RESEARCH ARTICLE

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The Prevalence of Anxiety, Depression, Insomnia, and Post-Traumatic Stress Symptoms Among Healthcare Workers After the COVID-19 Vaccinations

ABSTRACT

Objective: The purpose of this study was to determine the frequencies of depression, anxiety, insomnia, and post-traumatic stress disorder (PTSD) symptoms among healthcare workers (HCWs) in Turkey after the COVID-19 vaccinations and to evaluate the associated factors.

Methods: A cross-sectional online survey was conducted in Turkey between November and December 2021. We used a demographic data form, COVID-19 vaccination status, the Patient Health Questionnaire-9, General Anxiety Disorder-7, the Insomnia Severity Index, and the National Stressful Events Survey post-traumatic stress disorder (PTSD) Short Scale.

Results: A total of 1013 HCWs participated in the study. Women constituted 68.5% of the participants, 65.4% were physicians, 32.5% had histories of COVID-19, and 98.0% had received at least one dose of the COVID-19 vaccine. Depressive symptoms were exhibited by 50.3% of the HCWs, while 35.7% exhibited anxiety, 44.6% insomnia, and 12.0% PTSD symptoms. Nurses reported significantly greater depression ($p<0.001$), anxiety ($p<0.001$), insomnia ($p<0.001$), and PTSD ($p<0.001$) symptoms than physicians did. No statistically significant association was determined in terms of the reporting of depression, anxiety, insomnia, and PTSD symptoms and receipt of COVID-19 vaccination.

Conclusions: The prevalence of depression, anxiety, insomnia, and PTSD symptoms among health workers decreased from the beginning of the pandemic, although the prevalence of these symptoms was still high. Nurses exhibited greater depressive, anxiety, insomnia, and PTSD symptoms than physicians. Receipt or non-receipt of vaccination, or the number of doses involved, caused no difference in terms of mental health.

Keywords: COVID-19, Physicians, Nurses, Anxiety, Depression, Insomnia, PTSD.

COVID-19 Aşılamaları Sonrasında Sağlık Çalışanları Arasında Anksiyete, Depresyon, Uykusuzluk ve Travma Sonrası Stres Bozukluğu Semptomlarının Sıklığı

ÖZET

Amaç: Bu çalışmanın amacı, COVID-19 aşılamaları sonrasında Türkiye'deki sağlık çalışanları arasında depresyon, anksiyete, uykusuzluk ve travma sonrası stres bozukluğu (TSSB) semptomlarının sıklığını belirlemek ve ilişkili faktörleri değerlendirmektir.

Yöntem: Kasım ve Aralık 2021 tarihleri arasında Türkiye'de kesitsel bir çevrimiçi anket gerçekleştirilmiştir. Demografik veri formu, COVID-19 aşılama durumu, Hasta Sağlığı Anketi-9, Genel Anksiyete Bozukluğu-7, Uykusuzluk Şiddet İndeksi ve Ulusal Stresli Olaylar Anketi Travma Sonrası Stres Bozukluğu (TSSB) Kısa Ölçeği kullanılmıştır.

Bulgular: Çalışmaya toplam 1013 sağlık çalışanı katılmıştır. Katılımcıların %68,5'ini kadınlar, %65,4'ünü doktorlar, %32,5'ini COVID-19 geçmişi olanlar ve %98,0'ını en az bir doz COVID-19 aşısı olanlar oluşturmuştur. Sağlık çalışanlarının %50,3'ü depresif semptomlar gösterirken, %35,7'si anksiyete, %44,6'sı uykusuzluk ve %12,0'si TSSB semptomları sergilemiştir. Hemşireler doktorlara göre anlamlı derecede daha fazla depresyon ($p<0,001$), anksiyete ($p<0,001$), uykusuzluk ($p<0,001$) ve TSSB ($p<0,001$) semptomları bildirmiştir. Depresyon, anksiyete, uykusuzluk ve TSSB semptomlarının bildirilmesi ile COVID-19 aşısının alınması arasında istatistiksel olarak anlamlı bir ilişki tespit edilmemiştir.

Sonuç: Sağlık çalışanları arasında depresyon, anksiyete, uykusuzluk ve TSSB semptomlarının yaygınlığı pandeminin başlangıcından itibaren azalmakla birlikte, bu semptomların yaygınlığı hala yüksektir. Hemşirelerde depresyon, anksiyete, uykusuzluk ve TSSB semptomları hekimlere göre daha yüksekti. Aşı olup olmama ya da aşı dozu sayısı ruh sağlığı açısından bir fark yaratmamıştır.

