Severity of Depression and Anxiety, and Quality of Sleep and Life in Healthcare Workers During the COVID-19 Pandemic

COVID-19 Pandemisi Sırasında Sağlık Çalışanlarının Depresyon ve Anksiyete Şiddeti İle Uyku ve Yaşam Kaliteleri

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Abstract

The COVID-19 pandemic is having an adverse effect on healthcare workers (HCWs), both physically and mentally, due to the increased workload. The present study evaluates the effects of the COVID-19 pandemic on the level of depression and anxiety, and on quality of sleep and life among HCWs. In this cross-sectional study, an online questionnaire was used to garner data on mental health parameters and quality of sleep in HCWs and non-HCWs. The participants were evaluated with the "Patient Health Questionnaire-9" (PHQ-9) for depressive symptoms, the "Beck Anxiety Inventory" (BAI) for anxiety symptoms, the "Pittsburgh Sleep Quality Index" (PSQI) for sleep quality and the "Professional Quality of Life" (ProQol) scale for quality of life. Included in the study were 543 respondents, comprising 335 HCWs and 208 non-HCWs. The PHQ-9, BAI and PSQI scores were found to be significantly higher in the HCWs than in the non-HCWs. Among the HCW, the PHQ-9, BAI, PSQI and ProQol-compassion satisfaction scores were significantly higher for nurses than for physicians; the BAI, PSQI and ProQol-burnout scores of the nurses were higher than those of non-medical hospital personnel; and the BAI scores of the allied healthcare professionals were higher than those of physicians. The study found HCWs, especially nurses, to be more affected by the COVID-19 pandemic than the public in terms of mental health and sleep quality. During the COVID-19 pandemic, psychological support programs should be provided for HCWs to ensure the maintenance of quality of life among these key personnel.

Keywords:COVID-19 pandemic; healthcare workers; mental health; quality of sleep and life

Özet

COVID-19 pandemisi, artan iş yükü nedeni ile hem fiziksel hem de zihinsel olarak sağlık çalışanları üzerinde olumsuz bir etkiye sahiptir. Bu çalışma, COVID-19 pandemisinin, sağlık çalışanlarının depresyon ve anksiyete düzeyi ile uyku ve yaşam kaliteleri üzerindeki etkilerini değerlendirmektedir. Bu kesitsel çalışmada sağlık çalışanları ve sağlık çalışanı olmayanlarda mental sağlık parametreleri ve uyku kaliteleri ile ilgili verileri elde etmek için çevrimiçi bir anket kullanılmıştır Katılımcılar, depresyon için "Hasta Sağlığı Anketi-9" (PHQ-9), anksiyete semptomları için "Beck Anksiyete Envanteri" (BAE), uyku kalitesi için "Pittsburgh Uyku Kalitesi indeksi" (PUKİ) ve yaşam kalitesi için "Çalışanlar için Yaşam Kalitesi Ölçeği" (ProQol) ile değerlendirilmiştir. Çalışmaya 335'i sağlık çalışanı ve 208'i sağlık çalışanı olmayan toplam 543 kişi dahil edildi. PHQ-9, BAE ve PUKİ skorları sağlık çalışanlarında, sağlık çalışanı olmayanlara göre anlamlı derecede yüksek bulundu. Sağlık çalışanları arasında PHQ-9, BAE, PUKİ ve ProQol-mesleki tatmin skorları, hemşirelerde doktorlara göre anlamlı derecede daha yüksekti; hemşirelerin BAE, PUKİ ve ProQol-tükenmişlik skorları tıbbi olmayan hastane personeline göre daha yüksekti ve yardımcı sağlık personellerinin BAE skorları ise doktorlardan daha yüksekti. Bu çalışmada, sağlık çalışanlarının, özellikle de hemşirelerin, COVID-19 pandemisinden mental sağlık ve uyku kalitesi yönünden topluma göre daha çok etkilendiği saptanmıştır. COVID-19 pandemisi esnasında, bu kilit personelin yaşam kalitesinin sürdürülmesini temin etmek için, sağlık çalışanlarına psikolojik destek programları sağlanmalıdır.

Anahtar Kelimeler: COVID-19 pandemisi; sağlık çalışanları; mental sağlık; uyku ve yaşam kalitesi

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1. Introduction

Coronavirus disease 2019 (COVID-19) began in the city of Wuhan in the Hubei Province of China, and spread rapidly around the world in a short time. The causative agent was named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) (1,2) and on March 11, 2020, the outbreak was declared a pandemic by World Health Organization (3).

