

The Impact of the COVID-19 Pandemic on Sleep Quality in the Turkish Population: A Cross-sectional Study

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Objective: Because of the COVID-19 pandemic, people all over the world have been confined to their homes and exposed to unprecedented levels of stress. This study was conducted with the aim of evaluating the factors which are affecting sleep quality in the Turkish population during the COVID-19 pandemic.

Methods: The sample of this study consisted of 1023 individuals who completed a questionnaire by means of an online Google Forms connection by email and electronic communication between the dates of 12 July and 30 August 2020. A Personal Information Form, a Health Behavior Changes Form, the Numeric Rating Scale and the Pittsburg Sleep Quality Index (PSQI) were used to collect data.

Results: It was found that 68.1% of the participants in the study had poor sleep quality and 31.9% had good sleep quality. Also, those with a history of contact with a person with COVID-19, or those who knew someone with COVID-19 in those close to them had significantly worse levels of sleep quality than the others ($p<0.05$). It may be predicted that participants with an education level of high school or lower, a low income, a reduction in physical activity or food intake, fatigue or high stress levels may have lower sleep quality.

Conclusion: It is important to determine the factors affecting sleep quality during such large pandemics, and to provide the necessary support. [*P R Health Sci J* 2022;41(2):82-88]

Key words: COVID-19, Pandemic, Sleep quality, Stress, Anxiety, Health behavior

In December 2019, a number of cryptogenic pneumonia cases were reported in Wuhan, in Hubei province in China (1), after which, a new corona virus in pneumonia patients (2), which was named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), spread rapidly throughout the world (1,3). The World Health Organization (WHO) named the epidemic disease caused by the virus Corona Virus Disease 2019 (COVID-19) (4). In Turkey, the first positive case was seen on 11 March 2020 (5). As of 26 October 2020, the number of COVID-19 cases in the world had passed 147 million, and 3 116 444 had lost their lives (6).

COVID-19 not only affects patients by causing physical damage, but also affects people emotionally and psychosocially (7,8). In the pandemic, the lack of a treatment or vaccination, measures to prevent infection, uncertainty, changes in working routine, the thought of infection and the fear of catching the disease from others has caused sleeplessness, anxiety, stress, depression, and health-related fears (7-10). Along with great physical and mental stress, this can cause emotional and sleep problems in both health workers and the general population (3,7,11-13). Negative feelings such as fear, anxiety and stress cause physical tension, mental pressure and an increase in cortisol levels, and thus cause a reduction in melatonin levels and in sleep quality (10).

Sleep quality, along with physical and psychological health, is affected by many socio-cultural factors (10). The pandemic has caused worry and concern throughout the world not only because it causes death, but also because of its social and economic effects. The pandemic has significantly affected daily life with social distancing, travel bans, the cancellation of sporting and other mass activities, and changes in working practices. Partial lockdowns have caused the closure of some businesses and an increase in unemployment. Restrictions such as social isolation, social distancing and the closure of parks and gyms can cause a result in physical activity. Some people may embark on or increase negative activities such as smoking or drinking in order to cope with the psychological problems associated with the pandemic (12). These changes in lifestyle behaviors can cause a reduction in sleep quality because of anxiety and stress (14,15).

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Studies, particularly with health workers, have reported very high rates of insomnia (34-38%) since the emergence of COVID-19 (16-18). Information obtained from the general population in Italy has shown that insomnia, loss of sleep and poor sleep quality are more widespread (11). At the same time, individuals with more anxiety, stress and depressive symptoms have more sleep disturbance (3,11,17). However, no studies were found of the factors affecting sleep quality in the general Turkish population. Therefore, it was intended in this study to evaluate sleep quality in the COVID-19 pandemic and the factors affecting it.

Methods

Aim and type of study

This descriptive and cross-sectional type of study was conducted with the aim of evaluating sleep quality in adults during the COVID-19 pandemic and the factors affecting it.

