

# Determination of sleep quality, fatigue and related factors in nursing students

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## Abstract

**Context:** Sleep problems may lead to attention disorders, irritability, anxiety, and fatigue in individuals. Fatigue, which is a result of insufficient sleep, may lead to the absence of energy, restlessness, impairment of concentration, and predisposition to accidents in individuals.

**Aims:** The aim of this study was to determine sleep quality, fatigue, and related factors in nursing students.

**Setting and Design:** This study was carried out as a cross-sectional, descriptive, and relationship seeker. This study was carried out with students who study in the Nursing Department of Health College of a University in Southeastern Turkey between May and June 2018.

**Materials and Methods:** The population of the study consisted of 380 students and the sample consisted of 281 students who met the criteria for taking. Data were collected using Personal Information Form, Pittsburgh Sleep Quality Index (PSQI), and Fatigue Severity Scale (FSS).

**Statistical Analysis Used:** Percentage, Shapiro–Wilk test, spearman correlation test, Mann–Whitney U-test, and Kruskal–Wallis test were used for data analysis.

**Results:** The mean PSQI score of the participants was  $8.50 \pm 2.70$ , and the mean score of FSS was  $4.99 \pm 1.40$ . Correlation analysis revealed a positive moderate correlation between PSQI and FSS at 0.01 level. With PSQI total score, the difference among age, economic status, current location, working status, chronic disease, smoking status, caffeinated beverage consumption status, being late to class, and drowsiness during the lesson of students was found out to be significant ( $P < 0.05$ ).

**Conclusion:** In this study, poor sleep quality is common among nursing students and fatigue severity of students with low sleep quality increases. This may affect the success level of students negatively. Thus solution-oriented strategies should be developed based on factors which affect the sleep quality and fatigue level of nursing students.

**Keywords:** Fatigue severity scale, Fatigue, Nursing, Pittsburgh sleep quality index, Sleep, Student

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**Received:** 10 June 2020; **Revised:** 15 February 2021; **Accepted:** 10 March 2021; **Published:** 19 July 2021

### Access this article online

#### Quick Response Code:



#### Website:

[www.jnmsjournal.org](http://www.jnmsjournal.org)

#### DOI:

10.4103/JNMS.JNMS\_69\_20

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**How to cite this article:** Yiğitalp G, Aydın LZ. Determination of sleep quality, fatigue and related factors in nursing students. *J Nurs Midwifery Sci* 2021;8:212-8.

## INTRODUCTION

Sleeping is one of the basic requirements of life which affects daily life, physical, and psychological health in many aspects. Sleeping is a natural process that controls energy conservation, development, and reparation of the nervous system, automatic and cognitive functions, arousal, and behavior.<sup>[1]</sup> Sleep is a part of the system called the sleep wake cycle. This cycle of roughly 8 h of night sleep and 16 h of day vigilance is controlled by a combination of two internal effects called homeostasis and circadian rhythms. Continuity of the sleep awake cycle is essential in maintaining health.<sup>[2]</sup>

Sleep quality is defined as feeling fit, in the form and ready for a new day after sleep. Sleep quality includes aspects such as sleeping time, sleep time, the number of wakes per night, the depth of sleep, and its relaxing. When sleep quality is poor, attention/memory disorders, emotional variability, delusions may occur, and this may affect individuals' working life, social life, economic status, general health, and mental status.<sup>[3]</sup> In addition, sleep quality is influenced by factors such as gender, socioeconomic status, smoking and alcohol consumption, caffeinated beverages, and the presence of chronic diseases.<sup>[2,4,5]</sup> Studies carried out domestically and abroad have reported poor sleep quality of university students.<sup>[6-8]</sup> Due to the intensive and strenuous training programs carried out in health-care professions including nursing, students are likely to make sacrifices from their sleep periods. Therefore, students who cannot sleep adequately may be physically, cognitively, and emotionally affected.<sup>[9]</sup>

Good sleep is curative and relieves the feeling of fatigue, and then individuals feel ready to face the challenges of a new day.<sup>[10]</sup> Fatigue, which is a widely debated topic in medicine and psychology, is accepted as the main component of chronic fatigue syndrome and burnout syndrome. Not only insomnia, but also irregular lifestyle, physical illness, and sociodemographic factors are all causal risk factors for fatigue.<sup>[11]</sup>

Studies have shown that fatigue is common in nursing students as well as sleep problems, there is a relationship between sleep quality and severity of fatigue, and the severity of fatigue increases as sleep quality decreases.<sup>[12,13]</sup>

If nursing students who are candidates to become members of a profession providing health services to the society and who care for sick/healthy individuals even while student can sleep sufficiently and healthily, this will also contribute to the individuals and the society they serve and become role models.<sup>[14]</sup>

In Turkish society, there are few studies examining the relationship between sleep quality and severity of fatigue among nursing students. This study is important because it will provide a database for studies on improving sleep quality and thus reducing fatigue levels of nursing students, who are one of the important groups of health-care system. Therefore, in this study, it was aimed to examine the sleep quality and fatigue levels of nursing students and the factors affecting them.