Anahtar Kelimeler: COVID-19, Doktorlar, Hemşireler, Anksiyete, Depresyon, Uykusuzluk; PTSD.

INTRODUCTION

During the COVID-19 pandemic, healthcare workers (HCWs) encountered significant stress concerning exposure to the disease, anxiety regarding the transmission of the infection to their families, insufficient personal protective equipment, new shifts, working areas, and difficult decisions concerning the allocation of limited resources. Almost half of the HCWs encounter potentially morally injurious events (1). Working conditions were found to play an important role in COVID-19 deaths, particularly in occupations requiring contact with patients or the public (2). Higher rates of infection, hospitalization, and admission to the intensive care unit were found among HCWs with COVID-19 than those without (3). In one systematic review examining COVID-19 infection and deaths among HCWs in 195 countries, the general infection and mortality rates among HCWs were comparable to those of the general population. Infections were largely observed among women, although deaths occurred primarily among men. COVID-19-related infections occurred mostly in nurses, while deaths occurred mostly in doctors (4).

Effective vaccines or drugs were required in order to reduce COVID-19-related mortality. The first vaccines were applied worldwide by the end of 2020. One study performed at the beginning of the COVID-19 vaccination campaign described the idea that the COVID-19 vaccine would put an end to the pandemic among health workers as an important source of motivation (5). COVID-19 vaccination in Turkey was first administered to HCWs in the high-risk group in January 2021. HCWs began receiving CoronaVac and, subsequently, BioNTech vaccines. Homogenous and heterologous vaccinations are safe and effective (6-9). Although protection against infection and mild disease decreased in the months following vaccination, the effectiveness against severe disease and hospitalization remained high. However, declining immunity and circulation of SARS-CoV-2 variants have revealed the need for booster doses (10-14).

Although nurses exhibited lower levels of anxiety and depression following the COVID-19 vaccination compared to the pre-vaccination period, the COVID-19 vaccine was found to exhibit only a minimal association with nurses' mental health (15). A survey study repeated 12 times between January and July 2021 revealed small but significant associations between COVID-19 vaccination and mental health difficulties in adults. Initially, the non-vaccinated group reported more anxiety symptoms, but over time, anxiety symptoms decreased and became similar in the vaccinated and non-vaccinated groups Similarly, while there was a difference in depressive symptoms at first, there was no difference in depressive symptoms between vaccine and non-vaccine recipients over time (16).

HCWs on the frontline in the fight against the pandemic experienced considerable physical, psychological, and mental exhaustion during this period. The severity of mental health problems among HCWs increased between January and September 2020 (17). The first step in the provision of mental health and effective psychological interventions involves screening the mental health status of at-risk groups. One study performed in Turkey in the early stage of the COVID-19 pandemic reported prevalences of depressive, anxiety, insomnia, and post-traumatic stress disorder (PTSD) symptoms among HCWs of 77.6%, 60.2%, 50.4%, and 76.4%, respectively (18). These rates are considerably higher than those reported in several other studies from across the world (19-22). Limited numbers of studies have evaluated the psychological status of HCWs during this period when problems experienced at the outset of the pandemic decreased, the rate of COVID-19-related deaths decreased, protective measures such as lockdowns were discontinued, and COVID-19 vaccination coverage rates increased significantly. Determining the frequency of psychological problems among HCWs in light of the changing dynamics during the ongoing pandemic in Turkey will be useful in clarifying the long-term support needs of the healthcare workforce. This is because different conditions have emerged in all countries during the pandemic. It will therefore be useful to identify the factors capable of resulting in differences in the psychological status of HCWs in Turkey. For example, although not all HCWs were on the frontline, they enjoyed priority access to the COVID-19 vaccines. It will, therefore, be useful, in terms of the planning of future psychological interventions, to determine whether this priority access resulted in any difference among HCWs in psychological terms. The present study aimed to determine the frequencies of depression, anxiety, insomnia, and PTSD among HCWs in Turkey after the COVID-19 vaccinations and to evaluate the associated factors.

MATERIAL AND METHODS

This cross-sectional study was performed in Turkey between October 15 and November 15, 2021. Approximately 120,000 HCWs are employed in public, university, and private hospitals in Turkey. A minimum sample size of 385 individuals was calculated at 95% reliability, 5% margin of error, and 50% likelihood. HCWs (physicians, nurses, physiotherapists, audiologists, dieticians, language and speech therapists, radiotherapy technicians, anesthesia technicians, medical laboratory technicians, emergency medical technicians, psychologists, and medical secretaries) aged over 18 years and consent to participate were included. Permission for this study was obtained from the Turkish Ministry of Health Scientific

Research Platform. This study was approved by the Ondokuz Mayıs University Clinical Research Ethics Committee (OMUKAEK 2021/473).