Study design and sampling

This research used a virtual snowball sampling approach with various social media sources (Twitter, WhatsApp, Instagram and Facebook), and was conducted by means of the popular online Google Forms connection by email and electronic communication. The population of the research consisted of the individuals in the Turkish population using email and electronic communication media of the Google Forms connection between the dates of 12 July and 30 August 2020. The questionnaire was made using an online platform which could be accessed by a device with internet connection. It was announced by means of private social networks (WhatsApp, Twitter, Facebook and Instagram) and by post lists. The study was completed with 1023 participants, whose ages ranged from 18 to 72 from Turkey's seven geographical regions. The research sample consisted of individuals who were aged 18 and over, who were literate, who used Google Forms by email or electronic communication, who had a smartphone or a computer, who had internet access, who followed the researchers' social networks (WhatsApp, Twitter, Facebook, Instagram), whose physical and cognitive health levels were consistent with answering the forms planned to be used in the research, and who agreed to take part in the research. Those with a sleep or insomnia problem or sleep apnea, those taking a regular sleep medication, and those with a known history of psychiatric illness were excluded from the study. In calculating the size of the research sample, a minimum number of 455 individuals was calculated for a Type I error of 0.05 and a test power of 80%.

Data collection instruments

A Personal Information Form, a Health Behavior Changes Form, the Numeric Rating Scale and the Pittsburg Sleep Quality Index (PSQI) were used to collect data.

The Personal Information Form was created by the researchers after a scan of the literature (7-10). It consisted

of 17 questions on sociodemographic characteristics such as age, gender, education level, BMI and occupation, and on characteristics such as COVID-19 infection and contact history.

The Health Behavior Changes Information Form was created by the researchers after a scan of the literature (8,12,13,18). It consisted of eight questions on changes in health behaviors during the COVID-19 pandemic, such as the use of cigarettes and alcohol, physical activity, eating, and liquid intake.

The Numeric Rating Scale (NRS), 10-point NRS was used in this study to evaluate anxiety and stress. Equal intervals were arranged on a horizontal line, and it was scored from 0 (No) to 10 (Extremely).

The Pittsburg Sleep Quality Index was developed by Buysse et al (19). The reliability and validity of the scale were tested in Turkey (20). Its Cronbach alpha internal consistency coefficient was found to be 0.804. The total score varies from 0 to 21. A total PSQI score of ≤ 5 indicates good sleep quality, and a score of > 5 indicates poor sleep quality (20). In this study, the Cronbach alpha reliability coefficient of the scale was found to be 0.843.

Data analysis

Data were analyzed with the Statistical Package for Social Sciences 22.0 (SPSS, IBM Corp., Armonk, NY, USA). The Kolmogorov-Smirnov test was performed to examine normal distribution similarity. The Chi-squared test, Fisher's exact test, Mann Whitney-U test, Spearman correlation and Binary logistic regression (BLR) analysis were used in the statistical analysis of data. Results were assessed to a confidence interval of 95% and a significance level of $p < 0.05$.

Ethical considerations

This study was conducted in accordance with the principles of the Declaration of Helsinki. Permission to conduct the research was obtained from the Commission for Scientific Research Studies on COVID-19 from the internet site of the Turkish Ministry of Health. At the same time, ethical permission and permission to use the scale were obtained from Mersin University Clinical Research Ethics Committee (dated 8 June 2020, No. 500). All participants were given full information on the requirements of the study, and before participating in the research, they were asked to agree to the data sharing and confidentiality policy.

Results

The mean age of the 1023 participants was 32.70 ± 10.79 years (range = 18 to 72). A majority were women (69.7%). The total mean PSQI score of the participants was found to be 7.76 ± 3.77 (min: 0, max: 21) (Table 1). It was found that the mean PSQI score of the females (7.90 ± 3.69) was higher than that of the males (7.45 ± 3.94) ($Z = -2.087$, $p = 0.037$).

Comparing the participants' socio-demographic characteristics and PSQI, it was found that most of the females, those with an education level of high school or below, those who were self-

Table 1. Distribution of participants' mean scores on the total sleep quality index and its sub-dimensions (n=1023)

