

Anxiety levels and sleep quality in nursing students during the COVID-19 pandemic

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Abstract

Purpose: This study was carried out with the aim of determining the correlation between the levels of anxiety experienced by students and their sleep quality during the coronavirus disease 2019 (COVID-19) pandemic.

Design and Methods: This descriptive and correlational type study' sample population was 283 students. The personal information form, state-trait anxiety inventory, Verran and Snyder–Halpern sleep scale were used in data collection.

Findings: Study findings indicate that students' state-trait anxiety levels and sleep quality are average, 28.26% of them sleep interrupted and there is a correlation between their anxiety and sleep quality.

Practice Implication: it is recommended that teaching students how to deal with COVID-19 and interventional studies aimed at improving sleep quality by reducing anxiety levels should be conducted to further investigate the topic.

KEYWORDS

anxiety, nursing students, SARS coronavirus, sleep quality

1 | INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an aggressive pandemic disease that started in Wuhan, China. COVID-19 is a highly contagious and pathogenic viral infection caused by acute respiratory syndrome Coronavirus 2 (SARS-CoV-2). Although its intermediate source and the mode of transfer to people are unknown, its quick ability for human-to-human transmission has been widely confirmed. According to data from the World Health Organization, it is reported that there are millions of new cases and deaths worldwide every day. World Health Organization.¹ Therefore, it is extremely important to implement preventive measures to reduce the spread of the disease. In order for any preventive advice to be useful, a comprehensive approach is required to ensure proper health education of the public. It is often emphasized that taking measures to prevent the spread of the virus alone is not enough and the necessary precautions, the quarantine process, and the social distancing rule should also be implemented.^{2,3} Quarantine is one of the public health measures to prevent the spread of a transferrable disease and it carries negative

psychological effects.^{4–6} Social distancing, cancellation of meetings, and closing schools are some of the quarantine practices.

Quarantine and transferrable diseases are an important source of stress that can lead to negative effects on the overall psychological health of students.⁷ At the same time, videos, news, and articles about COVID-19 shared on the Internet create a high level of stress, anxiety, and fear in people which also cause difficulty falling asleep, changes in sleep schedule and obsessive thoughts.^{8–10} It has been reported that conditions such as depression, stress, anxiety, and fatigue can lead to sleep disorders. A stressed individual has difficulty in falling asleep and mental rest cannot be achieved.⁸ This situation negatively affects the quality of life and educational processes of students.¹¹ Some researchers found that students experiencing stress tend to develop health issues, depression, sleep disorders and their academic abilities decrease.^{12–15} Therefore, the study was carried out to determine the correlation between the levels of anxiety and sleep quality of the students during the COVID-19 pandemic. The main research questions are as follows:

1. How are nursing students' anxiety levels during the COVID-19 pandemic?
2. How are nursing students' sleep quality during the COVID-19 pandemic?
3. Is there a difference between the sociocultural characteristics of nursing students and their anxiety levels and sleep quality during the COVID-19 pandemic?
4. Is there any correlation between nursing students' levels of anxiety levels and sleep quality during the COVID-19 pandemic?

2 | DESIGN AND METHODS

2.1 | Purpose and type of study

The study is a descriptive and correlational study to determine the correlation between anxiety levels and sleep quality of nursing students in the period of COVID-19 pandemic.

2.2 | Population and sample of study

The population of the study consists of a total of 432 students studying in the 2019–2020 academic year at a Nursing Department of a Faculty of Health Sciences in Turkey and the sample of the study includes 283 students who agreed to participate in the study without sample calculation. Sixty-six percent of the total population was included.

2.3 | Measures

Data collection forms that were used are the “Personal information form,” “State-trait anxiety inventory” and “Verran and Snyder–Halpern sleep scale.”

2.3.1 | Personal information form

In the personal information form created by researchers using the literature, there are questions about students' gender, school year, the kinds of measures taken for the COVID-19 pandemic, and the news sources used to get information.^{16–18}

2.3.2 | State-trait anxiety inventory (STAI FORM TX-1, TX-2)

Developed by Spielberger and their friends in 1970, the validity and reliability study of the state-trait anxiety inventory in Turkey was carried out by Öner and Le Compte in 1985.¹⁹ The state-trait anxiety inventory is a self-assessment questionnaire consisting of short expressions. Originally developed for the purpose of investigating

anxiety in normal adults, this scale was also found to be suitable for high school students and individuals with psychiatric and physical disorders in subsequent trials. The state-trait anxiety inventory consists of two parts including the state anxiety inventory and trait anxiety inventory.

