Association between Sleep Quality and Mental Health among Medical Students in a University Center in Tehran, Iran

Amirreza Keyvanfar[1] ⓘ, Maryam Mohseny[2] ⓘ, Amir Zamani[1], Mohamadmehdi Derisi[1], Amirali Soheili[1], Zahrasadat Seyedalhosseini[1], Fatemeh Shamekhi-Amiri[1]

[1] Student Research Committee, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2] Department of Community Medicine, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author: Maryam Mohseny; *Department of Community Medicine, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran*
Email: mohseny.maryam0@gmail.com

Quantitative Study

Abstract

Background: Poor sleep quality and mental health problems are relatively common among medical students, and have many consequences in their lives and education. Moreover, some studies have reported that the above two issues affect each other. In Iran, limited studies have been conducted in this field. Therefore, this study was conducted with the aim to determine the frequency of poor sleep quality and mental health problems among medical students and the association between these two variables.

Methods: In this cross-sectional study, which was conducted from January to April 2021, 320 medical students of Shahid Beheshti University of Medical Sciences (Tehran, Iran) participated. Sampling was performed through the stratified method based on gender and educational phase. Data was collected using an online questionnaire including the following components: a researcher-made sociodemographic characteristics questionnaire, the Pittsburgh Sleep Quality Index (PSQI), and the Depression, Anxiety, and Stress Scale-21 items (DASS-21).

Results: The mean age of 320 participants was 22.95 ± 2.59 years and 145 (45.3%) were men. The percentage of medical intern participants (34.7%) was higher than that of basic science (34.4%) and medical extern (30.9%). The mean PSQI score was 8.11 ± 2.99, which shows overall poor sleep quality. The comparison between poor sleepers and good sleepers in terms of sociodemographic variables showed that only grade point average was significantly lower in poor sleepers (P = 0.049). The prevalence of some levels of depression, anxiety, and stress among participants was 100%, 100%, and 95.3%, respectively. There were also significant associations between poor sleep quality and all three components of mental health of depression (P < 0.001), anxiety (P < 0.001), and stress (P < 0.001).

Conclusion: Poor sleep quality and mental health problems are interrelated among medical students, and reduce their academic performance. The high prevalence of these problems indicates the importance of the issue, which requires immediate action by the authorities to decrease its consequences.

Keywords: Sleep quality; Mental health; Depression; Anxiety; Medical students

Introduction

Sleep is a human physiological need and is necessary for the maintenance of physical and mental health (El Hangouche et al., 2018). Poor sleep quality has consequences such as daytime fatigue and drowsiness, poor academic performance, and physical and mental disorders. Therefore, it is essential to identify poor sleep quality and its related factors, and take adequate measures to control them (Abdulah & Piro, 2018).

Numerous studies have reported the prevalence of sleep disturbances among medical students at about 58%, which is a significant amount (Khaksarian et al., 2020). Compared with the general population, medical students are more vulnerable to poor sleep quality, perhaps due to struggling with many challenges during their studies such as heavy workload, time restriction, and night shifts, all of which lead to circadian rhythm disturbances (Damiano, de Oliveira, Ezequiel, Lucchetti, & Lucchetti, 2020, Khero, Fatima, Shah, & Tahir, 2019). Additionally, medical students' cognitive domains (concentration, short-term and long-term memory, decision-making, and logical reasoning) must operate adequately and quickly. Otherwise, they cannot correctly diagnose and treat patients, which will have consequences for patients and themselves (Alotaibi, Alosaimi, Alajlan, & Bin Abdulrahman, 2020).

Moreover, mental health issues, including depression, anxiety, and stress, are also more common among medical students than other students (Zeng, Chen, Wang, Zhang, & Deng, 2019). There are many factors involved in medical students' mental health problems, including age, gender, residence status, level of education, religiosity, and family history of mental illness (Moutinho et al., 2017). Moreover, the high rate of substance use, alcohol abuse, and suicide among medical students as a method of overcoming their mental issues is worrying (Fischbein & Bonfine, 2019). Studies have shown that some mental health issues have a serious impact on sleep quality, and the interaction between sleep quality and poor mental health leads to a vicious cycle (Shi et al., 2020). In Iran, there have been few studies to determine the association between the sleep quality of medical students and their mental health. Hence, to better manage these problems, it is important to determine the prevalence poor sleep quality and its potential risk factors (Janatmakan, Morovatdar, Soltanifar, & Rezaee, 2020).

This study was conducted with the aim to determine the frequency of poor sleep quality and mental health problems among medical students and the association between these two variables.