PSQI sub-dimensions	Good sleep quality						Poor sleep quality					
	Total (n=1023)		≤5 points (n=326)		>5 (n=697)		Total (n=1023)		≤5 points (n=326)		>5 (n=697)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Subjective sleep quality	1.31	0.81	0.69	0.52	1.60	0.76	1.31	0.81	0.69	0.52	1.60	0.76
Sleep latency	1.47	0.95	0.68	0.72	1.83	0.81	1.47	0.95	0.68	0.72	1.83	0.81
Sleep duration	1.69	1.11	0.76	0.87	2.13	0.94	1.69	1.11	0.76	0.87	2.13	0.94
Sleep efficiency	0.59	0.91	0.02	0.20	0.86	0.98	0.59	0.91	0.02	0.20	0.86	0.98
Sleep disturbance	1.45	0.63	1.01	0.38	1.65	0.62	1.45	0.63	1.01	0.38	1.65	0.62
Use of sleep medication	0.13	0.51	0.00	0.07	0.19	0.61	0.13	0.51	0.00	0.07	0.19	0.61
Daytime dysfunction	1.09	0.91	0.40	0.55	1.41	0.87	1.09	0.91	0.40	0.55	1.41	0.87
PSQI Total	7.76	3.77	3.60	1.23	9.71	2.88	7.76	3.77	3.60	1.23	9.71	2.88

PSQI: Pittsburgh Sleep Quality Index, SD: standard deviation

employed, retired or housewives, those with a low income level, and those with a chronic illness) had significantly worse sleep quality than the others ($p < 0.05$). It was found that those who had a contact history with someone with COVID-19 and those who had someone close to them with a diagnosis of COVID-19 had significantly worse sleep quality than those who did not ($p < 0.05$). No significant difference was found between sleep quality and age, marital and employment status, the person lived with, body mass index (BMI), being infected with COVID-19, being in 14-day isolation, protective measures relating to COVID-19, or receiving psychological help ($p > 0.05$) (Table 2).

When participants' changes in health behavior during the COVID-19 outbreak and their levels of anxiety and stress were compared with PSQI, a significantly poorer level of sleep quality was found in participants whose daily cigarette consumption and caffeinated drinks consumption were increased, whose food and liquid intake were decreased, whose physical activity was reduced, and whose fatigue, fear, stress and anxiety levels were increased. No significant difference was found between alcohol consumption and sleep quality ($p < 0.05$) (Table 3).

A significant correlation at a medium level was found between participants' PSQI and their anxiety ($r = 0.330, p < 0.001$) and stress ($r = 0.372, p < 0.001$) levels (Table 4).

It was found that during the COVID-19 outbreak, the probability of having poorer sleep quality was higher in participants who had an education level of high school or below ($OR = 0.520, 95\%CI = 0.316-0.856$) or a low income ($OR = 0.519, 95\%CI = 0.360-0.748$), who had reduced levels of physical activity ($OR = 0.600, 95\%CI = 0.439-0.819$) or food intake ($OR = 0.607, 95\%CI = 0.379-0.971$), or who had an increased level of fatigue ($OR = 0.355, 95\%CI = 0.256-0.491$) or stress ($OR = 1.168, 95\%CI = 1.035-1.318$), (Table 5).

Discussion

In this study, an evaluation was made of sleep quality and the factors affecting it during the COVID-19 pandemic.

When the PSQI cutoff point was evaluated as 5 in our study, it was found that the prevalence of poor sleep quality on the

participants was 68.1%, and the total mean PSQI score was 7.76 ± 3.77 . Tu et al., in a study with nurses using the same scale, found that 60% of nurses working on the front line in the pandemic had poor sleep quality, and had symptoms of short sleeping time, a long time getting to sleep, and insomnia (3). Nurses' mean PSQI score was found to be 8.48 ± 3.63 . In a study by Pinto et al., a majority (69.6%) of participants with respiratory system disease reported sleeping problems, with the most widespread problem being frequently waking in the night (9). In studies conducted in China

and sleeping problems is reported to be between 34 and 60% (3,16-18). These findings show that sleep quality has been seriously affected in the pandemic.

It was found that participants who were female, who had an educational level of high school or below, who were self-employed, retired or housewives, whose income level was low or who had a chronic illness had significantly worse sleep quality than the others. It was also found that those with a history of contact with someone with COVID-19 or those with someone close to them with a COVID-19 diagnosis had significantly worse sleep quality than the others. It is reported in the literature that sleep problems are more widespread among females (16,21-23). Similarly, in a study by Fu et al., it was reported that females are more at risk of developing anxiety and sleep disturbances (24). Compared with males, females socialize more, experience their feelings more strongly and have negative views on their health. This may be why they are more anxious (24,25). In a study by Sinha et al., significant delays were reported during the pandemic in females' time of going to sleep, waking up, and length of sleep compared with males (26). Also, women's sleep quality during the pandemic may be affected by an increase in housework and responsibilities in looking after children.