The state anxiety inventory: State anxiety refers to transient emotional reactions manifested by the individual to nonconstant situations with varying intensity depending on the situation. In situations where the individual perceives the stressful situation as a threat, the level of “state anxiety” is high and in situations where this danger is not perceived as threatening, the level of state anxiety is low. The state anxiety inventory requires the individual to describe how they feel at a given moment and under certain circumstances, taking into account their feelings about the situation in which they are in. It measures the state of the individual, that is, the level of anxiety in which they are currently in. The intensity of the instantaneous stress, anxiety, and excitement responses caused by conditions increases or decreases over time. Individuals respond to the items on the inventory based on the degree of severity of their emotions at the moment.

The trait anxiety inventory: The trait anxiety inventory requires an individual to describe how they feel in general. The trait anxiety inventory measures anxiety according to how the individual feels “often” and “constantly.” The trait anxiety inventory measures an individual's tendency to see, perceive and interpret most of the situations that are accepted to be neutral according to the objective criteria as threatening and stressful. Individuals respond to the items on the inventory according to the frequency of the emotions generally feel.

Some of the expressions on the inventory are given positive score (which increases the total anxiety score), while the rest are given a negative score (which reduces the total anxiety score). A score between 1 (or –1) and 4 (or –4) is given according to the positive or negative properties of the expression and a constant score of 50 is added to the total score. The highest possible score is 80 and the lowest possible score is 20. The higher the total anxiety score, the greater the anxiety level of the individual taking the inventory. For the trait anxiety inventory, the final score is calculated by adding a constant score of 35. In the interpretation of the scores, the total score value from both scales varies from 20 to 80. A high score indicates a high level of anxiety and a low score indicated a lower level of anxiety. Both scales contain 20 items with two types of expressions. Direct expressions express negative emotions, and reversed expressions express positive emotions. The reversed items on the state anxiety scale are items 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20. The reversed items on the trait anxiety scale are items 21, 26, 27, 30, 33, 36 and 39. In 1977, Cronbach's alpha value was 0.94 for the State Anxiety Inventory and 0.83 for the trait anxiety inventory.¹⁹ In this study, Cronbach's Alpha value was 0.74 for the State Anxiety Inventory and 0.81 for the trait anxiety inventory.

2.3.3 | Visual Analog Sleep (VAS) Scale

The Verran and Snyder–Halpern (VSH) sleep scale, developed by Verran and Snyder–Halpern in 1990, consists of 15 items and three

sections. The sections include sleep disturbance, effective sleep, daytime sleep (additional sleep). The Turkish validity reliability study was performed by Çetinkaya and Karabulut in 2016. The VSH sleep scale's Turkish Form was reduced to 10 items after subtracting items 3, 4, 5, 11, 13, and 16 from the original VSH sleep scale. The items 2, 4, 8, and 9 were, then, reverse-scored. Each item in the scale is evaluated using the visual comparison technique on a chart from 0 (at the left end) to 100 (at the right end). The Turkish form of the scale produces a score between 0 and 1000 under the title of sleep quality. The increase in the score from the scale indicates a decrease in the quality of sleep. In the validity study of the scale by Çetinkaya and Karabulut,²⁰ the Cronbach's alpha coefficient was 0.94, and in this study, the Cronbach's alpha coefficient of the scale was found 0.73.

2.4 | Data collection procedure

The data were collected in May 2020 via an online survey. The participants were invited to the study electronically. Participants filled out the questionnaires through the online survey platform.

2.5 | Ethical considerations

Before the initiation of the study, the necessary permission to conduct the study was granted by the Ministry of Health's Commission for Scientific Research on COVID-19, followed by the ethical committee approval (dated 2020, numbered 108) from a university's clinical study ethics committee. The first page of the prepared on-line data collection form included an informed consent section for the students, and the data collection form only filled out by the students who agreed to participate in the study.

2.6 | Statistical analysis

SPSS 21.0 package program was used to analyze the data. The compatibility of the data to normal distribution was determined using the Kolmogorov–Smirnov/Shapiro–Wilk's test, kurtosis and skewness coefficients. The mean values and standard deviation were used for descriptive statistics. The Cronbach's alpha coefficient was used to determine the internal consistency of the scales of this study. Out of the descriptive tests, the frequency and average value tests were used. Since the distribution of data was found to be normal, the correlation between two independent variables of the parametric tests was calculated using the Student *t* test and the correlation between multiple independent variables was calculated using the analysis of variance test. The χ^2 test was used to compare the students' sleeping conditions before and after the COVID-19 period. The Pearson correlation analysis was used to interpret the correlation between quantitative variables.

