

## Original Article

# The Relationship Between COVID-19 Fear and Sleep Quality in Pregnant Women

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### Abstract

**Background:** In the pandemic, problems such as anxiety and stress have increased due to the fear of contracting COVID-19, and individuals' sleep quality has been affected. Sleep is very important for maternal health and fetal development during pregnancy.

**Aim:** The aim of this study was to examine the relationship between COVID-19 fear and sleep quality of pregnant women and the factors affecting them.

**Methodology:** Descriptive and correlational study was conducted with 295 pregnant women. Data were collected face-to-face, with written informed consent, using the Personal Information Form, Fear of COVID-19 Scale and Pittsburg Sleep Quality Index. In data analysis, parametric tests such as Independent Groups t test, One Way Anova Test, Pearson correlation test were used.

**Results:** The mean age of the pregnant women was 28.6±4.97 years. The mean score of the total Pittsburg Sleep Quality Index was 6.56±2.88 and the mean score of the Fear of COVID-19 Scale was 19.41±5.49. The mean total score of the Pittsburg Sleep Quality Index was higher in those who did not work, had a disease and had a second pregnancy, and the difference between them was significant ( $p<0.05$ ). Sleep quality was poor in 59% of pregnant. A positive, low-level correlation was found between the COVID-19 Fear Scale and daytime dysfunction ( $r=0.187$ ,  $p<0.01$ ).

**Discussion:** Similar to our findings, studies have found that the sleep quality of pregnant women during the pandemic period was poor and the levels of fear of COVID-19 were similar. In addition, similar to the findings of this study, another study found that sleep affected the anxiety level of pregnant women.

**Conclusions:** It was found that the majority of pregnant women had poor sleep quality, and fear of COVID-19 caused pregnant women to experience daytime dysfunction. Further studies on COVID-19 fear and sleep quality of pregnant women are recommended.

**Keywords:** COVID-19, fear of COVID-19, pregnant, sleep, sleep quality.

### Introduction

Coronavirus has infected the whole world, causing symptoms such as high C-Reactive Protein (CRP), fever, cough, weakness, and respiratory distress (Gao et al., 2020). COVID-19, which has afflicted 185 nations, including Turkey, is an unprecedented form of coronavirus, with a rapid spread rate in terms of transmission routes that have harmed people physically, psychologically, and socially (Tonbul, 2020). According to World

Health Organization (WHO) data, the source of this virus with a mortality rate of 6.8% has not been clearly defined. The virus is known to be transferred when hands come into contact with the mucous membranes of the mouth, nose, and eyes after sneezing or coughing (Ince et al., 2020). Due to the increasing number of cases and deaths caused by COVID-19, some measures have been taken in our country to struggle against coronavirus. Within the scope of these measures, people were first led to social

isolation by posing curfews, flexible working hours, weekend curfews, closure of public areas, and prohibiting gatherings such as wedding and engagement ceremonies, and funerals where people are likely to come together. Social isolation brought stigmatisation (Tecerli, Ucuş & Ozel, 2020). In addition, it was observed that anxiety, loneliness, post-traumatic stress disorder, depression, sadness and sleep problems increased in individuals who could not socialise during the pandemic period (Fardin, 2020; Bilge & Bilge, 2020; Pablo et al., 2020; Ozer & Altun, 2022). In addition to these, it has been found that tension, nerves, and stress are seen in the society due to uncertainty in crisis situations caused by the pandemic (Kaya, 2020) and even the fear of COVID-19 increases the risk of suicide (Mamun & Griffiths, 2020). The increase in all these psychological problems has negatively affected the quality of life of individuals (Kurt & Karaaziz, 2021). It is known that psychological problems experienced in the pandemic have a negative effect on sleep quality. In a study conducted in Turkey, it was found that 47% of individuals had sleep problems during the pandemic period (Duruk & Kalayci, 2022). In the meta-analysis conducted by Simsir (2022), it was reported that fear of COVID-19 caused sleep disorders in individuals. In a study conducted abroad, it was reported that psychological problems experienced in the pandemic increased insomnia (Parra-Saavedra et al., 2020). This worldwide effective virus has also harmed pregnant women, who are among the most vulnerable populations (Dundar & Ozsoy, 2020). Pregnancy is one of the most significant life stages for women, in which they go through emotional, physiological, and psychological changes. Due to hormonal changes, these alterations begin in the first trimester and continue to worsen until the third trimester. All these changes experienced during pregnancy affect the immunological adaptation of pregnant women to the environment and predispose them to viral infections (Rasmussen, Jamieson & Uyeki, 2012). Although the impact of the COVID-19 virus on pregnant women is not fully known, many adverse outcomes in the mother and baby have been observed in similar outbreaks such as SARS and MERS in the past. Based

