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Investigation of Attitudes Toward COVID-19 Phobia and COVID-19 Vaccine in Healthcare Professionals in Türkiye

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What is already known on this topic?

- *Healthcare professionals experienced increased COVID-19-related psychological distress during the pandemic.*
- *COVID-19 vaccine attitudes are influenced by demographic, occupational, and health-related factors.*
- *Evidence on the relationship between COVID-19 phobia and vaccine attitudes is limited*

What this study adds on this topic?

- *This study identifies factors associated with both COVID-19 phobia and vaccine attitudes among healthcare professionals.*
- *COVID-19 phobia was higher among professionals with greater pandemic-related exposure and chronic diseases.*
- *The findings support targeted psychological support and vaccination communication strategies for future public health emergencies.*

Abstract

Objective: This study aimed to examine COVID-19 phobia and attitudes toward the COVID-19 vaccine among healthcare professionals.

Methods: This descriptive cross-sectional study was conducted between January and March 2021. Ethical approval and Ministry of Health permissions were obtained before the study commenced. A total of 4029 healthcare professionals from 80 different cities across Türkiye participated. Data were collected using the Participant Information Form, the COVID-19 Phobia Scale, and the Attitudes Toward the COVID-19 Vaccine Scale.

Results: Of the participants, 82.2% were female, 68.4% were married, and 57% were nurses. COVID-19 phobia was higher among participants with chronic diseases, those working in pandemic hospitals, those caring for COVID-19 patients, those who experienced loss of an acquaintance/relative due to COVID-19, married participants, and those with children. Vaccine attitudes were more positive among married participants, those with children, those with chronic diseases, and those with higher income, whereas more negative attitudes were observed among females and those working in pandemic hospitals.

Conclusion: The findings indicate that COVID-19-related experiences may be associated with both phobia levels and vaccination attitudes among healthcare professionals. Psychological preparedness and supportive interventions may help healthcare professionals better cope with future pandemics.

Keywords: COVID-19, health professionals, pandemic, phobia, vaccine

Introduction

The COVID-19 pandemic began in Wuhan, China, in late 2019 and rapidly spread worldwide, becoming a global public health crisis.[1] A total of 778 million cases were reported globally to the World Health Organization over a 5-year period, and approximately 7.1 million deaths occurred worldwide.[2] In Türkiye, the first case was reported in March 2020, and there have been 101 419 deaths to date.[3] The pandemic has had significant impacts not only on physical health but also on psychological, social, and economic well-being.[2,4]

Healthcare workers have faced unprecedented stress, uncertainty, and complex decision-making processes due to the challenges brought by the pandemic.[5,6] These conditions have adversely affected their psychological health at both personal and professional levels.[7-10] Previous outbreaks have shown that healthcare workers may experience stress, trauma, and sleep disorders.[10,11] Direct contact with infected patients, fear of infection, concern about transmitting the virus to family members, social isolation, increased workload, and insufficient resources have further intensified the

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psychological burden on healthcare professionals.[5-9,12] Naushad et al[13] also reported that lack of social support, insufficient education, and limited communication skills may increase the risk of mental health problems among healthcare workers during disasters and public health emergencies.

Vaccination is one of the most effective methods for preventing infectious diseases; however, vaccine hesitancy and underutilization remain important concerns, even among healthcare workers who are at high occupational risk.[14-16] Although vaccination rates in Türkiye were over 95% in 2007, a worrying trend of vaccine refusal emerged after 2010.[14,17] This is a significant concern, as the attitudes of healthcare workers can greatly influence social vaccine acceptance, and their concerns and refusals can have a negative impact.[14,18] Therefore, understanding healthcare professionals' vaccine-related attitudes is critical for planning effective communication strategies, strengthening trust in vaccination, and improving preparedness for future pandemics.

COVID-19 phobia and vaccine attitudes are closely related to healthcare workers' risk perception, professional exposure, and experiences during the pandemic. Healthcare professionals who directly cared for infected patients or worked in pandemic hospitals may have experienced higher levels of fear and psychological distress. At the same time, their attitudes toward vaccination may have been shaped by multiple factors, including perceived disease severity, trust in vaccines, concerns about side effects, previous vaccination behavior, professional knowledge, and exposure to pandemic-related uncertainty.[5-9] For this reason, vaccine attitudes should not be considered only as acceptance or refusal, but rather as a multidimensional response that may include both positive and negative evaluations.

