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Original Article

Relationship Between Stress and Sleep Quality Among Undergraduate Medical Students

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Abstract: Background: Medical students usually undergo immense pressures that are unlike those in their regular academic lives. Academic stress, prolonged study hours, and stress on academic performance make them vulnerable to injuries that may turn chronic. Chronic stress has a subtle effect on numerous health aspects. Sleep quality is likely to be one of the most impacted. It is necessary to comprehend the interplay of stress and sleep in this population in order to create quick interventions that will improve the health and performance of future healthcare professionals. **Methods:** A cross-sectional correlational study was performed for 6 months at a medical college and research institute in Sukkur. Nonprobability sampling was done to select 274 third-, fourth-, and final-year medical students as participants. A Student Stress Inventory (SSI) was used to measure stress levels and Pittsburgh Sleep Quality Index (PSQI) to measure sleep quality. The analysis was done with the help of SPSS version 24. The demographic data was summarized descriptively, and Pearson correlation and one-way analysis of variance were used to test for associations and differences among the groups. **Results:** The mean age of participants was 21.56 years (SD = 2.26), with 47.1% males and 52.9% females. A moderate positive correlation was found between stress and poor sleep quality ($r = 0.598$, $p < 0.001$). However, one-way ANOVA showed no significant differences in stress levels ($p = 0.695$) or sleep quality ($p = 0.119$) across different academic years. **Conclusion:** Higher stress levels were significantly associated with poorer sleep quality among undergraduate medical students, irrespective of their year of study. These findings underline the importance of implementing stress management and sleep improvement strategies to promote the mental health and academic success of medical students.

Keywords: Stress, Sleep Quality, Undergraduate Medical Students, Student Stress Inventory, Pittsburgh Sleep Quality Index

1. Introduction

Stress is a multifaceted psychological and physiological response to perceived challenges or threats: it has recently become even more prominent within academic circles, especially among medical students (Du et al., 2020). Defined as a state of mental or emotional strain affecting individuals resulting from adverse or demanding circumstances, stress here stands for a very complex interrelationship between environmental pressures and what one is able to cope with. Stressors in medical education come from the academic workload, expectations of performance, clinical responsibilities, and emotional burden from dealing with patient care (Allende-Rayme et al., 2022). Sleep is a natural, reversible, periodic, and restorative state that is used by all human beings to maintain health; disruption of sleep has detrimental effects on cognitive functioning, emotional regulation, memory consolidation, and overall health. Good sleep is, therefore, determined by various characteristics such as sleep duration, continuity, depth, and the feeling of restfulness upon waking. In the event of a compromised quality of sleep, there is a predisposition toward both mental and physical health conditions (Huang et al., 2020; Steiner-Hofbauer & Holzinger, 2020).

The prevalence of stress and its harmful impact on sleep quality represent a serious concern among undergraduate medical students, calling for immediate action. Academic demands, personal vulnerabilities, environmental contributors, and lifestyle choices are the common co-engenderers behind the twin added stresses and sleep disturbances in this population (Manzar et al., 2020). Stress and poor sleep are high-priority emotional problems in the context of healthcare students will, however, be rightly and objectively assessed through the use of appropriate validated measures

such as the Perceived Stress Scale and Pittsburgh Sleep Quality Index by researchers and educators for them to elucidate and advocate for a timely and targeted intervention. Only in maximal mobilization can we hope to protect the well-being of the future healthcare worker and maximize their ability to serve the well-being of others (Estrela et al., 2021; Di Benedetto et al., 2020; Fu et al., 2020).

Medical students face several sources of stress, the clinical ones being one of them, in addition to those coming from their demanding schedules and constant examinations, which, then, all together, negatively affect their mental health and sleeping hours. The disruption of normal sleep patterns is the result of chronic stress, which leads to insomnia, fatigue, reduction in cognitive and academic performance. Sleep has been acknowledged as crucial in the light of mental health and learning, yet there is scanty research on the issue of stress and sleep quality in medical students. Hence, this research intends to participate in the survey of stress among medical students and the relationship between stress and sleep quality, thereby creating the groundwork for optimally effective, that is, healthier coping mechanisms, which would in turn result in better academic performance.

2. Materials and Methods

Study Design: The link between stress and sleep quality in medical students has been examined through a cross-sectional study. Its design is considered to be the most effective, economical, and suitable for understanding relationships between variables at one single moment without the necessity of a prolonged follow-up. The research was able to ascertain the present stress and sleep habits of the students accurately by gathering information from the subjects at the same time.

Study Setting: The research took place in a number of educational institutions situated in Sukkur, Sindh, and these included Ziauddin University, Royal Institution, GMC, Teachers Institute, and Blessings Institute. The selection of multiple centers guaranteed that there would be a good mix of medical students and this, in turn, increased the applicability of the findings to a wider population.

Study Duration*:*This research was finished in 6 months after the approval of the study package, thereby making sure that all the steps involved in data collection and analysis were conducted in an organized and timely manner.