It was found in this study that in addition to common affective factors such as gender, income level, chronic illness and certain employment groups, participants with a lower education level (high school and below) had poorer sleep quality. Similarly, in a study by Fu et al., sleep disturbances were found to be more widespread in individuals with a low level of education (24). Also, in a study with health workers by Zhang et al., more insomnia was reported in participants with a lower level of education (18). The reason for this may be that, during quarantine and the later in the pandemic, adults with a higher level of education adopt more practical coping strategies such as gaining information, reading, and getting social and psychological support.

Because the participants who were self-employed, retired or housewives mostly spent their time at home before the pandemic, they may have had a greater risk of difficulty in getting to sleep,

Table 2. Comparison of the socio-demographic variables with sleep quality during COVID-19 pandemic

Variables	Total n (%)	Good sleep quality (≤5 points) n (%)	Poor sleep quality (>5) n (%)	Test values
<i>Age (years)</i>				
18-40	797 (77.9)	255 (32.0)	542 (68.0)	$\chi^2=1.632$
41-64	209 (20.4)	68 (32.5)	141 (67.5)	$p=0.442$
≥65	17 (1.7)	3 (17.6)	14 (82.4)	
<i>Gender</i>				
Female	713 (69.7)	212 (29.7)	501 (70.3)	$\chi^2=4.933$
Male	310 (30.3)	114 (36.8)	196 (63.2)	$p=0.029$
<i>Marital status</i>				
Married	512 (50.0)	159 (31.1)	353 (68.9)	$\chi^2=0.312$
Single	509 (50.2)	167 (32.7)	344 (67.3)	$p=0.592$
<i>Educational status</i>				
High school and below	161 (15.7)	37 (23.0)	124 (77.0)	$\chi^2=8.395$
University	662 (64.7)	215 (32.5)	447 (67.5)	$p=0.015$
Master's degree or above	200 (19.6)	74 (37.0)	126 (63.0)	
<i>Occupation</i>				
Teachers or students	440 (43.0)	154 (35.0)	286 (65.0)	$\chi^2=9.536$
Health professionals	162 (15.8)	44 (27.2)	118 (72.8)	$p=0.023$
Enterprise or institution workers	250 (24.4)	87 (34.8)	163 (65.2)	
Others	171 (16.7)	41 (24.0)	130 (76.0)	
<i>Working status during COVID-19</i>				
Work outside the home	397 (38.8)	134 (33.8)	263 (66.2)	$\chi^2=2.052$
Work at home (Home office)	147 (14.4)	50 (34.0)	97 (66.0)	$p=0.359$
Unemployed	479 (46.8)	142 (29.6)	337 (70.4)	
<i>Working program</i>				
Continuous daytime	421 (76.7)	149 (35.4)	272 (64.6)	$\chi^2=3.066$
Continuous night	12 (2.2)	4 (33.0)	8 (66.7)	$p=0.216$
Day and night shifts	116 (21.1)	31 (26.7)	85 (73.3)	
<i>Income situation during COVID-19</i>				
Poor	289 (28.3)	60 (20.8)	229 (79.2)	$\chi^2=23.991$
Middle	527 (51.5)	185 (35.1)	342 (64.9)	$p<0.001$
Good	207 (20.2)	81 (39.1)	126 (60.9)	
<i>Chronic illness status</i>				
Yes	177 (17.3)	37 (20.9)	140 (79.1)	$\chi^2=11.848$
No	846 (82.7)	289 (34.2)	557 (65.8)	$p=0.001$
<i>People lived with</i>				
Alone	107 (10.5)	35 (32.7)	72 (67.3)	$\chi^2=1.285$
With wife	112 (10.9)	32 (28.6)	80 (71.4)	$p=0.864$
With wife and children	399 (39.0)	126 (31.6)	273 (68.4)	
With mother and father	405 (39.6)	133 (32.9)	272 (67.2)	
<i>History of contact with someone infected with COVID-19</i>				
Yes	119 (11.6)	27 (22.7)	92 (77.3)	$\chi^2=5.225$
No	904 (88.4)	299 (33.1)	605 (66.9)	$p=0.022$
<i>Relative or acquaintance infected with COVID-19</i>				
Yes	376 (36.8)	102 (27.1)	274 (72.9)	$\chi^2=6.150$
No	647 (63.2)	224 (34.6)	423 (65.4)	$p=0.015$
<i>Psychological help during COVID-19</i>				
Yes	16 (1.6)	4 (25.0)	12 (75.0)	$\chi^2=0.353$
No	1007 (98.4)	322 (32.0)	685 (68.0)	$p=0.788$
BMI (M±SD)		24.12 ±4.16	24.34 ± 4.16	$Z=-1.311$ $p=0.190$