Although previous studies have examined the psychological effects of COVID-19 among healthcare workers and vaccine hesitancy separately, limited evidence is available on the combined evaluation of COVID-19 phobia and vaccine attitudes among healthcare professionals, particularly in large samples including different occupational groups and regions. Such an evaluation may provide a broader understanding of the psychological and behavioral responses of healthcare workers during large-scale health crises. This is important because psychological distress among healthcare workers during the COVID-19 pandemic has been associated with increased occupational burden and reduced well-being, while vaccine attitudes among healthcare workers may influence both their own vaccination behavior and public confidence in vaccination.[5-14,18]

Therefore, this study aimed to examine COVID-19 phobia and attitudes toward the COVID-19 vaccine among healthcare professionals in Türkiye. By including a large sample of healthcare workers from different regions of the country, this study contributes to the understanding of how pandemic-related psychological responses and vaccine attitudes coexist among healthcare professionals. The findings may help inform future strategies for psychological support, risk communication, and vaccination planning in health systems.

Methods

Study Design

This study was designed as a descriptive cross-sectional study.

Date of the Study

The study was conducted between January and March 30, 2021.

The Study Universe and Sample

The target population of the study consisted of healthcare professionals working in the health sector in Türkiye. The sample included 4029 healthcare professionals aged 18-65 years from 80 different cities. Data were collected through an online survey distributed to healthcare professionals using a non-probability convenience and voluntary response sampling method. Participants who agreed to participate completed the questionnaire electronically.

Data were collected using a non-probability convenience and voluntary response sampling method. The sample included healthcare professionals from 80 cities across 7 geographical regions of Türkiye.

Criteria for Inclusion in the Research

- Living in Türkiye,
- Being between the ages of 18 and 65 years,
- Providing services in the field of health,
- Being willing to participate in the research.

Data Collection

Data were obtained by reaching 4029 participants from 80 cities in 7 regions of Türkiye via an online survey method. The questionnaire was completed electronically by participants who voluntarily agreed to participate in the study.

Data Collection Tools

The Participant Information Form, COVID-19 Phobia Scale, and Attitudes Toward COVID-19 Vaccine Scale were used for data collection.

Participant Information Form

This 23-question form, prepared by reviewing literature, is designed to gather crucial sociodemographic data. Information about gender, age, occupation, marital status, family type, number of people in the family, presence of children, level of education, income level, years of working in the profession, and work unit was obtained. In addition, the form consisted of questions regarding general health status (presence of chronic diseases) and information about the COVID-19 pandemic process (working in a pandemic hospital, caring for patients with COVID-19, COVID-19 testing and results, COVID-19 positivity in relatives, use of medication and vitamins for protection, loss of loved ones, and flu vaccine status).

The COVID-19 Phobia Scale

This scale was developed by İbrahim Arpacı and colleagues in 2020 to measure phobia against COVID-19. The scale consists of 20 questions and is evaluated using a 5-point Likert-type scale: "Strongly disagree (1)", "Disagree (2)," "Agree (3)," "Generally agree (4)," and "Strongly agree (5)." The scale has 4 sub-dimensions: social, psychological, economic, and somatic. Psychological dimension items 1, 5, 9, 13, 17, and 20; somatic dimension items 2, 6, 10, 14, and 18; social dimension items 3, 7, 11, 15, and 19; the economic dimension is measured by items 4, 8, 12, and 16. The scale is scored between 20 and 100; higher scores indicate higher levels of phobia against COVID-19. The Cronbach's alpha coefficient of the scale was reported as 0.925 and was found to be 0.94 in this study.[19]