Methods

This cross-sectional study was conducted from January to April 2021. The study population included first to seventh-year medical students of Shahid Beheshti University of Medical Sciences, Tehran, Iran. Using Cochran's formula, according to a study by Janatmakan et al. (2020), who reported a 51.3% prevalence for poor sleep quality in Mashhad, Iran, and considering α = 5% and d = 6%, the sample size was calculated as 267 people. The sample size was increased to 320 with an assumption of a 20% incomplete response. Samples were selected through stratified sampling based on educational phase and gender.

Instruments

Data were collected using an online questionnaire. This questionnaire included three sections: a researcher-made questionnaire to extract sociodemographic information, the Pittsburgh Sleep Quality Index (PSQI), and the Depression, Anxiety, and Stress Scale-21 items (DASS-21). Participants were asked about their age, gender,

residence status, educational phase, and grade point average in the sociodemographic section.

Pittsburgh Sleep Quality Index: The PSQI is a self-report questionnaire with 19 items that assess sleep quality during the previous month. The PSQI has 7 sub-categories, including sleep duration, sleep disturbance, sleep latency, daily dysfunction due to drowsiness, sleep efficiency, subjective sleep quality, and need for medication to sleep. Minimum and maximum scores for each sub-category are 0 (no problem) and 3 (have a serious problem), respectively. Finally, all scores are added together and a number between 0 and 21 is obtained; a score > 5 indicates poor sleep quality. The validity and reliability of the Persian version of the PSQI questionnaire have been reported. The internal consistency of this questionnaire was acceptable with the Cronbach's alpha coefficient of 0.77 (Farrahi, Nakhaee, Sheibani, Garrusi, & Amirkafi, 2012).

The Depression, Anxiety, and Stress Scale-21 items: The validity and reliability of this questionnaire have been reported by Sahebi, Asghari, and Salari (2005). The DASS-21 contains 21 statements that assess the mental health of individuals over the previous week. Each statement is scored on a Likert scale ranging from 0 (never) to 3 (almost always). There are 7 questions about each of the areas of depression, anxiety, and stress. The scores are added up to determine the total score of the scale. A depression score < 5, anxiety score < 4, and stress score < 8 are considered normal.

Statistical analysis: SPSS software (version 23.0.; IBM Corp, Armonk, NY, USA) was used to analyze the data. Categorical variables were described by frequency and percentage. Numerical variables were reported as mean and standard deviation. Chi-square test, independent-sample t-test, and one-way ANOVA were used to analyze the data. P-value < 0.05 was considered statistically significant.

Ethical considerations: This study was approved by the Institutional Research Ethics Committee and Vice-Chancellor in Research Affairs of Shahid Beheshti University of Medical Sciences (ID: IR.SBMU.RETECH.1399.791). The study was a project based on the Helsinki Declaration 2000. Questionnaires were unnamed, online informed consent was obtained from participants, and the participants information were kept confidential.

Results

The sociodemographic characteristics of the participants are presented in table 1.

Table 1. Sociodemographic characteristics of the participants (n = 320)

Variables	Values[*]
Mean age	22.95 ± 2.59
Gender	
Male	145 (45.3)
Female	175 (54.7)
Educational phase	
Basic sciences	110 (34.4)
Medical externship	99 (30.9)
Medical internship	111 (34.7)
Residence status	
Home with family	174 (54.4)
Home alone	44 (13.8)
Home with other students	10 (3.1)
Dormitory	29 (28.7
Grade point average	17.14 ± 1.12
Mean age	22.95 ± 2.59

[*]Values are expressed as No. (%) or mean ± SD.

The mean age of the 320 participants was 22.95 ± 2.59 years, and 145 (45.3%) participants were men. The percentage of medical intern participants (34.7%) was higher than that of basic science (34.4%) and medical extern (30.9%). The most common residence status was home with family (54.4%), followed by home alone (13.8%).

The mean PSQI score was 8.11 ± 2.99, which shows overall poor sleep quality. There were no significant differences between poor sleepers and good sleepers in terms of age (P = 0.111), gender (P = 0.662), educational phase (P = 0.223), and residence status (P = 0.461); however, poor sleepers had a lower grade point average than good sleepers (P = 0.049). We also compared different sleep quality sub-categories based on educational phase in table 2. As shown in the table above, subjective sleep quality (χ^2 = 15.145; P = 0.019) and sleep disturbances (χ^2 = 10.215; P = 0.037) differed significantly between various educational phases; but the other sub-categories did not differ significantly.

