Impact of COVID-19 on Sleep, Anxiety, and Depression Among Medical Call Center Staff: Insights from a January 2021 Study

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Background: The COVID-19 outbreak emerged as a dual threat, effecting both the physical and mental well-being of health-care staff. This study aimed to evaluate sleep quality using the Pittsburgh Sleep Quality Index (PSQI), levels of anxiety and depression using the Hospital Anxiety Depression Scale (HADS), and the significant influencing factors during COVID-19 pandemic in 284 workers in a medical call center in January 2021.

Material/Methods: Out of 443 pre-hospital care providers, 284 consented to participate. Data collection was done using an introductory information form, the PSQI for sleep quality, and the HADS for anxiety (HADS-A) and depression (HADS-D). Surveys were hosted on an online survey website and distributed via WhatsApp, with completed forms retrieved from the website.

Results: Male sex (P=0.0001) and extended working hours in current workplace (P=0.017) were associated with higher HADS-A scores. Health problems, increased need for mental support, and poor job satisfaction correlated with lower HADS-D scores (P=0.025, P=0.005, P=0.0001, respectively) and higher PSQI scores (P=0.008, P=0.009, P=0.008, respectively). A moderately significant positive correlation was found between overall sleep quality and HADS-A (P=0.001, r=0.538) and HADS-D scores (P=0.001, r=0.493).

Conclusions: The pandemic significantly impacted the mental health and sleep quality of frontline healthcare personnel, necessitating the identification and mitigation of adverse psychosocial factors. Implementing and evaluating psychoeducational programs and establishing multidisciplinary mental health teams can provide for essential support and counseling, promoting the well-being of healthcare staff and ensuring effective emergency care.

Keywords: Anxiety • COVID-19 • Depression • Sleep Quality • Health Personnel

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Introduction

Caused by severe acute respiratory syndrome coronavirus 2, COVID-19 disease appeared in Wuhan, China, in December 2019 and was declared a pandemic by the World Health Organization in March 2020. By November 2021, as many as 628 million cases were detected worldwide, and the disease claimed the lives of almost 6.5 million people [1].

With the rapidly escalating number of cases of COVID-19 diagnosis, a wide range of measures were adopted to control and contain the further spread of the disease. Among these measures were lockdowns, mandatory wearing of masks, social distancing, regulations to allow working from home, obligatory quarantine practices for those coming from abroad, interruption of face-to-face education, and suspension of social activities such as theater, cinema, concert, and sports [2].

The physical symptoms, including shortness of breath, loss of taste and/or smell, headache, high fever, and others, brought by the pandemic may have also been accompanied by various psychosocial challenges. The most prevalent issues were xenophobia, financial challenges, separation from friends, and being away from loved ones during lockdown, in addition to fears of catching the disease, infecting the loved ones, losing them due to the disease, being stigmatized by society at large, and losing a job. All the aforementioned psychosocial factors coupled with sudden changes in daily routines can lead individuals to develop intense anxiety [3,4].

Individuals could also deny the pandemic and not comply with the precautions and regulations, depending on the psychosocial factors brought about by the disease [3]. Social media content also fueled public anxiety [5]. A study conducted in 2010 suggested that the anti-vaccination movement and negative news about the newly developed vaccines that appeared in the media during the H1N1 epidemic heightened concerns over the issue, deterring healthcare providers from being vaccinated [6]. In addition, the fact that a healthcare provider was also a member of his or her community should not go unnoticed. The burden that came with busy work in the frontline during the pandemic could have extended beyond physical symptoms and been followed by psychosocial effects [7]. Depression along with sleep and anxiety disorders came under close scrutiny in scholarly research focusing on the psychological effects experienced by healthcare staff involved in past epidemics, such as severe acute respiratory syndrome (SARS), Middle East respiratory syndrome, Ebola, and influenza [8]. In the SARS epidemic of 2003, for instance, depression and anxiety scores of healthcare staff working in high-risk zones were observed to be high even after 1 year [9]. In addition, depression rates were higher and sleep quality was lower in nurses working in a SARS unit, compared with that of their counterparts working in non-SARS units [10].

The need for healthcare staff in the COVID-19 pandemic became more prominent than the need for other service groups, as had been the case with previous epidemics such as SARS, Middle East respiratory syndrome, and influenza. A range of factors, such as working in the frontline, increased workload, fear of being infected and infecting relatives, social isolation, and limited access to medical and personal protective equipment, produced not only physical but also social and mental effects [11]. It is also documented that the COVID-19 breakout was responsible for the development of physical, social, and psychological disorders in pre-hospital care providers [12]. In a systematic review referring to the experiences of intensive care unit (ICU) nurses caring for patients with COVID-19, the findings revealed that ensuring the provision of high-quality patient care during the pandemic required a dedicated focus on addressing the psychological needs of and enhancing job satisfaction among ICU nurses [13].

