sleep (0-4) and poor sleep (5-21). Data was then entered into Statistical Package for Social Sciences (SPSS) version 27. Frequency and percentages were calculated for qualitative variables. The chi-square test was applied between academic stress and sleep quality. Obtained *p*-values of less than 0.05 were considered statistically significant, while *p*-values of greater than 0.05 were seen as statistically insignificant.

RESULTS

Out of the 280 subjects of the study, 135(48.2%) participants were females and 145(51.8%) were males. 168(60%) respondents ranged from ages 18-20 years while 112(40%) were 21-25 years of age. 111(40%) of our participants were second-year medical students, followed by 91(32.5%) from third year, 59(21.1%) from first year, while the remaining respondents were from fourth and final year.

According to self-assessment by the participants, 246(87.8%) subjects reported that they experienced academic stress, which comprised 132(97.7%) of the total female participants and 114(78.6%) of the total males. The more frequent causes of this stress included pressure to achieve high grades and exhaustion due to academic load. Academic stress scores obtained showed that 161(57.5%) respondents experienced high academic stress. Poor sleep (PSQI score 5-21) was seen in 225(80.3%) of total participants, which comprised 107(79.2%) of total females and 118(81.3%) of total males. Only 28(20.7%) females and 27(18.6%) males had a PSQI score of 0-4, indicating good sleep.

During the month preceding the survey, 204(72.9%) reported a disturbed sleep latency, out of which 29(10.4%) had severely disturbed sleep latency. Only 26(9.3%) participants had sleep duration >7

hours per day during the previous month, 76(27.1%) had sleep duration 6-7 hours per day, 122(43.6%) reported daily duration of sleep 5-6 hours, while 56(20%) respondents got even less than 5 hours of sleep per day. 92(32.9%) participants had a good habitual sleep efficiency of >85%. 188(73.1%) respondents had disturbed Habitual Sleep Efficiency, out of which 30(10.7%) had habitual sleep efficiency even less than 65%, which is explained further in figure. 242(86.4%) participants had nighttime disturbances, while 8(2.9%) respondents reported severe sleep disturbances. 199(71.1%) had daytime dysfunction whereas severe daytime dysfunction was seen in 46(16.4%) participants. A few respondents, i.e., 49(17.5%), even reported using sedatives to fall asleep.

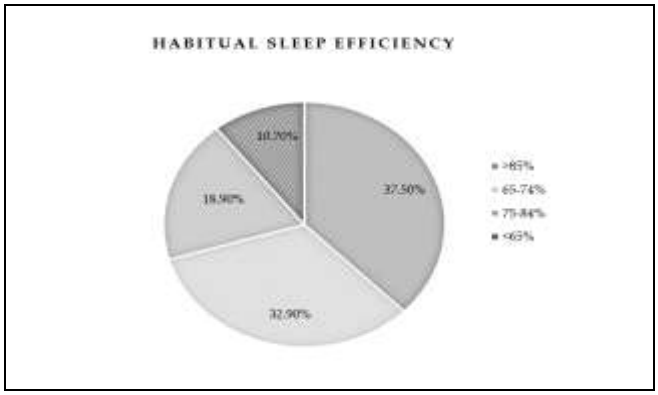

Figure: Habitual Sleep Efficiency (HSE) (n=280)

A statistically significant *p*-value of 0.009 was obtained between academic stress and sleep quality among medical students, showing an association between the two variables. Poor sleepers consisted of a greater proportion of participants with high academic stress, whereas good sleepers consisted of more participants with low academic stress, as seen in Table.

Table: Association of Academic Stress with Sleep Quality (n=280)

Academic Stress	Good Sleep (n=55)	Poor Sleep (n=225)	*p*-value
Less Stressed	32(11.43%)	87(31.07%)	p=0.009
More Stressed	23(8.21%)	138(49.29%)	

Association of academic stress and sleep quality with sociodemographic variables was analyzed. It was seen that more females (73.3%) were experiencing high academic stress as compared to males (42.7%), with statistical significance noted ($p<0.001$). A higher percentage of males (81.3%) experienced poor sleep as compared to females (79.2%), but no statistical significance was found ($p=0.655$). On examining the association between academic stress levels and age, it was revealed that more participants (64.28%) from the elder age group (21-25 years) were experiencing higher academic stress levels as compared to proportion of participants (52.9%) from the younger age group (18-20 years), but these findings were found to be statistically insignificant ($p=0.061$). However, when associating quality of sleep with age groups, it was seen that a higher proportion of participants (84.5%) from the younger age group suffered more poor sleep as compared to participants experiencing poor sleep from the older age group (74.1%).