on this assumption, the effects of coronavirus on pregnant women and newborns are thought to be similar (Kirca & Ongen, 2020). In the study by Liu et al., (2020) fever, cough and lymphocytopenia were common in 15 pregnant women who developed COVID-19 pneumonia. One of the main concerns for pregnant women during the pandemic is whether the virus is transmitted from mother to baby. Evidence of intrauterine transmission from mother to infant in three pregnant women infected with COVID-19 is insufficient (World Health Organization, 2020; Ugurlu & Vural, 2020). In addition, in studies conducted on pregnant women, no results were found that pregnant women are more likely to get COVID-19 and have a physiologically more severe process (Centers for Disease Control and Prevention, 2021). When examined psychologically, it is seen that pregnant women have higher levels of stress and anxiety due to the fear of getting COVID-19 (Demir & Kilic, 2020). Pregnant women may also experience sleep problems due to physiological and psychological changes (Ozhuner & Celik, 2019). It is known that sleep quality and regularity in pregnant women, especially in the last trimester, deteriorates more due to reasons such as daytime sleepiness, decreased total amount of sleep, night awakenings and insomnia (Yeral, 2019). Sleep difficulties in pregnant women, particularly in the third trimester, have been linked to elevated cytokine levels, and poor sleep quality has been linked to poorer obstetric outcomes associated with oxidative stress-induced endothelium damage (Ding et al., 2014; Brown, Turner & Kumar, 2018). In addition, it has been reported that the immune system of individuals is negatively affected by the deterioration of sleep quality, and they are prone to infection (Alvaro, Roberts & Harris, 2013). It is thought that the whole life of the pregnant woman whose sleep pattern is disturbed will be negatively affected. However, sleep problems during pregnancy are not among the issues that health professionals are aware of in antenatal care and sleep problems are generally not included among counselling issues (Koybasi & Uy, 2017). All the above-mentioned psychosocial-physiological problems seen in crisis situations in the society may affect pregnant women more because pregnant

women are in the vulnerable group. It is thought that pregnant women may experience more sleep problems with the addition of the fear of COVID-19 to the physical and psychological changes seen in accordance with the process during pregnancy. When the studies on the subject were examined, it was observed that there was a limited number of studies examining the relationship between sleep quality and fear of COVID-19 in pregnant women during the pandemic period. This study was conducted to determine the relationship between COVID-19 fear and the sleep quality of pregnant women.

Research questions:

- What are the levels of fear of COVID-19 in pregnant women?
- How is the sleep quality of pregnant women during the COVID-19 pandemic?
- Is there a relationship between pregnant women's fear of COVID-19 and their sleep quality?

### **Methodology**

**Research Design:** The research is a descriptive and correlational type of study.

**Sample of the Study:** The population consisted of pregnant women in the Gynecology and Obstetrics Outpatient Clinic of a university hospital in the Black Sea Region, in Türkiye. The sample of the study included 295 pregnant women who met the inclusion criteria and agreed to participate in the study. Due to repeated admissions of pregnant women to the hospital, the sample size was calculated using the unknown population formula. The calculation of the sample size was based on the 74% incidence rate of poor sleep quality in pregnant women in Yeral's (2019) study (Yeral, 2019).