By serving as the initial point of contact with infected and suspected cases, pre-hospital healthcare providers play a pivotal role in delivering care to patients outside the hospital setting. They are also tasked with transporting these patients to hospitals when required. It is thus essential to assess the impact of the COVID-19 pandemic on the sleep quality, anxiety, and depression status of pre-hospital healthcare providers. Understanding these aspects is crucial for ensuring timely and effective medical care, particularly during a pandemic, when the demand for healthcare services is heightened.

This study aimed to evaluate sleep quality and levels of anxiety and depression in 284 workers in a medical call center in January 2021.

In the research, we sought answers to the following questions:
1. What was the status of sleep quality, anxiety, and depression of pre-hospital care providers in the COVID-19 pandemic?
2. What was the status of sleep quality, anxiety, and depression of pre-hospital care providers during the COVID-19 pandemic according to some sociodemographic characteristics?

Material and Methods

Ethics Statement

This study was approved by the University Ethical Committee for Clinical Investigations (date: December 8, 2020; number: 23). Verbal consent was obtained from the pre-hospital care providers who volunteered to participate in the study. The principles outlined in the Declaration of Helsinki were followed.

Study Design

This descriptive and cross-sectional study was conducted from January 1 to 30, 2021, targeting healthcare staff affiliated with the pre-hospital care call center and its associated ambulance services. Of the 443 pre-hospital care providers approached, 284 voluntarily consented to participate in the study.

We intentionally did not create any inclusion criteria, allowing any healthcare staff expressing willingness to participate to be included in the study. However, individuals who took sick leave within the 1-month period following the initiation of the study and declined participation were excluded from the study.

Measurements

Introductory information form: Developed by the researchers to elicit sociodemographic attributes of the pre-hospital care providers, the introductory information form collected the following characteristics: age, sex, marital status, parenthood, education, profession, job satisfaction, physical health status, polymerase chain reaction (PCR) test status, history of mental health, years of work experience, work duration in the current department, and status of encountering, examining, or caring for patients with COVID-19.

Pittsburgh Sleep Quality Index (PSQI): The PSQI was originally developed by Buysse et al, and its adaptation to Turkish was performed by Agargun [14,15]. The Cronbach alpha value of the Turkish version of the PSQI administered in this study was 0.877. Broadly speaking, the PSQI is a 19-item self-rated scale that assesses sleep quality and disturbances over a 1-month time interval. Out of 24 items in total, 19 are rated by the participants themselves, and the last 5 items are rated by their roommates. A total of 18 items of the rated scale are divided into 7 sub-dimensions, including subjective sleep quality, sleep onset latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep medication use, and daytime dysfunction. Each sub-dimension is weighted between 0 (no trouble) and 3 (serious distress). The sum of the scores for the 7 sub-dimensions yields the global PSQI score, which ranges between 0 and 21. A global score of 5 or less is considered good sleep quality, and a score of greater than 5 signifies poor sleep quality [15].

Hospital Anxiety and Depression Scale (HADS): The HADS is a self-report questionnaire that was developed by Zigmond and Snaith to identify levels of anxiety (HADS-A) and depression (HADS-D) [16]. It has 14 items, each of which is scored between 0 and 3. Anxiety and depression are assessed with 7 questions each. The lowest and highest possible scores on each scale are 0 and 21, respectively, with high scores signaling increased anxiety and depression. According to this scale,

adapted into Turkish by Aydemir et al, the cut-off value was specified as 7 for anxiety and 10 for depression in the Turkish population [17].

Data Collection

The research data was collected through 3 tools: the introductory information form, which was designed by the researchers to collect sociodemographic attributes of the participants, the PSQI, which was used to measure sleep quality, and the HADS, which was used to measure anxiety and depression. The survey forms and scales were designed and hosted on a website (https://survey.zohopublic.com). Subsequently, these instruments were disseminated to the entire pre-hospital healthcare staff within our province via the instant messaging application, WhatsApp Messenger, using a website link. Those individuals who willingly volunteered to take part in the study accessed the survey forms and scales through this provided website link. The data collection process involved retrieving the completed forms and scales submitted by the study participants through the designated website.

Statistical Analysis

All statistical analyses were performed using SPSS 25.0 (IBM Corp, Armonk, NY, USA). Continuous variables were defined by the mean±standard deviation and median (minimum-maximum values), and categorical variables were defined by number and percent. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used for determination of normal distribution. The Mann-Whitney U test and Kruskal-Wallis variance analysis (post hoc: Mann-Whitney U test with Bonferroni Correction) were used for comparisons among groups. The Spearman correlation coefficient was used to examine the relationships between continuous variables. Key determinants were identified through the creation of multivariate regression models, wherein the variables reaching statistical significance in univariate analyses were considered. Categorical variables used when creating the models were turned into dummy variables and added to the models. Statistical significance was determined on the basis of $P<0.05$ and a 95% confidence interval (CI).

