

Exploring the Link Between Sleep Quality and Academic Performance of Medical Students: A Cross-Sectional Analysis

Raghda I. Saleem¹, Mustafa E. Omran², Hassanein Adel Ibrahim³, Hawraa Auda Abbas³, Mujtaba Bahaa Hadi³,
Mojtba Hassan Heavy³, M. Hassan Abbood Mohsen³, Nabaa Muslim Nazar³

1. Assistant lecturer, Department of Family and Community Medicine, College of Medicine, University of Basrah, Basrah, Iraq

2. Lecturer at Al-Zahraa College of Medicine/ Basrah University, CABM (Medicine) FIBMS (Rheumatology)

3. Medical students at Al-Zahraa College of Medicine/ Basrah University.

Received:15.12.2024

Accepted:30.12.2024

Abstract

Background: Sleep is an essential biological process that significantly impacts quality of life, body functions, and homeostasis. Sleep disturbances are a common complaint among college students worldwide. Medical students, who face increased academic load and irregular schedules, are particularly affected.

Aims of the study: This study aimed to assess the association between sleep quality and academic performance. As well it tries to investigate the other contributing factors to poor sleep experiences.

Method: A cross-sectional observational study was conducted on 224 students from Al-Zahraa College of Medicine. A questionnaire included sociodemographic characteristics, sleep-affecting factors, and an assessment of the sleep quality of students by the Pittsburgh Sleep Quality Index (PSQI).

Results: A total of (224) medical students. The mean age of students was 21.61 years, and the females form 54.5% of the sample. Most of the participants had mild sleep difficulties 56.3% while only 4% had severe sleep difficulties. There is a significant association between lack of sleep and poor academic achievement as the p-value <0.05.

Conclusions: Sleep disturbances are common among medical students, as most of the participants report sleep difficulties. The study shows that there is a significant relationship between sleep quality and academic performance.

Keywords: sleep quality, academic performance, Medical College, PSQI, students.

Corresponding author: Raghda i. Saleem

✉ E-mail: Raghdaalbaldawi@gmail.com

Introduction

Sleep is a natural, unconscious state defined by both behavioral changes and physiological processes that differentiate it from

wakefulness. The behavioral changes in sleep involve posture, awareness and mobility. The physical changes reflect the complex and dynamic nature of sleep which affects a range of body systems, including the somatic and autonomic nervous systems, as well as the respiratory, cardiovascular, gastrointestinal, endocrine, renal, sexual, and thermoregulatory systems.[1]

Sleep is one of the inevitable daily living activities and it is one of the most important factors contributing to health [2].

Quality sleep is essential for physical, cognitive and psychological well-being. Learning, memory processing, cellular repair and brain development are among the most important functions of sleep. Sleep deprivation is associated with increased daytime sleepiness, reduced neurocognitive performance and fatigue [3].

College students are particularly affected by sleep deprivation, especially during the transition from adolescence to adulthood. Research by Carskadon and Davis discovered that incoming college students tended to get less sleep and experienced delays in their sleep onset. These sleep disturbances can lead to various negative health outcomes, including mood swings, fatigue, trouble concentrating, and lower academic performance [4].

Multiple factors contribute to poor sleep quality, including demographics, lifestyle choices, physical activity, psychological health, and chronic illnesses. The rise of internet addiction is particularly pronounced among college students in Asian communities, and this addiction is closely linked to sleep issues. Stress levels and educational pressures also correlate with poor sleep quality [5].

Medical students face even greater challenges than their non-medical peers and the general population, making them particularly vulnerable. Various stressors contribute to their situation, including heavy academic loads, tightly packed schedules, long hours of study, pressure from exams, peer influences, high parental expectations, and a highly competitive environment [6].

Disruptions to sleep patterns in medical students can have far-reaching consequences, including an increased risk of mental health problems, impaired cognitive function, reduced emotional well-being, and decreased academic achievement. Over time, these sleep issues can influence their effectiveness as healthcare providers [7].

The relationship between sleep quality and academic performance has received considerable attention in recent years, particularly among university students. Sleep disturbances are a common complaint among college students globally, often correlated with stress due to increased academic demands [8]. In addition,

busy schedules, sudden changes in sleep patterns and new social opportunities can contribute to these disturbances [9].

