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Original article

The Impact of Sleep Quality on Academic Performance Among Second-Year Medical Students at Al Zawia University

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Abstract
Sleep deprivation is a common problem among medical students, owing primarily to the intense academic schedules and extended study hours that come with medical school. This study examines the impact of sleep deprivation on academic performance among medical students at Al-Zawia University. A study of 230 students (44 males and 186 females) in their second medical year used the Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality and patterns, as well as self-reported academic performance. The research found a negative association between sleep duration and academic performance. Students who had a PSQI score > 10 (indicating poor sleep) performed worse. In addition, sleep patterns varied among genders throughout the same academic year. These findings highlight the need to raise awareness among medical students about the need for appropriate sleep for academic success, mental health, and physical well-being.
Keywords: Sleep deprivation, Academic performance, Medicine, Medical Student, Al-Zawia.

Introduction

Sleep is an essential biological requirement for physical health [1-3], emotional stability, cognitive function [4], and the sustenance of proper life and development [5]. Adequate and high-quality sleep is critical for university students, especially those enrolled in rigorous degrees like medicine, to achieve peak academic performance. Sleep disturbances are a common symptom of medical school due to the demanding nature of the curriculum [6-8], the high number of hours spent studying each week, the high standards of success, and the regular exposure to stressful events [9,10]. Students' health, particularly that of medical students, is undervalued when it comes to sleep hygiene, despite the mounting evidence that shows how important sleep is for learning, concentration, and memory consolidation [11-13]. Second-year medical students frequently find themselves in a key transition period. They are no longer beginners, but they are still adjusting to the program's full academic intensity. At this point, students must strike a balance between theoretical study, laboratory sessions, and planning for future clinical exposure. The cognitive demands are great, and many students forego sleep to fulfill deadlines, study for exams, or deal with the psychological load of academic life. Sleep deprivation, whether chronic or acute, can affect focus, decision-making, and academic production [14-17].

There is a lack of data addressing this issue within the Libyan academic context, specifically at Al Zawia University. The local educational environment, cultural habits, and lifestyle choices may uniquely influence sleep behaviors and, by extension, academic outcomes. Previous research has demonstrated consistent associations between poor sleep quality and lower academic achievement among students [17,18]. Inadequate sleep has been linked to elevated stress levels, decreased motivation, shorter attention spans, and impaired working memory [19-22], all of which are essential for academic success in the medical field. This study seeks to investigate the relationship between sleep quality and academic performance among second-year medical students at Al Zawia University. By assessing sleep patterns, duration, disturbances, and overall restfulness to see if there is a statistically significant link between how well students sleep and how well they perform academically. Furthermore, the study intends to promote awareness among students and educators on the need to promote healthy sleep habits as part of academic assistance programs. Understanding this link is critical, not only to improve academic achievement but also to boost mental wellness. Overall, this research addresses a timely and relevant issue that bridges the gap between health and education. As the demands of medical training continue to rise, fostering a culture that values sufficient and quality sleep may be one of the most impactful yet simple strategies for supporting student success.

Methods

This study employed a cross-sectional survey to examine the association between sleep quality and academic performance among second-year medical students at Al Zawia University during the 2024–2025 academic year. A total of 230 students who met the inclusion criteria participated voluntarily. Data were gathered using a structured self-administered questionnaire, which included the Pittsburgh Sleep Quality Index (PSQI) to evaluate various aspects of sleep over the preceding month, as well as self-reported Grade Point Average (GPA) and recent exam scores to assess academic performance. Socio-demographic information, including age and gender, was also collected to account for potential confounding factors. All responses were systematically coded and analyzed using SPSS version 29.01. Descriptive statistics

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summarized participant characteristics and sleep patterns, while Pearson correlation assessed the strength and direction of associations between PSQI scores and academic outcomes. Linear regression was applied to determine whether sleep quality could predict academic performance, adjusting for demographic variables. Ethical approval was secured from the Faculty of Medicine's Research Ethics Committee, and informed consent was obtained from all participants. Confidentiality and anonymity were rigorously maintained throughout the study. The methodology ensured a reliable evaluation of patterns linking sleep behavior with academic achievement in this population.