BMI: Body Mass Index

waking up frequently at night or waking early in the morning in connection with the isolation measures. This kind of finding, that not working at a job and unemployment are related to worse sleep quality, is similar to previous studies (9,21,27). Isolation, and after

that social distancing during the pandemic, have had a greater effect on those who were already always at home.

In the same way, participants with a low income reported a higher level of poor sleep quality. The results of another study were similar (24). This may derive from a loss of the living standards of before the pandemic, as nearly half (46.8%) of the participants lost their jobs as a result of the pandemic.

No significant difference was found between participants' age, marital status, who they lived with, BMI, being infected with COVID-19, being in 14-day isolation, taking protective measures against COVID-19 or receiving psychological help and their sleep quality. Different from our finding, Sivertsen et al. reported that young adults aged between 18 and 35 showed a greater tendency to sleep problems. In the same study, it was shown that young adults widely used social media devices which interfered with their daily activities including sleep (28). It has also been stated that the use of digital media has increased during the pandemic (11). Social media platforms make the process of social isolation more tolerable, but the use of social media near the time of going to bed may have a large negative effect on the sleep of young adults (11,29).

In a study by Fu et al., different from our findings, anxiety and sleep disturbances were greater in married people (24). It is thought that the lack of effect of marital status on sleep quality arises from the number of married and single participants being almost equal. No significant difference was found between participants' being infected with COVID-19, their 14-day isolation and their protective measures against COVID-19 and their sleep quality. In a study by Wang et al., a correlation was found between sleep disturbance and exposure to COVID-19 patients (17). It is thought that the reason why the COVID-19 infection status of those participating in our study did not affect their sleep quality was that the number of infected participants was low (n=18). Also, although no significant difference was found between

staying in 14-day isolation and sleep quality, it was found that 71.2% of those who stayed in isolation and 67.4% of those who did not have poor sleep quality. Therefore, it can be said that staying in isolation has a negative effect on sleep quality.

Table 3. Comparison of health behavior change, anxiety and stress levels with sleep quality during the COVID-19 pandemic

