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EVALUATION OF SLEEP QUALITY AND PERCEIVED STRESS LEVELS IN MEDICAL STUDENTS

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Abstract

Objectives: The aim of the study was to determine sleep quality and perceived stress levels in medical students and to develop recommendations for this purpose.

Materials and Methods: There were a total of 1466 students enrolled during the study. A 43-question questionnaire including a sociodemographic data form, Pittsburgh Sleep Quality Index, and Perceived Stress Scale scales was applied to 1217 students (83% of all students).

Results: The mean age of the participants was 21.64 years (±2.26 years), with 56.4% of the participants being female and 43.6% male. The study revealed that 41.2% of the students surveyed reported good sleep quality, while 58.8% indicated poor sleep quality. 6th-grade students' good sleep quality was statistically significantly higher than the other grades ($p<0.001$). Poor sleep quality was found to be significantly higher in students who smoked and drank alcohol than in those who did not ($p<0.05$). As indicated by the Perceived Stress Scale, 0.9% of the participants exhibited no stress, 41.2% demonstrated low stress, 53.2% displayed moderate stress, and 4.7% displayed high stress. Female students had significantly higher perceived stress levels and poor sleep quality than male students ($p<0.05$). Among the students, the perceived stress level of those who used alcohol and did not do physical activity was statistically significantly higher ($p<0.05$).

Conclusion: Medical students have high levels of psychological stress and poor sleep quality due to long and intensive working hours, challenging exam load, life disorganization, and patient management responsibilities.

Keywords: Medical students, sleep quality, stress.

Introduction

Sleep is indispensable for an individual's quality of life and general health. Changes in sleep patterns or quality can negatively affect daily activities and impair physical and mental health.[1] Lack of sleep can have serious consequences, causing work and traffic accidents.[2]

It is reported that sleep problems and fatigue are common in university students and that this fatigue may even be as intense as that of heavy laborers. Students reported that their sleep patterns were inconsistent, that they could not get enough sleep, that their sleep quality was poor, and that they frequently resorted to alcohol or over-the-counter medication to regulate their sleep and used stimulants to stay awake.[3,4]

Stress is a fight or flight response to a trigger that threatens a person's life and harmony with his/her environment.[5] Stress is a ubiquitous problem in many different fields, including business, education, and many others. The exposure of working individuals to numerous stress factors in their daily lives can result in a range of psychological, physical, and social changes.[6]

The medical faculty, in particular, is characterized by its unique challenges, which are a consequence of the protracted and arduous nature of the educational process, the substantial course load, and the anxieties associated with examination pressure. The prevalence of depression, anxiety, burnout levels, and suicidal attempts among medical students is a matter of concern.[7]

This study aimed to examine the quality of sleep and perceived stress levels of medical students, to determine the factors affecting sleep and stress, and to develop recommendations regarding these factors.

Unlike similar studies, this research involves a larger group of participants with a high response rate and examines a wider range of variables such as sleep efficiency, sleep latency, and subjective sleep quality in relation to perceived stress.

Materials and Methods

Study design

The study aimed to include all medical students. However, only 1,217 students (83%) out of the 1,466 enrolled students volunteered and signed the informed consent form. Students who did not attend classes were on

academic leave or refused to participate were excluded. Although random sampling was not performed, the high participation rate was considered sufficient for the sample to be representative of the population. The questionnaire was administered face-to-face to consenting students. Participants were informed of the study's purpose, told that their participation was voluntary, and assured that their responses would remain confidential. No personal identifiers were collected, and all data were anonymized and reported only in aggregate form.

Ethical Approval

The type of this study was descriptive cross-sectional and was conducted at the Faculty of Medicine of Selçuk University Hospital from January to May 2024. The aims and procedures of the study were evaluated and approved by our ethics committee before the relevant analyses were performed (Date: 13 February 2024; No: 2024/85).