Attitudes Toward the COVID-19 Vaccine Scale

This scale was developed by Geniş and colleagues in 2020 to measure attitudes toward the COVID-19 vaccine. The scale, consisting of 9 items, is in a 5-point Likert-type format measuring positive and negative attitudes. The statements are evaluated as "Strongly disagree (1)," "Disagree (2)," "Undecided (3)," "Agree (4)," and "Strongly agree (5)." The items in the negative attitude sub-dimension are reverse scored (1→5; 2→4; 3→3; 4→2; 5→1). The total

score is divided by the number of items in the sub-dimensions to obtain a value between 1 and 5. Higher scores in the positive attitude sub-dimension indicate more positive attitudes toward the COVID-19 vaccine, whereas higher scores in the negative attitude sub-dimension indicate stronger negative vaccine-related attitudes after reverse scoring. The Cronbach's alpha coefficient of the scale was reported as 0.80, and it was found to be 0.90 in this study.[20]

Statistical Analysis

The distribution of data was examined using the Shapiro–Wilk test. Since the data did not show normal distribution, non-parametric tests were used. The Kruskal–Wallis test was applied for 3 or more groups that did not show normal distribution, and the Mann–Whitney *U*-test was applied for 2 groups. Relationships between numerical data were evaluated with Spearman correlation analysis. The Dunn test was used for post-hoc comparisons of significant variables. Data are presented with descriptive statistics as minimum, maximum, and median; categorical data are presented with frequency and percentage. Statistical analyses were performed using IBM SPSS Statistics 26.0 (IBM SPSS Corp.; Armonk, NY, USA), and the significance level was set at $\alpha = 0.05$.

No statistical correction was applied for multiple testing. Therefore, given the large number of univariate comparisons, statistically significant findings were interpreted cautiously and considered exploratory rather than confirmatory.

Ethical Considerations

Before starting the study, ethical approval was obtained from Hasan Kalyoncu University (Approval No.:2020/120; Date: December 16, 2020), and Ministry of Health permission was obtained. Three data collection tools were used in the study. The Participant Information Form was prepared by the researchers, and written permission was obtained from the relevant researchers for the COVID-19 Phobia Scale and Attitudes Toward the COVID-19 Vaccine Scale. Participants were informed about the purpose of the study and data confidentiality, and all participants were required to provide electronic informed consent before completing the questionnaire.

Results

A total of 4029 healthcare professionals participated in the study. The mean age of the participants was 37.51 ± 10.38 years. Most participants were female (82.2%), married (68.4%), and university graduates (68.4%). Additionally, 70.3% worked in pandemic hospitals and 53% were involved in the care of COVID-19 patients. Detailed sociodemographic, professional health-related, and COVID-19-related characteristics are presented in Table 1.

Regarding COVID-19 experiences, 77.9% of participants had a history of COVID-19 testing, 33.3% of those tested had been diagnosed, and 54.1% reported that a first- or second-degree relative had been diagnosed with COVID-19. Furthermore, 55.6% reported loss of an acquaintance/relative due to COVID-19.

The mean total score of the COVID-19 Phobia Scale was 55.45 ± 15.06 (range: 20-100), with the highest score observed in the psychological sub-dimension (20.19 ± 5.34). For the Attitudes Toward COVID-19 Vaccine Scale, the highest mean score was observed in the negative attitude sub-dimension (16.22 ± 3.39).

Sociodemographic Factors

COVID-19 phobia scores varied according to several sociodemographic characteristics. Women had significantly higher phobia scores than men ($P < .001$) and also reported more negative attitudes toward vaccination. In addition, married participants and

Table 1. Sociodemographic, Professional, Health-Related, and COVID-19-Related Characteristics of Participants

		n	%
Gender	Female	3311	82.20
	Male	718	17.80
Occupation	Physician	403	10.00
	Nurse	2298	57.00
	Midwife	322	8.00
	Health officer	216	5.40
	Dietitian	57	1.40
	Medical secretary	178	4.40
	Security	77	1.90
	Cleaning staff	50	1.20
	Other	428	10.60
Marital status	Married	2757	68.40
	Single	1272	31.60
Family type	Living slone	532	13.20
	Nuclear family	2918	72.40
	Extended family	215	5.30
	Other	364	9.00
Having children	Yes	2616	64.90
	No	1413	35.10
Educational status	Primary school	14	0.30
	Secondary school	22	0.50
	High school	373	9.30
	University	2755	68.40
	Postgraduate	865	21.50
Income status	Income less than expenses	1236	30.70
	Income equals expenses	2070	51.40
	Income more than expenses	723	17.90
Presence of chronic disease	Yes	1095	27.20
	No	2934	72.80
Type of chronic disease	Heart disease	45	4.20
	Diabetes	94	8.90
	Hypertension	140	13.20
	Cancer	36	3.40
	Asthma/COPD	128	12.10
	Other	616	58.20
Work unit	Intensive care	434	10.70
	Services	996	24.70