Table 2. Comparison of the Pittsburgh Sleep Quality Index sub-categories between educational phases

Sleep quality components	Basic sciences (n = 110)	Medical externship (n = 99)	Medical internship (n = 111)	All students (n = 320)	χ^2	P-value
PSQI global score						
Poor sleep quality	85(26.6)	77(24.0)	95(29.7)	257(80.3)	2.997	0.223
Good sleep quality	25(7.8)	22(6.9)	16(5.0)	63(19.7)		
Subjective sleep quality						
Very good	26(8.2)	11(3.4)	11(3.4)	48(15.0)	15.145	0.019
Fairly good	52(16.2)	66(20.6)	67(21.0)	185(57.8)		
Fairly bad	30(9.4)	18(5.6)	30(9.4)	78(24.4)		
Very bad	2(0.6)	4(1.3)	3(0.9)	9(2.8)		
Sleep disturbances						
Low	39(12.1)	23(7.2)	21(6.6)	83(25.9)	10.215	0.037
Moderate	70(21.9)	73(22.8)	85(26.6)	228(71.3)		
Severe	1(0.3)	3(0.9)	5(1.6)	9(2.8)		
Need for medication to sleep						
Not during the previous month	99(30.9)	83(25.9)	91(28.5)	273(85.3)	8.078	0.232
Less than once a week	9(2.8)	7(2.2)	9(2.8)	25(7.8)		
Once or twice a week	1(0.3)	6(1.9)	5(1.6)	12(3.8)		
Three or more times a week	1(0.3)	3 (0.9)	6(1.9)	10(3.1)		
Daily dysfunction						
Low	17(5.3)	23(7.2)	21(6.6)	61(19.1)	2.178	0.703
Moderate	52(16.2)	42(13.1)	48(15.0)	142(44.3)		
Severe	41(12.9)	34(10.6)	42(31.1)	117(36.6)		
Sleep latency						
< 15 minutes	45(14.0)	36(11.2)	41(12.8)	122(38.1)	5.380	0.496
15-30 minutes	43(13.5)	32(10.0)	36(11.2)	111(34.7)		
30-60 minutes	17(5.3)	21(6.5)	26(8.2)	64(20.0)		
≥ 60 minutes	5(1.6)	10(3.2)	8(2.4)	23(7.2)		
Sleep duration						
≥ 7 hours	81(25.4)	65(20.3)	74(23.1)	220(68.8)	8.344	0.214
6-7 hours	23(7.2)	19(5.9)	18(5.6)	60(18.8)		
5-6 hours	4(1.3)	12(3.8)	15(4.6)	31(9.7)		
< 5 hours	2(0.6)	3(0.9)	4(1.3)	9(2.8)		
Sleep efficiency						
≥ 85%	82(25.6)	74(23.1)	71(22.2)	227(70.9)	5.317	0.504
75-85%	20(6.2)	14(4.4)	26(8.2)	60(18.8)		
65-75%	5(1.6)	6(1.9)	8(2.4)	19(5.9)		
< 65%	3(0.9)	5(1.6)	6(1.9)	14(4.4)		

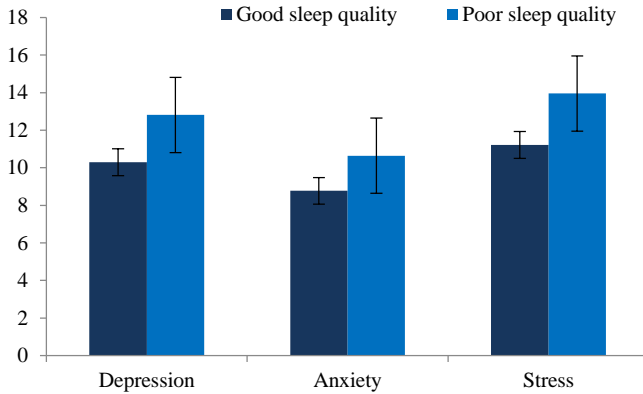PSQI: Pittsburg Sleep Quality Index
Values are expressed as No (%).

Figure 1. Comparison of DASS-21 scores based on sleep quality

In terms of depression score, 134 (41.9%) individuals were moderate, 80 (25.0%) were severe, and 106 (33.1%) were extremely severe.

In terms of anxiety score, 36 (11.3%) participants were moderate, 108 (33.8%) were severe, and 176 (55.0%) were extremely severe. In terms of stress scores, 15 (4.7%) individuals were normal, 60 (18.8%) were mild, and the remaining 245 (76.5%) were moderate or worse. Figure 1 shows the comparison of mental health status (DASS-21) between educational phases (Figure 2). Moreover, at different educational phases, depression score (P = 0.036) and stress score (P = 0.002) were significantly different; however, anxiety score was not related to educational phase (P = 0.905).

As shown in figure 1, the depression score was higher in bad sleepers (12.81 ± 4.39) compared with good sleepers (10.30 ± 3.14) (P < 0.001). Furthermore, anxiety score was higher in bad sleepers (10.64 ± 2.70) compared with good sleepers (8.77 ± 1.59) (P < 0.001). Additionally, stress score was higher in bad sleepers (13.95 ± 4.43) compared with good sleepers (11.22 ± 3.37) (P < 0.001).