Both the American Medical Association and the American Academy of Sleep Medicine regard insufficient sleep as a serious risk for adolescents and young adults [10,11] with sleep deprivation significantly impacting their health, well-being, and academic performance [9].

Poor sleep causes increased drowsiness and daytime fatigue, negatively impacting mental alertness, memory, and concentration [12].

Aims of the study

1. To assess the association between sleep quality and academic performance.
2. To investigate the other contributing factors to poor sleep experiences.

Method

This cross-sectional observational study was conducted at Al-Zahraa College of Medicine, University of Basrah, Basrah, Iraq to explore the relationship between sleep quality and academic performance among students.

The data collection spanned from the first of September 2024 to the first of December 2024. Two hundred twenty-four students from different stages at Al-Zahraa College of Medicine were included in the study.

Exclusion criteria:

- Students who were in their first year in the medical college
- Those who were already diagnosed as having psychological disorders, or receiving any sedative treatment (eight students were excluded)
- Students who refused to participate in the study (21 participants were excluded)
- Data collection was conducted using a questionnaire through direct interviews done by the researchers which covered the following aspects the first part includes
- Sociodemographic details such as age, gender, residence, marital status, employment status and work hours.
- Students' medical profile: any chronic illnesses, psychological well-being and chronic use of medications.

- Academic performance-related variables: current academic stage, Academic performance was evaluated by asking participants to report their grades from the previous semester and categorized into fair, medium, good, very good and excellent.
- Sleep-related variables: average sleep duration, tea, coffee, and energy drink consumption.
- The second part represents evaluation criteria that are used to assess the sleep quality of students Pittsburgh Sleep Quality Index (PSQI) consists of 19 items that form 7 component scores which together generate a global score. It interprets as the following:
- Global Pittsburgh Sleep Quality Index (PSQI Score) : Each of the 7 components is scored on a scale of 0 to 3. The global score is obtained by summing the 7 component scores and ranges from 0 to 21. (13)
- The PSQI Interpretation is the following:
- Good sleep quality: 0 to 4.
- Mild sleep difficulties: 5 to 10
- Moderate sleep difficulties:11 to 15
- Severe sleep difficulties: 16 to 21
- A global score greater than 5 suggests poor sleep quality and may indicate a need for further evaluation or intervention. This cut-off is often used in research and clinical practice. (13)

Ethical approval was granted by the Al-Zahraa College of Medicine ethics committee. The researchers contacted each student to provide an overview of the study, explain the procedures, and reassure them that their privacy would be maintained and that all collected information would remain confidential.

The data set was checked for any missing data, it was entered into the Statistical Package for the Social Sciences (SPSS) program version 24 which was used to code and analyse data. For the quantitative data, the t-test was used, and the Chi-Square test and Fisher's Exact tests were used for the qualitative data, to assess the association between groups and a P-value ≤ 0.05 was considered significant.

3. Results

Our study involved 224 students from al-Zahraa Medical College. Their sociodemographic

information is shown in Table 1. The mean age of students was 21.61 years, and the females form 54.5% of the sample. Regarding residential status, 50% of the participants lived with their families. The marital status showed that 97.3% of students were singles. Most of the students participating in the study were from the third stage 22.8%, and then the fourth stage 21.9%. The academic performance last year varied was mainly medium in 35.7% of students and excellent among only 0.4 %.

Table (1): the sociodemographic characteristics of participants

Characteristics		Number	Percentage
Age	(Mean \pm SD)	21.61 \pm 1.620	
Gender	Male	102	45.5
	Female	122	54.5
Residency	With family	112	50.0
	Dormitories	105	46.9
	Rented apartments	7	3.1
Marital status	Single	218	97.3
	Married	6	2.7
Current academic year	Second	36	16.1
	Third	51	22.8
	Fourth	49	21.9
	Fifth	44	19.6
	Sixth	44	19.6
Academic performance in last year	Fair	78	34.8
	Medium	80	35.7
	Good	52	23.2
	Very good	13	5.8
	Excellent	1	0.4

Table 2 shows the sleep-affecting factors among participants. Around a third of students sleep 6

hours per day on average. Also, the research found that 45.5% drink tea daily while 44.6% abstain from drinking coffee and 91.5% abstain from energy drinks. Most participants (87.1%) do not smoke. And 92.2% didn't suffer from chronic diseases and 93.3% were unemployed.