Data Collection

Data on participants' age, gender, marital status, class, economic status, alcohol and cigarette use, average sleep duration, physical activity status, presence of chronic diseases, and medications used continuously were collected through a structured self-report-based questionnaire form created by the researchers. These questions are based on self-report methods that are frequently used in similar studies and whose validity is supported in the literature.[8] A 43-question questionnaire was administered to the participants, including the Pittsburg sleep quality index (PSQI) and perceived stress scales (PSS).

Perceived Stress Scale (PSS)

The Turkish validity and reliability study of the PSS-14 was conducted by Eskin et al. The internal consistency coefficient was 0.84 and Cronbach's α coefficient was 0.893. Consisting of 14 questions, the PSS-14 assesses the degree of stress perceived in certain situations in the individual's life on a 5-point Likert-type scale ranging from “Never (0)” to “Very often (4)”. The PSS-14 scores range from 0 to 56, with a higher score indicating more stress perceived by the individual.[9]

Pittsburg Sleep Quality Index (PSQI)

The PSQI was created by Buysse et al. in 1989 to assess the quality of sleep and disturbances over the previous month.[10] Cronbach Alpha amount of the scale is 0.80. The PSQI consists of 7 subcomponents: subjective quality of sleep, habitual efficiency of sleep, disturbances of sleep, latency of sleep, duration of sleep, use of sleep

medication, and daytime dysfunction. The total PSQI score ranges from 0 to 21. A score of 5 or below means sleep quality is good, and a score of 6 or above indicates poor sleep quality.[11]

Statistical Analysis

Data were analyzed using the IBM SPSS 22.0 statistical package program. In descriptive analyses of the data, frequency (n) and percentage (%) were used for categorical variables and mean ± standard deviation was used for normally distributed variables. The results were analyzed at the significance level of $p<0.05$ and 95% confidence interval.

Before the analysis, the compatibility of the variables with normal distribution was checked by the Kolmogorov-Smirnov test ($p>0.05$) and Q-Q plot graphs; skewness and kurtosis values between -1 and +1 supported normal distribution. PSS, PSQI questionnaire scores, and sociodemographic data were evaluated using descriptive statistics. Pearson chi-square test and Fisher's exact test were applied for sociodemographic data, sleep problems, and questionnaire scores. One-way analysis of variance (ANOVA) was performed for the comparison of PSQI subcomponents and PSS scores. In cases where significant differences were found as a result of ANOVA, post hoc analyses were performed in pairwise comparisons between groups, and the Tukey HSD (Honestly Significant Difference) test was used for multiple test corrections. Thus, the risk of type I error in multiple subcomponent comparisons was controlled. The relationship between the subcomponents of the PSQI and the numerical variables in the PSSdata was determined by Pearson correlation analysis ($p<0.05$). Students were categorized according to their curricular stages with the 1st, 2nd, and 3rd grades as “preclinical” and the 4th, 5th, and 6th grades as “clinical” group. The preclinical group includes the lecture-oriented education period in which there is no direct contact with the patient (no clinical internships, shifts, or ward duties), while the clinical group includes clinical rotations involving hospital-based practices and patient care.

Results

Of the 1217 students in the study, 56.4% were female and 43.6% were male. The mean age was 21.64±2.26 (min:17, max:36) years. 15.9% of the students were studying in the first grade, 18.3% in the second grade, 16.3% in the third grade, 20.5% in the fourth grade, 14.2% in the fifth grade, and 14.8% in the sixth grade. 3.8% of the students were married and 96.2% were single. 37.6% of the students did not do physical activity, 40.7% did it 1-2 times a week, 16.7% did it 3-4 times a week, and 5% did it more than 5 times a week. 14.9% of the students reported smoking and 14% reported drinking alcohol. 90.5% of the participants stated that they did not have chronic diseases and 91.9% stated that they did not use any medication regularly.

While 58.8% of the students had poor sleep quality, the perceived stress level was none in 0.9%, low in 41.2%, moderate in 53.2%, and high in 4.7%.

Regarding sleep quality, 6th-grade students had significantly better sleep quality compared to other grades (p<0.001). According to post hoc analysis, the rate of poor sleep quality was significantly higher in 2nd and 4th grade students (p<0.001). According to gender, male students had better sleep quality than females (p=0.019). The rate of poor sleep quality was significantly higher in the smoking (p=0.006) and alcohol users (p=0.018) groups (Table 1).