In such outbreaks of disease in recent years, such as SARS and Ebola, numerous psychiatric symptoms were observed among the public (4,5). Similarly, the increased threat of infection associated with COVID-19 has led to a rise in anxiety and depression around the world (6), and the development of these symptoms is likely to lead to posttraumatic stress disorder (PTSD) (7). It is known from previous experience that infectious disease outbreaks can affect the mental health of societies, and can impair sleep quality in individuals (8).

The frontline position of healthcare workers (HCWs) in the management of the COVID-19 outbreak places them at increased risk of infection (9-11). Previous studies have established that serious life-threatening outbreaks, such as SARS and Ebola, place considerable pressure on HCWs (12), increasing the likelihood of development of psychological stress and other mental health problems, as well as sleep disorders (9). During the COVID-19 pandemic, various factors, such as risk of nosocomial infection and even mortality due to constant contact with patients, excessive workload, fatigue, lack of personal protective equipment and uncertainties during working hours, were found to have a negative physical and mental impact on healthcare personnel. Personal isolation, reduced social support, the risk of infecting relatives, expectations of support and the sense of responsibility towards the general public elevate the psychological stress level of HCWs and frontline workers in particular, while also increasing their susceptibility to anxiety, depression, PTSD, and sleep problems (11-13).

The primary objective in the present study is to evaluate the severity of depressive and anxiety symptoms, as well as sleep quality, among HCWs in Turkey during the COVID-19 pandemic. To the best of our knowledge, there have been few studies to date evaluating quality of life in HCWs related to burnout, PTSD and job satisfaction. Accordingly, as a further objective of the study, HCWs are assessed also in terms of these parameters.

2. Materıals and Methods

Study design and participants

This cross-sectional observational study evaluates the mental health parameters, and quality of sleep and life among HCWs during the COVID-19 pandemic in Turkey. The depression, anxiety and sleep quality scores of the HCWs were compared with those of non-HCW volunteers. The study was conducted between August 1 and September 1, 2020, with the prepared questionnaires being completed online by all participants. The HCW group in the study comprised HCWs working at Yuksek Ihtisas University Medicalpark Ankara Batikent Hospital, as a sole center. The HCWs who agreed to participate in the study were categorized into four groups: physicians, nurses, allied health professionals (AHPs) (emergency medicine - anesthesia-radiology technicians, operating room staff and laboratory personnel) and non-medical hospital personnel (NMHP) (administrative staff, medical secretaries, cleaning staff). The control group (non-HCWs) included friends of hospital employees, who themselves or their relatives were not HCWs, or relatives of patients who presented to the hospital. The inclusion criteria were: Being over the age of 18 and able to understand and fill out the questionnaires completely. The study was conducted in compliance with the principles of Good Clinical Practice and the Declaration of Helsinki and its amendments, and the study protocol was approved by the Ethics Committee of Yuksek Ihtisas University, with reference number of 2020/07/09. Online informed consent for inclusion in the study was provided by each participant in advance of the study.

Screening questionnaire

The first part of the questionnaire garnered details of such basic sociodemographic characteristics and histories of comorbidities. Among the study variables, depression was assessed using the Patient Health Questionnaire-9 (PHQ-9), anxiety using the Beck Anxiety Inventory (BAI), sleep quality using the Pittsburgh Sleep Quality Index (PSQI) and healthcare workers' quality of life using the Professional Quality of Life Scale (ProQol).

The PHQ-9 is a self-reporting questionnaire that is used to aid in the diagnosis and evaluation of the severity of depression (14). The questionnaire includes nine items and evaluates how often the individual has been disturbed by the problem specified in each item over the last two weeks, rated on a four-point Likert scale. In the present study, an accepted a cut-off value of 10 points was established, with scores of ≥11 being evaluated as depression. The Turkish reliability study of the questionnaire was conducted by Sari et al. in 2016 (15).

BAI is a 21-item, self-reported, valid and reliable inventory that was developed by Beck et al. in 1988 to measure the severity of anxiety in psychiatric populations (16). The respondents are asked to evaluate the level to which they have been disturbed by the symptoms specified in each item within the last one week on a four-point Likert scale. The validity and reliability study of the Turkish version of BAI was conducted by Ulusoy et al. in 1998 (17).