## MATERIALS AND METHODS

### Study design

This study was carried out as a cross-sectional, descriptive, and relationship seeker.

### Study population and Study sample

The population of the study consisted of 380 students who studied in the Health College, Nursing Department of a University in the southeast of Turkey. The study was completed with 281 students (73.9%). The data were collected by distributing survey forms to the students in the classroom environment between May and June 2018. It took about 10–15 min to answer the questions.

### Inclusion criteria

Sampling criteria have been determined as (1) volunteering to take part in the study and (2) not being diagnosed with any sleep disorder due to different reasons and thus not taking medicine. In addition, the students who were not absent in the data collection process were included in the study, while the students who did not answer all the questions were excluded from the study.

### Research instruments

Data were collected using Personal Information Form, Pittsburgh Sleep Quality Index (PSQI), and Fatigue Severity Scale (FSS).

#### *Personal information form*

This form, which was prepared by the researchers in line with the literature, was composed of the social demographics information of nursing students such as age, gender, grade, employment status, income level, consumption of caffeinated drinks, smoking, and alcohol use status.

#### *Pittsburgh Sleep Quality Index*

PSQI was developed by Buysse *et al.*<sup>[15]</sup> In 1989, validity and reliability studies were conducted by Ağargün *et al.* in 1996.<sup>[16]</sup> PSQI consists of 19 self-report questions and 5 questions asked to be answered by the spouse or a roommate of the individual, which were not included in

the final score. The index consists of seven components which are subjective sleep quality, sleep latency, duration of sleep, habitual sleep activity, sleep disturbance, use of sleeping pills, and daytime sleep dysfunction. The total score of PSQI, which was evaluated over 0–3 points, has a value between 0 and 21. A PSQI score of 5 or higher indicates poor sleep quality. In the study of Ağargün *et al.*, Cronbach alpha internal consistency coefficient of PSQI was found to be 0.80.<sup>[16]</sup> In this study, Cronbach alpha internal consistency coefficient was found to be 0.92.

#### Fatigue Severity Scale

FSS was developed by Krupp *et al.*<sup>[17]</sup> in 1989, and validity and reliability study was conducted in 2007 by Armutlu *et al.* in our country.<sup>[18]</sup> Each question of the 9-item FSS is evaluated over 1–7 points. It was stated that the average total score was 4 and above, indicating chronic fatigue. In the study of Armutlu *et al.*, Cronbach's alpha internal consistency coefficient was found to be 0.89. In this study, Cronbach alpha internal consistency coefficient was found to be 0.76.

#### Data analysis

Statistical analysis and coding of the data were evaluated using SPSS 16 (Statistical Package for Social Sciences, SPSS Inc., Chicago, IL, USA). Percentage, mean minimum, maximum, standard deviation, Shapiro–Wilk test, Spearman correlation test, Mann–Whitney U-test, and Kruskal–Wallis test were used for data analysis. All findings were tested at 0.05 significance level.

#### Ethical consideration

Ethics committee approval of the study was obtained from the noninterventional Clinical Research Ethics Committee Commission of a university (May 18, 2018/172). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. In addition, written permission (June 27, 2018/59215) was obtained from the School of Health where the study was conducted. Informed consent was obtained from all individual participants included in the study. The individuals were informed about the voluntary nature and confidentiality of participating in the study.

## RESULTS

### The sociodemographic and personal characteristics

The average age of the students participating in the study was  $20.78 \pm 2.16$ , 31.0% were freshmen, 63.0% were

women, 77.2% have equal income and expenses, and 46.3% were live alone and 93.2% were unemployed. It was determined that 88.6% of the students did not have chronic disease, 84.3% did not smoke, 94.2% did not use alcohol, 71.5% consumed caffeinated drinks, 62.2% came to classes late, and 73.0% of them fell asleep in the lessons [Table 1].

### Pittsburgh Sleep Quality Index and Fatigue Severity Scale scores

The total average scores of the students who participated in PSQI and FSS were given. It was determined that 89.0% of the students had PSQI 5 and above and they had sleep problems, 76.9% of them had FSS 4 and above and had chronic fatigue [Table 2]. The PSQI total average score of the students was found to be  $8.50 \pm 2.70$ , and the FSS average total score was found to be  $4.99 \pm 1.40$  [Table 3].

