

Do anxiety levels and attitudes towards COVID-19 vaccines among healthcare workers change after COVID-19 vaccination?

Hasan Balaban¹, Meltem Demirdağ Çevikkan², Selin Tanyeri Kayahan¹

¹Department of Psychiatry, Turkish Ministry of Health, Yalvaç State Hospital, Isparta, Turkey; ²Department of Otorhinolaryngology, Turkish Ministry of Health, Yalvaç State Hospital, Isparta, Turkey

ABSTRACT

Objectives: The COVID-19 pandemic has significant effects on the mental health of societies and individuals worldwide while especially for healthcare workers these effects pose a higher risk due to occupational exposure. COVID-19 vaccines have been a turning point in the pandemic, however concepts as vaccine hesitancy and anti-vaccination have come into question again. This study aimed to comparatively evaluate the attitudes of healthcare professionals towards the COVID-19 vaccines, their pandemic-related anxiety and phobia levels before and after vaccination.

Methods: In this cross-sectional study, the anxiety levels and attitudes towards COVID-19 vaccines of healthcare professionals working in a state hospital were evaluated by administering Coronavirus Anxiety Scale (CAS), Coronavirus-19 Phobia Scale (CP19-S), and Attitudes Towards COVID-19 Vaccine Scale (ATV-COVID-19) to the participants both in the pre-vaccine (n = 154) and post-vaccine (n = 81) periods. All these scales were previously validated in Turkish population. 44.8% (n = 69) of pre-vaccine sample and 45.7% (n = 37) of post-vaccine sample were female and all participants were Turkish. Participants were questioned about COVID-19 symptoms during each application and kept in touch in terms of side effects.

Results: One hundred fifty-four pre-vaccine and 81 post-vaccine health workers were included in the study. After the vaccination scores of CAS and CP19-S decreased significantly compared to the pre-vaccine period ($p < 0.001$ and $p = 0.005$, respectively); while ATV-COVID-19 scores significantly increased ($p < 0.001$). Participants did not report significant adverse events in the post-vaccine period.

Conclusions: The results of the study in the form of a decrease in anxiety and fear levels and an increase in positive attitudes towards the vaccine after vaccination suggest that vaccination may have a positive effect on the mental health of healthcare workers.

Keywords: COVID-19, vaccination, healthcare workers, anxiety, phobia, vaccine hesitancy

Coronavirus Disease (COVID-19) was first identified in China in December 2019, spread rapidly all over the world and was declared as a pandemic by

the World Health Organization (WHO). COVID-19 is a viral infectious disease that can cause a wide range of symptoms from mild upper respiratory tract disease



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Address for correspondence: Hasan Balaban, MD., Turkish Ministry of Health, Yalvaç State Hospital, Department of Psychiatry, 32400 Yalvaç, Isparta, Turkey. E-mail: hasan32balaban@gmail.com, Phone: +90 246 441 72 80



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info@prusamp.com

symptoms to severe disease findings and respiratory failure, and may result in death for some of the patients [1, 2].

The COVID-19 pandemic significantly affects societies around the world in many ways, especially in mental and physical health. It has been reported in repeated studies that psychiatric symptoms are observed in the general population due to the COVID-19 pandemic, and the frequency of anxiety and depression has increased significantly [3]. It is suggested that the mental symptoms seen due to the pandemic pose a higher risk for some special groups. Health workers are among the leaders of these groups [4]. It has been reported that pandemic-related depression, anxiety and severe stress are common among healthcare workers in the early period of the pandemic [5]. However, in the later stages of the pandemic, the burden of health workers continued, the symptoms of burnout increased and the stress experience became permanent [5-7].

Vaccines developed for COVID-19 infection have set a turning point in the pandemic course. In the last months of 2020, the vaccines with proven protective effectiveness against COVID-19 approved by local authorities and WHO have been made widely available. Therefore decreased severe disease and disease-related mortality rates have become hope for all people [8]. Various studies evaluating the attitudes of healthcare professionals towards vaccination applications reported that positive attitudes are more prominent than the general population [9, 10]. However, no study has been found in the literature to date that directly investigates the effects of vaccination applications on the mental difficulties, anxiety and fear levels of healthcare workers related to COVID-19. In this study, it was aimed to measure and compare the anxiety and fear levels of healthcare workers of a public hospital before and after COVID-19 vaccination, and to investigate the changes in their attitudes towards the vaccine before and after the application.