(*Continued*)

Table 1. Sociodemographic, Professional, Health-Related, and COVID-19-Related Characteristics of Participants (*Continued*)

		n	%
	Polyclinic	883	21.90
	Administrative and management unit	325	8.10
	Education nursing	235	5.80
	Infection nursing	1156	28.70
Working in a pandemic hospital	Yes	2834	70.30
	No	1195	29.70
Caring for patients with COVID-19	Yes	2136	53.00
	No	1893	47.00
History of COVID-19 testing	Yes	3137	77.86
	No	892	22.14
COVID-19 diagnosis among those tested	Yes	1045	33.30
	No	2092	66.70
First- or second-degree relative diagnosed with COVID-19	Yes	2178	54.10
	No	1851	45.90
Use of medication/ vitamin support	Yes	2428	60.30
	No	1601	39.70
Type of support received	Vitamin C	204	8.30
	Vitamin D	303	12.30
	Herbal teas	119	4.80
	Other	1832	74.50
Loss of an acquaintance/relative due to COVID-19	Yes	2240	55.60
	No	1789	44.40
Previous influenza vaccination	No	2488	61.80
	I get vaccinated regularly every year	235	5.80
	I got vaccinated once	902	22.40
	I got vaccinated more than once	404	10.00
Age (years)		37.51 ± 10.38	
Years of professional experience		15.64 ± 33.09	
Number of people in the household		3.60 ± 1.62	

*Categorical variables are presented as frequency and percentage. Continuous variables are presented as mean ± SD. Percentages for type of chronic disease were calculated among participants with chronic disease. Percentages for type of support received were calculated among participants who reported receiving medication or vitamin support. Percentages for COVID-19 diagnosis were calculated among participants who had been tested for COVID-19.

Table 2. COVID-19 Phobia and Vaccine Attitude Scores by Sociodemographic Characteristics

	Total Score	Positive Attitude	Negative Attitude
Variable	**COVID-19 Phobia Scale**	**Vaccination Attitudes Scale**	
Gender			
Female	54 (20-100)	12 (4-20)	16 (5-25)
Male	49 (20-100)	14 (4-20)	17 (5-25)
*P**	***P* < .001**	***P* < .001**	***P* < .001**
Educational status			
Primary school	54 (33-73)	13.50 (5-19)	15.50 (14-21)
Secondary school	53.50 (28-76)	12 (4-20)	15.50 (7-24)
High school	51 (20-100)	12 (4-20)	15.00 (5-25)
University	54 (20-100)	12 (4-20)	15 (5-25)
Postgraduate	52 (20-100)	15 (4-20)	17 (5-25)
*P***	***P* < .001**	***P* < .001**	***P* < .001**
Marital status			
Married	54.00 (20-100)	13 (4-20)	16 (5-25)
Single	52.50 (20-100)	12 (4-20)	15 (5-25)
*P**	***P* < .001**	**P < .001**	**P < .001**
Having children			
Yes	54 (20-100)	13 (4-20)	16 (5-25)
No	53 (20-100)	12 (4-20)	15 (5-25)
*P**	**P = .001**	**P < .001**	**P < .001**
Income status			
Income less than expenses	57 (20-100)	12 (4-20)	15.0 (5-25)
Income equals expenses	53 (20-100)	13 (4-20)	16.00 (5-25)
Income more than expenses	50 (20-96)	14 (4-20)	17.00 (5-25)
*P***	**P < .001**	**P < .001**	**P < .001**

Spearman's Rho Variable	**COVID-19 Phobia Scale Total Score**	**Positive Attitude**	**Negative Attitude**
Age (years), *r*	0.055	0.206	0.203
Age (years), *P****	*P* < .001	*P* < .001	*P* < .001
Years of professional experience, *r*	0.079	0.188	0.188
Years of professional experience, *P****	*P* < .001	*P* < .001	*P* < .001
Number of people in the household, *r*	−0.023	−0.014	0.013
Number of people in the household, *P****	.147	.378	.404

Data are presented as median (min-max). Post-hoc comparisons were performed using Dunn's test and are presented in Supplementary Table 1.
*Mann–Whitney *U*-test.
**Kruskal–Wallis test.
***Spearman correlation analysis.

those with children had higher phobia scores, and more positive attitudes toward vaccination (Table 2).

