

The Effects of Sleep on the Academic Performance and Psychological Distress among Medical Students in Saudi Arabia

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ABSTRACT

Introduction: Sufficient sleep is an essential aspect of a healthy lifestyle. Sleep deprivation is prevalent in the general population due to prolonged work hours, obesity, and increased internet action. However, sleep deprivation is not limited to the general population as medical students are also affected. Sleep deprivation leads to severe consequences such as reduced cognitive function, gastrointestinal diseases, systemic inflammation, and depression.

Purpose: This study aims to identify and understand the correlation between quality of sleep, academic and psychological distress among medical students.

Methods: A cross-sectional study among Alfaisal University undergraduate medical students was conducted, and an online survey was distributed *via* the university email system. The sociodemographic characteristics were assessed across the poor and good quality of sleep using chi-square, Fisher exact test, and t-test where appropriate. We used purposeful variable selection for model building in our multivariate analyses. All statistical tests were 2-sided, and findings were considered statistically significant at $P < 0.05$.

Results: A total of 241 respondents participated in the study. Two-thirds of the respondents reported poor sleep quality (75.93%). The highest psychological distress was reported among respondents with poor quality of sleep (48.63%). There was a statistically significant positive linear relationship between Kessler's Psychological Distress score and sleep quality score ($P\text{-value} < 0.001$). The mean sleeping score for those with GPA (1.5-1.9) students was higher than those with GPAs 2-4. This means that students with higher GPAs had better sleeping quality.

Conclusion: The quality of sleep among medical students is poor. Poor quality of sleep is associated with psychological distress and poor academic performance. Sufficient sleep is critical for general health and mental functioning. Future research that assesses the impact of medical students' sleep habits and disturbances on their overall health is highly encouraged.

Keywords: Sleep; Psychological distress; Anxiety

INTRODUCTION

Sleep is a condition of the body and mind that recurs typically for several hours every night, in which sensory responsiveness is reduced, the postural muscles relaxed, and consciousness practically suspended [1]. Sufficient sleep is necessary for a healthy lifestyle. The National Sleep Foundation (NSF) recommends that adults sleep between 7 to 9 hours a night.

Sleep deprivation is a problem that is prevalent worldwide. Approximately one-third of Saudi adults reported short sleep time [2]. Some factors leading to insufficient sleep include long work hours, obesity, and increased internet access.

Sleep insufficiency is common among medical students due to high academic demand, alcohol abuse, smoking, excessive caffeine intake, and high-stress levels. Consequences associated

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with inadequate sleep include gastrointestinal diseases, cardiac and peripheral sympathetic distortions, systemic inflammation, and depression [3]. In addition, sleep deprivation affects cognitive functions, including attention span, memory, and mood as well as academic performance among students.

Psychological distress is a symptom of poor mental health and can lead to several mental illnesses, including depression, anxiety, and insomnia. Sleep is one of the essential aspects of medical students' psychological and physical health. It also plays a critical role in their academic performance and overall well-being [4]. This study aims to exploit sleep quality, psychological distress, and academic performance among medical students.

METHODOLOGY

A cross-sectional study was carried out among Alfaisal University undergraduate medical students. An online survey was distributed via the university emails and social media such as WhatsApp. The survey included four main sections. The first section covered academic year, nationality, gender, and marital status questions. The second section covered sleep-related questions using the Pittsburgh Sleep Quality Index (PSQI), and the third section covered anxiety-related questions using Kessler psychological distress Scale K10. The last section included questions about caffeine consumption and GPAs [5].

The researchers used the PSQI to assess medical students' quality and quantity of sleep. The PSQI consists of 9 questions. The questions were grouped into seven components, where each component had a range score of 0-3. A score of 0 indicates no trouble, while a score of 3 indicates severe trouble. The scores of each of the seven components will be summed up to obtain a final score ranging from 0-21. A score of 0 indicates no difficulty in all aspects, while a score of 21 indicates severe difficulty in all aspects (6). Kessler Psychological Distress Scale (K10) was used to evaluate medical student stress prevalence and level. The K10 consists of ten questions that measure mental health symptoms of depression and anxiety during the previous month. Items on a 5-point scale had scores ranging from 10 to 50. Scores from 10 to 19 were likely to be well, 20 to 24 were considered a mild disorder, and 25 to 29 were moderate, and 30 or higher were severe. The K10 is a widely known global tool for assessing psychological distress in population-based studies. No identifying information such as names or emails was collected. Access to the data was restricted to the authors only. Participation was voluntary, and participants were able to withdraw at any time. The Institutional Review Board (IRB) approved this study.