Results

Statistical analyses were done using SAS (Statistical Analysis Software) and SPSS Version 29.01 (IBM SPSS, USA). All data were entered into SAS, and data cleaning and exploration were done to ensure accuracy. Descriptive statistics were used to examine all variables in the survey study. In the study, there were 44 males (19.1%) and 186 Females (80.9%). The mean age of the study population was 20.35 with a SD of 0.65. The mean PSQ1(Sleep quality score) was 8.3 with a Standard deviation (SD) of 3.05. Prevalence: 20% of students had a PSQI score > 10, indicating poor sleep quality. The mean GPA (examination score) was 9.46 with a Standard deviation (SD) of 3.089. 80% of our study population had good (less than 10) PSQ1, 66.53% female, and 13.47% male.

Table1. Descriptive statistics of Gender.

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Female	186	80.9	80.9	80.9
Male	44	19.1	19.1	100.0
Total	230	100.0	100.0	

As shown in (Table 2), the mean PSQI score of 8.30 indicates that, on average, participants experienced poor sleep quality, as PSQI scores >5 are generally considered indicative of sleep disturbances. The moderate standard deviation (SD = 3.057) suggests some variation in sleep quality among participants, possibly influenced by lifestyle, academic stress, or other psychosocial factors. The analysis also shows that the mean GPA was 9.46, with a standard deviation of 3.089, reflecting moderate variability in academic performance. Depending on the GPA scale used, this may indicate average or slightly above-average academic outcomes.

Table 2. Overview of participant demographics and key variables.

Variable	Mean ± SD	Frequency (%)
Age	20.35 ± 0.655	
Gender Male Female		 44 (19.1%) 186(80.9%)
PSQI (sleep quality) Score	8.30 ± 3.057	
GPA (Examination score)	9.46 ± 3.089	

(Table 3) displays a cross-tabulation between PSQI scores and gender revealed that out of 230 participants, 46 (20%) exhibited very poor sleep quality (PSQI >10), while 184 (80%) had good to moderate sleep quality (PSQI ≤10). Among females (n = 186), 33 (14.34%) reported poor sleep, compared to 13 (5.66%) of the 44 males. Good sleep quality was reported by 66.53% of females and 13.47% of males. These results indicate a higher absolute number and proportion of poor sleepers among females, although males represent a smaller sample. The overall trend suggests that sleep disturbances are prevalent across both genders, but more common among females in this cohort. This gender-based variation in sleep quality may be influenced by physiological, psychological, or academic stress-related factors.

Table 3. Cross tabulation of PSQ1 and Gender.

Gender	Sleep Quality Score				
	10 and Less (Good)	Percentage (Good)	More than 10 (Bad)	Percentage (Bad)	Total
Female	153	66.53%	33	14.34%	186
Male	31	13.47%	13	5.66 %	44
Total	184	80%	46	20%	230

As shown in Table 4, A Pearson correlation analysis was conducted to examine the relationship between sleep quality (measured by the PSQI) and academic performance (measured by GPA) among 230 participants. The results revealed a strong negative correlation (r = -0.857) between PSQI scores and GPA. This indicates that as sleep quality worsens (i.e., higher PSQI scores), academic performance tends to

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decline significantly. The correlation was found to be highly statistically significant ($p < 0.01$), suggesting that the observed relationship is unlikely to be due to chance. A negative coefficient of this magnitude reflects a very strong inverse association between the two variables. The strength of the correlation highlights the potential impact of sleep habits on students' academic outcomes.

Table 4. Correlation Analysis (Bivariate) Pearson correlation.

Correlations		PSQI	GPA
PSQI Sleep quality score	Pearson Correlation	1	-.857**
	Sig. (2-tailed)		0.000
	N	230	230
GPA Examination scores	Pearson Correlation	-.857**	1
	Sig. (2-tailed)	0.000	
	N	230	230

Simple linear regression was utilized to see whether sleep quality level significantly impacted student performance, as shown in Table 5. The regression model explains 73% of the variation in GPA. Sleep quality (PSQI) is a significant predictor ($p < 0.01$), with each one-point increase (poor sleep) resulting in a 0.86 fall in GPA. The total relationship was statistically significant ($R2 = 0.735$, $F = 631.787$, $p < 0.01$). The model returned a high R value of 0.857, showing a strong positive correlation between predicted and actual GPA values.