Table 2: The sleep-affecting factors among participants

Variables		Number	Percentage
Average sleeping hours daily	≥ 8 hours	65	29.0
	7 hours	53	23.7
	6 hours	74	33.0
	≤ 5 hours	32	14.3
Tea consumption	Daily	102	45.5
	Weekly	70	31.3
	Never	52	23.2
Coffee consumption	Daily	72	32.1
	Weekly	52	23.2
	Never	100	44.6
Energy drink consumption	Daily	9	4.0
	Weekly	10	4.5
	Never	205	91.5
Smoking	Yes	29	12.9
	No	195	87.1
Chronic illnesses	Yes	16	7.1
	No	208	92.9
Employment status	Yes	15	6.7
	No	209	93.3

Figure 1 shows the PSQI classification and most of the participants had mild sleep difficulties 56.3% while only 4% had severe sleep difficulties and the students who had moderate sleep difficulties were 15.6%. Noteworthy that 24.1% of participants with good sleep quality

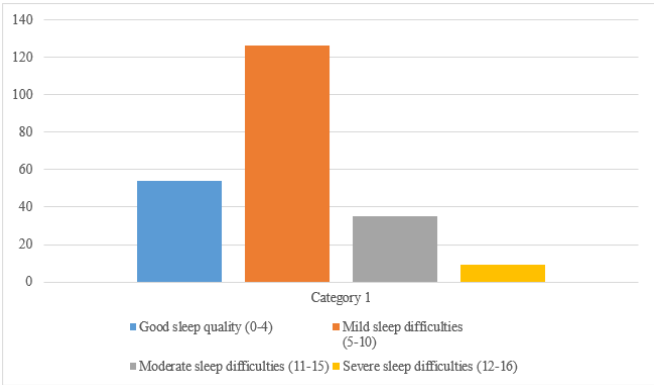


Figure (1): PSQI classification among participants'

Table 3 shows the relationships between sociodemographic characteristics of the students and PSQI levels classification. Regarding mean age, no significant association was noticed since the p-value was>0.05. Regarding gender, males show a slightly higher percentage of good sleep (53.7% vs 46.3%) but still no significant statistically significant p-value >0.05. Regarding residency, and marital status no significant differences were noticed in p-value> 0.05. Regarding the relationship between the academic stage and PSQI, there are no significant differences but the prevalence of poor sleep increases with advancing years.

Table (3): the Relationships between Sociodemographic characteristics and PSQI levels classification:

Variables		PSQI levels classification				p-value
		Well	Mild	Moderate	Severe	
Age	(Mean ± SD)	21.19± 1.375	21.76 ± 1.680	21.66 ±1.626	21.78 ± 1.922	0.470
Gender	Male	29	53	17	3	0.434
		53.7%	42.1%	48.6%	33.3%	
	Female	25	73	18	6	
		46.3%	57.9%	51.4%	66.7%	
Residency	With family	29	58	19	6	0.535
		53.7%	46%	54.3%	66.7%	
	Dormitories	24	64	15	2	
		44.4%	50.8%	42.9%	22.2%	
	Rented apartments	1	4	1	1	
		1.9 %	3.2%	2.9%	11.1%	
Marital status	Single	53	123	34	8	0.450
		98.1%	97.6%	97.1%	88.9%	
	Married	0	3	1	1	
		1.9%	2.4%	2.9%	11.1%	
Current Academic year	Second	9	17	7	3	0.080
		16.7%	13.5%	20.0%	33.3%	
	Third	17	29	5	0	
		31.5%	23.0%	14.3%	0%	
	Fourth	14	29	6	0	
		25.9%	23.0%	17.1%	0%	
	Fifth	11	22	8	3	
		20.4%	17.5%	22.9%	33.3%	
	Sixth	3	29	9	3	
		5.6%	23.0%	25.75%	33.3%	

Table 4 shows the Relationships between academic performance last year and PSQI levels. There is a significant statistical relationship between performance and the PSQI since the p-value < 0.05. Students with fair scores show the highest prevalence of PSQI 66.7% and 0% among those with good, very good, and excellent scores.