As a result of Shapiro–Wilk test ( $P < 0.05$ ), Spearman correlation test, which is one of the nonparametric

**Table 1: Sociodemographic and Personal Characteristics (n=281)**

Characteristics	n (%)
Grade	
First	87 (31.0)
Second	60 (21.4)
Third	51 (18.1)
Fourth	83 (29.5)
Gender	
Female	177 (63.0)
Male	104 (37.0)
Economic status	
Income less than expenses	46 (16.4)
Equal income and expenses	217 (77.2)
Income higher than expenses	18 (6.4)
The current accommodation	
With family	89 (31.7)
In dormitory	62 (22.1)
Alone in an apartment/house	130 (46.3)
Employment	
Employed	19 (6.8)
Unemployed	262 (93.2)
Chronic illness	
Yes	32 (11.4)
No	249 (88.6)
Smoking status	
Yes	44 (15.7)
No	237 (84.3)
Alcohol consumption status	
Yes	16 (5.8)
No	265 (94.2)
Consumption of caffeinated beverages	
Yes	201 (71.5)
No	80 (28.5)
Being late to class	
Yes	175 (62.2)
No	106 (37.8)
Drowsiness during the lesson	
Yes	205 (73.0)
No	76 (27.0)
Age, middle±SD (minimum-maximum)	20.78±2.16 (17.37)

SD: Standard deviation

**Table 2: The Pittsburgh Sleep Quality Index and Fatigue Severity Scale Categories**

	<i>n</i> (%)
PSQI	
<5	31 (11.0)
≥5	250 (89.0)
FSS	
<4	65 (23.1)
≥4	216 (76.9)

PSQI: Pittsburgh Sleep Quality Index, FSS: Fatigue Severity Scale

**Table 3: The Total Pittsburgh Sleep Quality Index and Subcomponent and Fatigue Severity Scale Score Average**

PSQI and subcomponents	Middle±SD	Minimum-maximum
Subjective sleep quality	0.10±0.41	1-3
Sleep latency	1.30±0.92	1-3
Sleep time	0.71±0.94	1-3
Habitual sleep activity	2.86±0.57	1-3
Sleeping disorder	1.37±0.53	1-3
Use of sleeping drugs*	0.00±0.00	-
Day time sleep dysfunction	1.29±0.77	1-3
PSQI total score	8.50±2.70	1-16
FSS total score	4.99±1.40	1.33-14.11

\*As the students do not use sleeping drugs (criteria to be included in the sampling); it is taken as "0" points. PSQI: Pittsburgh Sleep Quality Index, FSS: Fatigue Severity Scale, SD: Standard deviation

**Table 4: The Relation Between Pittsburgh Sleep Quality Index and Fatigue Severity Scale Total Score Averages**

Scales	PSQI ( <i>r</i> , <i>P</i> )	FSS ( <i>r</i> , <i>P</i> )
PSQI		0.317*, 0.000
FSS	0.317*, 0.000	

\*Correlations are significant at the level of *P*: 0.01. PSQI: Pittsburgh Sleep Quality Index, FSS: Fatigue Severity Scale

statistical methods, was applied as the two scales did not show normal distribution. Spearman correlation analysis showed a positive moderate correlation between PSQI and FSS at the level of 0.01 [Table 4].

When the individual characteristics of the students and total PSQI average scores were examined, the difference between age, economic status, current place of residence, employment status, chronic illness, smoking status, caffeinated beverage consumption, late arriving to class, and drowsiness in the lesson was found significant ( $P < 0.05$ ), but the difference between grade, gender, and alcohol use status was not found significant ( $P > 0.05$ ). When the individual characteristics of the students and the total average scores of the FSS were examined, there was a significant difference between class, gender, and late arriving to class, drowsiness in the lesson ( $P < 0.05$ ), but no significant difference were found among age, economic status, current location, working status, chronic disease, smoking status, alcohol consumption, and caffeinated beverage consumption ( $P > 0.05$ ) [Table 5].

## DISCUSSION

In this study, sleep quality and fatigue levels of nursing students were examined and the relationship between the two variables was examined.