The PSQI is a self-administered scale that measures an individual's sleep quality within the last one month. The scale consists of 19 items for the assessment of seven parameters, being subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, hypnotic drugs and daytime dysfunction. Each component is scored from 0 to 3, and the total score ranges from 0 to 21 points. The higher the score, the poorer the reported sleep quality (18). The present study accepted the cut-off value for PSQI as 7,

while a score of >7 points indicated sleep disorder (19). The Turkish validity and reliability study of the PSQI was conducted in 1996 (20).

ProQol, the Turkish validity and reliability study of which was conducted by Yesil et al. in 2010, is a self-reported scale that was developed by Stamm BH. The scale consists of three subscales, each of which comprises 10 items [compassion satisfaction (CS), burnout (BO), compassion fatigue (CF - secondary traumatic stress scale)], with each subscale being evaluated separately (21).

Statistical analyses

The statistical analysis was performed using IBM SPSS Statistics (Version 23.0. Armonk, NY: IBM Corp). For descriptive statistics, normal distribution was determined by a One-Sample Kolmogorov Smirnov test. Normally distributed continuous variables were expressed as medians (min-max), while categorical variables were expressed in numbers and percentages. A Student's t test was used to compare the continuous variables of two groups, a One-Way Anova was applied for more than two groups, and subgroups were compared with Bonferroni Post-Hoc analyses. The differences between categorical variables were calculated using a Chi-square test. The independent impact of factors on the scores were established with Linear Logistic Regression analyses. A p value of <0.05 was considered statistically significant.

3. Results

Participants and sociodemographic characteristics

A total of 543 (87.0%) of the 624 people approached agreed to participate in the study, including 335 (86.1%) of the 389 HCWs and 208 (88.5%) of the 235 non-HCWs. The 81 people who refused to participate in the study or who did not complete the questionnaire in full were excluded. The sociodemographic characteristics and other variables of the HCWs, non-HCWs and HCW subgroups, are presented in Table 1.

Table 1. Comparison of the sociodemographic characteristics of the study participants

	Total 543 (%100)	Non-HCWs† 208 (38.3%)	HCWs† 335 (61.7%)	P-value*	Physician 87 (26%)	Nurse 107 (31.9%)	Allied health professional 52 (15.5%)	Non-medical hospital personnel 89 (26.6%)	P-value*
	n (%) / median (min-max)								
Age				0.398					<0.001
18-29	229 (42.2%)	88 (42.3%)	141 (42.1%)		-	74 (69.2%)	24 (46.2%)	43 (48.3%)	
30-39	161 (29.7%)	62 (29.8%)	99 (29.6%)		28 (32.2%)	18 (16.8%)	17 (32.7%)	36 (40.4%)	
40-49	100 (18.4%)	33 (15.9%)	67 (20%)		35 (40.2%)	12 (11.2%)	10 (19.2%)	10 (11.2%)	
≥50	53 (9.8%)	25 (12%)	28 (8.4%)		24 (27.6%)	3 (2.8%)	1 (1.9%)	-	
Gender				0.596					<0.001
Female	365 (67.2%)	137 (65.9%)	228 (68.1%)		32 (36.8%)	94 (87.9%)	39 (75%)	63 (70.8%)	
Male	178 (32.8%)	71 (34.1%)	107 (31.9%)		55 (63.2%)	13 (12.1%)	13 (25%)	26 (29.2%)	
Marital status				0.976					<0.001
Unmarried/divorced/widowed	258 (47.5%)	99 (47.6%)	159 (47.5%)		15 (17.2%)	73 (68.2%)	25 (48.1%)	46 (51.7%)	
Married	285 (52.5%)	109 (52.4%)	176 (52.5%)		72 (82.8%)	34 (31.8%)	27 (51.9%)	43 (48.3%)	
Spouse being a healthcare worker									<0.001
No					27 (37.5%)	24 (70.6%)	21 (77.8%)	36 (83.7%)	
Yes					45 (62.5%)	10 (29.4%)	6 (22.2%)	7 (16.3%)	
Living with									<0.001
Alone or with a friend	91 (16.8%)	32 (15.4%)	59 (17.6%)		19 (21.8%)	24 (22.4%)	6 (11.5%)	10 (11.2%)	
Husband or wife with or without children	278 (51.2%)	114 (54.8%)	164 (49%)		65 (74.7%)	28 (26.2%)	26 (50%)	45 (50.6%)	
With elder family	174 (32%)	62 (29.8%)	112 (33.4%)		3 (3.4%)	55 (51.4%)	20 (38.5%)	34 (38.2%)	
Education level									<0.001
Primary to high school	146 (26.9%)	54 (26%)	92 (27.5%)		-	47 (43.9%)	21 (40.4%)	23 (25.8%)	
Associate degree	114 (21%)	38 (18.3%)	76 (22.7%)		-	21 (19.6%)	24 (46.2%)	31 (34.8%)	
Undergraduate	151 (27.8%)	87 (41.8%)	64 (19.1%)		-	28 (26.2%)	5 (9.6%)	31 (34.8%)	
Postgraduate	132 (24.3%)	29 (13.9%)	103 (30.7%)		87 (100%)	11 (10.3%)	2 (3.8%)	4 (4.5%)	
Work experience (years)									<0.001
1-5					2 (2.3%)	67 (62.6%)	23 (44.2%)	37 (41.6%)	
6-10					11 (12.6%)	10 (9.3%)	10 (19.2%)	30 (33.7%)	
11-15					20 (23%)	13 (12.1%)	8 (15.4%)	15 (16.9%)	
16-20					17 (19.5%)	2 (1.9%)	8 (15.4%)	3 (3.4%)	
>20					37 (42.5%)	15 (14%)	3 (5.8%)	4 (4.5%)	
Hospital department									<0.001
COVID-19 department					21 (24.1%)	46 (43%)	11 (21.2%)	19 (21.3%)	
COVID-19 free department					64 (73.6%)	59 (55.1%)	24 (46.2%)	20 (22.5%)	
Patient free department					2 (2.3%)	2 (1.9%)	17 (32.7%)	50 (56.2%)	