Table (4): Relationships between academic performance last year and PSQI levels:

Variables	PSQI levels classification				p-value
	Well	Mild	Moderate	Severe	
Fair	13	45	14	6	0.005
	24.1%	35.7%	40.0%	66.7%	
Medium	18	43	16	3	
	33.3%	34.1%	45.7%	33.3%	
Good	13	34	5	0	
	24.1%	27.0%	14.3%	0%	
Very good	9	4	0	0	
	16.7%	3.2%	0%	0%	
Excellent	1	0	0	0	
	1.9%	0%	0%	0%	

Table 5 the relationship between the sleep-affecting factors and PSQI levels. The tea, coffee, energy drink consumption, smoking and working status show no significant association with PSQI levels since p-value > 0.05. The presence of chronic illness shows a significant association with sleep disturbance, p-value <0.05

Table (5): The relationships between sleep-affecting factors and PSQI levels:

Variables		PSQI levels classification				p-value
		Well	Mild	Moderate	Severe	
Tea consumption	Daily	25	60	15	2	0.527
		46.3%	47.6%	42.9%	22.2%	
	Weekly	14	41	10	5	
		25.9%	32.5%	28.6%	55.6%	
	Never	15	25	5	2	
		27.8%	19.8%	28.6%	22.2%	
Coffee consumption	Daily	18	39	12	3	0.768
		33.3%	31.0%	34.3%	33.3%	
	Weekly	13	28	7	4	
		24.1%	22.2%	20.0%	44.4%	
	Never	23	59	16	2	
		42.6%	46.8%	45.7%	22.2%	
Energy drink consumption	Daily	1	3	3	2	0.070
		1.9%	4.0%	2.9%	22.2%	
	Weekly	2	4	3	1	
		3.7%	3.2%	8.6%	11.1%	
	Never	51	117	31	6	
		94.4%	92.9%	88.6%	66.7%	
Smoking	Yes	6	10	7	1	0.603
		11.1%	11.9%	20%	11.1%	
	No	48	111	28	8	
		88.9%	88.1%	80.0%	88.9%	
Chronic illnesses	Yes	1	6	7	2	0.002
		1.9%	4.8%	20.0%	32.2%	
	No	53	120	28	7	
		98.1%	95.2%	80.0%	77.8%	
Employment status	Yes	3	8	3	1	0.893
		5.6%	6.3%	8.6%	11.1%	
	No	51	118	32	8	
		94.4%	93.7%	91.4%	88.9%	

Discussion:

Numerous literature have observed sleep quality among college students and its impact on academic performance, aiming to understand the complex relationship between them and its effect on students' academic achievements [14]. Inadequate sleep is linked to concentration problems and impaired daily functioning, whereas sufficient sleep is essential for memory consolidation and greatly influences academic accomplishment. (15)

This research highlights the negative impacts of sleep problems on academic performance in students sample in Al-Zahraa College of Medicine. Students with average scores showed the highest rates of poor sleep quality (66.7%), whereas those with good, very good, and excellent scores demonstrated minimal scores for severe sleep disturbance. These results correspond to Mirghani et al 2015 which was conducted among Sudanese medical students and revealed a notable disparity in sleep

quality between students who excel academically and those with average achievement. [14]

Likewise, Seun-Fadipe et al 2017 conducted in Nigeria targeted undergraduate students and displayed that those students with high sleep quality excelled academically compared to those with low sleep quality [16].

These results reinforce the increasing evidence for the crucial role of enhancing sleep quality in promoting academic achievements.

The researchers in both studies, as well as the current study, utilized the PSQI to evaluate sleep which is of acceptable applicability and found to provide understanding of factors that impact sleep pattern and quality.

Studies with similar assumptions such as Alhusseini et al. in 2022 found that students with higher scores had good sleep quality, and those with lower scores had the contrary [17].