The majority of the students included in the study had poor sleep quality and the PSQI total average score was high. Studies have shown that the level of sleep disorders in students varies. The mean total PSQI score of university students was  $5.20 \pm 2.70$  to  $7.28 \pm 3.56$  in domestic studies, and the frequency of poor sleep quality was between 46.4% and 88.5%,<sup>[8,9,19]</sup> and PSQI total score in studies conducted abroad, the average frequency was between  $5.20 \pm 2.45$  and  $6.72 \pm 3.06$ , and the frequency of poor sleep quality ranged from 57.2% to 64.4%.<sup>[6,7,12]</sup> These data suggest that sleep quality may be affected by different societies, cultural structures, and lifestyles and that there may be differences between countries due to the use of different measurement methods in sleep-related studies. In addition, although these results vary according to countries, it is revealed that sleep problems are common health problems among students.

Although some studies have shown that age does not affect sleep quality,<sup>[19,20]</sup> age has been reported to be among the factors affecting sleep quality of individuals.<sup>[11,21,22]</sup> In this study, age was found to be effective on sleep quality. As age increases, the sleep quality decreases. In our study, the age group had a wide (17–37). Older students may have greater responsibilities in daily life, which may cause them to experience sleep problems.

The study found that students living with their families and alone at home had better sleep than those staying in the dormitories. Similar studies have reported that students living with their families have better quality of sleep.<sup>[23,24]</sup> This can be explained by the fact that the dormitory rooms are crowded, and the sleep quality may be adversely affected due to unsuitable ambient conditions such as noise, light, and ventilation.

Many studies have shown that having chronic diseases has negative effects on sleep.<sup>[4,5,9]</sup> In this study, the presence of chronic diseases was found to affect sleep quality.

It is known that smoking has a stimulating effect due to nicotine and therefore it is stated that smoking before going to sleep makes it difficult to fall asleep and affects sleep quality negatively.<sup>[23]</sup> In general, the literature supports the positive relationship between poor quality sleep and smoking.<sup>[5,25,26]</sup> In this study, in accordance with

**Table 5: The Personal Characteristics of Participants and Scale Score Averages**

Characteristics	Middle±SD	
	PSQI	FSS
Grade		
First	7.97±2.71	4.76±1.33
Second	8.71±2.78	4.91±1.37
Third	9.13±2.70	5.59±1.59
Forth	8.53±2.58	4.92±1.29
$\chi^{2**}$ (df: 3)	5.720	9.089
<i>P</i>	0.126	0.028
Gender		
Female	8.67±2.59	5.22±1.38
Male	8.22±2.87	4.60±1.37
<i>Z*</i>	-1.544	-3.559
<i>P</i>	0.123	0.000
Economic status		
Income less than expenses	9.83±3.12	5.27±1.43
Equal income and expenses	8.29±2.60	4.99±1.37
Income higher than expenses	9.09±2.85	4.88±1.58
$\chi^{2**}$ (df: 2)	6.090	1.621
<i>P</i>	0.048	0.445
The current accommodation		
With family	8.33±2.59	5.03±1.49
In the dormitory	9.35±2.88	4.93±1.33
Alone in an apartment/house	8.14±2.67	4.98±1.35
$\chi^{2**}$ (df: 2)	7.628	0.232
<i>P</i>	0.022	0.891
Employment		
Employed	10.05±3.09	4.94±1.36
Unemployed	8.41±2.65	5.00±1.40
<i>Z*</i>	-2.254	-0.146
<i>P</i>	0.024	0.884
Chronic illness		
Yes	9.43±2.88	4.88±1.36
No	8.41±2.66	5.00±1.42
<i>Z*</i>	-2.096	-0.273
<i>P</i>	0.036	0.785
Smoking status		
Yes	9.69±2.94	4.88±1.55
No	8.29±2.61	5.00±1.38
<i>Z*</i>	-2.869	-0.037
<i>P</i>	0.004	0.971
Alcohol consumption status		
Yes	8.87±2.57	5.04±1.36
No	8.50±2.72	4.98±1.41
<i>Z*</i>	-0.416	-0.211
<i>P</i>	0.678	0.833
Consumption of caffeinated beverages		
Yes	8.87±2.67	5.12±1.27
No	8.01±2.79	4.83±1.71
<i>Z*</i>	-2.146	-1.795
<i>P</i>	0.032	0.073
Being late to class		
Yes	7.89±2.51	4.75±1.36
No	8.88±2.64	5.24±1.38
<i>Z*</i>	-2.779	-2.564
<i>P</i>	0.005	0.010
Drowsiness in class		
Yes	9.40±2.59	5.26±1.13
No	7.21±2.64	4.56±1.47
<i>Z*</i>	-5.009	-2.832
<i>P</i>	0.000	0.005
Age ( <i>r</i> , <i>P</i> )	0.317, 0.000***	0.037, 0.539

\*Mann-Whitney U test, \*\*Kruskal-Wallis test, \*\*\*Correlation is significant at the level of *P*: 0.01. PSQI: Pittsburgh Sleep Quality Index, FSS: Fatigue Severity Scale, SD: Standard deviation

the literature, it was found that the sleep quality of smokers was worse than nonsmokers. This can be explained with the negative impacts of nicotine on sleep. The students may have smoked before sleep or may have woken up to smoke at night and thus, their sleep quality may have been ruined.