METHODS

Study Design

This study which has a prospective and cross-sectional design, was carried out with the participation of healthcare professionals working in a state hospital. The study was approved by the University of Suley-

man Demirel University Clinical Research Ethics Committee. The study was conducted in accordance with the Declaration of Helsinki and the principles of Good Clinical Practice. In this context, all participants who agreed to participate in the study were informed in detail about the study and their written consent was obtained on a voluntary basis.

Sampling and Data Collection

The sample of the study consisted of all participants who volunteered to participate in the study, gave informed written consent, and met the inclusion criteria. The criteria for inclusion in the sampling were determined as being 18 years old and over and being a healthcare worker for the evaluations made before the vaccination. For the evaluations made after vaccination, being vaccinated against COVID-19 was added to the previous criteria. Participants who were included in the initial assessment but were not vaccinated were excluded from the study. For the study sampling, all healthcare workers (including medical doctors, nurses, midwives, medical technicians, technical and cleaning staff and administration officers) were invited to join the assessment in the outpatient service unit of psychiatry. Data of the participants was collected with the assessment tools described below before and after COVID-19 vaccination. 154 participants were assessed pre-vaccine but only 81 of them were re-assessed for the second post-vaccine assessment.

The data collection form which includes information about sociodemographic and occupational characteristics, and the Coronavirus Anxiety Scale (CAS), the Attitudes Towards COVID-19 Vaccine Scale (ATV-COVID-19) and the Coronavirus-19 Phobia Scale (C19P-S) were applied before and after the COVID-19 vaccine administration. CAS is a 5-point Likert-type scale consisting of 5 questions and was developed by Silva *et al.* [11] in 2020 to measure the anxiety levels associated with COVID-19. Turkish validity and reliability study of the scale was conducted by Biçer *et al.* and internal consistency (Cronbach's alpha) of the scale in the sample of the study was found 0.832 [12]. ATV-COVID-19 Scale is also a 5-point Likert-type scale consisting of 9 items and examined in two sub-dimensions, positive and negative. It was developed by Geniş *et al.* [13] in 2020 and its validity and reliability study was conducted in the

same year with the internal consistency (Cronbach's alpha) 0.80 reported. C19P-S is a 5-point Likert-type scale consisting of 20 questions, was developed by Arpacı *et al.* [14] to measure the symptoms of COVID-19-related phobia and its internal consistency (Cronbach's alpha) was found 0.926 in Turkish population of study.

Before the application of each questionnaire, the participants were questioned in terms of COVID-19 symptoms (fever, weakness, cough, sore throat, inability to taste and smell, headache, myalgia) and COVID-19 contact history, then were examined if necessary. Accordingly, those who did not suspect COVID-19 were included in the study. Post-vaccine evaluation was conducted at the end of two weeks after the vaccines were applied to the participants. In addition, participants were contacted regarding post-vaccine adverse effects.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS) version 26 was used for statistical analysis. Normality tests were performed with the Shapiro-Wilk test, normally distributed data were shown with mean and standard deviation values, and non-normally distributed data were shown with median and minimum-maximum values accordingly. While the categorical data were expressed as numbers and percentages, the evaluations of the variables before and after vaccination were made with mixed model analysis for repeated measurements. The p value for statistical significance was determined as < 0.05 .

RESULTS

Sociodemographic Characteristics and COVID-19 Related Features

The study sample consisted of 154 healthcare workers in the pre-vaccine period and 81 in the post-vaccine period. Sociodemographic characteristics and COVID-19-related characteristics of the two groups are shown in Table 1 in detail. Accordingly, no statistically significant difference was found between the samples evaluated in the pre- and post-vaccination period in terms of age, gender distribution, marital status and occupational distribution. There was no significant difference between the two samples in terms of rates

of COVID-19 infection, risk of COVID-19 infection, and presence of chronic disease. However, when participants were asked to subjectively evaluate their risk of contracting COVID-19 infection, similar scores were obtained in both groups ($p = 0.944$).