			p						p
Direct contact with COVID-19 (+) patient			<0.001						<0.001
None	437 (80.5%)	203 (97.6%)		234 (69.9%)	51 (58.6%)	56 (52.3%)	42 (80.8%)	85 (95.5%)	
Present	106 (19.5%)	5 (2.4%)		101 (30.1%)	36 (41.4%)	51 (47.7%)	10 (19.2%)	4 (4.5%)	
COVID-19 in family members	6 (1.1%)	3 (1.4%)	0.553	3 (0.9%)	1 (1.1%)	-	1 (1.9%)	1 (1.1%)	0.637
Medical comorbidity	135 (24.9%)	47 (22.6%)	0.336	88 (26.3%)	32 (36.8%)	25 (23.4%)	16 (30.8%)	15 (16.9%)	0.018
Psychiatric disease	36 (6.6%)	13 (6.3%)	0.779	23 (6.9%)	7 (8%)	6 (5.6%)	3 (5.8%)	7 (7.9%)	0.875
Smoking	223 (41.1%)	85 (40.9%)	0.940	138 (41.2%)	24 (27.6%)	47 (43.9%)	20 (38.5%)	47 (52.8%)	0.007

†Healthcare workers, *Chi-square test

Comparison of the severity of depression and anxiety and sleep quality between HCWs and non-HCWs

The PHQ-9, BAI and PSQI scores were significantly higher in the HCWs than in the non-HCWs ($p<0.001$, $p=0.012$ and $p<0.001$ respectively). Based on the cut-off value, the prevalence of depression was significantly higher in the HCWs ($p<0.001$). The levels of depressive symptoms were significantly higher in the HCWs ($p<0.001$). The moderate and severe anxiety symptoms in HCWs were found to be higher than in the non-HCWs ($p=0.012$). Based on the cut-off value, 142 (42.4%) of the HCW participants had sleep disturbance, compared to 50 (24%) in the other group ($p<0.001$) (Table 2).

Evaluation of depression, anxiety, quality of sleep and life among HCW subgroups

The median PHQ-9 score was significantly higher among the nurses and AHPs ($p<0.001$). Depression was most common among the nurses and AHPs (n:53, 49.5% and n:24, 46.2%, respectively) ($p=0.002$). The median BAI score was higher among the nurses and AHPs ($p<0.001$), and a greater prevalence of moderate and severe anxiety was also observed in these two HCW subgroups ($p<0.001$). The highest median PSQI score was recorded in the nurses, while the physicians had the lowest score ($p<0.001$). The prevalence of sleep disturbance was also the highest among nurses (n:57, 53.3%) and lowest among physicians (n:22, 25.3%) ($p=0.001$). The median score of the ProQol-CS subscale was highest in the nurses and lowest in the physicians ($p=0.010$). The median score in the burnout subscale was significantly higher in the nurses ($p=0.008$). A moderate level of CF was found in 38.3% of nurses, suggesting that posttraumatic stress secondary to COVID-19 is significantly higher among nurses ($p=0.024$) (Table 3).