$n = t^2 pq / d^2$  n= number of individuals to be sampled

p= frequency of occurrence of the event (0.74)

q= frequency of nonoccurrence of the event (0.26)

t= the theoretical value taken from the t-table with certain degrees of freedom and specified error level (1.96)

d= sampling error accepted according to the frequency of occurrence of the event (0.05)

$n = 0.74 \times 0.26 \times (1.96)^2 / (0.05)^2 = 295$  pregnant women were recruited for the study.

**Inclusion Criteria:** Being at the age of 18-45 years old, having a healthy pregnancy, and

volunteering to participate in the study.

**Exclusion Criteria:** Having a physical disability, and withdrawing at any stage despite agreeing to participate in the research.

### **Data Collection Tools**

**The Descriptive Information Form:** The descriptive information form includes sociodemographic, obstetric, and COVID-19-related questions such as age, occupation, education, family, income status, gestational week, number of pregnancies, number of children, coronavirus infection, vaccination, and loss of a relative due to coronavirus. Developed by the researchers, the form includes 24 questions.

**Fear of COVID-19 Scale:** The Fear of COVID-19 Scale (FCV-19S) was developed by Ahorsu et al. (2020) (Ahorsu et al., 2020) to measure individuals' COVID-19-related fear levels. Its Turkish validity and reliability study was performed by Ladikli et al. (2020) and was found to be valid and reliable for the Turkish sample (Ladikli et al., 2020). This five-point Likert-type scale consists of 7 items. The scoring of the items ranges from 1 to 5 (1=Strongly disagree; 5=Strongly agree). There are no reverse items in the scale. An increase in the score indicates an increase in the fear of being infected with COVID-19. The internal consistency of the scale is 0.82 and the test-retest reliability is 0.72. The minimum and maximum scores to be obtained are 7 and 35. In this study, the Cronbach alpha value of the scale was calculated as 0.83.

**The Pittsburg Sleep Quality Index:** The Pittsburg Sleep Quality Index (PSQI) was developed by Buysse et al. (1989) (Buysse et al., 1989) and its Turkish validity and reliability study was performed by Agargun et al. (1996). The PSQI is a self-report scale that assesses sleep quality and sleep disturbances over a one-month time interval. The PSQI has 7 components, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The severity of symptoms for each sub-dimension ranges from 0 points "no distress" to 3 points "severe distress". Total PSQI scores are obtained by adding sub-dimensions and vary between 0 and 21. A score of 6 points or more is considered "poor sleep quality" and a score of 5 points or less is considered "good sleep quality". The scale

with a Cronbach alpha coefficient of 0.80 and 7 subcomponents is known to have a diagnostic sensitivity of 89.6% and a specificity of 86.5%. The Cronbach alpha internal consistency coefficient was found to be 0.80 (Agargun, Kara & Anlar, 1996). In this study, the Cronbach alpha value of the scale was found to be 0.69.

**Data Collection:** The data were collected with face-to-face interview technique by adhering to the mask, distance, and hygiene behaviors within the scope of COVID-19 measures. The surveys were completed in an average of 10-15 minutes by the participants. The data were collected between July 2021 and November 2021.

**Data Analysis:** Descriptive tests such as frequency, arithmetic mean, percentage, and standard deviation were used in the analysis of the data. The conformity of the research data to normal distribution was evaluated by the Kolmogorov-Smirnov test, histogram graph, normal distribution curve, Skewness, and Kurtosis coefficients, and it was determined that the data were normally distributed. In the analysis of the data, a t-test and the One-Way ANOVA test was used. The relationships between the scale scores were evaluated with the Pearson correlation analysis test.  $p < 0.05$  was considered statistically significant.

**Ethical Considerations:** Permission was obtained from the authors to use the scales in the study through e-mail. Approval was obtained from University Non-Invasive Clinical Research Ethics Committee (17.06.2021/145). Written permission (17.06.2021/ Number: E-35766460-799) was obtained from the Ministry of Health COVID-19 Studies Board and XXX Provincial Health Directorate to collect the data. Informed written and verbal consent was received from the participants. The principles of the Declaration of Helsinki were followed in the study.