Correlation analyses showed that age and years of professional experience were positively associated with both positive and negative vaccine attitudes ($P < .05$). However, the number of people in the household was not significantly associated with vaccine attitudes (Table 2). The correlation coefficients indicated weak associations

Relationship Between COVID-19 Phobia and Vaccine Attitudes

Higher COVID-19 phobia scores were positively correlated with positive vaccine attitudes and negatively correlated with negative vaccine attitudes ($r = 0.096$, $P < .001$; $r = -0.043$, $P = .007$, respectively) (Table 3). The correlation coefficients indicated weak associations.

Professional Characteristics

COVID-19 phobia scores were higher among healthcare professionals working in pandemic hospitals than among those working in non-pandemic hospitals ($P = .008$). COVID-19 phobia scores also differed by occupation ($P < .001$) (Table 4).

Positive vaccine attitude scores differed according to work unit and occupation group ($P < .001$). Negative vaccine attitude scores were higher among healthcare professionals working in pandemic hospitals ($P = .001$) and also differed according to work unit and occupation group ($P < .001$) (Table 4).

Health-Related Experiences

Health-related experiences were associated with COVID-19 phobia scores. COVID-19 phobia scores were higher among participants with chronic diseases, those involved in the care of COVID-19 patients, those tested for COVID-19, and those reporting loss of an acquaintance/relative due to COVID-19 (Table 4).

Participants with chronic diseases had higher positive and negative vaccine attitude scores ($P < .001$). History of COVID-19 testing and COVID-19 diagnosis among those tested were not associated with vaccine attitude scores ($P > .05$) (Table 4).

Table 3. Relationship Between COVID-19 Phobia Scale and Attitudes Toward COVID-19 Vaccine Scale Scores

		Positive Attitude	Negative Attitude
Spearman's rho	Psychological	0.106	−0.020
		$P < .001$	$P \geq .212$
	Somatic	0.059	−0.060
		$P < .001$	$P < .001$
	Social	0.105	−0.015
		$P < .001$	$P \geq .345$
	Economic	0.032	−0.090
		$P \leq .042$	$P < .001$
	Total score	0.096	−0.043
		$P < .001$	$P \leq .007$

*Values represent Spearman's rho correlation coefficients. *P*-values are presented below each correlation coefficient. Positive and negative attitudes refer to the sub-dimensions of the Attitudes Toward COVID-19 Vaccine Scale.

Discussion

Past epidemics have revealed a variety of factors that may increase psychological vulnerability, including age, gender, chronic disease, proneness to anxiety, low tolerance for uncertainty, and social isolation.[21] Studies conducted during the COVID-19 pandemic have shown that women, young people, those with low-income levels, smokers, and individuals with chronic health problems are particularly affected by the psychological impact.[22] In the present study, COVID-19 phobia scores were higher among women, older participants, those with longer professional experience, and healthcare workers with chronic diseases. These findings suggest that both individual vulnerability factors and pandemic-related occupational exposure may contribute to psychological distress among healthcare professionals.

The COVID-19 pandemic has also caused fear and phobia in many individuals and healthcare workers. Lee et al[23] reported that coronaphobia is associated with generalized anxiety disorder and fear of death. Factors such as restrictions brought by the pandemic, fear of infecting family members with the virus, economic problems, and increased workload have further increased the psychological burden of healthcare workers.[24] Similarly, in this study, higher COVID-19 phobia scores were observed among healthcare professionals working in pandemic hospitals, those caring for patients with COVID-19, those with chronic diseases, and those reporting loss of an acquaintance/relative due to COVID-19. These findings may reflect the cumulative effect of direct exposure, perceived personal risk, and emotional burden during the pandemic. Healthcare workers who were repeatedly exposed to COVID-19-related illness, death, and uncertainty may have experienced a stronger sense of threat, which may explain their higher phobia scores.