The sociodemographic characteristics were assessed across the poor and good quality of sleep using chi-square, fisher exact test, and t-test where appropriate. Purposeful variable selection was used for model building in our multivariate analyses, and backward elimination was used to retain all variables with $P < 0.3$. Only significant predictors were included in the multivariate model. ANCOVA analysis of covariance was used to examine the association between sleep quality, academic performance, and psychological distress. Assumptions of homogeneity of variance and dependent variable normality were assessed [7]. All

statistical tests were 2-sided, and findings were considered statistically significant at $P < 0.05$. All analyses were conducted using SAS statistical software version 9.4.

RESULTS

A total of 241 respondents participated in the study presents sociodemographic and Kessler Psychological Distress scores by sleep quality. Using the PSQI, two-thirds of the respondents reported poor sleep quality (75.93%). A higher proportion of non-Saudi respondents reported poor sleep quality (72.13%) than Saudi respondents (27.87%). Most of the respondents with poor (93.1%) and good (91.26%) sleep quality were unemployed. There was a statistically significant difference in sleep quality among different academic years (P value 0.0008), where second-year respondents reported the highest in poor sleep quality (30.05%). The proportion of respondents with GPAs between 3.00 to 4.00 (13.11%), were approximately three times higher than those with 1.5 to 1.99 GPAs (86.89%) in reporting poor sleep quality. Coffee and energy drink consumption was not significantly different between poor (P value 0.47) and good (P value 0.07) sleep quality respondents. There was a statistically significant difference in Kessler Psychological Distress score's mean between poor and good sleep quality respondents (P value < 0.0001). On the other hand, poor sleep quality respondents had a higher Kessler Psychological Distress score mean (28.74) compared to good sleep quality (18.98). In the sleep quality score was significantly different among each category of psychological distress (P value < 0.0001). The highest psychological distress was reported among respondents with poor sleep quality (48.63%) (Figure 1).

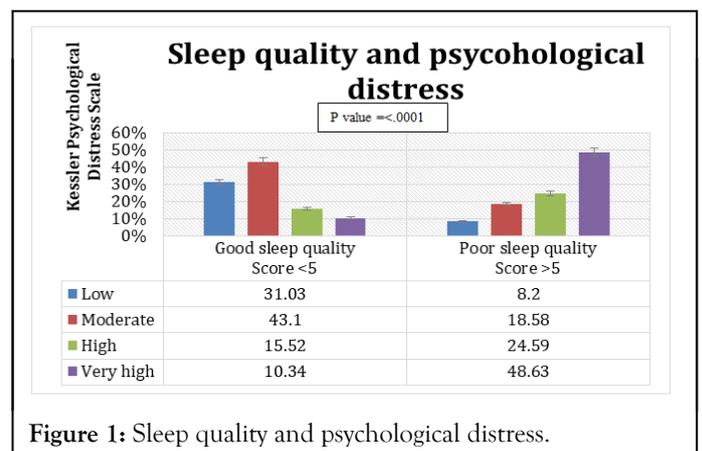


Figure 1: Sleep quality and psychological distress.

The results of the association between sleep quality and academic performance and psychological distress using a multivariate model of analysis of covariance. There was a statistically significant positive linear relationship between Kessler's Psychological Distress score and sleep quality score (P value < 0.0001). For one unit increase in Kessler Psychological Distress score, sleep quality score increases 0.052 unit given that all other variables in the model are held constant. There was a statistically significant difference between males and females in reporting sleep quality scores (P value < 0.0001). The same pattern was observed in GPAs; respondents' mean sleep quality score reported 1.5 to 1.99 GPAs was significantly different from respondents reported 2 to 4 GPAs. The mean sleeping score for

those with GPAs (1.5-1.9) students was higher than those with GPAs 2-4. This means that students with higher GPAs had better sleeping quality.