Discussion

The current study presented important findings about sleep quality and mental health among medical students.
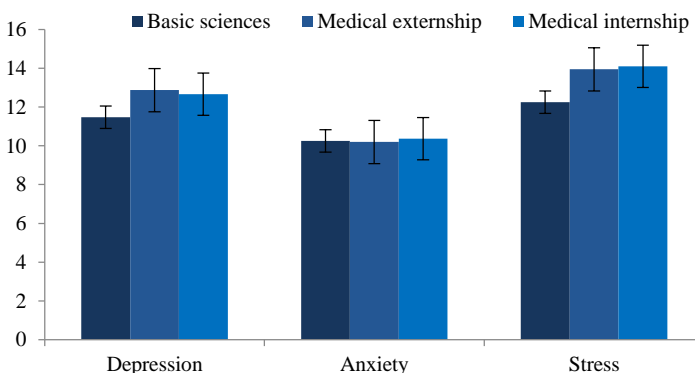

Figure 2. Comparison of DASS-21 scores between educational phases

Generally, sleep quality was poor among medical students. Students' academic

performance is associated with their sleep quality. In addition, a considerable number of participants had some levels of mental health problems. Moreover, the 3 components of mental health (depression, anxiety, and stress) and sleep quality were significantly associated. The above results are consistent with most previous studies and inconsistent with some researches.

Previous foreign studies have reported poor sleep quality among medical students in different countries such as Brazil (39.5%) (Correa, Oliveira, Pizzamiglio, Ortolan, & Weber, 2017), Pakistan (61.2%) (Khero et al., 2019), India (76.4%) (Gupta, Bhardwaj, Nadda, Gill, Mittal, & Gupta, 2020), Morocco (58.2%) (El Hangouche et al., 2018), Ghana (56.2%) (Lawson, Wellens-Mensah, & Attah, 2019), and Saudi Arabia (63.2%) (Al-Khani Sarhandi, Zaghloul, Ewid, & Saquib, 2019). Khaksarian et al. (2020), in a meta-analysis in Iran, also reported that about 58% of medical students were poor sleepers.

The study by Correa et al. (2017) showed that there was poor sleep quality at all levels of education; however, there was no significant relationship between educational levels and sleep quality. First-year and second-year students had worse subjective sleep quality and sleep disturbances than older students (Correaet al., 2017). According to a study by Khero et al. (2019), sleep latency, sleep duration, sleep efficiency, use of sleep medication, and daily dysfunction were worse in clinical students compared to pre-clinical students. The findings of these studies are in line with our findings.

Similar to the result of our study, most previous studies have shown that poor sleep quality is significantly associated with lower grade point average (academic performance) (Lawson et al., 2019; El Hangouche et al., 2018; Maheshwari & Shaukat, 2019; Haile, Alemu, & Habtewold, 2017). In contrast, a study by Al-Khani et al. (2019) has shown that academic performance in poor sleepers was significantly higher than that in good sleepers; the reason for this contradiction is not clear.

The study by Al, Zaher, Turk, Abbas, and Alkhatib (2017) showed that the prevalence of depression, anxiety, and stress among medical students was 52.6%, 35.1%, and 60.6%, respectively. Gender and low income were associated with depression and anxiety. Anxiety was also related to the education phase and was higher in senior students (Al et al., 2017). Shadzi, Salehi, and Vardanjani (2020) reported moderate to severe levels of depression, anxiety, and stress in 48.8%, 50.5%, and 48% of medical students in Shiraz, Iran, respectively. Furthermore, all three mental health problems were significantly associated with poor sleep quality (Shadzi et al., 2020). In addition, in some other studies, depression and anxiety were significantly associated with poor sleep quality (Rezaei, Khormali, Akbarpour, Sadeghniiat-Hagighi, & Shamsipour, 2018; Becker Jarrett, Luebbe, Garner, Burns, & Kofler, 2018). The results of all of the above studies are consistent with our results.

As mentioned, sleep quality and mental health components in our study were worse than in previous studies. This difference can be attributed to two factors. First, unlike previous studies, our study was conducted during the COVID-19 pandemic, which could have affected all parameters, including sleep quality and mental health. Second, workload and academic stress, hours and numbers of shifts, and other factors affecting mental health and sleep quality may be worse in our statistical population.

Our study has some limitations. First, other demographic factors, such as smoking and alcohol abuse could be considered. Second, a similar study had not been performed in our study population to compare the possible effect of COVID-19 on the variables. Third, the design of our study was cross-sectional, in which the causal relationship of the main variables could not be assessed. Therefore, it is

suggested that analytical studies be used for this purpose in the future.

Conclusion

Poor sleep quality and mental health problems are prevalent among medical students, especially senior students. These factors are interrelated and can affect students' academic performance and quality of life (QOL). Therefore, the authorities must take effective steps to screen and improve the sleep quality and mental health of this vulnerable group by adopting appropriate interventions.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

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