Results

Analysis of Demographics of Participants

A cohort of 284 participants was recruited for this investigation. Nearly half of the study population fell within the age bracket of 26 to 35 years, and a majority of 158 individuals (55.6%) identified as female. Marriage status revealed that 195 participants (68.7%) were married, while 115 individuals (40.5%) did not have children. A substantial proportion of 225

participants (79.2%) reported no history of mental health is-sues. Notably, pre-hospital care workers, inclusive of paramed-ics, constituted the predominant demographic, representing 80% of the total study population (**Table 1**).

Analysis of Descriptive Characteristics of Participants in Relation to COVID-19

Of the total participants, 261 (91.9%) reported encountering patients presenting symptoms consistent with COVID-19, and, notably, 230 participants (81%) reported having either exam-ined or administered medical care to these patients. In the con-text of diagnostic measures, 190 participants (66.9%) report-ed undergoing a reverse transcription PCR test. Among those tested, 62 participants (21.8%) received a positive diagnosis for COVID-19 (**Table 2**).

Analysis of Mean HADS-A, HADS-D, and PSQI Scores Among Participants

The participants exhibited a mean HADS-A score of 12.11±4.87, with a median of 12, signifying the prevalence of anxiety symp-toms. A considerable proportion or participants, 182 (64.1%), had HADS-A scores at or above 11. The mean HADS-D scores were 13.28±4.66, with a median of 13. An overwhelming ma-jority of participants, 256 (90.1%), had HADS-D scores of 8 and above, highlighting a substantial prevalence of depressive symptoms within the cohort. Furthermore, HADS-A and HADS-D scores surpassed the established cut-off values in the majority of the study population (64.1% and 90.1%, respectively). The mean PSQI score was 8.47±3.06, with a median PSQI value of 8. Alarmingly, 255 participants (89.8%) scored 5 and above on the PSQI, indicating a prevalent incidence of poor sleep quality among the majority of the studied cohort (**Table 3**).

Relationship Between HADS-A, HADS-D, and PSQI Score Averages and Demographics of the Participants

The analysis of mean HADS-A scores across different age groups revealed a noteworthy distinction, specifically be-tween participants aged 26 to 35 years and those aged 36 to 45 years, as well as between those aged 26 to 35 years and 46 years and older (P=0.002). Subsequent analysis showed that pre-hospital care providers aged 46 years and older exhibit-ed the highest scores on the anxiety and depression scales. However, no significant disparity emerged among age groups concerning sleep quality. Accordingly, sex-based analysis re-vealed a significant difference in HADS-A and PSQI scores (P=0.0001, P=0.008, respectively), indicating poorer sleep quality among female participants, while male participants registered higher scores on the anxiety scale. However, no statistically significant sex-based variance was observed in relation to HADS-D scores.

Comparisons according to profession yielded significant differ-ences in HADS-A, HADS-D, and PSQI scores between paramed-ics and pre-hospital care providers, as well as between para-medics and other healthcare personnel (P=0.0001, P=0.001, P=0.003, respectively). Notably, paramedics were the subgroup with the most compromised sleep quality, and a marked dis-tinction was evident between healthcare staff without health issues and those with chronic conditions, across all 3 scales (P<0.05). In the context of mental health analysis, a substantial difference was identified across all 3 scales between health-care staff without prior mental health concerns and those who had experienced mental health issues but failed to re-ceive support (P<0.05).

Considering job satisfaction, the 3 delineated groups (satisfied, partially satisfied, and dissatisfied) exhibited significant dif-ferences in HADS-A and HADS-D scores (P<0.05). Specifically, distinctions were noted in PSQI values between satisfied and partially satisfied participants, as well as between satisfied and dissatisfied participants (P<0.05), although no noticeable difference was observed between the partially satisfied and dissatisfied groups. Regarding the duration of employment in their current department, notable differences in the anxiety scale were evident between those with 1 to 5 years of service and those with more than 18 years, while no clear distinctions were observed for depression and sleep quality.

In the context of COVID-19 diagnosis, no striking differenc-es emerged in terms of HADS-A, HADS-D, and PSQI scores. Analysis of PSQI scores, when considering the role of treating or providing care to a COVID-19 patient, revealed no signifi-cant variations. However, in the examination of HADS-A and HADS-D, significantly lower scores were found among the par-ticipants involved in patient care than in those not engaged in such activities. Assessment of PCR test status demonstrat-ed significantly lower HADS-A and HADS-D scores for the in-dividuals tested, while those without a test yielded higher PSQI scores. Notably, HADS-D scores did not differ significant-ly based on PCR test outcomes. Conversely, the participants with negative PCR test results demonstrated significantly low-er HADS-A scores than those without PCR testing. The PSQI analysis revealed significantly lower scores among those with-out a test than among those with either positive or negative test results (**Table 4**).