## Results

The pregnant women involved in the study were between 19-43 years of age, their mean age was  $28.6 \pm 4.97$ , 47.1%, were 29 years old or over, 34.9% were high school graduates, 31.9% were employed, the spouses of 37.3% were high school graduates, and 86.8% had a nuclear family. The spouses of 92.2% were

employed, 58.3% had income equal to expenses, and 65.4% lived in the city center (Table 1). It was also determined 56.9% had a gestational week of 36 and over, 35.3% had 3 or more pregnancies, 38% had their first birth, 38.6% had one child, 65.4% had a planned pregnancy, and 15.3% had a disease (Table 1). In addition, 15.3% of the pregnant women smoked, 99.7% did not drink alcohol, 34.9% consumed coffee regularly, 25.4% of coffee drinkers consumed one cup of coffee per day, 75.3% drank tea regularly, and 19% of tea drinkers drank 5 cups or more of tea per day (Table 2). The characteristics of the pregnant women related to COVID-19 showed that 38% of the pregnant women were infected with coronavirus, 49.8% had a family member infected with coronavirus, 68.5% had COVID-19 vaccination, and 13.9% had lost a relative due to coronavirus (Table 2). According to the mean PSQI total scores that were analyzed according to all the characteristics of the pregnant women in the study, the mean scores were observed to be higher in women with characteristics such as being between the ages of 19-23, having a postgraduate degree, having a spouse with secondary school education, having a working spouse, living alone, living in a village/town, having a pregnancy of 31 weeks or less, giving birth once, having one child, having an unplanned and unwanted pregnancy, having COPD-asthma disease, taking regular medication, smoking or drinking alcohol, regularly consuming 2 cups or more of coffee and 1-2 cups of tea a day, having been infected with COVID-19, having family members not contracting COVID-19, getting COVID-19 vaccination, and losing a relative due to COVID-19, but the difference in scores between the groups was not statistically significant ( $p > 0.05$ ). Those who were unemployed, whose income was less than expenses, who had a disease and who had a second pregnancy had a higher mean score of PSQI total score, and the difference between groups was statistically significant ( $p < 0.05$ ). The mean scores of the FCV-19S showed that being between the ages of 19-23, having a postgraduate education, having a spouse with secondary school education, being unemployed, having equal income and expenses, living alone, living in a village/town, having a pregnancy between 32-

35 weeks, having a 2nd pregnancy, giving birth once, having 3 or more children, having an unplanned and unwanted pregnancy, having a disease, having heart disease, not using a regular medication, smoking and drinking alcohol, not consuming coffee and tea regularly, being infected with COVID-19 and having a family member infected with COVID-19, getting coronavirus vaccination, and losing a relative due to coronavirus caused higher mean scores on the FCV-19S, but the difference between the groups was not statistically significant ( $p>0.05$ ). Those who got COVID-19 vaccination had higher mean total scores on the FCV-19S than those who did not, and the difference between the groups was statistically significant ( $p<0.05$ ). In this study, the sleep quality status of pregnant women and the mean scores of the FCV-19S according to their sleep quality are given in Table 3. It was found that 59% of pregnant

women had poor sleep quality. Although the mean scores of pregnant women with poor sleep quality were higher than those with good sleep quality, the difference was not statistically significant ( $p>0.05$ ) (Table 3). The mean total PSQI score of the pregnant women in the study was calculated as  $6.56\pm 2.88$ , and the mean total Fear of COVID-19 Scale score was calculated as  $19.41\pm 5.49$  (Table 4). The mean scores of PSQI components from 1 to 7 were calculated as  $1.27\pm 2.88$ ,  $1.21\pm 0.68$ ,  $0.63\pm 0.98$ ,  $0.85\pm 1.07$ ,  $1.81\pm 0.52$ ,  $0.02\pm 0.12$  and  $0.76\pm 0.76$ , respectively (Table 4). A low positive correlation ( $r=.187$ ,  $p<0.01$ ) was found between the Fear of COVID-19 Scale score and the 7<sup>th</sup> component (daytime dysfunction) of the PSQI score while there was no correlation between the other PSQI components ( $p>0.05$ ), (Table 5).