Comparison of study variables among HCW subgroups

The study variables of depression, anxiety, sleep quality and workers' quality of life among the HCW subgroups were compared with a Bonferroni Post-Hoc analysis, and the PHQ-9, BAI, PSQI and ProQol-CS scores of nurses were found to be significantly higher than those of physicians ($p<0.001$, $p<0.001$, $p<0.001$, $p=0.008$, respectively). Furthermore, the BAI, PSQI and ProQol-BO scores of nurses were significantly higher than those of NMHP ($p=0.020$, $p=0.006$, $p=0.007$, respectively), while AHPs also had higher BAI scores than physicians ($p=0.039$) (Table 4).

Table 2. Scores and severity of depression, anxiety and sleep quality of HCWs and non-HCWs

	Total	Non-HCWs[†]	HCWs[†]	P-value
	543 (100%)	208 (38.3%)	335 (61.7%)	
	n(%) / median (min-max)			
PHQ-9[‡] score	8 (0-27)	6 (0-25)	9 (0-27)	< 0.001*
Depression				< 0.001**
Not available (≤10 point)	373 (68.7%)	162 (77.9%)	211 (63%)	
Available (≥11 point)	170 (31.3%)	46 (22.1%)	124 (37%)	
Depression level				< 0.001**
Minimal depression (1-4 point)	133 (24.5%)	74 (35.6%)	59 (17.6%)	
Mild depression (5-9 point)	213 (39.2%)	77 (37%)	136 (40.6%)	
Moderate depression (10-14 point)	103 (19%)	39 (18.8%)	64 (19.1%)	
Moderate-severe depression (15-19 point)	56 (10.3%)	10 (4.8%)	46 (13.7%)	
Severe depression (20-27 point)	38 (7%)	8 (3.8%)	30 (9%)	
BAI[§] score	7 (0-61)	6 (0-61)	8 (0-52)	0.001**
Anxiety level				0.012**
Very low anxiety (≤7 point)	280 (51.6%)	118 (56.7%)	162 (48.4%)	
Mild anxiety (8-15 point)	130 (23.9%)	54 (26%)	76 (22.7%)	
Moderate anxiety (16-25 point)	76 (14%)	24 (11.5%)	52 (15.5%)	
Severe anxiety (26-63 point)	57 (10.5%)	12 (5.8%)	45 (13.4%)	
PSQI[¶] score	6 (0-20)	5 (0-20)	6 (0-20)	< 0.001*
Sleep disturbance				< 0.001**
Not available (≤7 point)	351 (64.6%)	158 (76%)	193 (57.6%)	
Available (≥8 point)	192 (35.4%)	50 (24%)	142 (42.4%)	

[†]Healthcare workers, [‡]Patient Health Questionnaire-9, [§]Beck Anxiety Inventory, [¶]Pittsburgh Sleep Quality Index
*Student's t test, **Chi-square test

Table 3. Scores and severity of depression, anxiety, quality of sleep and life among HCW subgroups

	Physician	Nurse	Allied health professional	Non-medical hospital personnel	P-value
	87 (26%)	107 (31.9%)	52 (15.5%)	89 (26.6%)	
	n (%) / median (min-max)				
PHQ-9[†] score	7 (0-27)	10 (0-27)	10 (0-26)	8 (0-27)	< 0.001*
Depression					0.002**
Not available (≤10 point)	68 (78.2%)	54 (50.5%)	28 (53.8%)	61 (68.5%)	
Available (≥11 point)	19 (21.8%)	53 (49.5%)	24 (46.2%)	28 (31.5%)	
Depression level					< 0.001**
Minimal depression (1-4 point)	25 (28.7%)	9 (8.4%)	8 (15.4%)	17 (19.1%)	
Mild depression (5-9 point)	40 (46%)	39 (36.4%)	18 (34.6%)	39 (43.8%)	
Moderate depression (10-14 point)	13 (14.9%)	24 (22.4%)	13 (25%)	14 (15.7%)	
Moderate-severe depression (15-19 point)	2 (2.3%)	22 (20.6%)	10 (19.2%)	12 (13.5%)	
Severe depression (20-27 point)	7 (8%)	13 (12.1%)	3 (5.8%)	7 (7.9%)	