Multivariate Regression Analysis Results for HAD-A, HAD-D, and PSQI

Multivariate regression models were constructed with the vari-ables that were statistically significant in univariate analyses that we mentioned in **Table 4**. Accordingly, in **Table 5**, male sex and extended working hours in the current workplace correlat-ed with higher HADS-A scores, whereas the presence of health

Table 1. Demographic characteristics of healthcare staff.

		Number	%
Age (years)	18-25	50	17.6
	26-35	140	49.3
	36-45	74	26.1
	46-55	17	6.0
	56+	3	1.1
Sex	Male	126	44.4
	Female	158	55.6
Marital status	Single	89	31.3
	Married	195	68.7
Parenthood status	None	115	40.5
	1	73	25.7
	2	76	26.8
	3	20	7.0
Profession	Physician	15	5.3
	Paramedic	99	34.9
	Pre-hospital care provider	128	45.1
	Other	42	14.8
Educational status	Secondary school	5	1.8
	High school	42	14.8
	University	233	82.0
	Post-Graduate	4	1.4
Work experience	1-5 years	58	20.4
	6-11 years	130	45.8
	12-17 years	61	21.5
	18-23+ years	35	12.3
Working duration in the current department	1-5 years	174	61.3
	6-11 years	84	29.6
	12-17 years	19	6.7
	18-23+ years	7	2.5
Health problem/chronic disease	None	233	82.0
	Diabetes mellitus	7	2.5
	Hypertension	1	0.4
	Coronary artery disease	1	0.4
	Asthma	4	1.4
	Chronic obstructive pulmonary disease	1	0.4
	Other	37	13.0

Table 1 continued. Demographic characteristics of healthcare staff.

		Number	%
Mental health problem & support	I have had no mental problems	225	79.2
	I had a mental problem but didn't get support	39	13.7
	I have received medication	11	3.9
	I have received medication and psychotherapy	9	3.2
Job satisfaction	Satisfied	124	43.7
	Partly satisfied	132	46.5
	Dissatisfied	28	9.9

Table 2. Descriptive characteristics of healthcare providers in relation to COVID-19.

		n	%
Were you infected with COVID-19?	Yes	261	91.9
	No	23	8.1
Did you treat/provide care to a patient with COVID-19?	Yes	230	81.0
	No	54	19.0
Did you have a PCR test?	Yes	190	66.9
	No	94	33.1
What was your test result?	Positive	62	21.8
	Negative	128	45.1
	No Test	94	33.1

PCR – polymerase chain reaction.

Table 3. Mean HADS and PSQI scores: depression, anxiety, and sleep quality status among healthcare staff.

Scales (n=284)	Mean±SD	Median (min-max)	n (%)
HADS-A (total score)	12.11±4.87	12 (0-21)	284 (%100)
10 and below	6.85±2.57	8 (0-10)	102 (35.9)
11 and above	15.06±3.03	15 (11-21)	182 (64.1)
HADS-D (total)	13.28±4.66	13 (0-21)	284 (%100)
7 and below	4.54±2.2	5 (0-7)	28 (9.9)
8 and above	14.24±3.78	14 (8-21)	256 (90.1)
PSQI (total score)	8.47±3.06	8 (1-18)	284 (%100)
Below 5	3.55±0.83	4 (1-4)	29 (10.2)
5 and above	9.03±2.71	9 (5-18)	255 (89.8)

PSQI – Pittsburgh Sleep Quality Index; HADS – Hospital Anxiety and Depression Scale; HADS-A – Hospital Anxiety and Depression Scale-anxiety subscale; HADS-D – Hospital Anxiety and Depression Scale-depression subscale.

Table 4. Anxiety, depression, and PSQI score averages of healthcare staff by demographic characteristics.