Opinions About COVID-19 Vaccines

In the interviews before and after vaccination, participants were asked whether they had knowledge about COVID-19 vaccines. Accordingly, in the sample evaluated after vaccination, the level of knowledge about COVID-19 vaccines increased statistically significantly ($p < 0.001$) compared to the sample evaluated before vaccination. It has been observed that the rates of concern due to not having enough information about COVID-19 vaccines and the impact of COVID-19 vaccines, concern about short-term and possible long-term side effects of COVID-19 vaccines, and opinion about the ineffectiveness of COVID-19 vaccines have decreased significantly. It was determined that the reports of indecision about the administration of COVID-19 vaccines to children decreased significantly in the post-vaccination period. Findings related to this are detailed in Table 2.

CAS, CP 19-S ve ATV-COVID-19 Scale Points Before and After Vaccination

The scores of the ATV-COVID-19, CP19-S and CAS before and after vaccination are shown in detail in Table 3. Accordingly, a statistically significant decrease was observed in CP 19-S and CAS scores in the post-vaccine period ($p = 0.005$, $p < 0.001$, respectively), while a significant increase was found in the ATV-COVID-19 score ($p < 0.001$).

CAS, CP 19-S ve ATV-COVID-19 Scale Scores in Subgroups Before and After Vaccination

In the sample of healthcare professionals, the scores of the CAS, CP 19-S and ATV-COVID-19 scales applied in the pre-vaccine and post-vaccine periods were compared due to occupational subgroups. Accordingly, the scale scores did not show a significant difference between the subgroups. However, a significant decrease was found in ATV-COVID-19 scores in each occupational group in the post-vaccine period compared to the pre-vaccine period (Table 4).

While it was determined that the scale scores did not show a significant difference in the comparison

Table 1. Distribution of sociodemographic characteristics and COVID-19 related features in pre- and post-vaccine groups

	Pre-Vaccine	Post-Vaccine	<i>p</i> value
Age (years) (Mean ± SD)	37.9 ± 10.7	38.6 ± 10.1	0.590
Gender, n (%)			
Male	85 (55.2)	44 (54.3)	0.909
Female	69 (44.8)	37 (45.7)	
Marital Status, n (%)			
Married	106 (68.8)	60 (74.1)	0.411
Single	48 (31.2)	21 (25.9)	
Occupation, n (%)			
Medical doctor	14 (9.1)	8 (9.9)	0.169
Midwife	6 (3.9)	1 (1.2)	
Nurse	49 (31.8)	30 (37.0)	
Medical technician	12 (7.8)	10 (12.3)	
IT officer	17 (11.0)	10 (12.3)	
Technical staff	4 (2.6)	5 (6.2)	
Cleaning staff	24 (15.6)	9 (11.1)	
Administration officer	12 (7.8)	4 (4.9)	
Other	16 (10.4)	4 (4.9)	
Workplace unit, n (%)			
Emergency room	45 (29.2)	12 (15.0)	0.150
Outpatient clinic	28 (18.2)	16 (19.8)	
COVID-19 (-) inpatient clinic	10 (6.5)	2 (2.5)	
COVID-19 (+) inpatient clinic	19 (12.3)	16 (19.8)	
Administrative office	19 (12.3)	9 (11.1)	
Diet Outpatient clinic	3 (1.9)	2 (2.5)	
Other	30 (19.5)	24 (29.6)	
COVID-19 infection history, n (%)			
Yes	13 (8.4)	9 (11.1)	0.516
No	141 (91.6)	72 (88.9)	
COVID-19 infection history in family, n (%)			
Yes	13 (8.4)	11 (13.6)	0.101
No	141 (91.6)	70 (86.4)	
Risk group for COVID-19 infection, n (%)			
Yes	30 (19.5)	17 (21.0)	0.415
No	100 (64.9)	56 (69.1)	
N/A	24 (15.6)	8 (9.9)	
Chronic disease, n (%)			
Yes	21 (13.6)	12 (14.8)	0.990
No	133 (86.4)	69 (85.2)	
Subjective COVID-19 Risk Assessment (%)	50 (0-100)	50 (0-100)	0.944