The psychological impact of the COVID-19 pandemic among healthcare professionals may vary according to occupation and work unit. A study conducted in Singapore found that physicians were at greater risk of experiencing mental health problems compared with nurses.[22] However, in the current study, COVID-19 phobia and economic concerns were lower among physicians than among several other healthcare professional groups. This difference may be related to variations in professional roles, perceived control, access to information, decision-making authority, and working conditions. Nurses and other frontline healthcare workers may have had more prolonged bedside contact with patients and may therefore have experienced a higher emotional and physical burden. However, because several subgroup comparisons were performed and some occupational groups had relatively small sample sizes, these findings should be interpreted cautiously.

Healthcare professionals' attitudes toward the COVID-19 vaccine also differed according to sociodemographic and professional characteristics. Yılmaz et al[25] reported that married individuals with children, those with higher income, and those with postgraduate education had more positive attitudes toward the COVID-19 vaccine. In the present study, married participants, participants with children, those with chronic diseases, and those with higher income also had higher positive vaccine attitude scores. These findings may be explained by heightened perceived responsibility, perceived vulnerability, and motivation to protect oneself and family members. Healthcare professionals with children or chronic diseases may perceive the consequences of infection as more serious and may therefore develop more favorable attitudes toward vaccination as a protective strategy.

In this study, women had more negative attitudes toward vaccination. This finding may be related to gender-specific concerns

Table 4. COVID-19 Phobia and Vaccine Attitude Scores According to Professional and Health-Related Characteristics

	COVID-19 Phobia Scale Total Score	Vaccination Attitudes Scale	
		Positive Attitude	Negative Attitude
Working in a pandemic hospital			
Yes	54 (20-100)	12 (4-20)	17 (5-25)
No	53 (20-100)	12 (4-20)	16 (5-25)
*P**	*P* = .008	.058	.001
Work unit			
Intensive care	56 (33-90)	12 (4-20)	15 (5-25)
Inpatient services	54.50 (26-90)	12 (4-20)	15 (5-25)
Polyclinic	55 (24-98)	13 (4-20)	16 (5-25)
Administrative/management unit	54.50 (23-97)	12 (4-20)	16 (5-25)
Education nursing	57 (28-99)	14 (4-20)	16 (5-25)
Infection nursing	55 (20-100)	12 (4-20)	16 (5-25)
*P***	*P* < .047	*P* < .001	*P* < .001
Occupation			
Physician	50 (20-97)	16 (4-20)	18 (8-25)
Nurse	54 (20-100)	12 (4-20)	15 (5-25)
Midwife	56 (20-100)	12 (4-20)	15 (5-25)
Health officer	53 (20-98)	20 (6-30)	17 (5-25)
Dietitian	52 (25-96)	13 (4-20)	17 (9-25)
Medical secretary	59 (21-99)	15 (4-20)	15 (5-25)
Security staff	46 (20-85)	12 (4-20)	16 (8-25)
Cleaning staff	53 (29-80)	13 (4-20)	15 (7-23)
Other	53 (21-100)	12 (4-20)	16 (5-25)
*P***	*P* < .001	*P* < .001	*P* < .001
Presence of chronic disease			
Yes	55 (20-100)	13 (4-20)	16 (5-25)
No	53 (20-100)	12 (4-20)	15 (5-25)
*P**	*P* < .001	*P* < .001	*P* < .001
Caring for patients with COVID-19			
Yes	54 (20-100)	12 (4-20)	15 (5-25)
No	53 (20-100)	13 (4-20)	16 (5-25)
*P**	*P* < .022	*P* < .002	*P* < .001
History of COVID-19 testing			
Yes	54 (20-100)	12 (4-20)	16 (5-25)
No	52 (20-99)	12 (4-20)	16 (5-25)
*P**	*P* < .001	*P* < .056	*P* < .699

(*Continued*)

Table 4. COVID-19 Phobia and Vaccine Attitude Scores According to Professional and Health-Related Characteristics (*Continued*)