**Table 1: Distribution of Pregnant Women According to Sociodemographic and Obstetric Characteristics and Mean Scores of PSQI and COVID-19 Fear Scale (Cont.)**

Characteristics	n	%	PSQI Total X±SD	FCV-19S Total X±SD
<b>Gestation week</b>				
31 weeks and below	25	8.5	7.00±2.81	19.20±6.03
32-35 weeks	102	34.6	6.16±2.83	19.80±5.01
36 weeks and above	168	56.9	6.75±2.91	19.21±5.70
<i>Test and p-value</i>			F=1.600/p=.202	F=0.385/p=.681
<b>Number of pregnancies</b>				
1 pregnancy <sup>(a)</sup>	88	29.8	5.92±2.78	18.69±5.63
2 pregnancies <sup>(b)</sup>	103	34.9	7.05±2.94	19.84±5.41
3 pregnancies and <sup>+(c)</sup>	104	35.3	6.63±2.83	19.60±5.44
<i>Test and p-value</i>			F=3.797/p=.024	F=1.137/p=.322
<i>between a-b</i>				
<b>Number of births</b>				
0	94	31.9	6.13±2.90	19.00±5.52
1 birth	112	38.0	6.97±2.99	19.69±5.59
2 births	70	23.7	6.48±2.49	18.81±5.44
3 births and +	19	6.4	6.63±3.35	22.05±4.37

<b>Test and p-value</b>			F=1.458/p=.226	F=2.035/p=.109
<b>Number of living children</b>				
0	96	32.5	6.23±3.08	19.14±5.57
1 child	114	38.6	6.92±2.87	19.64±5.70
2 children	68	23.1	6.42±2.40	18.67±5.10
3 children and +	17	5.8	6.64±3.51	22.41±4.37
<b>Test and p-value</b>			F=1.040/p=.374	F=2.263/p=.081
<b>Planning status of the pregnancy</b>				
Planned	193	65.4	6.52±2.98	19.44±5.55
Not planned but wanted	89	30.2	6.55±2.50	19.06±5.50
Unplanned and unwanted	13	4.4	7.30±3.90	21.46±4.42
<b>Test and p-value</b>			F=0.445/p=.641	F=1.082/p=.340
<b>Having a disease</b>				
Yes	45	15.3	7.48±3.48	19.62±5.68
No	250	84.7	6.40±2.74	19.38±5.47
<b>Test and p-value</b>			t =2.330/p=.02	t =0.272/p=.786
<b>Type of disease</b>				
Hypertension	8	2.7	8.25±5.44	21.87±7.49
Heart disease	1	0.3	9.00±0.0	23.00±0.0
COPD-asthma	1	0.3	12.00±0.0	22.00±0.0
Diabetes	11	3.7	6.72±2.76	18.09±5.08
Thyroid	11	3.7	6.54±1.96	20.27±5.81
Other	13	4.4	8.00±3.69	18.53±5.22
Disease-free	250	84.7	6.40±2.74	19.38±5.47
<b>Test and p-value</b>			F=1.860/p=.086	F=0.578/p=.748
<b>Regular use of medication</b>				
Yes	154	52.2	6.64±3.18	19.38±5.59
No	141	47.8	6.48±2.53	19.45±5.40
<b>Test and p-value</b>			t=0.501/p=.617	t=-0.110/p=.912
<b>TOTAL</b>	295	100	6.56 ± 2.88	19.41±5.49

*X=Mean, SD=Standard Deviation, PSQI=Pittsburg Sleep Quality Index, FCV-19S=Fear of COVID-19 Scale  
F=One Way ANOVA, t=Independent t test*

**Table 3. Comparison of Fear of COVID-19 Scale scores according to sleep quality**

Sleep Quality	n	%	FCV-19S X ±SD
Good (less than 5)	121	41.0	19.02±5.17
Poor (more than 6)	174	59.0	19.68±5.70
<b>Test and p-value</b>			t test=-1.022/p=.308

X=Mean, SD=Standard Deviation, FCV-19S= Fear of COVID-19 Scale, t=Independent t test