Table 1. Evaluation of the Relationship Between Sociodemographic Characteristics and Sleep Quality in Medical Students

	Sleep Quality						
	Good (PSQI≤5) (n=502)		Poor (PSQI>6) (n=715)		Total	X^2	p
	n	%	n	%	n		
Grade							
1.grade	80	41.5	113	58.5	193	33.353	**<0.001***
2. grade	74	33.2[a]	149	66.8[b]	223		
3. grade	86	4.4	112	56.6	198		
4. grade	79	3.6[a]	171	68.4[b]	250		
5. grade	85	49.1	88	50.9	173		
6. grade	98	54.4[a]	82	45.6[b]	180		
Gender							
Female	263	38.3	423	61.7	686	5.497	**0.019***
Male	239	45.0	292	55.0	531		
Marital Status							
Married	21	45.7	25	54.3	46	0.217	0.641**
Single	481	41.1	690	58.9	1171		
Cigarette							
Yes	58	32.0	123	68.0	181	7.434	**0.006***
No	444	42.9	592	57.1	1036		
Alcohol							
Yes	56	32.9	114	67.1	170	5.628	**0.018***
No	446	42.6	601	57.4	1047		

* Pearson chi-square analysis ** Continuity correction test was used.

According to the perceived stress level, males were significantly more likely to have low stress than females (p=0.003), whereas females were more likely to experience moderate stress (p=0.003). Students who engaged in physical activity had a higher rate of low stress levels (p<0.001), whereas moderate stress was more common in those who did not (p<0.001). Students who used alcohol had a significantly higher rate of high stress levels (p=0.006). Students without chronic diseases were more likely to have low-stress levels, whereas

students with chronic diseases were significantly more likely to have high stress levels (p<0.001). Students who regularly used medication were significantly more likely to have high stress levels (p<0.001) (Table 2).

Table 2. Evaluation of the Relationship between Sociodemographic Characteristics of Medical Faculty Students and Perceived Stress Levels

	Perceived Stress Level					
	None (0-11)	**Low (12-26)**	**Middle (27-41)**	**High (42-56)**	**X^2**	**p**
	n %	n %	n %	n %		
Grade						
Preclinical	5 %0.8	242 %39.4	333 %54.2	34 %5.5	3.318	0.343*
Clinic	6 %1.0	260 %43.1	314 %52.1	23 %1.4		
Gender						
Female	3 %0.4	257 %37.5[a]	391 %57.0[a]	35 %5.1	14.182	**0.003***
Male	8 %1.5	245 %46.1[b]	256 %48.2[b]	22 %4.1		
Marital Status						
Married	2 %4.3[a]	23 %50.0	21 %45.7	0 %0	8.313	**0.035****
Single	9 %0.8[b]	479 %40.9	626 %53.5	57 %4.9		
Physical Activity						
Yes	11 %1.4[a]	344 %45.3[a]	377 %49.6[a]	28 %3.7[a]	23.657	**<0.001***
No	0 %0[b]	158 %34.6[b]	270 %59.1[b]	29 %6.3[b]		
Cigarette						
Yes	1 %0.5	79 %43.6	89 %49.2	12 %6.6	2.944	0.400*
No	10 %1.0	423 %40.8	558 %53.9	45 %4.3		
Alcohol						
Yes	0 %0	60 %35.3	94 %55.3	16 %9.4[a]	13.085	**0.006***
No	11 %1.1	442 %42.2	553 %52.8	41 %3.9[b]		
Chronic Disease						
There is	0 %0	37 %31.9[a]	64 %55.2	15 %12.9[a]	22.596	**<0.001***
None	11 %1.0	465 %42.2[b]	583 %53.0	42 %3.8[b]		
Regular Medication Use						
There is	0 %0	33 %33.3	51 %51.5	15 %15.2[a]	19.466	**<0.001****
None	11 %1.0	469 %41.9	596 %53.3	42 %3.8[b]		

* Pearson chi-square analysis ** Continuity correction test was used.