Demographic information	HADS-A		HADS-D		PSQI	
	Mean±SD	Med (min-max)	Mean±SD	Med (min-max)	Mean±SD	Med (min-max)
Age group						
18-25 years (1)	11.64±4.83	12 (0-20)	12.4±4.93	13 (0-21)	8.44±3.04	8.5 (3-15)
26-35 years (2)	11.27±4.76	11 (0-21)	13.01±4.53	13 (0-21)	8.63±3.09	8 (1-18)
36-45 years (3)	13.26±4.85	13.5 (3-21)	13.84±4.81	14 (3-21)	8.27±3.26	8 (1-16)
46+ years (4)	14.95±4.31	15.5 (6-21)	15.3±3.77	15.5 (8-20)	8.2±2.33	8 (4-13)
P value (test value)	0.002* kw=15.104 (2-3. 2-4)		0.104 kw=6.164		0.899 kw=0.59	
Sex						
Male	13.43±4.99	14 (0-21)	13.6±4.73	13 (0-21)	7.92±2.98	8 (1-17)
Female	11.06±4.54	11 (0-21)	13.03±4.61	13 (0-21)	8.91±3.08	9 (3-18)
P value	0.0001* z=-4.023		0.324 z=-0.986		0.008* z=-2.648	
Parenthood status						
None	12.1±4.74	12 (0-21)	13.23±4.61	13 (0-21)	8.15±3.07	8 (1-17)
1 child	11.53±4.47	11 (2-21)	12.6±4.43	12 (0-21)	8.63±2.9	8 (4-15)
2 children	12.38±5.4	13 (0-21)	13.76±4.94	13 (3-21)	8.68±3.25	8.5 (1-18)
3 and more children	13.25±5.09	13 (3-21)	14.25±4.67	13 (8-21)	8.95±3.02	8 (4-14)
P value (test value)	0.473 kw=2.514		0.353 kw=3.26		0.529 kw=2.214	
Profession						
Physician (1)	13.13±4.5	14 (6-21)	13.67±3.56	13 (8-20)	8.8±2.51	9 (4-13)
Paramedic (2)	10.83±5.01	11 (0-21)	12.28±4.76	12 (0-21)	9.04±3.19	9 (3-17)
Pre-hospital staff (3)	11.98±4.34	12 (0-21)	13.2±4.48	13 (0-21)	8.51±3.1	8 (1-18)
Other (4)	15.17±4.99	16 (4-21)	15.74±4.57	16.5 (4-21)	6.9±2.35	7 (1-12)
P value (test value)	0.0001* kw=22.834 (2-4. 3-4)		0.001* kw=15.164 (2-4. 3-4)		0.003* kw=14.269 (2-4. 3-4)	
Health status						
I have no health problems	12.42±4.85	13 (0-21)	13.58±4.61	13 (0-21)	8.21±3.08	8 (1-18)
I have a chronic condition for which I am being treated	10.69±4.81	11 (0-21)	11.9±4.72	12 (1-20)	9.65±2.76	10 (4-16)
P value (test value)	0.018* z=-2.364		0.024* z=-2.264		0.002* z=-3.146	
History of mental health						
I have had no mental problems	12.73±4.82	13 (0-21)	13.91±4.55	14 (0-21)	8.07±3.03	8 (1-17)
I had a mental problem but didn't get support	9.23±3.77	9 (0-15)	10.54±4.45	11 (0-20)	10.1±2.83	10 (6-18)
I have received medication	12.27±4.67	11 (5-20)	13±3.35	12 (10-19)	9.36±2.54	9 (5-13)
I have received medication and psychotherapy	8.89±5.78	9 (0-18)	9.78±4.41	10 (1-15)	10.33±2.65	10 (7-15)
P value (test value)	0.0001* kw=21.28 (1-2)		0.0001* kw=20.715 (1-2)		0.0001* kw=18.863 (1-2)	

Table 4 continued. Anxiety, depression, and PSQI score averages of healthcare staff by demographic characteristics.

Demographic information	HADS-A		HADS-D		PSQI	
	Mean±SD	Med (min-max)	Mean±SD	Med (min-max)	Mean±SD	Med (min-max)
Job satisfaction						
Satisfied	14.35±4.42	15 (1-21)	15.47±3.94	15 (4-21)	7.26±2.77	7 (1-15)
Partly satisfied	10.89±4.16	11 (2-20)	12.21±3.89	12 (2-21)	9.18±2.71	9 (3-16)
Dissatisfied	8±5.33	7 (0-18)	8.64±5.84	8 (0-21)	10.5±3.82	10.5 (1-18)
P value (test value)	0.0001* kw=51.097 (1-2. 1-3. 2-3)		0.0001* kw=56.511 (1-2. 1-3. 2-3)		0.0001* kw=38.105 (1-2. 1-3)	
Years of experience in current department						
1-5 years	11.59±4.97	12 (0-21)	12.99±4.87	13 (0-21)	8.65±3.2	9 (1-18)
6-11 years	12.42±4.75	12 (2-21)	13.44±4.33	13 (4-21)	8.38±2.92	8 (1-16)
12-17 years	13.68±3.74	15 (4-20)	13.79±4.05	14 (7-20)	8±2.56	8 (3-12)
18-23+ years	17.14±3.13	17 (13-21)	17.14±3.39	18 (12-20)	6.43±1.99	6 (4-9)
P value (test value)	0.007* kw=12.013 (1-4)		0.145 kw=5.403		0.217 kw=4.443	
Were you infected with COVID-19?						
Yes	12.15±4.81	12 (0-21)	13.41±4.62	13 (0-21)	8.51±3.04	8 (1-17)
No	11.65±5.65	12 (0-21)	11.87±5.08	11 (4-21)	8.09±3.46	8 (3-18)
P value (test value)	0.754 z=-0.313		0.095 z=-1.669		0.495 z=-0.683	
Did you treat/provide care to a patient with COVID-19?						
Yes	11.78±4.78	12 (0-21)	12.97±4.46	13 (0-21)	8.57±3	8 (1-17)
No	13.54±5.08	14 (0-21)	14.61±5.29	15.5 (0-21)	8.07±3.35	8 (3-18)
P value (test value)	0.013* z=-2.488		0.013* z=-2.495		0.154 z=-1.426	
Did you have a PCR test?						
Yes	11.6±4.66	11.5 (0-21)	12.82±4.68	13 (0-21)	8.91±2.84	9 (1-17)
No	13.15±5.16	13 (0-21)	14.21±4.51	13.5 (2-21)	7.6±3.34	7 (1-18)
P value (test value)	0.01* z=-2.575		0.03* z=-2.169		0.0001* z=-3.801	
What was your test result?						
Positive (1)	11.53±4.91	12 (2-21)	12.56±5.44	13 (0-21)	9.27±2.87	9 (4-17)
Negative (2)	11.63±4.56	11 (0-21)	12.95±4.29	13 (1-21)	8.73±2.82	8 (1-16)
No Test (3)	13.15±5.16	13 (0-21)	14.21±4.51	13.5 (2-21)	7.6±3.34	7 (1-18)
P value (test value)	0.036* kw=6.669 (2-3)		0.094 kw=4.719		0.0001* kw=15.55 (1-3. 2-3)	