**Table 2. Distribution of pregnant women according to their habits and COVID-19-related characteristics and comparison of mean scores of the PSQI and The Fear of COVID-19 Scale**

Characteristics	n	%	PSQI Total X±SD	FCV-19S Total X±SD
<b>Smoking</b>				
Yes	45	15.3	6.53±2.69	19.46±6.45
No	250	84.7	6.57±2.92	19.40±5.32
<b>Test and p-value</b>			t=-0.091/p=.927	t=0.066/p=.948
<b>Alcohol use</b>				
Yes	1	0.3	4.00±0.0	23.00±0.0
No	294	99.7	6.57±2.88	19.40±5.50
<b>Test and p-value</b>			t test=-.891/p=.374	t test=0.652/p=.515
<b>Regular coffee consumption</b>				
Yes	103	34.9	6.94±3.12	19.24±5.42
No	192	65.1	6.36±2.73	19.51±5.54
<b>Test and p-value</b>			t test=1.620/p=.105	t test=-0.398/p=.691
<b>Amount of coffee consumption</b>				
None	191	64.7	6.38±2.73	19.57±5.48
1 cup	75	25.4	6.77±3.21	18.82±5.34
2 cups and more	29	9.9	7.24±2.94	19.89±6.00
<b>Test and p-value</b>			F=1.350/p=.259	F=0.621/p=.538
<b>Regular tea consumption</b>				
Yes	222	75.3	6.67±2.94	19.14±5.48
No	73	24.7	6.24±2.68	20.23±5.50
<b>Test and p-value</b>			t test=1.100/p=.271	t test=1.465/p=.144
<b>Regular tea consumption</b>				
None	73	24.7	6.24±2.68	20.23±5.50

1-2 glass	102	34.6	7.11±2.90	19.82±5.19
3-4 glasses	64	21.7	6.18±2.99	18.85±6.01
5 glasses and over	56	19.0	6.42±2.90	18.25±5.27
<b>Test and p-value</b>			F=1.960/p=.119	F=1.797/p=.148
<b>Having been infected with COVID-19</b>				
Yes	112	38.0	6.66±2.71	19.83±5.61
No	83	62.0	6.50±2.99	19.16±5.42
<b>Test and p-value</b>			t test=0.460/p=.642	t test=1.011/p=.313
<b>Having a family member infected with COVID-19</b>				
Yes	147	49.8	6.51±2.85	19.43±5.38
No	148	50.2	6.62±2.92	19.39±5.62
<b>Test and p-value</b>			t test=-0.351/p=.726	t test=0.057/p=.954
<b>Being vaccinated against COVID-19</b>				
Yes	202	68.5	6.57±2.77	20.12±5.53
No	93	31.5	6.54±3.13	17.87±5.11
<b>Test and p-value</b>			t test=-0.085/p=.932	t test=3.334/p=.001
<b>Loss of a relative due to COVID-19</b>				
Yes	41	13.9	7.29±3.35	20.12±5.33
No	254	86.1	6.45±2.79	19.30±5.52
<b>Test and p-value</b>			t test=1.730/p=.084	t test=0.885/p=.377
<b>TOTAL</b>	295	100	6.56 ± 2.88	19.42±5.49

X=Mean, SD=Standard Deviation, PSQI=Pittsburg Sleep Quality Index, FCV-19S=Fear of COVID-19 Scale F=One Way ANOVA, t=Independent t test

**Table 4: PSQI total score, components, and COVID-19 Fear Scale mean scores**

Scales	Min-Max values received	Min-Max values that can be received	Mean± SD
<b>PSQI Total</b>	1-17	0-21	6.56 ± 2.88
<b>Component 1</b>	0-3	0-3	1.27±0.64
<b>Component 2</b>	0-3	0-3	1.21±0.68
<b>Component 3</b>	0-3	0-3	0.63±0.98
<b>Component 4</b>	0-3	0-3	0.85±1.07
<b>Component 5</b>	1-3	0-3	1.81±0.52
<b>Component 6</b>	0-1	0-3	0.02±0.12
<b>Component 7</b>	0-3	0-3	0.76±0.76
<b>Fear of COVID-19 Scale</b>	7-34	7-35	19.41 ± 5.49