IT = Information Technology

Table 2. Opinions about COVID-19 vaccines before and after vaccination

	Pre-Vaccine	Post-Vaccine	p value
Knowledge about COVID-19 vaccines, n (%)			
Absolutely yes	18 (11.7)	18 (22.2)	< 0.001
Yes	44 (28.6)	33 (40.7)	
Partially	57 (37.0)	2 (2.5)	
Very little	26 (16.9)	21 (25.9)	
No	9 (5.8)	5 (6.2)	
Information source, n (%)			
News	110 (71.4)	60 (74.1)	0.657
Social media	85 (55.2)	44 (54.3)	0.899
Ministry of Health	120 (77.9)	68 (84.0)	0.756
Scientific articles	39 (25.3)	18 (22.2)	0.632
WHO declarations	35 (22.7)	26 (32.1)	0.079
"I am worried because I am not informed enough about COVID-19 vaccines", n (%)			
Yes	90 (58.4)	14 (17.3)	< 0.001
No	64 (41.6)	67 (82.7)	
"I am worried about the short-term side effects of COVID-19 vaccines", n (%)			
Yes	99 (64.3)	19 (23.5)	< 0.001
No	55 (35.7)	62 (76.5)	
"I am worried about possible long-term effects of COVID-19 vaccines", n (%)			
Yes	112 (72.7)	42 (51.9)	0.001
No	42 (27.3)	39 (48.1)	
"I don't think that COVID-19 vaccines will be effective", n (%)			
Yes	61 (40.1)	23 (28.4)	0.015
No	91 (59.9)	58 (71.6)	
"I didn't have a COVID-19 vaccine for myself or for my children due to my anti-vaccination opinions", n (%)			
Yes	7 (4.6)	3 (3.7)	0.726
No	145 (95.4)	78 (96.3)	
"I am thinking about having a COVID-19 vaccine", n (%)			
Yes	96 (62.3)	76 (93.8)	< 0.001
No	12 (7.8)	-	
Not decided	46 (29.9)	5 (6.2)	
"I would consider having my children vaccinated against COVID-19 if applicable", n (%)			
Yes	48 (31.2)	45 (71.4)	< 0.001
No	18 (11.7)	4 (6.3)	
Not decided	44 (28.6)	14 (22.2)	
No children	44 (28.6)	-	

WHO = World Health Organization

Table 3. Scores of ATV-COVID-19, CP19-S and CAS before and after vaccination

	Pre-Vaccine	Post-Vaccine	p value
ATV-COVID-19 (MeanPoints ± SD)	31.2 ± 7	35.5 ± 6.2	< 0.001*
CP19-S (MeanPoints ± SD)	50.5 ± 14.8	44.9 ± 12.8	0.005*
CAS (MedianPoint)	1 (0-18)	0 (0-8)	< 0.001*

ATV-COVID-19 = Attitudes Towards COVID-19 Vaccine Scale, CP19-S = Coronavirus-19 Phobia Scale, CAS = Coronavirus Anxiety Scale

between the subgroups formed according to the units participants work in, the ATV-COVID-19 scores were found to decrease significantly in the post-vaccine period compared to the pre-vaccine period in the individuals working in the inpatient units and polyclinic services (Table 4).

ATV-COVID-19: Attitudes Towards COVID-19 Vaccine Scale

In the post-vaccine period compared to the pre-vaccine period, CP 19-S scale scores were statistically significantly decreased in the subgroup working in inpatient clinics serving COVID-19 negative patients (p = 0.034). Similarly, CP 19-S scores were found to de-

crease significantly in the post-vaccine period in people without a history of being infected with COVID-19 (p = 0.012). No significant difference was found in the intergroup evaluations made according to occupational groups and workplace units in the pre-vaccine and post-vaccination periods in CAS scores (Table 5).