BAI[‡] score	5 (0-31)	12 (0-52)	10 (0-44)	7 (0-41)	< 0.001*
Anxiety level					< 0.001**
Very low anxiety (≤7 point)	61 (70.1%)	34 (31.8%)	22 (42.3%)	45 (50.6%)	
Mild anxiety (8-15 point)	13 (14.9%)	30 (28%)	12 (23.1%)	21 (23.6%)	
Moderate anxiety (16-25 point)	8 (9.2%)	21 (19.6%)	10 (19.2%)	13 (14.6%)	
Severe anxiety (26-63 point)	5 (5.7%)	22 (20.6%)	8 (15.4%)	10 (11.2%)	
PSQI[§] score	5 (0-19)	8 (0-20)	7 (0-17)	6 (0-15)	< 0.001*
Sleep disturbance					0.001**
Not available (≤7 point)	65 (74.7%)	50 (46.7%)	27 (51.9%)	51 (57.3%)	
Available (≥8 point)	22 (25.3%)	57 (53.3%)	25 (48.1%)	38 (42.7%)	
ProQol[¶] - CS[¥] score	35 (12-50)	41 (11-50)	39 (18-50)	39 (11-50)	0.010*
CS[¥] level					0.073**
Mild (≤22 point)	12 (13.8%)	5 (4.7%)	3 (5.8%)	5 (5.6%)	
Moderate (23-4 point)	51 (58.6%)	53 (49.5%)	27 (51.9%)	49 (55.1%)	
Severe (≥42 point)	24 (27.6%)	49 (45.8%)	22 (42.3%)	35 (39.3%)	
ProQol[¶] - BO[µ] score	23 (10-46)	25 (10-47)	23 (12-37)	23 (10-40)	0.008*
BO[µ] level					0.106**
Mild (≤22 point)	39 (44.8%)	37 (34.6%)	25 (48.1%)	44 (49.4%)	
Moderate (23-41 point)	46 (52.9%)	65 (60.7%)	27 (51.9%)	45 (50.6%)	
Severe (≥42 point)	2 (2.3%)	5 (4.7%)	-	-	
ProQol[¶] – CF[Ꙩ] score	15 (10-42)	19 (10-40)	18 (10-43)	16 (10-41)	0.063*
CF[Ꙩ] level					0.024**
Mild (≤22 point)	68 (78.2%)	66 (61.7%)	42 (80.8%)	68 (76.4%)	
Moderate (23-41 point)	18 (20.7%)	41 (38.3%)	9 (17.3%)	21 (23.6%)	
Severe (≥42 point)	1 (1.1%)	-	1 (1.9%)	-	

[†]*Patient Health Questionnaire-9,* [‡]*Beck Anxiety Inventory,* [§]*Pittsburgh Sleep Quality Index,* [¶]*Professional Quality of Life,*
[¥]*Compassion satisfaction,* [µ]*Burnout,* [Ꙩ]*Compassion fatique,* *Student's t test,* **Chi-square test

Table 4. Comparison of depression, anxiety, quality of sleep and life among HCW subgroups

	Nurse	Allied health professional	Non-medical hospital personnel
		P-value*	
PHQ-9[†] score			
Physician	<0.001	0.052	0.290
Nurse		1.000	0.075
Allied health professional			1.000
BAI[‡] score			
Physician	<0.001	0.039	0.134
Nurse		0.514	0.020
Allied health professional			1.000
PSQI[§] score			
Physician	<0.001	0.427	1.000
Nurse		0.194	0.006
Allied health Professional			1.000
ProQol[§] - compassion satisfaction score			
Physician	0.008	0.135	0.142
Nurse		1.000	1.000

Allied health professional			1.000
ProQol[§] – burn-out score			
Physician	0.148	1.000	1.000
Nurse		0.297	0.007
Allied health professional			1.000
ProQol[§] – compassion fatigue score			
Physician	0.066	1.000	1.000
Nurse		0.625	0.431
Allied health professional			1.000

[†]**Patient Health Questionnaire-9,** [‡]**Beck Anxiety Inventory,** [§]**Pittsburgh Sleep Quality Index,** [¶]**Professional Quality of Life,** *****Bonferroni Post-Hoc analyses**

Independent factors for depression, anxiety, sleep disturbance, CS, BO and CF

The study results revealed that younger age, female gender, lower education level, working in units with COVID-19 patients, presence of COVID-19 in family members and history of psychiatric disease to be independent factors for depression. Female gender, lower education level, working in COVID-19 departments and history of psychiatric disease were independent factors for anxiety. Additionally, female gender, working in units with COVID-19 patients, presence of COVID-19 symptoms and history of asthma were found to be independent factors for sleep disturbance. In an examination of quality of life, female gender, direct contact with a SARS-CoV-2 positive patient and a history of psychiatric disease were independent factors for BO. Finally, female gender; being single, divorced or widowed; and working in COVID-19 departments were independent factors for PTSD (Table 5).