SD=Standard Deviation, , PSQI=Pittsburg Sleep Quality Index



**Table 5: PSQI and its components and fear of COVID-19 scale correlation chart**

	FCV-19S	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Component 7	PSQI Total
FCV-19S	1								
Component 1	0.093	1							
Component 2	0.74	.353**	1						
Component 3	-.027	.135*	.141*	1					
Component 4	-.016	.080	.164**	.609**	1				
Component 5	.094	.307**	.295**	.130*	.169**	1			
Component 6	.067	.067	.074	.130*	.042	.047	1		
Component 7	.187**	.442**	.215**	.173**	.112	.250**	.144*	1	
PSQI Total	.093	.559**	.538**	.705**	.699**	.495**	.184**	.566**	1

\**p*<0.05 level of significance \*\**p*< 0.01 level of significance FCV-19S= Fear of COVID-19 Scale, PSQI=Pittsburg Sleep Quality Index

**Discussion**

During the pandemic period, individuals infected with the coronavirus permanently experience at least one symptom, including fatigue and sleep disorders (Nasserie, Hittle, & Goodman, 2021). In this study, the mean PSQI score of pregnant women was 6.56±2.88, and 59% had poor sleep quality. The fear of COVID-19 raised the stress of pregnant women throughout the pandemic period, and the stress significantly affected the sleep quality of pregnant women, and the fear of COVID-19 had a 7% influence on the stress experienced during pregnancy (Unver, Ozsahin, & Tekdal, 2022). In a meta-analysis study conducted before the pandemic period, the mean PSQI score of pregnant women was reported to be 6.0±07 (Sedov et al., 2018). In this study conducted after the pandemic, it can be said that the sleep quality of pregnant women worsened. In a study conducted in Turkey during the pandemic period, the mean PSQI score of pregnant women was reported as 6.79±3.20 (Colak et al., 2021). Similarly, various studies showed that the sleep quality of pregnant women was poor during the pandemic period (Alan et al., 2020; Alpozgen

et al., 2022). In a study conducted during the pandemic period, 19% of 303 pregnant women were reported to have decreased sleep quality due to fear of COVID-19 and financial difficulties caused by the pandemic (Khoury et al., 2021). It was emphasized in a study in Colombia that 49.1% of pregnant women experienced insomnia, and the anxiety and psychological anxiety in pregnant women during the pandemic indirectly increased insomnia (Parra-Saavedra et al., 2020).

In this study, the mean PSQI scores were compared according to the sociodemographic characteristics of pregnant women, and it was found that the sleep quality of non-working pregnant women was worse. In contrast, previous studies showed that the employment status of pregnant women did not affect sleep quality (Koybasi & Uy, 2017; Ozturk et al., 2019). In a national study, unemployed pregnant women were found to have higher depression and anxiety levels during the pandemic (Kahyaoglu Sut & Kucukkaya, 2020). Anxiety and other mood disorders are known to be positively associated with sleep quality (Colak et al., 2021). The sleep quality of non-working pregnant women is probably

impaired at night since they are not fatigued during the day.

It was found that the sleep quality of pregnant women was not significant according to education level and age in this study. Evidence shows that educational status did not affect sleep quality (Ozturk et al., 2019). In the current study, the sleep quality of pregnant women with an income less than their expenses was worse. In another study, unlike our results, it was noted that income status did not affect sleep quality (Colak et al., 2021). During the pandemic, when problems such as layoffs were encountered, those with low-income levels may have been in a more challenging economic circumstance, and hence their sleep quality may have suffered. The sleep quality of pregnant women with chronic diseases was worse. In the literature, unlike the findings of this study, it has been reported that having any disease does not affect sleep quality (Ozturk et al., 2019). It is thought that the mental health of pregnant women with a chronic condition was affected during the pandemic, and therefore PSQI scores were higher in this study. Women with second pregnancies had worse sleep quality than those with the first pregnancy. Unlike the current findings, research has demonstrated that the number of pregnancies does not affect sleep quality (Celik & Mesut, 2017; Ozturk et al., 2019), and the difference is attributed to the pandemic. Experiencing extreme situations, such as a pandemic after their first pregnancy and having a second child may have led the pregnant women to suffer additional stress for themselves and their babies, and thus their sleep quality may have been harmed. There was no statistically significant variation in the mean PSQI score of pregnant women based on the gestational week. A study conducted during the pandemic yielded similar results to the current study (Alpozgen et al., 2022). In contrast, the sleep quality of pregnant women in the third trimester was found to be lower in a relevant study (Koybası & Uy, 2017). Because most of the pregnant women in this study were in their third trimester, it is reasonable to conclude that there was no change in sleep quality based on the gestational week.