DISCUSSION

The aim of this study is to determine the attitudes of healthcare workers of a public hospital who had the CoronaVac vaccine produced by Sinovac company for COVID-19 towards the COVID-19 vaccine, their anx-

Table 4. ATV-COVID-19 scores in subgroups

ATV-COVID-19 Scores	Pre-Vaccine		Post-Vaccine		p value	Δp
	n	Mean ± SD	n	Mean ± SD		
Occupation						
Medical doctor	14	33.9 ± 7.9	8	40.3 ± 3.2	0.038	0.980
Nurse/midwife	55	29.7 ± 6.5	31	34.5 ± 6.5	0.002	
Medical technician	12	29.2 ± 3.1	10	36.9 ± 4.4	< 0.001	
Cleaning staff	24	31.5 ± 6.5	9	35.8 ± 5.7	0.045	
Other	49	30.8 ± 7.6	23	34.7 ± 6.8	0.040	
Workplace unit						
Emergency room	45	29.9 ± 6.8	12	31.3 ± 6.2	0.513	0.403
Outpatient clinic	28	32.1 ± 7.8	16	37.1 ± 5.0	0.020	
COVID (-) inpatient clinic	10	30.1 ± 5.3	2	36.0 ± 1.4	< 0.001	
COVID (+) inpatient clinic	19	30.1 ± 5.7	16	35.8 ± 4.9	0.011	
Administrative office	19	31.6 ± 9.5	9	34.4 ± 6.3	0.928	
Other	30	32.7 ± 6.1	24	36.5 ± 7.2	0.104	
COVID-19 infection history						
Yes	13	31.5 ± 5.6	9	33 ± 4.1	0.471	0.483
No	141	31.1 ± 7.1	72	35.9 ± 6.3	0.999	

xiety and fear levels towards the COVID-19 pandemic in the pre- and post-vaccination periods and whether those changed in between these periods.

When the literature on the subject was examined, no other study has been found which assessed the differences between the attitudes towards the vaccine and the pandemic, and the psychological impact among healthcare workers before and after vaccination, therefore our study is the first in this field.

During the COVID-19 pandemic, mental health problems are quite common among healthcare workers. In a recent meta-analysis related to this issue; it was stated that depression, anxiety and post-traumatic stress symptoms were reported in one out of every four healthcare workers during the COVID-19 pandemic period, while one out of every three healthcare workers had a COVID-19 phobia and nearly half had insomnia [15]. In the same study the risk factors for anxiety were examined; fear of being infected with COVID-19, poor health and presence of organic diseases, female gender, presence of frontline and high-risk contact with COVID-19, and characteristics

associated with rural life were described as risk factors [15]. However, it has been reported that high levels of anxiety occurring in the early phase of the pandemic can be considered as an adaptive defense response to potentially threatening events, but chronic or disproportionate anxiety can become harmful and cause the development of various psychiatric disorders [16]. In a study investigating the reasons why mental health problems are much more common in healthcare workers during the COVID-19 pandemic; it has been reported that the ever-increasing number of confirmed and suspected cases, excessive workload, depletion of personal protective equipment, widespread media coverage of the current situation, lack of specific drugs and feelings of inadequate support were important [17]. It has been reported that mental health problems seen in healthcare professionals do not only affect themselves individually, but may be associated with a decrease in the quality of patient care and an increase in medical errors [18]. High-risk contact with patients diagnosed with COVID-19, especially in frontline and risky positions such as the emergency room and inten-

Table 5. CP19 scores in subgroups

CP19 Scores	Pre-Vaccine		Post-Vaccine		p value	Δp
	n	Mean ± SD	n	Mean ± SD		
Occupation						
Medical doctor	14	47.1 ± 9.6	8	46.4 ± 8.7	0.990	0.135
Nurse/midwife	55	47.9 ± 13.7	31	44.1 ± 15.6	0.760	
Medical technician	12	48.8 ± 16.5	10	40.6 ± 8.4	0.186	
Cleaning staff	24	58.0 ± 14.2	9	49.7 ± 8.5	0.106	
Other	49	51.3 ± 16.1	23	45.7 ± 12.8	0.138	
Workplace Unit						
Emergency room	45	48.2 ± 14.6	12	40.7 ± 13.0	0.999	0.121
Outpatient clinic	28	52.7 ± 12.6	16	49.6 ± 11.0	0.428	
COVID (-) inpatient clinic	10	58.5 ± 18.0	2	38.0 ± 17.0	0.034	
COVID (+) inpatient clinic	19	48.7 ± 15.9	16	48.3 ± 14.9	0.955	
Administrative office	19	47.5 ± 12.3	9	39.9 ± 8.2	0.085	
Other	30	52.4 ± 16.4	24	46.1 ± 11.6	0.104	
COVID-19 Infection History						
Yes	13	50.4 ± 14.5	9	41.9 ± 9.8	0.077	0.801
No	141	50.6 ± 14.8	72	45.3 ± 13.1	0.012	