Significant relationships were found between perceived stress scores and subcomponents of PSQI in medical students. It was observed that perceived stress scores increased significantly as the frequency of sleep disturbance increased, subjective sleep quality worsened, daytime dysfunction increased, falling asleep time prolonged, sleep duration shortened, and sleep efficiency decreased (p<0.001) (Table 3).

Table 3. Evaluation of the Comparison of the Score Levels of Pittsburg Sleep Quality Subcomponents and Perceived Stress Scale Scores of the Students

	Perceived Stress Scale Score		
Sleep disturbance	**n**	**Mean±S.D**	**p**
Nothing	77	25.56 ± 8.84	
1<time/week	735	27.58 ± 6.78	**<0.001**
1-2 times/week	367	30.53 ± 7.34	
≥3 times/week	38	35.26 ± 7.74	
Subjective Sleep Quality			
Very Good	80	24.75 ± 7.83	
Good	693	27.10 ± 6.73	**<0.001**
Bad	370	30.94 ± 6.59	
Very Bad	74	35.91 ± 7.74	
Daytime Dysfunction			
Never	244	25.14 ± 7.73	
<1 time/week	357	27.06 ± 6.20	**<0.001**
1-2 times/week	424	29.87 ± 6.72	
≥3 times/week	192	33.35 ± 6.95	
Sleep Latency			
0-15 minutes	257	27.30 ± 7.79	
16-30 minutes	432	27.53 ± 7.00	**<0.001**
31-60 minutes	379	29.71 ± 6.93	
>60 minutes	149	31.50 ± 7.29	
Sleep Duration			
7 hours	734	27.80 ± 7.32	
6-7 hours	263	28.99 ± 6.89	**<0.001**
5-6 hours	151	31.12 ± 6.60	
<5 hours	69	30.91 ± 8.76	
Sleep Activity			
>%85	1043	28.25 ± 7.21	
%75-84	116	31.42 ± 7.22	**<0.001**
%65-74	29	31.45 ± 8.84	
<%65	29	29.07 ± 7.83	
Total	1217		

SD:Standart Deviasyon, One-way Analysis of Variance (ANOVA) test was used.

A moderate positive correlation was detected between the PSQI scores and PSS scores (r=0.391; p<0.001). This suggests that as sleep quality worsens, the level of perceived stress increases (Table 4).

Table 4. Analysis of the Relationship Between Age, Grade, PSQI Score and PSS Score

		PSS Score	PSQI Score	Grade	Age
PSS Score	r				
	p				
PSQI Score	r	**0.391****			
	p	**<0.001**			
Grade	r	**-0.098****	**-0.102****		
	p	**<0.001**	**<0.001**		
Age	r	**-0.128****	**-0.077****	**0.786****	
	p	**<0.001**	**0.004**	**<0.001**	

Pearson correlation analysis was used.

Discussion

In this study, sleep quality and perceived stress levels of medical students were evaluated. Factors that may be effective on these variables were analyzed.

When sleep quality was evaluated, 58.8% of the students had poor sleep quality. In a study conducted by Alotaibi et al. in 230 medical students, 77% of the students reported poor sleep quality.[12] Academic intensity, high levels of stress, anxiety and depression, unhealthy lifestyle, extracurricular activities, and active social life harm sleep quality in medical students.

In the study, the good sleep quality of 6th-grade students was significantly higher than that of other grades. In addition, poor sleep quality was significantly higher in 2nd and 4th-grade students compared to other grades. In the study conducted by Sarısaltık et al. it was found that the sleep quality of first-year medical faculty students was worse than other grades. [13] These results may help students to manage their sleep patterns more effectively with increased clinical experience and better adaptation to the medical school environment in the later stages of their education.

In the evaluation by gender, male students were found to have better sleep quality compared to female students. In a 2020 study using the PSQI, female students were found to have a higher rate of poor sleep quality than male students.[13] This difference may be due to stress management, sleep habits, physiological and hormonal effects, cultural and social factors, and methodological differences.