Table 5. Model summary of linear regression analysis.

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	F Change
1	.857[a]	0.735	0.734	1.594	0.735	631.787
a. Predictors: (Constant), Sleep quality score						

Table 6 exhibited the regression analysis revealed a statistically significant negative relationship between PSQI scores and GPA ($B = -0.866$, $p < 0.001$), indicating that poorer sleep quality was associated with lower academic performance. The standardized coefficient ($\beta = -0.857$) suggests a strong effect size, with PSQI explaining a substantial proportion of GPA variance. The 95% confidence interval for B (-0.934, -0.798) does not include zero, further confirming the robustness of this association.

Table 6. Coefficients table.

Coefficients[a]								
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**	**95.0% Confidence Interval for B**	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	16.649	0.305		54.616	0.000	16.048	17.249
	PSQI	-0.866	0.034	-0.857	-25.135	0.000	-0.934	-0.798
a. Dependent Variable: GPA								

Table 7 depicts the ANOVA results indicate that the regression model significantly predicted GPA scores ($F = 631.79$, $p < 0.001$). The large F-value demonstrates that PSQI scores explain a substantial proportion of the variance in GPA. Specifically, the model accounts for a meaningful amount of the total variation in academic performance, beyond what would be expected by chance. These findings confirm the statistical validity of the model linking sleep quality to academic performance.

Table 7. ANOVA test

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1605.625	1	1605.625	631.787	.000[b]
	Residual	579.440	228	2.541		
	Total	2185.065	229			
a. Dependent Variable: GPA						
b. Predictors: (Constant), PSQ1(Sleep quality score)						

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Discussion

Our objective was to evaluate sleep quality among second-year medical students, identifying its prevalence and severity while examining associations with academic performance. It further explores socio-demographic, psychological, and academic determinants linked to sleep disturbances. Based on these findings, the study seeks to propose evidence-based strategies to enhance sleep hygiene and academic achievement. The research aims to assess the influence of sleep quality on academic performance. These results indicate a higher absolute number and proportion of poor sleepers among females, although males represent a smaller sample. The overall trend suggests that sleep disturbances are prevalent across both genders, but more common among females in this cohort. This gender-based variation in sleep quality may be influenced by physiological, psychological, or academic stress-related factors. Similar results were observed in a study by [23], who found that male students may have more sleep deficits because of stress, whereas female students frequently report poorer sleep quality due to anxiety. On the other hand, research from Central Asian International Medical University (CAIMU) in Jalal-Abad, Kyrgyzstan, found differences between genders in sleep patterns, though not statistically significant [24].

Our results revealed a strong negative correlation between PSQI scores and GPA. This indicates that as sleep quality worsens (higher PSQI scores), academic performance tends to decline significantly. The strength of the correlation highlights the potential impact of sleep habits on students' academic outcomes. The findings are consistent with previous research indicating that poor sleep quality can impair cognitive functions such as concentration, memory, and problem-solving, all of which are critical for academic success [25-27]. A previous study found that medical students who got less than 6 hours of sleep had decreased memory consolidation and slower reaction times, leading to poor exam performance [28].

Similarly, [29,30]. Found that sleep deprivation reduces learning efficiency and problem-solving skills, which are crucial for medical education. Improving sleep hygiene may therefore be a valuable intervention strategy to support better educational performance. Overall, this analysis underscores the importance of addressing sleep quality in educational and health contexts.

Conclusion

This study establishes a clear association between sleep deprivation and reduced academic performance among medical students at Al-Zawia University. Students exhibited very poor sleep quality (PSQI >10) consistently underperformed, with additional influences from gender. The observed results may warrant further investigation into contributing factors such as sleep quality, time management, or study habits. The findings point to an urgent call for medical schools to establish comprehensive strategies that mitigate sleep deprivation, thereby enhancing academic achievement and ensuring students' mental and physical well-being.

Conflict of interest. Nil

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