CP19-S = Coronavirus-19 Phobia Scale

sive care unit, was associated with moderate to severe anxiety and depression rates [19]. A study conducted among healthcare professionals working in hospitals showed that healthcare professionals experience mental symptoms at a higher rate than administrative personnel [20]. In our study, persons working in each unit of a state hospital were included. In this context, a statistically significant comparison could not be made between high-risk or low-risk groups due to the number of participants.

It has been reported in studies with large samples that vaccine applications reduce anxiety and depression levels, which are seen with increased frequency in the general population [21]. Various studies evaluating the attitudes of healthcare professionals towards vaccination applications reported that positive attitudes are more prominent than the general population [9, 10]. Among the studies in which healthcare workers were evaluated in this respect, Haddaden *et al.* [22] reported that vaccination against COVID-19 resulted with increased well-being both physical and mental in their sample of 300 healthcare workers. In another study investigating the subjective feelings of healthcare workers after vaccination, it was stated that hope and positive feelings about the end of the pandemic increased after vaccination [23]. In a study that included 524 healthcare workers working in COVID-19 pandemic hospitals, it was determined that the majority of the participants had a good perception and positive attitudes towards the vaccine [24]. Turan *et al.* [25], in their study to examine the relationship between coronaphobia and attitudes towards the COVID-19 vaccine in the society, determined that the participants had moderate COVID-19 phobia and positive attitudes towards the vaccine; and as the COVID-19 phobia increased, positive attitudes towards the vaccine also increased.

In the literature, only one study was found that investigated the differences between the psychological symptoms seen in healthcare workers before and after vaccination. In this comprehensive study conducted in Turkey, it was reported that, in a sample of 475 dentists, anxiety and fear levels decreased significantly after vaccination, while the frequency of interventional dentistry applications increased [26]. Similarly, in our study, when the scales applied to health workers to examine mental symptoms in the pre- and post-vaccine period were examined, it was seen that the scores

of the Attitudes towards COVID-19 Vaccine Scale significantly increased, while the CAS and C19P-S scores decreased significantly in the post-vaccine period. Considering that healthcare professionals can comprehend the questions asked in the scales more easily, due to the content of the education they received and the hospital environment, and that they can easily rate the symptoms they have or do not have, it can be thought that the confidence in the scale scores will be higher.

Vaccines are among the most effective practices in reducing the spread of COVID-19 infection and preventing disease-related deaths [27]. In addition, it is reported that attitudes such as vaccine hesitancy and vaccine rejection due to doubts about vaccine side effects and efficacy are also detected at a significant rate worldwide [28, 29]. It is stated that these attitudes pose a significant risk to global health, and the importance of informing the society in the light of scientific data and thus increasing the confidence in vaccine applications is emphasized [30]. Vaccine hesitancy, one of the barriers to vaccination, was recognized by WHO as one of the top ten threats to global health in 2019 [31]. These indecisions have been exacerbated by COVID-19. On the other hand, there is also a study showing that vaccine acceptance is higher in people with high subjective anxiety, fear and individual risk perception [32].

Attitudes such as vaccine hesitancy and vaccine rejection can also be seen in healthcare workers who are at the forefront in the fight against COVID-19 [28-30, 33]. Opponents of vaccines are very difficult to convince. However, people with vaccine hesitancy are not anti-vaccine and do not get vaccinated due to various hesitations. The most effective method in convincing people with vaccine hesitancy is to eliminate their hesitations in the light of scientific studies. Therefore, it is important to combat misinformation and create interventional educational campaigns that target populations at risk of hesitation. It has been reported that the attitudes of healthcare professionals towards the COVID-19 vaccine and vaccination recommendations will affect the vaccination decision of the public and make it easier for them to be vaccinated [28, 34]. Therefore, sharing the results obtained in our study in such educational campaigns will be beneficial in eliminating negative perceptions about the vaccine.