A Local study from Iraq conducted in Baghdad, Al-Kindy College of Medicines, which incorporates 500 students studying the link between stress and sleep difficulties on one side with poor academic performance on the other side found that there is a strong, positive and significant relationship between them, where, a high proportion of contributors reporting that poor sleep undesirably affected their academic performance [18]. The aforementioned study, as the current study, reached comparable results and shows that academic performance is usually influenced by diverse factors like studying under stressful conditions, anxiety, fear of failure, memory problems and sleep deprivation that altogether led to poor performance with lower-than-expected grades.

Rasekhi et al. 2017 and Maheshwari 2019 studied the influences of various factors such as tea, coffee, energy drink consumption, smoking, chronic illness and employment status on academic performance and failed to find any significant relationships as what is reached in the current study [19, 20].

On the other hand, Abdulrahman displayed obvious correlations between sleep quality with gender and chronic illnesses but failed to detect any significant connections between sleep quality and academic performance, marital status, educational year, intake of caffeinated beverages and employment situation [21].

Limitations

The current study did not examine additional important aspects that may affect academic performance as sleep behavior (e.g. weekend habits) and mental health issues (mood, anxiety, and behavioral disorders) which could represent an appealing field for the current researchers to add more knowledge about academic performance and expand local information about this subject.

Conclusion:

- The study revealed that most participants reported poor sleep quality, confirming the previous facts that sleep disturbances are a common complaint among medical students.
- The study shows a significant relationship between sleep quality and academic performance. The research showed that chronic illness was a negatively affecting factor in sleep quality. However, sleep quality was not significantly affected by gender, marital status, residency, Stimulant drinks consumption, work status, or smoking.

Recommendation:

Future studies should consider collecting data over a longer timeframe, including multiple academic semesters, to account for variations in sleep patterns and stress levels. Exam-related stress should be explicitly measured and included as a variable.

Using validated stress scales or surveys during both exam and non-exam periods can help isolate the impact of stress on sleep quality and performance should be considered in future studies.

References:

1. Chokroverty S. Overview of sleep & sleep disorders. Indian Journal of Medical Research. 2010;131(2):126-40.
2. Sexton-Radek K, Pichler-Mowry R. Daily activities and sleep quality in young adults. Perceptual and motor skills. 2011;112(2):426-8.9.
3. AlDabal L, BaHammam AS. Metabolic, endocrine, and immune consequences of sleep deprivation. The open respiratory medicine journal. 2011; 5:31.
4. Carskadon MA, Davis SS. Sleep-wake patterns in the high-school-to-college transition: Preliminary data. Sleep Research. 1989;18(1):113.