Caffeine is a widely used, easily accessible, powerful central nervous system stimulant. It increases wakefulness and delays the transition to sleep. In addition, caffeine-containing foods increase the number of wakefulness during sleep while reducing total sleep time and deep sleep. Thus, it may cause a decrease in sleep quality.<sup>[1]</sup> Similar to previous studies, our study showed that those who consume caffeinated beverages have lower sleep quality.<sup>[5,27,28]</sup>

In this study, we found a relationship between sleep quality and drowsiness in class. It was determined that the students with low sleep quality felt more drowsy in the lesson. Similar studies have shown a positive relationship between sleep quality and drowsiness in the lesson,<sup>[14]</sup> and reduced sleep time is a direct factor that leads to daytime sleepiness.<sup>[29]</sup> It was also stated that daytime sleepiness rate of students who had problems falling asleep and waking up at night increased.<sup>[30]</sup> Daytime sleepiness is expected in individuals with poor sleep quality.

Although there were studies showing that students' grade, gender, and alcohol use affect sleep quality,<sup>[23,31]</sup> no statistically significant relationship was found between these variables and sleep quality among nursing students in this study. This can be because the studies were conducted with students from different cultures. It can particularly be related with the frequency and amount of alcohol consumption.

It was determined that the majority of the students who participated in the study experienced chronic fatigue. The FSS total average score was found high. In one study, 29.0% of students reported severe fatigue and 47.8% reported moderate fatigue.<sup>[12]</sup> In another study, 83.5% of students expressed moderate and excessive fatigue, while 59.8% reported moderate fatigue.<sup>[32]</sup> In another study, 58.2% of the students stated that they were predominantly tired.<sup>[33]</sup> These results are similar to our study.

As the grades of the students included in the study are higher, the severity of fatigue increased. In particular, it was determined that the students in the third grade were more tired. First grade students are less tired than others. These results are in parallel with similar studies.<sup>[12,32]</sup> This can be explained by the increase in the intensity of the course as the

students move to the upper grades. This can be explained with the fact that upper grades make more effort in the daytime because of intenser courses and study late into the night and thus they experience sleeplessness and fatigue.

Similar to previous studies<sup>[25,33]</sup> although this study shows that women are more tired than men, there are studies reporting that men feel more tired than women,<sup>[32]</sup> and studies that do not show difference between tiredness and gender.<sup>[13]</sup> This can be because the studies were conducted in different cultures and with different student groups (such as medical students, nursing students, and students from other departments).

The most obvious daytime complaint about insomnia is fatigue. Because sleep is generally considered as an effective measure against fatigue. It is assumed that the primary cause of fatigue in individuals with insomnia is that the body cannot be properly rest due to poor quality sleep.<sup>[34]</sup> Positive moderate correlation was found between sleep quality and fatigue severity of the students. The fatigue severity increases in the students whose sleep quality is low. Sleep quality is similar to the severity of fatigue of students. Similar results have been obtained in many studies.<sup>[4,25,35]</sup>

### Limitations

This study was conducted with the nursing students of a university. Therefore, the research results can be generalized only to this group. In addition, the whole population was aimed to be reached; however, the study was completed with 281 (73.9%) students who fulfilled the sampling criteria, were not absent during the data collection process, answered all the questions, and agreed to participate in the study.

### CONCLUSION

In this study, low sleep quality and fatigue is common among nursing students. Older age, low income, living in a dormitory, working in a job, having a chronic illness, smoking, consuming caffeinated drinks, drowsiness in class, not being late to class are associated with poor sleep quality. Being in the third grade, being a woman, not being late to class, and drowsiness in class are associated with high levels fatigue. In addition, the severity of fatigue of students with low sleep quality increases. Therefore, strategies should be developed to increase the sleep quality and to reduce the severity of fatigue of nursing students. In order to contribute to the development of a healthy lifestyle of nursing students, the strategies necessary to increase healthy and quality sleep and reduce fatigue should be examined in a broad time within the scope of health protection and

promotion course in the curriculum. Especially in nursing students, more comprehensive studies should be conducted to investigate the relationship between sleep quality and fatigue.

### Conflicts of interest

There are no conflicts of interest.

### Authors' contributions

All authors contributed to this research.

### Financial support and sponsorship

Nil.

### Acknowledgments

We thank all the students who participated in the study.

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