In this study, which was conducted to examine the relationship between fear of

COVID-19 and sleep quality, it was observed that pregnant women had a moderate level of fear of COVID-19 according to the mean score of the Fear of COVID-19 Scale. The COVID-19 fear levels of pregnant women were found to be similar (Kaplan et al., 2022; Solmaz, Cagan & Taskın, 2022; Durmus et al., 2022). Similarly, literature has citations that the fear of COVID-19 does not vary depending on the characteristics of pregnant women like age, education level, number of pregnancies, number of children, and planning pregnancy status (Unver, Ozsahin, & Tekdal, 2022 ; Solmaz, Cagan, & Taskın, 2022). In this study, the mean FCV-19S scores of those who received the COVID-19 vaccine were higher. There is literature reporting that fear of COVID-19 is associated with the vaccination of pregnant women (Tarus et al., 2022) or vice versa (Solmaz, Cagan, & Taskın, 2022). Pregnant women are regarded to be the most susceptible category in this study since they are more concerned about the health of their newborns, thus they get vaccinated against COVID-19. Also, more than half of the pregnant women included in the study had a high school or higher education level, which may influence their tendency to be vaccinated.

In the current study, a low level of positive correlation was found between the mean FCV-19S scores and the daytime dysfunction (component 7) sub-dimension of the PSQI ( $r=.187^{**}$ ,  $p<0.01$ ). Sleeping was found to alleviate anxiety in pregnant women during the pandemic period in an international study (Zhang et al., 2021). The Fear of COVID-19 Scale assesses people's anxiety about contracting the coronavirus. Anxiety can be caused by fear. It should not be overlooked in this context that sleep quality and fear of coronavirus may be associated. Nonetheless, it is believed that the lack of a meaningful link between the Fear of COVID-19 scale and the PSQI total score in this study is owing to the date of the study. This research was carried out when pandemic restrictions were being lifted. For this reason, it is thought that pregnant women's anxiety about contracting coronavirus has decreased compared to the pandemic period.

The implications of the COVID-19 outbreak on pregnant women are not yet evident,

although there are findings on the psychological consequences of previous epidemics. Studies on the SARS epidemic emphasize that individuals experience problems such as depression (Hawryluck et al., 2004), stress (DiGiovanni et al., 2004), and insomnia (Lee et al., 2005). This study was carried out in the days following the end of measures such as restrictions, masks, and quarantine for the COVID-19 pandemic. As a result, as with earlier epidemics, the end of the pandemic will not solve all concerns, and it will require time to follow up on and treat the problems, particularly in the psychological field. The findings are believed to be particularly important in this regard.

### Conclusion

This study demonstrated that fear of COVID-19 has a low positive connection with daytime dysfunction (component 7), a sub-dimension of PSQI. If this disorder, which impairs sleep quality, isn't treated, and ignored, it may worsen and induce more serious sleep issues. Therefore, it is recommended that perinatal care providers assess pregnant women not only physically but also psychologically such as fear and worry. When assessing psychological symptoms, that may affect the overall functioning of the organism, such as sleep quality, should be considered. It should not be forgotten that the concerns, particularly in the psychosocial domain, will not vanish with the end of the epidemic. It is recommended that research with diverse and large samples be conducted to understand the long-term impacts of the pandemic on pregnant women.

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