In the study, the proportion of students with poor sleep quality was significantly higher among smokers compared to non-smokers. Similarly, in a study by Shalva et al. with 126 medical students, smokers were found to have lower sleep quality. [14] The stimulant effects of nicotine increase sleep latency and disrupt sleep integrity. Similarly, in our study, the rate of poor sleep quality in students who used alcohol was found to be

significantly higher than those who did not use alcohol. However, no significant relationship was found between alcohol use and sleep quality in the study by Jie et al. [15] The different results between studies suggest that the effects of alcohol use on sleep quality may be complex and multifaceted. The effects of alcohol on sleep may depend on several variables such as the amount and frequency of consumption, individual differences, and other lifestyle factors.

When the perceived stress level of the students was analyzed, it was determined that 53.2% experienced moderate stress, 41.2% had low-stress levels, and 4.7% experienced high stress levels. This finding is consistent with the median score of 27, which was reported in the study conducted by Dağtekin et al. in 2019 with 1002 students [16] These results indicate that the stress levels of medical students are high, similar to the literature and that supportive measures should be taken for stress management.

When the relationship between physical activity and stress level was examined, it was found that students who engaged in physical activity had significantly lower stress levels. In a study conducted in 2022 by Boyd et al. in first-year medical students, it was shown that decreases in physical activity level increased the perceived stress level. [17] Our study shows that physical activity reduces perceived stress in line with the literature. Physical activity is an important stress management tool at the individual and social levels.

Statistically significant relationships were found between the subcomponents of sleep quality and perceived stress. In a study conducted in 2025 with 386 medical students, moderate positive correlations were found between sleep quality and depression, anxiety, and stress levels; increased levels of depression and anxiety were associated with deterioration in sleep quality. [8] These findings indicate that stress levels are high in individuals with poor sleep quality, difficulty falling asleep, insufficient sleep duration, irregular bedtime and wake-up times, insomnia or sleep fragmentation for some reasons, and impaired daytime functioning.

There was a moderate positive correlation between PSQI and PSS scores. Since the increase in sleep quality scores indicates poor sleep quality, poor sleep quality indicates an increase in stress. In a study conducted in 2023 on 795 medical students in India, similar to our study, Pearson's correlation analysis showed a significant positive correlation between perceived stress and sleep quality. [18] High-stress levels disrupt sleep cycles, damaging the individual both physically and mentally.

In this study, the quality of sleep and perceived stress levels of medical students were evaluated. As a result, a significant proportion of students were found to have poor sleep quality and stress levels were generally moderate. Sleep quality was better in 6th-grade and male students, while poor sleep quality was significantly higher in students who smoked and drank alcohol. Perceived stress levels were higher in female students, alcohol users, and those with chronic diseases or regular medication use. Physical activity was observed to reduce stress. There was a significant relationship between sleep disorder components and perceived stress.

Poor sleep quality was associated with increased stress. In order to improve the quality of sleep and decrease stress, recommendations such as sleep hygiene training, stress management techniques, and physical activity promotion should be developed for medical students. In addition, awareness and support programs are recommended to reduce smoking and alcohol use. Large-scale and multicentre studies can make it more understandable of this relationship.

Limitations of the study

The restriction of this study to a single university, in addition to the limitation of the data to a specific period, serves to constrain the generalizability of the results and the traceability of changes over time. The generalisability of the findings is contingent upon the execution of analogous research in diverse cultural and institutional contexts. Moreover, although the study's objective was to encompass the entire population, the participation rate was found to be 83%, thereby precluding the application of random sampling and resulting in the consideration of this as a potential limitation, which might have led to selection bias. It is recommended that future multicentre studies be conducted, employing larger and more culturally diverse samples. These studies will provide more generalizable and stronger evidence on the factors affecting sleep quality and stress levels.

Ethical Considerations: The aims and procedures of the study were re-evaluated and approved by our ethics committee before the relevant analyses were performed (Date: 13 February 2024; No: 2024/85).

Conflict of Interest: The authors declare no conflict of interest.

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