5. Zhang HS, Li Y, Mo HY, Qiu DX, Zhao J, Luo JL, Lin WQ, Wang JJ, Wang PX. A community-based cross-sectional study of sleep quality in middle-aged and older adults. *Quality of Life Research*. 2017; 26:923-33.
6. James BO, Omoaregba JO, Igberase OO. Prevalence and correlates of poor sleep quality among medical students at a Nigerian university. *Ann Nigerian Med*. 2011;5(1):1.
7. Singh R, Undevia NS, Schuman C, Attarian H. Excessive daytime sleepiness among attending physicians: a pilot survey study at an academic institution. *Sleep Medicine*. 2011 ;12(8):808-10.
8. Pascoe MC, Hetrick SE, Parker AG. The impact of stress on students in secondary school and higher education. *International journal of adolescence and youth*. 2020;25(1):104-12.
9. Haile YG, Alemu SM, Habtewold TD. Insomnia and Its Temporal Association with Academic Performance among University Students: A Cross-Sectional Study. *BioMed research international*. 2017;2017(1):2542367.
10. American Medical Association. Resolution 503: Insufficient sleep-in adolescents. Chicago, IL: American Medical Association, American Academy of Sleep Medicine. 2010.
11. Si A. Summary of findings: 2006 Sleep in America Poll. Washington DC: National Sleep Foundation. 2006.
12. Reisi M, Jalilian R, Azizi G, Rashti A, Faghihi Nia J, Akbari M, Babaei N, Sayedi SJ, Rezaei N, Modaresi MR. Academic performance, sleep disorders and their association in middle school students in Iran. *International Journal of Pediatrics*. 2017;5(3):4541-9.
13. Shahid A, Wilkinson K, Marcu S, Shapiro CM. Pittsburgh sleep quality index (PSQI). STOP, THAT and one hundred other sleep scales. 2012:279-83.
14. Mirghani HO, Mohammed OS, Almutadha YM, Ahmed MS. Good sleep quality is associated with better academic performance among Sudanese medical students. *BMC research notes*. 2015; 8:1-5.
15. Zimmerman ME, Benasi G, Hale C, Yeung LK, Cochran J, Brickman AM, St-Onge MP. The effects of insufficient sleep and adequate sleep on cognitive function in healthy adults. *Sleep Health*. 2024;10(2):229-36.
16. Seun-Fadipe CT, Mosaku KS. Sleep quality and academic performance among Nigerian undergraduate students. *J Syst Integr Neurosci*. 2017;3(5):1-6.
17. Alhusseini NK, Ramadan M, Almasry Y, Atout M, Hamsho K, Mahmoud M, Shakir I. Effects of Sleep Quality on Academic Performance and Psychological Distress Among Medical Students in Saudi Arabia. *Health Scope*. 2022;11(2).
18. Abd AL-Khaliq, Israa Mohammad, et al. "Prevalence of Stress and Sleep Disorders among Medical Students at Al-Kindy College of Medicine and its impact on Academic Performance." *South Asian Res J App Med Sci* 5.4 (2023): 37-42.
19. Rasekhi S, Pour Ashouri F, Pirouzan A. Effects of Sleep Quality on the Academic Performance of Undergraduate Medical Students. *Health Scope*. 2016;5(3): e31641.
20. Maheshwari G, Shaukat F. Impact of poor sleep quality on the academic performance of medical students. *Cureus*. 2019 Apr;11(4).
21. Abdulrahman KA, Bindekhael J, Alrehaili L, Aldhfayan N, Alomireeni A, Alzamil L. Effect of poor sleep quality on academic performance among students at a public Saudi University. *International Journal of Medicine in Developing Countries*. 2024 Jul 29;8(7):1574-.

استكشاف العلاقة بين جودة النوم والأداء الأكاديمي لطلاب الطب: تحليل مقطع

الخلفية: النوم هو عملية بيولوجية أساسية تؤثر بشكل كبير على جودة الحياة ووظائف الجسم والحفاظ على التوازن. اضطرابات النوم تعد شكوى شائعة بين طلاب الجامعات في جميع أنحاء العالم. طلاب الطب، الذين يواجهون عبئاً أكاديمياً متزايداً وجدولاً غير منتظم، هم الأكثر تأثراً.

أهداف الدراسة: هدفت هذه الدراسة إلى تقييم العلاقة بين جودة النوم والأداء الأكاديمي. كما حاولت التحقيق في العوامل الأخرى المساهمة في التجارب السيئة للنوم.

الطريقة: أجريت دراسة ملاحظة مقطعية على ٢٢٤ طالباً من كلية الطب في الزهراء. شمل الاستبيان الخصائص الاجتماعية والديموغرافية، (PSQI) والعوامل المؤثرة على النوم، وتقييم جودة النوم باستخدام مؤشر جودة النوم في بيتسبرغ.

النتائج: شارك في الدراسة ٢٢٤ طالباً في الطب، وبلغ متوسط أعمارهم ٢١,٦١ عاماً، وشكلت الإناث ٥٤,٥٪ من العينة. أظهر معظم المشاركين صعوبات نوم خفيفة بنسبة ٥٦,٣٪، بينما كان ٤٪ فقط يعانون من صعوبات نوم شديدة. لوحظ وجود ارتباط كبير بين نقص النوم وضعف الأداء الأكاديمي $p < 0.05$ حيث أن قيمة.

الاستنتاجات: تعد اضطرابات النوم شائعة بين طلاب الطب، حيث أفاد معظم المشاركين بوجود صعوبات في النوم. أظهرت الدراسة وجود علاقة كبيرة بين جودة النوم والأداء الأكاديمي.

الكلمات المفتاحية: جودة النوم، الأداء الأكاديمي، كلية الطب