	COVID-19 Phobia Scale Total Score	Vaccination Attitudes Scale	
		Positive Attitude	Negative Attitude
COVID-19 diagnosis among those tested			
Yes	54 (20-100)	12 (4-20)	16 (5-25)
No	54 (20-100)	12 (4-20)	16 (5-25)
*P**	*P* < .861	*P* < .595	*P* < .565
First- or second-degree relative diagnosed with COVID-19			
Yes	54 (20-100)	12 (4-20)	16 (5-25)
No	53 (20-100)	12 (4-20)	16 (5-25)
*P**	*P* < .016	*P* < .175	*P* < .339
Use of medication/vitamin support			
Yes	56 (20-100)	13 (4-20)	16 (5-25)
No	51 (20-100)	12 (4-20)	16 (5-25)
*P**	*P* < .001	.023	.91
Loss of an acquaintance/relative due to COVID-19			
Yes	55 (20-100)	12 (4-20)	16 (5-25)
No	52 (20-100)	12 (4-20)	16 (5-25)
*P**	*P* < .001	.086	.106

Data are presented as median (min-max). Post-hoc comparisons were performed using Dunn's test and are presented in Supplementary Table 1.
*Mann–Whitney *U*-test.
**Kruskal–Wallis test.

during the early period of COVID-19 vaccination, including uncertainty about vaccine safety during pregnancy, breastfeeding, fertility, and potential side effects. In addition, women constituted the majority of the sample, which may also have influenced the distribution of vaccine attitude scores. Therefore, this finding should be interpreted within the context of both gender-related concerns and the sample structure. Previous studies have also suggested that regular influenza vaccination is associated with more positive attitudes toward COVID-19 vaccination.[26] This may indicate that previous vaccine experience and trust in preventive health practices are important determinants of vaccine acceptance among healthcare workers (Supplementary Table 1).

One of the important findings of this study was that age and years of professional experience were positively associated with both positive and negative vaccine attitude scores. At first glance, this may appear contradictory; however, it may reflect ambivalent vaccine attitudes rather than a simple opposition between acceptance and refusal. More experienced healthcare professionals may better recognize the protective value of vaccination due to their clinical knowledge, professional exposure, and previous experience with infectious disease prevention. At the same time, their accumulated clinical observations, awareness of possible adverse events, and exposure to uncertainty during the early pandemic period may have made them more cautious and questioning. Therefore, positive and negative vaccine attitudes should not necessarily be interpreted as mutually exclusive, but rather as coexisting dimensions of vaccine-related evaluation among healthcare professionals.

The relationship between COVID-19 phobia and vaccine attitudes also requires cautious interpretation. In this study, COVID-19 phobia was positively correlated with positive vaccine attitudes and negatively correlated with negative vaccine attitudes; however, the correlation coefficients were weak. This suggests that COVID-19-related fear may be associated with more favorable vaccine attitudes, but it is unlikely to be the only or dominant determinant of vaccine-related decision-making. Vaccine attitudes among healthcare professionals are likely shaped by multiple factors, including perceived disease severity, trust in vaccines and institutions, professional knowledge, previous vaccination behavior, concerns about safety, and pandemic-related experiences.

The findings of this study should also be interpreted in light of the exploratory nature of the analyses. A large number of univariate comparisons were conducted, and no statistical correction was applied for multiple testing. Therefore, some statistically significant findings may reflect type 1 error. For this reason, marginal associations and subgroup differences should be interpreted cautiously and should be considered hypothesis-generating rather than confirmatory. Nevertheless, the findings provide useful insight into the psychological and behavioral responses of healthcare professionals during a major public health crisis.

Overall, this study suggests that COVID-19 phobia and vaccine attitudes among healthcare professionals are shaped by a combination of individual, professional, and pandemic-related factors. These findings highlight the need for targeted strategies that address both psychological support and vaccine communication. In future public health crises, interventions should not only

provide accurate information about vaccines but also consider healthcare workers' emotional burden, risk perception, family-related concerns, and professional exposure. Such strategies may help strengthen vaccine confidence, support psychological well-being, and improve preparedness among healthcare professionals.