4. Discussion

HCWs working on the frontline are at the highest risk of infection during disease outbreaks (12). Studies during the SARS outbreak in 2003 found healthcare personnel to be afraid of transmitting the infection to their families and colleagues, resulting in increased stress, anxiety and depressive symptoms (22,23).

The findings of the present study reveal significantly higher levels of depression and anxiety and disturbed sleep among HCWs during the COVID-19 pandemic than among non-HCWs. The present study identified depression in 37% and severe anxiety in 13.4% of HCWs. While the depression and anxiety levels (50.4% and 44.6% respectively) were quite high in a multi-center study conducted in China at the beginning of the pandemic (9), Korkmaz et al. observed severe anxiety in 13% of HCWs during the current pandemic (24). Another study from China with a large number of participants identified high levels of anxiety and sleep disturbance among HCWs, while HCWs had lower depressive symptoms than non-HCWs (25). The determination of mental health parameters at different rates in the studies conducted during the pandemic may be due to the fact that these studies were carried out in different periods of the pandemic, and the information about COVID-19 was increased in time.

The present study identified disturbed sleep in more than one-third (35.4%) of the all participants, which may be due to impaired cortisol secretion, decreased melatonin synthesis and increased cortisol levels in the blood as a result of increased anxiety, leading to a reduction in sleep quality in the individual (8). During the COVID-19 outbreak, Lai et al. reported a rate of insomnia of 34.0% among HCWs (9). In the present study, we observed sleep disturbance (42.4%) higher in HCWs. Besides sleep disturbance was markedly lower in non-HCW group (24%) compared to HCWs. This difference can be explained by the limited opportunities for rest associated with increased working hours and the heavier workloads of HCWs, and the elevated psychological distress, as was seen also in the SARS and MERS outbreaks (26,27).

Table 5. Independent factors for depression, anxiety, quality of sleep and life identified by linear regression analysis

Variables	PHQ-9[†] score		BAI[‡] score		PSQI[§] score		ProQol[¶]- BO[ʺ] Score		ProQol[¶] - CF[ᵃ] Score	
	OR[‡]	P-value	OR[‡]	P-value	OR[‡]	P-value	OR[‡]	P-value	OR[‡]	P-value
Age	-0.926	0.046								
Gender	-2.125	0.003	-5.293	<0.001	-1.335	0.008	-2.592	0.002	-2.869	0.001
Marital status	-1.296	0.176							-1.304	0.040
Education level	-0.701	0.029	-1.668	0.002						
Hospital department	-1.465	0.006	-2.699	0.004	-0.911	0.017			-1.304	0.040
Direct contact with COVID-19 (+) patient	0.543	0.489	-0.399	0.775	0.779	0.178	1.897	0.027	0.538	0.583
COVID-19 (+) in family members	12.584	<0.001	9.910	0.089						
Asthma (+)			2.848	0.195	1.701	0.020				

[†]*Patient Health Questionnaire-9, *[‡]*Beck Anxiety Inventory, *[§]*Pittsburgh Sleep Quality Index, *[¶]*Professional Quality of Life, *[ʺ]*Burnout, *[ᵃ]*Compassion fatigue, *[‡]*Odds ratio*

The present study also analyzed the mental health parameters severity and sleep disturbance levels of the HCW subgroups. The depression and anxiety levels of nurses were found to be significantly higher than those of physicians, which may be due to the fact that women, who account for the majority of nurses, are more prone to mental health problems (22), and that nurses are at greater risk of infection, being in close contact with COVID-19 patients for longer periods than other HCWs (9,12). Furthermore, the anxiety associated with the fear of transmission of COVID-19 to family members should be considered among the causes of the increased stress levels, especially among nurses (28). The ProQol-CF score, indicating PTSD, was highest in the nurses among the HCWs in the present study. Studies have reported various rates of prevalence of PTSD associated with COVID-19, and it has been highlighted that COVID-19 is likely to cause PTSD by causing fear, social isolation and restrictions in communities (7). In the present study, sleep disturbance among nurses was significantly higher than in physicians. Since nurses spend most of their time, and communicate most, with patients and their relatives, they may be exposed to extra pressure, which is likely to contribute to sleep disturbances (24).