Variables	Total n (%)	Good sleep quality (≤5 points) n (%)	Poor sleep quality (>5) n (%)	Test values
<i>Smoking during COVID-19</i>				
Increased	77 (7.5)	16 (20.8)	61 (79.2)	$\chi^2 = 4.352$ p = 0.037
Decreased	40 (3.9)	12 (30.0)	28 (70.0)	
No change	177 (17.3)	51 (28.8)	126 (71.2)	
Never	729 (71.3)	247 (33.9)	482 (66.1)	
<i>Alcohol drinking during COVID-19</i>				
Increased	44 (4.3)	10 (22.7)	34 (77.3)	$\chi^2 = 5.541$ p = 0.136
Decreased	44 (4.3)	20 (45.5)	24 (54.5)	
No change	147 (14.4)	45 (30.6)	102 (69.4)	
Never	788 (77.0)	251 (31.9)	537 (68.1)	
<i>Daily caffeinated drink intake during COVID-19</i>				
Increased	224 (21.9)	47 (21.0)	177 (79.0)	$\chi^2 = 18.448$ p < 0.001
Decreased	76 (7.4)	33 (43.4)	43 (56.6)	
No change	552 (54.0)	188 (34.1)	364 (65.9)	
Never	171 (16.7)	58 (33.9)	113 (66.1)	
<i>Physical activity during COVID-19</i>				
Increased	112 (10.9)	45 (40.2)	67 (59.8)	$\chi^2 = 38.888$ p < 0.001
Decreased	609 (59.5)	152 (25.0)	457 (75.0)	
No change	229 (22.4)	106 (46.3)	123 (53.7)	
Never	73 (7.1)	23 (31.5)	50 (68.5)	
<i>Daily food intake during COVID-19</i>				
Increased	484 (47.3)	127 (26.2)	357 (73.8)	$\chi^2 = 30.625$ p < 0.001
Decreased	140 (13.7)	32 (22.9)	108 (77.1)	
No change	399 (39.0)	167 (41.9)	232 (58.1)	
<i>Daily water intake during COVID-19</i>				
Increased	406 (39.7)	135 (33.3)	271 (66.7)	$\chi^2 = 12.087$ p = 0.002
Decreased	102 (10.0)	17 (16.7)	85 (83.3)	
No change	515 (50.3)	174 (33.8)	341 (66.2)	
<i>Fatigue during COVID-19</i>				
Increased	537 (52.5)	95 (17.7)	442 (82.3)	$\chi^2 = 50.894$ p < 0.001
Decreased	59 (5.8)	30 (50.8)	29 (49.2)	
No change	354 (34.6)	156 (44.1)	198 (55.9)	
No fatigue	73 (7.1)	45 (61.6)	28 (38.4)	
<i>Fear during COVID-19</i>				
Increased	609 (59.5)	154 (25.3)	455 (74.7)	$\chi^2 = 41.440$ p < 0.001
Decreased	19 (1.9)	7 (36.8)	12 (63.2)	
No change	258 (25.2)	93 (36.0)	165 (64.0)	
No fear	137 (13.4)	72 (52.6)	65 (47.4)	
Anxiety NRS during COVID-19		5.51 ± 2.79	7.12 ± 2.35	Z = -9.019 p < 0.001
Stress NRS during COVID-19		5.28 ± 2.76	7.00 ± 2.24	Z = -9.718 p < 0.001

NRS: Numeric Rating Scale

It was found in our study that participants whose consumption of cigarettes and caffeinated drinks rose and whose consumption of liquids and physical activity fell had significantly worse sleep quality than the other participants. No significant difference was found between alcohol consumption and sleep quality. In one study, women ate breakfast and lunch later than men during the pandemic. Regarding the evening meal, before the pandemic, women ate significantly earlier than men, but during the pandemic they ate at the same time (26). Therefore, changes in sleeping and waking times during the pandemic may also have affected participants' eating habits and liquid uptake.

Physical exercise is an active way of coping, and for this reason the function between sleep quality and coping style may be two-way (24). In our study, most (75%) of our participants with poor sleep quality were found to have reduced their physical activity levels during the pandemic. Similarly, in another study, not performing physical exercise was correlated with sleep disturbance (24). During the outbreak, many of the participants were isolated in their homes, and this restricted their physical exercise. A reduction in physical activity and thus low energy expenditure may have caused a delay in mealtimes and a reduction in food intake, and therefore have affected sleep quality.

In addition to this, it was found that participants whose fatigue, fear, stress and anxiety levels were increased had significantly worse sleep quality than the other participants. Sleep quality is sensitive to psychological state (30). In one study, it was found that most patients had a medium or severe level of anxiety during the pandemic (31), and that those with more severe anxiety and depressive symptoms had worse sleep disturbance (10). Cellini et al. reported that reduction in sleep quality was greater in those with a higher level of depression, anxiety and stress symptoms (11). However, different from our findings, no significant increase in anxiety levels was seen in a study conducted with MS patients in Turkey during the pandemic (32). It is thought that in the whole world, fear, stress and anxiety levels are high in connection with the reporting of large numbers of cases and high death rates, the lack of an effective cure or widespread use of vaccines for the COVID-19 virus, the fact that it is highly infectious, its worldwide economic effects,

and therefore the inability to return to normal. The effect of these symptoms on sleep levels is an important finding.

Limitations

In order to correctly interpret the findings of this study, a number of limitations must be taken into account. First, because the data presented here and the related analysis were produced from a cross-sectional design, it is difficult to draw causal conclusions. Second, the time when the study was conducted was when pandemic restrictions in Turkey was being lifted, and normalization was taking place.