In a study by Akarsu *et al.* [35], "fearing the side effects of the vaccine" and "not thinking that it will be reliable because there it is a new vaccine" were reported as the most frequent reasons related to indecision and rejection for the COVID-19 vaccine. In our study, post-vaccine symptom check was also performed, but there were no reports of vaccine-related side effects, except for mild fatigue. Fewer short-term vaccine-related side effects are consistent with increased positive attitudes towards the vaccine and decreased fear and anxiety.

In a systematic review by Li *et al.* [36], it was reported that the most common concern about vaccination among healthcare professionals and the most important cause of vaccine hesitancy is mistrust of the vaccine. Concerns about vaccine safety is mostly related to especially long-term potential side effects, rapid production and administration of COVID-19 vaccines with an Emergency Use Authorization, doubts about its effectiveness, mistrust of governments and regulatory authorities, lack of information [36]. One of the reasons for the decrease in participation after vaccination compared to pre-vaccine period in our study may be that some of the participants thought of clarifying their vaccination decisions accordingly, after seeing whether there would be a negative experience related to the vaccination among volunteers.

In a systematic review by Hajure *et al.* [37], psychological factors such as fear of COVID-19, fear of transmitting the disease to relatives, presence of depressive symptoms in the last week, high risk of infection, lack of fear about vaccine safety and the government's intention to vaccinate all citizens in means of mandatory pressure have been reported as to positively affect the adoption of the vaccine among healthcare professionals. Again, among healthcare workers, it has been shown that those who have a chronic illness, who perceive themselves at risk of infection with COVID-19, who have a higher education and income level, and who directly care for COVID-19 patients are more likely to be vaccinated [38].

Limitations

Our study has some limitations. First of all, since the first vaccine to be implemented in Turkey is CoronaVac, only attitudes about this vaccine have been evaluated. It is thought that there may be different attitudes towards different vaccines, and the rates of

confidence in the vaccine may change. In this context, it can be argued that with the introduction of different vaccines in the future, attitudes towards vaccines, levels of anxiety and fear can be compared, whether there is a difference between vaccines in this sense or not. However, the finding of increased positive attitudes towards the vaccine in our study may contribute to the sympathy of the vaccines that will come or be produced in our country in the future and to increase the vaccination rates. Secondly, it is seen that the number of volunteer participants in our study decreased in the post-vaccine period compared to the pre-vaccine period. It can be argued that this may be due to reasons such as vaccine hesitancy, abandonment of volunteering, the length of the questionnaires, and the inability to reach volunteers sufficiently due to flexible working practices. On the other hand, the inclusion of only healthcare workers who have not had a previous COVID-19 infection in the study sample may create a limitation in terms of generalizability. Finally, in our study, a comparison between health workers according to occupational subgroups could not be made due to the inadequacy of the number of participants within the groups. In the future, it may be recommended to conduct studies and comparisons on attitudes towards vaccines and anxiety levels in samples created by the researchers according to occupational groups among health workers. Considering that only healthcare professionals were evaluated in our study, the repetition of similar studies for other high-risk groups, such as people with chronic mental illness, may highlight the importance of extending the application of vaccination to all parts of the world and to all segments of society during the pandemic process.

CONCLUSION

The mental symptoms seen during the COVID-19 pandemic process pose a higher risk for some special groups, and healthcare workers are the leading of these groups. All of the participants in this study were selected from health professionals; the results of the study in the form of a decrease in anxiety and fear levels and an increase in positive attitudes towards the vaccine after vaccination suggest that vaccination may have a positive effect on the mental health of healthcare workers. Based on this and the results of possible

future research, practices and educational campaigns will positively affect the society's perspective on vaccines, helping to increase vaccination rates, ensure community immunity as soon as possible, and thus ensure the success of the effective fight against the pandemic.

Authors' Contribution

Study Conception: HB, MDC; Study Design: HB, MDC; Supervision: HB, MDC; Funding: HB, MDC; Materials: HB, MDC; Data Collection and/or Processing: HB, MDC, STK; Statistical Analysis and/or Data Interpretation: HB, MDC, STK; Literature Review: HB, MDC, STK; Manuscript Preparation: HB, MDC, STK and Critical Review: HB, MDC, STK.

Conflict of interest

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