Within the ongoing pandemic, the long working hours of HCWs, the prolonged use of personal protective equipment, dehydration and lack of sleep can cause burnout (29). As expected, burnout was found to be higher among nurses, who usually spend longer periods of time with SARS-CoV-2-positive patients (24) than non-medical personnel, who have no direct contact with the virus. This difference in the level of burnout may be attributable to the fact that non-medical personnel have the option of working less and working remotely (30). Zerbini et al. found that nurses working in COVID-19 wards were more psychologically affected by the pandemic than physicians working under the same conditions, which was attributed to the increased workload of nurses and their prolonged contact with COVID-19 patients (31). Despite these negative factors, it was interesting to note that CS was found to be higher among nurses in the present study. The fact that nurses have been working hard and risking their lives for COVID-19 patients for so long may be appreciated by their relatives and society, resulting in enhanced job satisfaction among nurses (32).

According to the linear regression analysis, young age and COVID-19 positivity among family members were independent factors for depression in this study. This finding can be explained by the fact that young people use social media much more effectively, making them more prone to stress and, having a friend or relative infected with COVID-19 was found to be associated with higher levels of stress, depression and anxiety (33,34). In the present study, the female gender was an independent factor for all scales except CS. The prevalence of depression, anxiety, distress is known to be higher in women than in men (9,12,35), and the female gender is in fact the leading contributory factor to PTSD (33,35). Lower education level was another independent factor for depression and anxiety; and working in units with COVID-19 patients was an independent factor for depression, anxiety, disturbed sleep and CF. A high level of education is believed to have a preventive effect on negative moods, based on autosuggestion, having greater access to information about COVID-19, and in the light of scientific data (35). This may explain why

physicians are better able to mentally tolerate the COVID-19 pandemic than other HCWs. PTSD symptoms were more common among the HCWs working in high-risk areas during the SARS outbreak, and negative psychological effects were also detected more in these individuals during the ongoing pandemic (36). Another reason for the higher levels of depression, anxiety, sleep disturbance and PTSD among nurses may be that they spend more time working at the frontline than other HCWs (9,12). People with chronic diseases are more prone to anxiety and insomnia (37). Hence, we found asthma to be associated with sleep disorders. A recent study reported contact with COVID-19 patients to be independently associated with disturbed sleep, and to have the potential to trigger neuropsychiatric symptoms (19), while similarly, contact with SARS-CoV-2 (+) patients was found to be associated with BO in the study. Living alone was identified as an independent factor for PTSD. Most of the nurses included in this study were single, suggesting that they may feel lonely. The understanding that discrimination and loneliness can have negative psychological effects during the current pandemic (34) supports this view.

Limitations

The present study has several limitations. First, the single-center design of the study and the relatively small sample size limit the generalization of the results to Turkey. Second, the cross-sectional design makes it difficult to predict to what extent the mental health parameters and sleep quality of HCWs, who work under great pressure, will change in the long term. Third, the interviews with most of the study participants were not conducted face-to-face, so as to minimize the risk of COVID-19 infection, with the questionnaires being completed online in a self-administered manner. Finally, the socioeconomic levels of the participants, which could affect the study results, were not taken into account.

5. Conclusion

The findings of the present study show that HCWs, and especially nurses, are more affected by the COVID-19 pandemic than the general public in terms of mental health and

sleep quality. The female gender and working in COVID-19 departments in particular were identified as independent factors for most of the study variables. The ongoing COVID-19 pandemic is seeing increased numbers of patients admitted to hospitals, which, in turn, leads to physical and mental exhaustion in HCWs. This prolonged process can lead to despair, and depression, anxiety, disturbed sleep, burnout and PTSD in HCWs. As can be understood from previous outbreaks, the current outbreak will keep HCWs under its influence for a long time, and so measures should be taken to enhance the motivation and morale of these workers, while non-HCWs should support HCWs through empathy. In order to prevent such negative situations, psychological support programs may be planned for HCWs, and especially for those working at the frontline during the COVID-19 pandemic. This will aid them in maintaining a good quality life, in both the near and distant future.

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