On analyzing the association of academic stress levels with various sleep characteristics, a significant association was seen between higher stress levels and disturbed sleep latency, with an obtained *p*-value of 0.045. It was also analyzed that participants who had higher academic stress had less sleep duration ($p=0.015$), more sleep disturbances ($p=0.024$), and were more prone to have daytime dysfunction ($p=0.043$). However, no statistical significance was found for lower habitual sleep efficiency and use of sleep medications in participants experiencing higher academic stress.

DISCUSSION

An association between academic stress and sleep quality highlighted the detrimental impacts of exposure to academic stress on medical students. Remarkably high percentage of academic stress and poor sleep quality was seen in the majority of the participants of this study. In a similar study conducted in Nepal, most of the students were found to have poor sleep quality, but at a lower percentage than our findings.[12] This difference can be attributed to lifestyle and personality differences among the students. It was found in the study that examination periods increase both stress and poor sleep quality. Findings like this were observed in a study conducted on Nigerian medical students.[13] A strong association between stress and poor sleep quality was also found in a study conducted in Saudi Arabia, according to which most of the students experienced academic stress and had poor sleep quality.[14]

A considerable number of our participants got 5-6 hours or less of sleep in the month preceding the survey, while in the previously mentioned study conducted in Nepal, most of the students got 6-7 hours or more of sleep every night.[12] This may be due to differences in curriculum, schedules, and routine

activities between the two demographics. Most of the participants in the study reported that it took them less than 15 minutes or a maximum of 30 minutes to fall asleep. This finding coincides with the findings seen in a study conducted on Nigerian students.[13]

PSQI scores that were calculated in this study indicated poor sleep in more than three fourths of the female population and even higher in male population, which is quite alarming considering the consequences of poor sleep in medical students. This is opposed to the findings in another similar study, where a slightly greater percentage of females had poor sleep quality.[13] However, gender differences in both studies are insignificant and can be attributed to extraneous factors.

Chi square test applied to assess the association between academic stress and sleep quality indicated a statistically significant association between academic stress and sleep quality, like results obtained in a study conducted in China and Saudi Arabia.[15,16] The study revealed considerably higher levels of academic stress in females as compared to males. This interesting finding in our analysis was found to be consistent with evidence seen in other studies conducted across the world, showing higher academic stress in females as compared to males.[17-20] On the other hand, almost the same percentage of males and females were seen to have poor sleep quality in the study, with a slightly higher frequency of poor sleep in males. This gives rise to the postulation that males may be exposed to factors other than academic stress, leading to their poor sleep.

It was seen in the study that some respondents had Habitual Sleep Efficiency (HSE) even lower than 65%, this finding is comparable to a similar study conducted in the twin cities of Pakistan.[21] This finding is quite alarming, as literature has shown that lower HSE can lead to chronic health problems, including cardiovascular diseases and diabetes.[22,23] In a study conducted in men, it was found that lower HSE can elevate physiological stress markers like cortisol and may also lead to elevations of blood pressure as compared to subjects with high sleep efficiency.[24] This signifies the importance of maintaining a higher HSE by the provision of good quality sleep.

A significant number of participants reported insomnia as a reason for self-medication, which can lead to misuse of sleeping pills, overdose, or addiction. This prevalence is higher in comparison to a previous study conducted in Pakistan, in which only a small percentage of medical students were using self-medication to induce sleep.[25] A higher frequency of sleeping medication use in the study may be due to neglected behavior towards its consequences, or it can also be a self-coping mechanism to deal with poor sleep quality.

As this study highlights the association between academic stress and poor sleep quality, it is important to acknowledge the need for developing strategies that can help manage academic stress as well as improve sleep, thus enhancing the overall health and academic performance of medical students. Moreover, further studies should be conducted on this aspect of medical students, thus extracting interventions that can improve the mental and physical health of students.

LIMITATIONS OF STUDY

The scope of the study was narrowed by a lack of resources, time constraints, and limited sample size. The study was conducted in only one Medical College, which limits the generalizability of results.

DISCLOSURE

This article was presented in a poster presentation at the Wah Medical College Symposium on 8th June 2024. 11th Annual AURF (Amcolians Undergraduate Research Forum) Symposium at Army Medical College on 4th April 2024. 6th Undergraduate Research Gala, Islamic International Medical College, Riphah University, on 5th March 2024. However, it was not published anywhere.

CONCLUSION

The study concludes that most students experiencing academic stress have disturbed sleep patterns, with poor sleep quality. A significant association was seen between both variables. A higher proportion of females experienced academic stress as compared to males, however, subjects having poor sleep quality comprised almost an equal percentage of males and females.

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Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

AG & MA: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

AA & FI: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MT & AS: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

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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