* $P<0.05$: statistically significant. kw – Kruskal-Wallis variance analysis; z – Mann-Whitney U test; PSQI – Pittsburgh Sleep Quality Index; HADS-A – Hospital Anxiety and Depression Scale-anxiety subscale; HADS-D – Hospital Anxiety and Depression Scale-depression subscale; PCR – polymerase chain reaction; SD – standard deviation; Med – median; Min – minimum; Max – maximum.

Table 5. Multivariate regression analysis results for HAD-A, HAD-D, and PSQI.

	Std Beta	t	P	95% CI
Model 1: HAD-A				
Age	0.111	1.917	0.056	-0.018-1.346
Sex	0.216	4.289	0.0001*	1.145-3.088
Health status	-0.141	-2.76	0.006*	-3.075--0.515
History of mental health	-0.11	-2.194	0.029*	-1.471--0.079
Job satisfaction	-0.399	-7.796	0.0001*	-3.754--2.24
Years of experience in current department	0.135	2.405	0.017*	0.164-1.642
Did you treat/provide care to a patient with COVID-19?	-0.074	-1.403	0.162	-2.192-0.368
Did you have a PCR test?	-0.055	-1.006	0.316	-1.694-0.548
What was your test result?	-0.017	-0.312	0.755	-1.469-1.067
Model 2: HAD-D				
Health status	-0.117	-2.249	0.025*	-2.668--0.177
History of mental health	-0.149	-2.839	0.005*	-1.69--0.306
Job satisfaction	-0.42	-7.872	0.0001*	-3.764--2.258
Did you treat/provide care to a patient with COVID-19?	-0.089	-1.684	0.093	-2.285-0.178
Did you have a PCR test?	-0.041	-0.776	0.438	-1.441-0.626
Model 3: PSQI				
Sex	-0.155	-2.931	0.004*	-1.603--0.315
Health status	0.143	2.662	0.008*	0.297-1.985
History of mental health	0.143	2.65	0.009*	0.162-1.1
Job satisfaction	0.317	5.824	0.0001*	0.99-2
Did you have a PCR test?	0.109	1.894	0.059	-0.028-1.448
What was your test result?	0.053	0.928	0.354	-0.443-1.233

* $P<0.05$: statistically significant effect. Std Beta: standardized beta coefficient. HAD-A – Hospital Anxiety and Depression-anxiety subscale; HAD-D – Hospital Anxiety and Depression-depression subscale; PCR – polymerase chain reaction.

issues, increased demand for mental support, and reduced levels of job satisfaction resulted in lower HADS-A scores (model 1 R^2: 0.336). Similarly, health problems, an increased need for mental support, and poor job satisfaction were linked to lower HADS-D scores (model 2 R^2: 0,264). In contrast, male sex exhibited a mitigating effect on PSQI scores, while the presence of health issues, heightened demand for mental support, and poor job satisfaction were associated with an increase in PSQI scores (model 3 R^2: 0,228).

Finally, a moderately significant positive correlation was noted between overall sleep quality and HADS-A and HADS-D scores of the participants (P=0.001, r=0.538 and P=0.001, r=0.493, respectively).