The study data were collected using a questionnaire via Google Forms. The questionnaire was sent to e-mail groups via WhatsApp groups. Data were collected using the snowball method, which is generally used for unknown populations. A section at the beginning of the questionnaire provided information concerning the aim of the research, length of the survey, identities of the authors, and confidentiality of the data. Informed consent was obtained online before participants completed the questionnaire. The 'only permit one reply per user' option was selected in order to prevent the same individual from completing it more than once. There were no missing data since every question had to be answered.

The questionnaire contained questions on sociodemographic characteristics (age, sex, marital status, working years, and history of chronic disease), history of COVID-19, death among loved ones due to COVID-19, working on the frontline at any time during the COVID-19 pandemic, COVID-19 vaccination status, the effect of COVID-19 vaccination on mental state, the Patient Health Questionnaire-9, General Anxiety Disorder-7, the Insomnia Severity Index, and the National Stressful Events Survey PTSD Short Scale.

Patient Health Questionnaire-9 (PHQ-9): This questionnaire was used to perform a psychological evaluation of the problems experienced by individuals in the previous 12 weeks and the extent to which they were distressed. This four-point Likert-type scale consisted of nine items. Depression severity was classified as none or minimal (scores of 0-4), mild (scores of 5-9), moderate (score of 10-14), moderately severe (scores of 15-19), or severe (scores of 20-27). The cut-off score was 10. Depression should be investigated and confirmed among individuals scoring 10 or higher (23, 24).

General Anxiety Disorder-7 (GAD-7): This short self-report form was used to evaluate generalized anxiety disorders. It consists of seven items scored on a four-point Likert-type scale. Anxiety severity was categorized as none or minimal (scores of 0-4), mild (scores of 5-9), moderate (scores of 10-14), or severe (scores of 15-21). The cut-off score was 10. Anxiety should be investigated and confirmed in individuals scoring 10 or higher (25, 26).

Insomnia Severity Index (ISI): This short self-report questionnaire was used to evaluate insomnia. It contains seven items scored on a five-point Likert scale. The severity of insomnia was classified as none or minimal (scores of 0-7), mild (scores of 8-14), moderate (scores of 15-21), or severe (scores of 22-28). The cut-off score was 10. Insomnia should be investigated and confirmed in individuals scoring 10 or more (27-29).

National Stressful Events Survey PTSD Short Scale (PTSD-SS): This scale was developed by Kilpatrick et al.. and adapted into Turkish by Evren et al. This scale was employed to evaluate PTSD and measure its severity. It consists of nine items rated on a five-point Likert-type scale. Possible scores range between 0 and 36, with scores of 24 or higher being regarded as significant for PTSD (30, 31).

Statistical Analysis: Data were analyzed using IBM SPSS Statistics version 22 software and expressed as numbers, percentages, means, and standard deviations. Age and working years were categorized according to previous studies (32, 33). The chi-square test was used to compare categorical data. Data were evaluated using normality tests and charts. Non-normally distributed data were compared using the Kruskal-Wallis test. Multivariate logistic regression analysis was also performed. Odds ratios (OR) and 95% confidence intervals (CIs) were presented. Statistical significance was set at $p < 0.05$.

RESULTS

One thousand thirteen HCWs took part in this study. Analysis showed that 60.4% were aged 26-40, 68.5% were women, 68.0 were married, 76.5% had been working for 20 years or less, and 12.5% had a history of chronic disease. In addition, 32.5% of HCWs had histories of COVID-19 infection, 34.8% had lost a loved one to the disease, and 67.8% had worked on the frontline during the COVID-19 pandemic. In addition, 58.7% of HCWs believed that COVID-19 vaccination had a positive impact on health workers' mental states. Ninety-eight percent of HCWs received at least one dose of the COVID-19 vaccine (Table 1).

The analysis showed that 50.3% of the HCWs exhibited symptoms of depression, 35.7% had symptoms of anxiety, 44.6% had insomnia, and 12.0% had PTSD. Depressive symptoms were reported by 63.6% of nurses, 51.8% of allied health professionals (AHPs), and 45.9% of physicians. Physicians reported a lower rate of depressive symptoms than nurses did ($p<0.001$). A higher rate of severe depression was reported by nurses and AHPs ($p<0.001$). The nurses' mean PHQ-9 scores were significantly higher than those of physicians ($p<0.001$). Anxiety symptoms were reported by 45.0% of the nurses, 36.2% of the AHPs, and 32.7% of the physicians. A higher rate of severe anxiety symptoms was reported by physicians compared to nurses ($p<0.006$). A higher rate of anxiety symptoms was reported by nurses and AHPs ($p<0.001$). Nurses registered significantly higher mean GAD-7 scores than physicians ($p<0.001$). Insomnia symptoms were reported by 61.2% of the nurses, 47.5% of the AHPs, and 38.8% of the physicians. Physicians reported a lower rate of insomnia symptoms than nurses ($p<0.001$).