TABLE 1 Student personal information (*n* = 283)

		<i>n</i>	%
Mean age ± <i>SD</i>			
Gender	Female	232	82.0
	Male	51	10.0
School year	1st year	95	33.6
	2nd year	73	25.8
	3rd year	62	21.9
	4th year	53	18.7
From where do they get the news?	TV	71	25.1
	Social media	138	48.8
	Internet	71	25.1
	Healthcare employees	2	0.7
	Other	1	0.4
Precautions they take	Mask	78	27.6
	Disinfectants	4	1.4
	Staying home	147	51.9
	Social distancing	52	18.4
	Other	2	0.7
Knowing the method of transmission	Yes	283	100
	No	0	0
Emotions regarding COVID-19 cases in Turkey	Anxiety	147	51.9
	Sadness	27	9.5
	Despair	19	6.7
	Hopelessness	2	0.7
	Fear	33	11.7
	Anger	1	0.4
	Denial	1	0.4
	Nervousness	47	16.6
	Apathy	6	2.1
Chronic disease	Yes	20	7.1
	No	263	92.9
Psychiatric disease	Yes	13	4.6
	No	270	95.4
Knowing someone with a diagnosis	Yes	56	19.8
	No	227	80.2

Abbreviation: COVID-19, coronavirus disease 2019.

3 | FINDINGS

Table 1 shows that the mean age of students was 20.39 ± 2.05 years and 82% (*n* = 232) were female, and 33.6% (*n* = 95) were first-year students. It was found that 48.8% (*n* = 138) of the students followed

TABLE 2 Levels of state anxiety, trait anxiety, and sleep quality of students

	<i>n</i>	Min–Max	Mean ± SD
State anxiety	283	20–78	42.24 ± 10.95
Trait anxiety	283	23–77	48.56 ± 9.83
VAS Scale	283	0–1000	438.366 ± 110.02

Abbreviation: VAS Scale, Visual Analog Sleep Scale

the news through social media, 51.9% ($n = 147$) stayed home as a precaution, and all students knew the COVID-19's method of transmission. 51.9% of students ($n = 147$) experienced anxiety when COVID-19 cases were diagnosed in Turkey, 92.9% ($n = 263$) did not have a chronic disease, 95.4% ($n = 270$) did not have a psychiatric diagnosis, and 19.8% ($n = 56$) knew someone who was diagnosed with COVID-19.

Table 2 shows that the students' state anxiety scores were 42.24 ± 10.95 and trait anxiety scores were 48.56 ± 9.83 , and their VSH sleep scale scores were 438.366 ± 110.02 .

Table 3 shows that students' state anxiety, trait anxiety and sleep quality do not differ by gender, age, school year, or the presence of a chronic or psychiatric disease. It was found that the students' state anxiety differed according to their feelings associated with COVID-19 and that this difference was caused by feelings of fear and anxiety ($p = 0.039$).

The examination of students' night sleep interruption shows that before COVID-19, 21.20% reported that their night sleep was interrupted, while during the COVID-19 period, this rate increased to 28.26% and this increase was considered to be statistically significant (Table 4).

Table 5 shows a high-level positive significant correlation between students' sleep quality and state anxiety ($r: 0.305$, $p: 0.000^{**}$) and trait anxiety ($r: 0.288$; $p: 0.000$).

4 | DISCUSSION

The findings were discussed under three categories in this study which aims to determine the correlation between the anxiety levels and sleep quality of students during the COVID-19 pandemic.

In the study, 48.7% of the students follow the news related to COVID-19 pandemic via social media. Roy et al.²¹ reported that the vast majority of participants follows the information about the pandemic via social media. Cheng et al.²² reported that the teenage and adult age groups reach a lot of information that could trigger stress through social media. Today, along with the rapid development of technology and social media tools, adults and teenagers are believed to use them more actively and access information using this technology.

It has been detected that students often take measures of self-quarantine and wearing mask to protect themselves against COVID-19. Roy et al.²¹ reported that participants often use

disinfectants, wash hands and use masks. Similarly, 80% of the respondents expressed increased adherence to social distancing and quarantine practices. Given the date of data collection, the quarantine for children and teenagers was considered to be effective.