Table 4. Correlation between sleep quality and age, BMI, anxiety and stress levels of participants during the COVID-19 pandemic

	Pittsburgh Sleep Quality Index	
	r	p
Age	0.034	0.282
BMI	0.025	0.431
Anxiety NRS	0.330	<0.001
Stress NRS	0.372	<0.001

NRS: Numeric Rating Scale, BMI: Body Mass Index

Conclusion

In conclusion, it was found that the sleep quality of many adults in the COVID-19 pandemic was poor. It was seen that participants whose education level was high school or below, whose physical activity and food intake were reduced and whose fatigue and stress levels were increased had poorer sleep quality. During the pandemic, many personal and environmental factors affect sleep quality.

In line with these results, sleep problems may be reduced by developing social policies to support those with sleep problems, by giving simple and clear information on the pandemic in order to combat the fear, stress and anxiety caused by uncertainty concerning the pandemic, by supporting healthy lifestyle behaviors with the help of technology, and by increasing social contact.

Resumen

Objetivo: Debido a la pandemia de COVID-19, personas de todo el mundo se han visto confinadas en sus hogares y expuestas a niveles de estr s sin precedentes. Este estudio se realiz  con el objetivo de evaluar los factores que est n afectando la calidad del

sue o en la poblaci n turca durante la pandemia de COVID-19. M todos: La muestra de este estudio estuvo compuesta por 1023 personas que completaron un cuestionario mediante una conexi n en l nea de Google Forms por correo y comunicaci n electr nicos entre las fechas del 12 de Julio y el 30 de agosto de 2020. Se utilizaron un formulario de informaci n personal, un formulario de cambios de comportamiento de salud, la escala de calificaci n num rica y el  ndice de calidad del sue o de Pittsburg para recopilar datos. Resultados: Se encontr  que el 68,1% de los participantes en el estudio ten an mala calidad de sue o y el 31,9% buena calidad de sue o. Adem s, aquellos con antecedentes de contacto con una persona con COVID-19, o aquellos que conoc an a alguien con COVID-19 en sus allegados, ten an significativamente peores niveles de calidad del sue o que los dem s ($p < 0,05$). Se puede predecir que los participantes con un nivel educativo de secundaria o inferior, bajos ingresos, una reducci n en la actividad f sica o la ingesta de alimentos, fatiga o altos niveles de estr s pueden tener una menor calidad del sue o. Conclusi n: Es importante determinar los factores que afectan la calidad del sue o durante pandemias tan grandes y brindar el apoyo necesario.

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Table 5. Binary logistic regression analysis of factors affecting the risk of poor sleep quality

Variables	B	P	OR	95% CI
Age	.008	0.362	1.008	0.991-1.025
Female	-.022	0.903	0.978	0.688-1.391
High school and below	-.653	0.010	0.520	0.316-0.856
Occupation (Others=self-employed, retirees, and housewives)	-.279	0.261	0.757	0.465-1.231
Income (Poor)	-.656	<0.001	0.519	0.360-0.748
Chronic illness status	-.439	0.051	0.644	0.415-1.001
A history of contact with someone infected with COVID-19	-.290	0.293	0.748	0.436-1.285
Relative or acquaintance infected with COVID-19	-.080	0.640	0.923	0.659-1.292
Smoking (Increased)	.061	.854	1.063	0.552-2.048
Daily caffeinated drink intake (Increased)	-.179	0.407	0.836	0.547-1.277
Physical activity (Decreased)	-.511	0.001	0.600	0.439-0.819
Daily food intake (Decreased)	-.500	0.037	0.607	0.379-0.971
Daily water intake (Decreased)	-.526	0.086	0.591	0.324-1.078
Fatigue (Increased)	-1.036	<0.001	0.355	0.256-0.491
Fear (Increased)	-.013	0.941	0.987	0.691-1.409
Anxiety NRS	.058	0.351	1.060	0.938-1.197
Stress NRS	.155	0.012	1.168	1.035-1.318

Independent variables: Educational and income status, occupation, chronic illness status, smoking, caffeinated drink intake, physical activity, food and water intake, history of contact with someone infected with COVID-19, relative or acquaintance infected with COVID-19, fatigue and fear were categorical variables, age, anxiety and stress were continuous variables.

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