Table 1. Characteristics of the participants (n=1013)

Variables	Categories	n(%)
Age group	≤25 years	95(9.4)
	26-40 years	612(60.4)
	>40 years	306(30.2)
Sex	Male	319(31.5)
	Female	694(68.5)
Marital Status	Unmarried	324(32.0)
	Married	689(68.0)
Occupation	Nurses	209(20.6)
	Allied Health Professions	141(13.9)
	Physicians	663(65.4)
Working years	≤20 years	775(76.5)
	>20 years	238(23.5)
History of chronic disease	No	886(87.5)
	Yes	127(12.5)
History of COVID-19 diagnosis	No	684(67.5)
	Yes	329(32.5)
Having a loved one who died due to COVID-19	No	660(65.2)
	Yes	353(34.8)
Working on the frontline at any time during the COVID pandemic	No	326(32.2)
	Yes	687(67.8)
Believing that COVID-19 vaccination has a positive effect on the mental state of HCWs	No	418(41.3)
	Yes	595(58.7)
Receipt of COVID-19 vaccination	No	20(2.0)
	Yes	993(98.0)
COVID-19 vaccine doses	Not vaccinated	20(2.0)
	1 dose Sinovac	5(0.5)
	1 dose Biontech	10(1.0)
	1 dose Sinovac+1 dose Biontech	4(0.4)
	2 doses Sinovac	70(6.9)
	2 doses Biontech	92(9.1)
	1 dose Sinovac+2 doses Biontech	14(1.4)
	2 doses Sinovac+1 dose Biontech	346(34.2)
	3 doses Sinovac	97(9.6)
	2 doses Sinovac+2 doses Biontech	355(35.0)

A higher rate of severe insomnia symptoms was observed among nurses and AHPs ($p<0.001$). Nurses registered higher mean ISI scores than physicians ($p<0.001$). PTSD symptoms were reported by 18.7% of the nurses, 17.0% of the AHPs, and 8.9% of the physicians. Physicians reported a lower rate of PTSD symptoms than nurses and AHPs ($p<0.001$). Nurses' mean PTSD-SS scores were significantly higher than those of physicians ($p<0.001$) (Table 2).

Higher rates of depressive symptoms were observed among participants aged ≤25 years ($p<0.001$), women ($p<0.001$), unmarried individuals ($p=0.023$), those with ≤ 20 years of working experience ($p=0.019$), and those who thought that COVID-19 vaccination had no positive effect on HCWs' mental state ($p=0.002$). Higher rates of anxiety symptoms were reported among participants aged ≤25 years ($p=0.002$), women ($p=0.002$), those with 20 years' or less working experience ($p=0.02$), and those who had worked on the frontline at any time during the COVID-19 pandemic ($p=0.014$). Higher rates of insomnia symptoms were reported by individuals who had lost a loved one due to COVID-19 ($p=0.01$), those who had worked on the frontline at any time during the COVID-19 pandemic ($p=0.013$), and those who stated that COVID-19 vaccination had no positive impact on HCWs' mental state ($p=0.012$). Finally, higher rates of PTSD symptoms were reported by women ($p=0.030$), individuals with a chronic disease ($p=0.025$), individuals who had lost a loved one due to COVID-19 ($p=0.034$), and those who stated that the COVID-19 vaccination had no positive impact on HCWs' mental state ($p<0.001$). No statistically significant association was found between COVID-19 vaccination and the reporting of depression, anxiety, insomnia, or PTSD symptoms (Table 3).