In the study, 51.9% of the students reported that they felt anxious in relation to the cases of COVID-19 in Turkey. Similarly, in their study on young adults, Liu et al.²³ reported that participants experienced depression and anxiety associated with COVID-19. The COVID-19 pandemic threatens the health of people in many countries and led to major changes in their everyday lives and routines. Both the uncertainty regarding their health statuses and a sudden change of daily routine may have caused changes in their emotional states, such as anxiety, depression.

It was found that students' levels of state anxiety differ according to their emotions associated with COVID-19, and this difference was due to the fact that the scores of students who feel fear were higher than those who feel other emotions. Because COVID-19 is a life-threatening transmittable disease, it is expected that the levels of anxiety in individuals experiencing fear for their lives will be high.

During the COVID-19 pandemic, students' levels of state anxiety and trait anxiety were found to be moderate. The studies conducted to determine anxiety during the COVID-19 pandemic show that in their study on Chinese people, Huang and Zhao²⁴ reported generalized anxiety disorder and depressive symptoms. In their study, Wang et al.¹⁷ reported high prevalence of anxiety and posttraumatic stress disorder symptoms in students. In their study on Italian people, Casagrande et al.¹⁰ also reported that participants showed signs of severe anxiety and depression during the COVID-19 pandemic. Compared to the literature, the student's anxiety scores in this study were found low. The literature reports that solitude is a risk factor for mental distress, such as anxiety and depression.²⁵ In light of this information, students participating in this study were already in their homes and with their families on the dates when the study data was collected. It was thought that the students' feelings of safety due to being with their families could have positively affected their levels of anxiety. Similarly, in their study with university students, Cao et al.¹⁸ reported that 75.1% of the students showed no signs of anxiety. They found that students with low levels of anxiety lived with their parents.

The study determined that the sleep quality of the students was moderate. The stress and fear instilled by the COVID-19 pandemic in students as well as in all individuals caused a negative impact on sleep quality Xiao et al.⁹ In a study that examined the sleep quality of individuals during the quarantine process in Italy due to COVID-19, Casagrande et al.¹⁰ reported that 57.1% of the 2291 individuals involved in the study had poor sleep quality. In a study to examine the sleep quality of individuals before and during the quarantine in Italy due to the COVID-19 pandemic, Cellini et al. (2020) reported that their sleep quality was good before the quarantine, but it was negatively affected during the quarantine and the proportion of individuals experiencing sleep problems increased from 40.5% to 52.4%. In a study examining sleep quality in

TABLE 3 Distribution of students' levels of state anxiety, trait anxiety, and sleep quality according to personal characteristics

Variables		n	State anxiety	Trait anxiety	Sleep quality
			Mean ± SD	Mean ± SD	Mean ± SD
	Female	232	42.09 ± 10.45	45.35 ± 9.40	420.112 ± 197.28
	Male	51	42.92 ± 13.07	42.03 ± 11.27	440.80 ± 211.18
	t		3.4086	1.522	0.013
	p		0.66	0.218	0.911
School year	First	95	40.83 ± 10.64	43.44 ± 9.61	486.98 ± 205.37
	Second	73	43.02 ± 11.24	46.36 ± 10.69	427.76 ± 206.35
	Third	62	43.43 ± 10.79	44.59 ± 9.20	434.25 ± 248.11
	Fourth	53	42.30 ± 11.29	45.07 ± 9.61	389.39 ± 143.21
	F		0.895	1.249	1.057
	p		0.444	0.292	0.368
Emotions	Anxiety ^a	147	41.58 ± 10.74	44.64 ± 10.25	499.68 ± 261.05
	Nervousness ^b	47	39.82 ± 9.56	42.76 ± 7.91	422.42 ± 247.59
	Fear ^c	33	46.36 ± 10.40	47.51 ± 10.61	386.36 ± 159.66
	Other ^d	56	43.57 ± 12.28	45.08 ± 9.52	392.05 ± 211.42
	F		3.175	1.879	1.674
	p		0.039*	0.63	0.105
Chronic disease	Yes	20	40.85 ± 11.42	42.55 ± 7.94	492.30 ± 25.05
	No	263	42.34 ± 10.93	44.92 ± 9.95	395.37 ± 202.97
	t		0.004	0.834	0.734
	p		0.905	0.362	0.392
Psychiatric disease	Yes	13	44.00 ± 15.17	46.15 ± 12.53	490.30 ± 232.05
	No	270	42.15 ± 10.73	44.68 ± 9.70	396.14 ± 202.63
	t		2.193	1.48	0.955
	p		0.400	0.285	0.329

Note: t, Student t test; F, one-way ANOVA test; c > d = a > b.