DISCUSSION

This study indicated that almost (76%) of undergraduate medical students have poor sleep quality. Moreover, the mean sleeping score for those with GPAs (1.5-1.9) students was higher than those with GPAs 2-4. This means that students with higher GPAs had better sleeping quality. This finding is in line with another local cross-sectional study conducted on students enrolled in the medical program at found that the prevalence of poor sleep was 63.2%, which was higher among students who were physically inactive and had more screen time. Similarly, a cross-sectional study conducted at the University of Ghana School of Medicine and Dentistry (UGSMD) students (n=153) found that sleep deprivation in the majority of students was characterized by the short duration of night sleep, morning tiredness, excessive daytime sleepiness, and frequent daytime naps. There was also a significant relationship between sleep quality and academic performance. A cross-sectional study among medical students of a public university in Iraq (n=316) revealed that the students suffer from different sleep disorders with no substantial difference between males and females. Students with a worse level of sleep disorders had a lower grade point average than those with standard sleep patterns. Another study conducted in King Saud University revealed those with "average" performances had higher Epworth Sleepiness Scale (ESS) scores and are more likely to sleep in class in contrast to the "excellent" group, who had earlier bedtimes and increased Total Sleep Time (TST) during weekdays. However, a study conducted at Taif University concluded no significant correlation between sleep quality and academic performance. Another survey study among bio-medical students in Malaysia showed similar findings indicating no association between hours of sleeping and GPA.

The results showed a significant positive linear relationship between kessler's psychological distress score and the quality of sleep score. The highest psychological distress was reported among respondents with poor quality of sleep (48.63%). Similarly, a cross-sectional study among young adults (n=10,123) in the US illustrated a significant association between sleep patterns and physiological problems. The research shows that early sleeping correlates with a lower suicide rate while sleeping late, having a short nighttime duration, delaying bedtime on weekends, or having weekend oversleeps all linked to mood disorders, anxiety, alcohol and drug use, smoking, and behavioral disorders.

A cross-sectional study among Saudi medical students in mekkah, Saudi Arabia (n=219) showed that psychological distress is shared among the sample but is most prominent among males. Less depressed students had higher GPAs. Psychological distress was reported among students with poor sleep quality. Another local cross-sectional study among medical students in their preclinical years at a Saudi medical college in 2019 (n=282) showed that their sleep quality was poor and their stress levels elevated, with these two variables significantly

associated. Furthermore, stress and daytime naps were significant predictors of poor sleep quality, and stress was more prevalent among females. Surprisingly, academic performance did not show any statistically significant association with sleep quality or stress levels. Another study conducted on the effects of insomnia on mental health has shown similar results in which individuals with insomnia were more likely to experience somatic complaints, OCD (obsessive-compulsive disorder), depression, anxiety, and psychiatric distress. The study was conducted among undergraduate students (n=69) and shows that a decrease in sleep quality is associated with increased anxiety and somatization disorder but not depression. In addition, a longitudinal study in Hong kong/macau sampled Chinese students (aged 18-25) (n=930) asserted a bi-directional linkage between sleep and mood. The study demonstrated that both quality and quantity of sleep are crucial to optimal brain activity to regulate human emotions. Moreover, another cross-sectional study among medical students in Saudi Arabia revealed sleep deprivation could negatively affect academic performance (78.8%) and mood (78.4%) mood. A study concluded that getting 6-10 hours of sleep per day was associated with normal Epworth Sleepiness Scale (ESS) scores (p=0.019) and academic grades 3.75. Moreover, a study found that students with abnormal ESS scores were associated with lower academic achievement, which indicates a strong correlation between sleep and academic performance. On the contrary, a prospective cohort study performed at a tertiary hospital-based medical school in Melbourne, Australia (n=102) found a negative correlation between students psychological distress and academic performance during their first clinical year [8].

CONCLUSION

The quality of sleep among medical students is poor. Poor quality of sleep is associated with psychological distress and poor academic performance. Sufficient sleep is critical for general health and mental functioning. Students' sleep-wake cycles were disrupted by irregular sleep habits and linked to academic responsibilities and busy schedules, resulting in sleep deprivation and poor sleep quality. The students' sleeping patterns in this study were substantially comparable to those of medical students worldwide. However, the cross-sectional nature of the study limits any causal inferences. The relatively small sample size limits generalizability. It is highly advised that medical students increase awareness of sleep regime importance and mental health. Future research that assesses the impact of medical students' sleep habits and disturbances on their overall health and other factors influencing their sleep habits, such as sleep hygiene, caffeine consumption, and screening time, is highly encouraged.

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