Table 2. The presence of symptoms and the severity thereof according to PHQ-9, GAD-7, ISI, and PTSD-SS, and a comparison of those scores

			Nurses	AHPs	Physicians	Total	
			n=209	n=141	n=663	n=1013	
Variables	**Categories**	**Cut-off**	**n(%)**	**n(%)**	**n(%)**	**n(%)**	**p**
Depression Symptoms	Absent	<10	76(36.4)	68(48.2)	359(54.1)	503(49.7)	**<0.001***
	Present	≥10	133(63.6)	73(51.8)	304(45.9)	510(50.3)	
Depressive Symptom Severity	Minimal or none	0-4	22(10.5)	27(19.1)	135(20.4)	184(18.2)	**<0.001***
	Mild	5-9	54(25.8)	41(29.1)	224(33.8)	319(31.5)	
	Moderate	10-14	59(28.2)	28(19.9)	163(24.6)	250(24.7)	
	Moderately severe	15-19	37(17.7)	24(17.0)	99(14.9)	160(15.8)	
	Severe	20-27	37(17.7)	21(14.9)	42(6.3)	100(9.9)	
PHQ-9 (Mean±SD)			12.6 ± 6.6^{a}	11.1 ± 7.0^{ab}	9.7 ± 5.9^{b}	10.5 ± 6.3	**<0.001****
Anxiety Symptoms	Absent	<10	115(55.0)	90(63.8)	446(67.3)	651(64.3)	**0.006***
	Present	≥10	94(45.0)	51(36.2)	217(32.7)	362(35.7)	
Anxiety Symptom Severity	Minimal or none	0-4	39(18.7)	34(24.1)	221(33.3)	294(29.0)	**<0.001***
	Mild	5-9	76(36.4)	56(39.7)	225(33.9)	357(35.2)	
	Moderate	10-14	45(21.5)	23(16.3)	145(21.9)	213(21.0)	
	Severe	15-21	49(23.4)	28(19.9)	72(10.9)	149(14.7)	
GAD-7 (Mean±SD)			9.8 ± 6.0^{a}	8.6 ± 5.9^{ab}	7.5 ± 5.4^{b}	8.1 ± 5.7	**<0.001****
Insomnia Symptoms	Absent	<10	81(38.8)	74(52.5)	406(61.2)	561(55.4)	**<0.001***
	Present	≥10	128(61.2)	67(47.5)	257(38.8)	452(44.6)	
Insomnia Symptom Severity	Minimal or none	0-7	63(30.1)	62(44.0)	343(51.7)	468(46.2)	**<0.001***
	Mild	8-14	69(33.0)	43(30.5)	208(31.4)	320(31.6)	
	Moderate	15-21	54(25.8)	23(16.3)	87(13.1)	164(16.2)	
	Severe	22-28	23(11.0)	13(9.2)	25(3.8)	61(6.0)	
ISI (Mean±SD)			12.2 ± 7.1^{a}	9.8 ± 7.4^{b}	8.4 ± 6.4^{b}	9.4 ± 6.8	**<0.001****
PTSD Symptoms	Absent	<24	170(81.3)	117(83.0)	604(91.1)	891(88.0)	**<0.001***
	Present	≥24	39(18.7)	24(17.0)	59(8.9)	122(12.0)	
PTSD-SS (Mean±SD)			14.9 ± 9.1^{a}	13.4 ± 9.3^{a}	10.9 ± 8.4^{b}	12.1 ± 8.8	**<0.001****

[a-b]: a-b: For all variables with the same letter, the difference between the means is not statistically significant.
*Chi-sqaure test, ** Kruskal-Wallis test
AHPs= Allied Health Professionals, SD=standart devaiation, PHQ-9 = Patient Health Questionnaire-9, GAD-7 = General Anxiety Disorder-7, ISI = Insomnia Severity Index, PTSD-SS = Post-Traumatic Stress Disorder Short Scale

Multivariate logistic regression analysis (forward LR) was performed with factors exhibiting significant variation in the univariate analysis. Factors affecting depression symptoms were identified as age, sex, and occupation. The factors affecting the reporting of anxiety symptoms were age, sex, occupation, and having worked on the frontline during the COVID-19 pandemic. The factors affecting the reporting of insomnia symptoms were losing a loved one due to COVID-19 and working on the frontline during the pandemic. Finally, factors affecting the reporting of PTSD symptoms were occupation, presence of chronic disease, and belief that COVID-19 vaccination had no positive effect on HCWs' mental state (Table 4).

DISCUSSION

In this study, in which coverage rates of COVID-19 vaccination among HCWs were high, 50.3% of HCWs exhibited symptoms of depression, 35.7% symptoms of anxiety, 44.6% symptoms of insomnia, and 12.0% symptoms of PTSD. One meta-analysis, including 239 workers from the beginning of the pandemic to March 2021, stated that 33% of HCWs exposed to COVID-19 reported depressive symptoms, 42% anxiety symptoms, 32% PTSD symptoms, and 42% insomnia symptoms (34). Cases of the major depressive disorder increased by 28% and cases of anxiety disorder increased by 26% in 204 countries and regions due to the COVID-19 pandemic. Daily SARS-CoV-2 infection rates and decreased human mobility were found to be associated with an increasing prevalence of major depressive disorder and anxiety disorder (35).