Abbreviation: ANOVA, analysis of variance.

*p < 0.05.

TABLE 4 Comparison of interruptions in students' night sleep before and after COVID-19

Interruption of night sleep before COVID-19			
Presence of night sleep interruption	Yes	No	Total
Yes	45	40	80 (28.26%)
No	15	183	198 (69.96%)
Total	60 (21.20)	223 (78.80%)	283 (100%)
χ^2	73.260		
p	0.000**		

Abbreviation: COVID-19, coronavirus disease 2019.

**p < 0.01.

TABLE 5 Correlation between students' levels of state anxiety, trait anxiety, and sleep quality

		State anxiety	Trait anxiety
VAS Scale	<i>r</i>	0.305	0.288
	<i>p</i>	0.000**	0.000**

Abbreviation: VAS Scale, visual analog sleep scale.

***p* < 0.01.

individuals who had to self-isolate at home for 14 days in China, Xiao et al.⁹ reported that isolated individuals had poor sleep quality during this period. That the sleep quality of the students participating in this study is higher than the individuals involved in similar studies in the literature is thought to be related to the fact that the COVID-19 pandemic started in Turkey later than in other countries, the necessary measures against many risk factor were already taken by then, and therefore, the individuals experienced less anxiety, stress, and fear associated with COVID-19.

The study examined the difference in sleep quality according to the variables of gender, age, school year, emotions about the initial cases of COVID-19, prevalence of chronic and psychiatric diseases. No statistically significant difference was detected between these variables and sleep quality. In a study examining sleep quality during the COVID-19 epidemic, Xiao et al.⁹ and Huang and Zhao,²⁴ reported that there is no statistically significant difference between individual characteristics and sleep quality. Given the stress and anxiety caused by the COVID-19 epidemic in all individuals, this finding, which is similar to the findings of a limited number of similar studies in the literature, showing that sleep quality was adversely affected is an anticipated result.

The study found that positive correlation between students' anxiety levels and sleep quality. Similarly, there are studies in the literature showing a correlation between sleep quality and anxiety level.²⁶⁻²⁹ In their study conducted in India, Roy et al.²¹ reported that 12% of respondents had sleep problems due to anxiety. Unlike Huang and Zhao,²⁴ in their study, they reported that there was no correlation between generalized anxiety disorder and sleep quality. The factors including social isolation, the physical environment of students' homes, probability of infection, reduction in social interactions, and all the developments around the world during the COVID-19 may have increased the level of anxiety in students and caused a decrease in sleep quality, which is a known side effect of anxiety.

5 | CONCLUSION AND RECOMMENDATIONS

The study determined that the students' levels of state-trait anxiety and sleep quality were moderate and there was a correlation between anxiety levels and sleep quality. The number of studies related to the correlation between anxiety and sleep quality during the COVID-19 pandemic is very limited.

5.1 | Implications for nursing practice

The COVID-19 pandemic has had effects in the negative direction on university students' academic performance, eating and sleeping patterns, economic status and especially their coping with the process they have been in. As shown by the results of the study, it was observed that the anxiety levels of the students were high, and this affected sleep quality negatively. In the scope of these results, various activities should be planned towards protecting and improving the physical, mental and social health of university students, reducing their anxiety levels and increasing their coping levels. In this context, it may be recommended to inform and support students by organizing online seminars or encourage them to attend programs organized by different institutions. Considering the unexpected duration and gravity of this process, it is needed to think about the long-term effects of the anxiety, depression and sleep disorder situation developing in university students and understand and discuss it more. In a global pandemic, it is compulsory for the profession of nursing to actively participate in clinical care, education and information sharing, public health and relevant political arrangements. Nurses are healthcare professionals who fight in the frontlines in the intervention with the COVID-19 pandemic, and nursing students will be key players in ending the pandemic with appropriate support. The COVID-19 pandemic is a period where nurses have been using their counseling and educational roles to the greatest extent. This is why academician nurses should provide support for students by practices that will increase their motivation, reduce their anxieties and provide them with healthy lifestyles. In light of these results, it is recommended that studies with a larger sample aimed at identifying the correlation between anxiety levels and sleep quality during the COVID-19 pandemic.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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