Study Population**:** The subject of the research was represented by medical students who were in their third, fourth, and final years of the undergraduate program. Selection of the students was done according to their availability and interest in joining the research.

Sampling Technique: A non-probability convenience sampling method was employed in selecting the participants. This way, the researchers were able to easily reach the target group and make sure that only those who wanted to participate did so.

Sample Size**:** A total of 274 students participated in the study. Participants were selected from the listed institutes to represent a range of academic years and demographic backgrounds.

Independent and Dependent Variables: As a dependent variable, the stress level was ascribed to the physiologic and psychologic responses of medical students towards academic and environmental pressures. The independent variable was sleep evaluated by the Pittsburgh Sleep Quality Index (PSQI). The control variables comprised age, sex, educational years, chronic illness, sleep-affecting medicines, and mental health history.

Assessment of Stress**:** Participant stress was assessed through the Student Stress Inventory (SSI), which is a standard questionnaire designed for the purpose of measuring the severity and variety of stressors found in the classroom as a result of different academic pressures. The areas like academic pressure, social stress, financial worries, and family-related stress are included in SSI. The participants have to rate each of the statements on a scale in the form of a Likert-type scale, where the high total scores indicate high perceived stress. SSI has very good internal consistency since its Cronbach's alpha values are usually over 0.80, and the measure gets its criterion validity confirmed through correlations with the other accepted measures of stress. This method allows the researchers to quantitatively measure not only the extent of stress but also its intensity in the studied population.

Assessment of Sleep Quality**:** The Pittsburgh Sleep Quality Index (PSQI), a trustworthy self-report questionnaire, was the tool which helped in the evaluation of sleep quality. The PSQI provides a multidimensional assessment of sleep during a one-month period covering the sleep aspects of onset, duration, efficiency, disturbances, and daytime dysfunction. The answers are then scored to arrive at the global PSQI score, with scores over 5 indicating poor quality of sleep. The PSQI is a very good tool for measuring sleep quality among students since it has been shown to be both reliable and valid for all populations, with Cronbach's alpha ranging from 0.70 to 0.83.

Data Collection Procedure: Data were gathered from qualified students following the acquisition of written informed consent. The participants received printed questionnaires that included both SSI and PSQI scales. This method guaranteed confidentiality, voluntary participation, and

anonymity of responses. Data collection was done in six months after getting the ethical approval and synopsis acceptance.

***Data Analysis Procedure*:** The analysis of the data collected was done using SPSS version 20. The demographic variables, stress levels, and measures of sleep quality were described through descriptive statistics which consisted of frequencies, percentages, means, and standard deviations. Inferential statistics like Pearson's correlation coefficient were applied to explore the connection between stress levels and sleep quality. P value A p-value < 0.05 was considered statistically significant.

3. Results

The study involved a total of 274 undergraduate medical students as participants. Their average age was 21.56 ± 2.26 years, and the ages varied between 18 and 25 years which was the required age group. Female students were 69.7% and that is more than twice the number of male students who were only 30.3%. Almost half of the students were (47.4%) from the 3rd year, then 34.3% from the 4th year and finally 18.2% from the last year.

Table 1: Demographic Characteristics of the participants

Variable	Category	Frequency (n)	Percentage (%)	Mean ± SD	Min–Max
Age (years)		274		21.56 ± 2.26	18–25
Gender	Male	83	30.3		
	Female	191	69.7		
Year of Study	3rd Year	130	47.4		
	4th Year	94	34.3		
	Final Year	50	18.2		

Table 2: Correlation Between Stress (SSI) and Sleep Quality (PSQI)

Variable	SSI Score	PSQI Score
SSI Score	1	0.598
PSQI Score	0.598	1
Sig. (2-tailed)		0.000
N	274	274

Interpretation: The Pearson correlation analysis revealed a moderate positive correlation between stress levels and sleep quality scores ($r = 0.598$, $p < 0.001$). This indicates that higher stress among undergraduate medical students is significantly associated with poorer sleep quality.

Table 3: One-Way ANOVA of Stress (SSI) and Sleep Quality (PSQI) Across Academic Years

Variable	Source	Sum of Squares	df	Mean Square	F	Sig.
SSI Score	Between Groups	77.336	3	38.668	0.364	0.695
	Within Groups	28,756.751	271	106.113		
	Total	28,834.087	274			
PSQI Score	Between Groups	14.009	3	7.005	2.146	0.119
	Within Groups	884.713	271	3.265		
	Total	898.722	274			

Interpretation: One-way ANOVA results showed no statistically significant differences in stress levels (SSI scores) across 3rd, 4th, and final-year students ($F = 0.364$, $p = 0.695$). Similarly, sleep quality (PSQI scores) did not differ significantly among students of different academic years ($F = 2.146$, $p = 0.119$). This suggests that academic year did not significantly influence either stress or sleep quality.