Discussion

We discovered a few important findings in our research. First, we found that sleep quality was poor and depression and anxiety were high among the participants. Second, we found that there was a relationship between the sex, health status, mental health status, job satisfaction, and working hours of the individuals and their anxiety scores. We also found that there was a relationship between the health status, mental health status, and job satisfaction of the participants and their depression scores. Finally, we found that there was a relationship between the sex, health status, mental health status, and job satisfaction of the individuals and their sleep quality. In this study, we aimed to investigate the sleep quality,

anxiety, and depression status among pre-hospital care providers during the COVID-19 pandemic, as well as the significant influencing factors.

In our investigation, male healthcare staff exhibited higher susceptibility to anxiety, while female staff demonstrated a tendency toward poorer sleep quality, based on the obtained anxiety scores. Notably, there was no significant sex-related disparity in depression scores, which contrasts with prior studies that reported a more pronounced elevation in depressive and anxious symptoms among female healthcare staff [18-21]. Earlier research has recognized female sex as an independent risk factor for anxiety and depression [22,23]. On the other hand, another study documented that male sex was a significant factor influencing the anxiety levels of healthcare workers, corroborating the findings of our study's multivariate regression analysis [24]. Due to a perception that the prevalence of COVID-19 was higher among men in the early stages of the pandemic, it is estimated that anxiety levels in male healthcare workers in our study were higher for this reason. Inconsistent with our findings, an investigation involving 964 Italian healthcare providers found female sex as a contributing factor to sleep disturbance [25]. Another study on 1306 Chinese frontline healthcare staff found poorer sleep quality in women, confirming the trends identified in our study [26]. That being said, it is crucial to acknowledge counter-arguments challenging the association between sex and anxiety, depression, and sleep quality [27-29]. Our (Turkish) societal structure, characterized by a patriarchal framework, places the primary responsibilities for working life and home economy on men. In certain segments, only male individuals in the family assume the role of the breadwinner. We thus hypothesize that male healthcare providers may have experienced heightened anxiety due to concerns about potential income loss during lockdown in the event of illness, fears of adverse economic and psychosocial effects on their family members in case of death, and apprehensions about infecting and losing loved ones. Conversely, traditional gender roles, where women are often perceived as primarily responsible for household chores and childcare after work, may have contributed to the observed poorer sleep quality among female healthcare than among their male counterparts.

Our analysis according to age group revealed a notable disparity in anxiety scores, particularly evident among participants aged 36 and older, who reported increased anxiety levels. This finding contradicts previous research [21], suggesting a tendency for anxiety to decrease with advancing age, a phenomenon attributed to increased experience and enhanced stress management capabilities in older individuals [12,30]. However, in our study, the relationship between the increase in anxiety level with increasing age may have been due to the fact that COVID-19 can be chronic and fatal, which increases especially with age. In contrast, other investigations presented

varying perspectives. One study observed no significant distinction in sleep disturbance, anxiety, and depression between the general population and healthcare providers aged 36 to 44 years [31]. Conversely, another study noted more frequent sleep complaints among healthcare staff under the age of 30 years [20]. A survey-based study in Shanghai comparing the pre- and post-COVID-19 period among physicians aged 23 to 28 years revealed elevated levels of anxiety, depression, and fear of violence in the post-pandemic era [32]. An Iranian study found depression to be more prevalent between the ages of 41 to 55 years, associating this with factors such as decreased physical strength with advanced age, challenging working conditions, disrupted sleep cycles, and underlying diseases [33]. In line with these diverse findings, we believe that older healthcare staff in our society may experience heightened anxiety due to increasing responsibilities in family care with age, necessitating care for older family members with chronic diseases. Additionally, the surge in chronic diseases associated with aging might be another factor driving elevated anxiety levels.

Published reports indicate that occupational status is more closely associated with sleep quality than anxiety. Sleep problems are reported to be more prevalent among certain occupations, particularly nurses, which is attributed to their increased time spent with patients and frequent communication with patients and their relatives [28,29,34]. Our study also highlighted the direct relationship between sleep disturbances, anxiety, and depression. In the context of the present study, noteworthy differences in anxiety, depression, and sleep quality were identified between pre-hospital care providers and paramedics in ambulatory services, compared with that of other healthcare staff working in hospitals. While anxiety scores in physicians were higher than those in paramedics and pre-hospital care providers, this difference did not reach statistical significance. These findings corroborate the observations of Usul et al, who also reported elevated anxiety levels in pre-hospital care providers and paramedics [21]. The occupational groups primarily engaging with patients in ambulatory services in our country encompass pre-hospital care providers and paramedics. This being the case, anxiety and depression symptoms may have remained relatively lower, and sleep quality better, in these groups than in others, due to the proper use of personal protective equipment, a heightened awareness of pandemic conditions, and the consideration of each new patient as a potential COVID-19 case over the course of the pandemic.