Women were more affected by the epidemic than men, and younger age groups were more affected than the older age group (35, 36).

Table 3. A comparison of depression, anxiety, insomnia, and post-traumatic stress according to the characteristics of the HCWs

Variables	Categories	Depressive Symptoms		p*	Anxiety Symptoms		p*	Insomnia Symptoms		p*	Posttraumatic Stress Symptoms		p*
		Absent	Present		Absent	Present		Absent	Present		Absent	Present	
		n(%)	n(%)		n(%)	n(%)		n(%)	n(%)		n(%)	n(%)	
Age group	≤25 years	30(31.6)	65(68.4)	**<0.001**	50(52.6)	45(47.4)	**0.002**	43(45.3)	52(54.7)	0.067	80(84.2)	15(15.8)	0.179
	26-40 years	297(48.5)	315(51.5)		384(62.7)	228(37.3)		338(55.2)	274(44.8)		534(87.3)	78(12.7)	
	>40 years	176(57.5)	130(42.5)		217(70.9)	89(29.1)		180(58.8)	126(41.2)		277(90.5)	29(9.5)	
Sex	Male	187(58.6)	132(41.4)	**<0.001**	227(71.2)	92(28.8)	**0.002**	189(59.2)	130(40.8)	0.093	291(91.2)	28(8.8)	**0.030**
	Female	316(45.5)	378(54.5)		424(61.1)	270(38.9)		372(53.6)	322(46.4)		600(86.5)	94(13.5)	
Marital Status	Unmarried	144(44.4)	180(55.6)	**0.023**	196(60.5)	128(39.5)	0.086	175(54.0)	149(46.0)	0.548	280(86.4)	44(13.6)	0.303
	Married	359(52.1)	330(47.9)		455(66.0)	234(34.0)		386(56.0)	303(44.0)		611(88.7)	78(11.3)	
Working years	≤20 years	369(47.6)	406(52.4)	**0.019**	483(62.3)	292(37.7)	**0.020**	423(54.6)	352(45.4)	0.356	674(87.0)	101(13.0)	0.081
	>20 years	134(56.3)	104(43.7)		168(70.6)	70(29.4)		138(58.0)	100(42.0)		217(91.2)	21(8.8)	
History of chronic disease	No	446(50.3)	440(49.7)	0.250	577(65.1)	309(34.9)	0.132	502(56.7)	384(43.3)	0.031	787(88.8)	99(11.2)	**0.025**
	Yes	57(44.9)	70(55.1)		74(58.3)	53(41.7)		59(46.5)	68(53.5)		104(81.9)	23(18.1)	
History of COVID-19 diagnosis	No	351(51.3)	333(48.7)	0.127	443(64.8)	241(35.2)	0.631	391(57.2)	293(42.8)	0.100	606(88.6)	78(11.4)	0.367
	Yes	152(46.2)	177(53.8)		208(63.2)	121(36.8)		170(51.7)	159(48.3)		285(86.6)	44(13.4)	
Having a loved one who died due to COVID-19	No	340(51.5)	320(48.5)	0.105	432(65.5)	228(34.5)	0.280	385(58.3)	275(41.7)	**0.010**	591(89.5)	69(10.5)	**0.034**
	Yes	163(46.2)	190(53.8)		219(62.0)	134(38.0)		176(49.9)	177(50.1)		300(85.0)	53(15.0)	
Caring for patients with COVID-19 at any time during the pandemic	No	175(53.7)	151(46.3)	0.077	227(69.6)	99(30.4)	**0.014**	199(61.0)	127(39.0)	**0.013**	293(89.9)	33(10.1)	0.196
	Yes	328(47.7)	359(52.3)		424(61.7)	263(38.3)		362(52.7)	325(47.3)		598(87.0)	89(13.0)	
Believing that COVID-19 vaccination has a positive effect on the mental state of HCWs	No	183(43.8)	235(56.2)	**0.002**	256(61.2)	162(38.8)	0.093	212(50.7)	206(49.3)	**0.012**	348(83.3)	70(16.7)	**<0.001**
	Yes	320(53.8)	275(46.2)		395(66.4)	200(33.6)		349(58.7)	246(41.3)		543(91.3)	52(8.7)	
Receipt of COVID-19 vaccination	No	13(56.5)	10(43.5)	0.505	17(73.9)	6(26.1)	0.329	16(69.6)	7(30.4)	0.166	20(87.0)	3(13.0)	0.751
	Yes	490(49.5)	500(50.5)		634(64.0)	356(36.0)		545(55.1)	445(44.9)		871(88.0)	119(12.0)	