4. Discussion

Present research has been perfectly aligned with previous results, verifying a significant link between stress and poor sleep quality in undergraduates. The pooled effect-size of the association was 0.39 while a little stronger, 0.41, was the one reported for the relationship between insomnia and stress in systematic reviews and meta-analysis comprised of 34 studies and 37 effect sizes. This indicated a moderate influence of stress on sleep disturbances in students. Analogously, the current study demonstrated a moderate correlation between stress and sleep quality of undergraduate medical students ($r = 0.598$, $p < 0.001$), even a bit stronger than pooled correlations found in meta-analyses. Therefore, it is assumed that high levels of stress are associated with considerably poor sleep in such groups. The high heterogeneity reported in the meta-analysis indicated a certain degree of variability among studies; however, the consistency of a moderate relationship among different settings and populations reinforces the reliability of the association. The slightly stronger correlation found could be related to the sample, particularly, the very high academic and clinical demands put on medical students causing a gap between stress and sleep to widen. Such interventions might be stress management programs and sleep hygiene education directed at university health services. Future research should, as per the meta-analysis, conduct longitudinal studies to identify causal pathways, thus gaining better understanding of stress and sleep problems developing throughout the students' academic progress. (Gardani et al., 2022).

The present study uncovered a moderate positive correlation ($r = 0.598$, $p < 0.001$) between stress and poor sleep quality among undergraduate medical students, which confirmed the long-established fact that increased stress corresponds to worse sleep. The present study is also in line with a previous study, which was conducted among Ethiopian medical students, showing that 62 % of the students suffered from poor sleep quality and that stress was significantly associated with sleep disturbances (AOR = 2.04, 95 % CI 1.26-3.31, $p < 0.05$). Researchers argued that one of the main reasons for sleeplessness in medical students was stress. Academic pressure, emotional strain, and lifestyle factors that are typical of this population may be the sources of stress responsible for significant disruption in sleep. In addition, the previous research pointed out other factors like depression, low social support, and poor sleep hygiene that were independently contributing to the quality of sleep, thus suggesting a multifactorial reason for sleep disturbances among medical students. In this study, correlation with other predictor variables was not yet excluded, while the correlation found was $r = 0.598$, this indicates that stress alone has an impressive negative effect on sleep quality. The Ethiopian study also found that higher academic performance (higher GPA) could be a protective factor against poor sleep quality, which was not investigated during this study. These relationships highlight even more the necessity of conducting more interventions in terms of stress management, mental health support and education on sleep hygiene among medical students so that their academic performance and wellness are improved. (Wondie et al., 2021).

The previous analysis on the plight of osteopathic medical students has brought to light the aspect of the existence of strong significant correlations between the majority of the burnout dimension that is emotional exhaustion (EE) and the other variable through the mediators like perceived stress, poor sleep quality, as well as smartphone addiction. The higher perceived stress and poor sleep quality were independently associated with the higher levels of emotional exhaustion and depersonalization. These factors were found to be very strongly associated with the case of personal accomplishment (PA), and in the case of perceived stress, it was only indicated. Thus, following the line of this study conducted on the undergraduate medical student population, the research found a moderate positive correlation ($r=0.598$, $p<0.001$) between the stress levels, measured with the help of the Student Stress Inventory (SSI) and sleep quality through the Pittsburgh Sleep Quality Index (PSQI). In other words, it would mean to convey the same message also as with the earlier study that said high stress would be significantly related to low sleep quality among medical students. The latter part, that is, smartphone use, as well as burnout dimensions, was studied in the former and not this study; however, their commonality lies in stress and sleep disturbances. Furthermore, the last research managed to disclose gender and year of study variations within the dimensions of burnout, but the latter research was not able to record significant differences across academic years concerning stress or sleep quality. Notwithstanding, both studies dedicated the same emphasis to the major influence that stress has on the quality of sleep and well-being in its entirety among medical students, echoed (Brubaker & Beverly, 2020).

5. Conclusion

The investigation from its end sought to determine the relationship between stress and sleep quality among the medical students in Sukkur, Sindh, and it brought about extremely revealing findings. The research proved the connecting index between stress and bad sleep quality as a moderate positive correlation ($r = 0.598$, $p < 0.001$), which meant that the higher the stress, the poorer the sleep. Besides this, the stress and sleep quality showed similar distributions with no significant differences

for the different years (3rd, 4th, and finals) which meant that the stress and its effects on sleep were the same during the last years of the medical training program. The results pointed out an urgent need for such intervention models as stress management and sleep hygiene in medical students' population for their holistic well-being as well as academic performance.

Limitations: The application of a non-probability convenience sampling method might have caused selection bias and therefore prevented the generalization of the outcomes to the entire population of undergraduate medical students. A cross-sectional design merely demonstrates correlations that exist at particular time points in the data and consequently, it does not help in the establishment of casual relationships such as that between stress and sleep quality.

Supplementary Materials: None

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