The existing body of literature has demonstrated a correlation between comorbid conditions and sleep quality, anxiety, and depression [31], although research performed thus far has produced mixed results. Some investigations have established a close link between chronic diseases and sleep disturbances and anxiety [25], whereas others have reported associations between chronic disease status and anxiety, rather

than depression [23]. Moreover, the presence of an underlying chronic disease has been identified as an independent risk factor for anxiety and depression [22]. In alignment with these varied findings, our study revealed a noteworthy distinction between individuals without health problems and those with a chronic disease concerning anxiety, depression, and sleep quality. The outcomes of our multivariate regression analysis indicate that the presence of health issues exerted a mitigating effect on anxiety and depression scores. Specifically, the participants without health problems reported increased anxiety, while those with a treated chronic disease had elevated depressive symptoms and poorer sleep quality. On the one hand, the elevated anxiety among healthy individuals may be attributed to the fear of contracting COVID-19. On the other hand, concerns about contagion and potential severity of COVID-19 progression in the presence of existing comorbidities may have caused those with chronic diseases to have greater depression and aggravating sleep quality.

No clear association was observed between the duration of working in the same department and depression or sleep quality. This is consistent with previous research findings, such as those reported by Yildirim et al, who found no significant correlations between parameters including professional title, workplace, working area, and working years with anxiety and depression [23]. In a study based in Italy, it was stated that the year of work experience was not related to the increase in the dimension of emotional exhaustion [35]. As per the findings from our multivariate regression analysis, years of experience within the current department was positively associated with elevated anxiety scores. This contradicts previous assertions suggesting that prolonged tenure in the same department may lead to lower stress levels, attributed to factors such as accumulated work experience, enhanced interpersonal skills, and steady income [12]. These results underscore the complexity of the relationship between work duration and mental health outcomes, suggesting that anxiety may be more influenced by certain factors associated with prolonged tenure, while depression and sleep quality may be influenced by other factors or show more nuanced relationships.

Wang et al [31] reported that a diagnosis of novel coronavirus infection among healthcare providers during the COVID-19 pandemic did not serve as a predictor for sleep quality. Consistent with this observation, our study found no significant disparity in sleep quality between individuals infected with COVID-19 and those without infection. Throughout the pandemic, the pre-hospital care call center experienced a surge in calls due to lockdowns and quarantine measures. Pre-hospital healthcare providers were constantly in the field responding to these calls, leading to irregular sleep patterns, irrespective of their COVID-19 infection status. We thus hypothesize that individuals facing increased work intensity, characterized by irregular

sleep, may have already experienced poor sleep quality regardless of their infection status.

Previous research reported elevated stress levels in healthcare personnel who did not undergo PCR testing [36]. Yet a contrasting study involving 939 healthcare staff during the COVID-19 pandemic documented higher stress levels in healthcare workers who had been subject to PCR testing [37]. Consistent with this observation, Unal et al also noted increased stress levels in pre-hospital care providers who took PCR tests [12]. In our study, we observed higher anxiety and depression levels in individuals without PCR testing, leading us to speculate that the uncertainty regarding the COVID-19 infection status of those who did not undergo PCR testing contributed to elevated stress levels in this group.

The outcomes of our multivariate regression analysis demonstrate that job satisfaction is associated with lower anxiety and depression levels, while concurrently enhancing sleep quality. This aligns with existing literature, whereby several studies have affirmed the correlation between job satisfaction among healthcare staff and reduced stress levels [12]. In a Spanish study, it is mentioned that higher levels of job satisfaction were linked to a better quality of sleep and lower levels of anxiety [38]. Additionally, a study focusing on sleep quality among healthcare providers in a tertiary hospital noted that individuals reporting job dissatisfaction had lower sleep quality [39].

The findings of this article and their discussion should be considered within the framework of certain limitations. Foremost among these limitations is the time constraints imposed by the specified dates of our investigation. The emotional states of healthcare staff may have undergone fluctuations contingent upon the evolving dynamics of the pandemic. In addition, the restricted scope of our participant pool may have limited the broader applicability of our conclusions; therefore, the observed patterns may not be fully representative of the entire population of pre-hospital care providers. Finally, the reliance on self-reports through the use of forms and scales introduces a potential source of bias in our interpretation. The subjective nature of self-reporting may not result in an objective evaluation, introducing an element of subjectivity to the data. Despite these limitations, the insights gained from this study contribute valuable perspectives to the understanding of the mental health and sleep quality dynamics among pre-hospital care providers during the specified time frame.

Conclusions

The pandemic has had significant physiological and psychosocial effects on pre-hospital healthcare providers, making it essential to maintain their psychological well-being and sleep

quality to ensure effective emergency care. Identifying and addressing the factors contributing to adverse psychosocial effects is crucial. Regular psychoeducational programs and psychosocial intervention studies should be implemented and assessed for their efficacy. Additionally, healthcare institutions should establish multidisciplinary mental health teams to provide comprehensive support and professional counseling,

thereby mitigating negative effects and promoting the mental well-being of healthcare staff.

Acknowledgements

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