*Chi-square

Table 4. Risk factors for depression, anxiety, insomnia, and post-traumatic stress among HCWs

Variables	Categories	p-value*	aOR (95% CI)
Depressive Symptoms			
Age groups	>40 years		Reference
	≤25 years	**<0.001**	2.553 (1.550-4.206)
	26-40 years	**0.002**	1.564 (1.174-2.085)
Sex	Male		Reference
	Female	**0.015**	1.419 (1.071-1.880)
Occupation	Physicians		Reference
	Nurses	**<0.001**	1.905 (1.353-2.684)
	AHPs	0.273	1.234 (0.848-1.796)
Anxiety Symptoms			
Age groups	>40 years		Reference
	≤25 years	**0.008**	1.927 (1.188-3.123)
	26-40 years	**0.016**	1.463 (1.075-1.991)
Sex	Male		Reference
	Female	**0.030**	1.394 (1.033-1.881)
Occupation	Physicians		Reference
	Nurses	**0.004**	1.664 (1.182-2.342)
	AHPs	0.103	1.414 (0.933-2.145)
Caring for patients with COVID-19 at any time during the pandemic	No		Reference
	Yes	**0.006**	1.547 (1.136-2.106)
Insomnia Symptoms			
Occupation	Physicians		Reference
	Nurses	**<0.001**	2.660 (1.919-3.688)
	AHPs	**0.005**	1.772 (1.190-2.638)
Having a loved one who died due to COVID-19	No		Reference
	Yes	**0.030**	1.343 (1.028-1.754)
Caring for patients with COVID-19 at any time during the pandemic	No		Reference
	Yes	**<0.001**	1.699 (1.265-2.282)
Posttraumatic Stress Symptoms			
Occupation	Physicians		Reference
	Nurses	**0.001**	2.161 (1.399-3.430)
	AHPs	**0.006**	2.080 (1.357-3.928)
History of chronic disease	No		Reference
	Yes	**0.015**	1.881 (1.056-2.962)
Believing that COVID-19 vaccination has a positive effect on the mental state of HCWs	Yes		Reference
	No	**0.001**	1.985 (1.313-2.873)

* multivariate logistic regression
aOR= Adjusted odds ratio, AHPs= Allied Health Professionals

A meta-analysis including studies from China determined a prevalence of insomnia symptoms of 37.0% before April 2020, during the early period of COVID-19, and of 41.8% after April 2020. No significant difference was found in terms of the prevalence of insomnia symptoms between the early and late stages of COVID-19. The prevalence of insomnia symptoms was higher among HCWs, patients with COVID-19, patients with chronic medical disorders, and those with mental disorders (37). In another meta-analysis, the prevalence of sleep problems during the COVID-19 pandemic was 24% in women and 27% in men. Although the highest prevalence was exhibited by COVID-19 patients of both sexes, HCWs, and the general population, no statistically significant differences were observed (38). Similarly, in the present study, insomnia symptoms were greater among women, although no significant gender differences were observed. Insomnia symptoms were significantly greater among nurses, individuals who had lost their loved ones due to COVID-19, and frontline workers. Younger age, female gender, working on the front line, fear or

risk of infection, the nursing profession, existing or previous mental health problems, and a low level of social support have been associated with a risk of sleep disorder and adverse psychological outcomes (39). Similarly, in the present study, anxiety, depression, insomnia, and PTSD symptoms were greater among nurses than physicians. Depression and anxiety were greater in young age and female gender. Anxiety levels were higher among individuals who worked with COVID-19 patients. PTSD symptoms were greater among individuals with chronic disease and those reporting that COVID-19 vaccination had no positive effect on their mental state. A meta-analysis, including cohort studies, reported a rapid increase in mental health problem symptoms at the onset of the pandemic, followed by a significant decrease in March-April 2020, and a subsequent statistically insignificant increase (40). Psychological distress among HCWs during the first wave of COVID-19 increased from March to May 2020, but remained high, at the same level, in August and November 2020, when there was no fluctuation in the pandemic (41). A study investigating the longitudinal effects of exposure among physicians (residents and clinical fellows) to patients tested for COVID-19 on stress, anxiety, depression, and burnout in three surveys conducted during the early phase of the pandemic (April-June 2020) reported that mean stress, anxiety, and burnout decreased by 21%, 25%, and 13%, respectively. However, mean stress, anxiety, and burnout increased in line with the number of patients tested for COVID-19 to whom participants were exposed (42). In another study, the prevalence of PTSD increased from 12.5% in 2019 to 18.0% in April 2020 and 22.0% in May, decreasing to 17.6% in December 2020 (43). A time-dependent decrease was observed in the high PTSD rates in the early period of the pandemic. A study from Turkey performed in the early period of the COVID-19 pandemic reported a prevalence of depression, anxiety, insomnia, and PTSD symptoms among HCWs of 77.6%, 60.2%, 50.4%, and 76.4%, respectively (18). Although the longitudinal effects could not be evaluated in the present study, it may be concluded that despite a decrease compared to the early periods of the pandemic, the symptoms of psychological problems still persist with a high frequency. Similar to the onset of the pandemic, the rate of reporting psychological symptoms was significantly higher among nurses than among physicians. However, it would not be appropriate to account for these rates, which are higher than those in many countries in terms of the pandemic. This is because there are more complex factors, including the increase in violence against HCWs in Turkey in recent years, physician murders, the very high number of cases treated on a daily basis, low salaries, and overseas-bound brain drains. The COVID-19 pandemic has been found to exhibit a deleterious effect on the mental health of individuals with existing psychiatric disorders, although no significant increase in symptom severity was observed compared to pre-pandemic levels (44). Although individuals with depressive, anxiety, or obsessive-compulsive disorder scored higher on the four-symptom scale than individuals without these psychological disorders both before and during the COVID-19 pandemic, they still reported no significant increase in symptoms during the pandemic. Individuals without depression, anxiety, or obsessive-compulsive disorder exhibited a greater increase in symptoms during the COVID-19 pandemic; individuals with the greatest burden on their mental health tended to exhibit a mild decrease in symptoms (45). The pandemic and the methods adopted because of it led to changes in individuals' daily routines, limited social interactions and tensions in families in lockdown together, and to a fear of catching the disease and/or spreading the virus. All of these factors result in adverse psychological outcomes. COVID-19 vaccines represent a source of hope that these processes will end. However, the effect of the COVID-19 vaccination on mental health remains controversial. COVID-19 vaccination has been lined to decreased anxiety and perceived infection, and a lower risk of mortality and hospitalization (46). A study from Bangladesh reported a lower frequency of general health problems, depression, PTSD, insomnia, and isolation symptoms among vaccinated HCWs compared to unvaccinated staff (47). However, COVID-19 vaccination appeared to have no effect on mental health among Japanese workers in the early stages of vaccination. There was no difference between healthcare and non-HCWs (48). Another study reported that while the association between vaccination and psychological distress was more pronounced in the early period of vaccine introduction, this difference subsequently disappeared (16). Although no long-term evaluation was performed in the present study, conducted on days when booster doses were administered, vaccination appeared to make no difference in terms of mental problems. This may be due to the expectation that COVID-19 vaccination would entirely eliminate the disease not having been met, the emergence of complementary vaccine doses, and the ongoing lack of an effective treatment. Additionally, factors such as COVID-19 case numbers, expected to rise in line with increased mobility, uncertainties concerning the protection afforded by the vaccine against COVID-19 mutations, and information pollution may also have prevented potential improvement in mental states.

Limitations: It is particularly important to collect high-quality data regarding the effects of the COVID-19 pandemic on mental health in the entire population and vulnerable groups. However, difficulties in data collection arising from the nature of the pandemic, the desire to access information

quickly by means of online questionnaires, and difficulties in collecting data traditionally from pre- and post-pandemic cohorts make it difficult to draw definitive conclusions concerning mental health (49). This represents a principal limitation of the present study. Due to the nature of survey studies, there is always the possibility of no-response bias. Other limitations can be sampling bias (the sample was not representative of all HCWs in Turkey), social desirability bias, potentially recall bias (severity dependent on the phrasing of questions), and other potential confounders (including the time-specific trajectory of the pandemic and degree of involvement in the workforce). Despite its advantages in terms of cost and productivity, it also has the disadvantage of being a nonrandom sampling technique (50). Finally, the participants did not attend clinical interviews about their mental states and were only evaluated based on their declarations made on the scales.

CONCLUSION

The frequency of depression, anxiety, insomnia, and PTSD symptoms among HCWs decreased compared to the beginning of the pandemic, although the prevalence of these symptoms is still high. Nurses exhibited greater depressive, anxiety, insomnia, and PTSD symptoms than physicians. Being vaccinated or unvaccinated or the number of doses of the vaccine received associated with no significant difference in terms of mental health.

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