Infectious diseases and pandemics pose significant physical and psychological risks to healthcare workers. The findings of this study indicate that COVID-19 phobia and attitudes toward vaccination among healthcare professionals may be influenced by sociodemographic, occupational, and health-related factors. Strengthening psychological resilience, providing adequate institutional support, ensuring sufficient personnel, and implementing effective infection control and protective measures are essential to reduce these impacts. In addition, well-organized outbreak management and vaccination strategies play a key role in preventing the spread of infectious diseases and reducing the societal impact of future pandemics. Future preparedness strategies should address both the psychological needs of healthcare workers and their vaccine-related concerns through clear communication, institutional support, and targeted educational interventions.

Limitations

This study has several limitations. First, the cross-sectional design prevents the establishment of causal relationships between COVID-19 phobia and vaccination attitudes. Second, the data were collected using self-reported measures, which may be subject to response bias. Third, although the study included a large sample of healthcare professionals from 80 cities and 7 geographical regions of Türkiye, the use of a non-probability convenience and voluntary response sampling method limits the representativeness of the findings. Healthcare professionals with stronger opinions or experiences related to COVID-19, vaccination, or pandemic-related stress may have been more likely to participate. In addition, the online data collection method may have excluded individuals with limited digital access or lower motivation to respond. Therefore, the findings should be generalized to all healthcare professionals in Türkiye with caution.

In addition, the psychosocial background of the participants related to anxiety or phobia was not examined in detail. Pre-existing psychological characteristics, previous mental health problems, coping strategies, and institutional support may have influenced COVID-19 phobia and vaccine attitudes but were not assessed in this study. Finally, a large number of univariate comparisons were conducted without multivariable modeling or adjustments for multiple testing; therefore, the possibility of type 1 error should be considered when interpreting statistically significant findings. Accordingly, the statistically significant findings should be interpreted as exploratory and hypothesis-generating rather than confirmatory.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Artificial Intelligence Usage Statement: The authors declared that no Artificial Intelligence tool was used in the preparation of the manuscript.

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Informed Consent: Participants were informed about the purpose of the study and data confidentiality, and all participants were required to provide electronic informed consent before completing the questionnaire.

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Supplementary Table 1. Dunn's Post-hoc Comparisons for Significant Kruskal–Wallis Analyses in Tables 2 and 4

Main table	Variable	Scale/subscale	Pairwise comparison	p-value
Table 2	Educational status	COVID-19 Phobia Scale total score	High school vs University	p=0.010
Table 2	Educational status	COVID-19 Phobia Scale total score	Postgraduate vs University	p<0.001
Table 2	Educational status	Positive vaccine attitude	High school vs Postgraduate	p=0.001
Table 2	Educational status	Positive vaccine attitude	Postgraduate vs University	p=0.001
Table 2	Educational status	Negative vaccine attitude	High school vs Postgraduate	p<0.001
Table 2	Educational status	Negative vaccine attitude	Postgraduate vs University	p=0.001
Table 2	Income status	COVID-19 Phobia Scale total score	Income less than expenses vs Income equals expenses	p<0.001
Table 2	Income status	COVID-19 Phobia Scale total score	Income less than expenses vs Income more than expenses	p<0.001
Table 2	Income status	COVID-19 Phobia Scale total score	Income equals expenses vs Income more than expenses	p<0.001
Table 2	Income status	Positive vaccine attitude	Income less than expenses vs Income equals expenses	p<0.001
Table 2	Income status	Positive vaccine attitude	Income less than expenses vs Income more than expenses	p<0.001
Table 2	Income status	Positive vaccine attitude	Income equals expenses vs Income more than expenses	p<0.001
Table 2	Income status	Negative vaccine attitude	Income less than expenses vs Income equals expenses	p<0.001
Table 2	Income status	Negative vaccine attitude	Income less than expenses vs Income more than expenses	p<0.001
Table 2	Income status	Negative vaccine attitude	Income equals expenses vs Income more than expenses	p<0.001
Table 4	Work unit	COVID-19 Phobia Scale total score	Inpatient services vs Polyclinic	p=0.019
Table 4	Work unit	COVID-19 Phobia Scale total score	Polyclinic vs Administrative/management unit	p=0.014
Table 4	Work unit	COVID-19 Phobia Scale total score	Administrative/management unit vs Education nursing	p=0.039
Table 4	Work unit	COVID-19 Phobia Scale total score	Polyclinic vs Infection nursing	p=0.046
Table 4	Occupation	COVID-19 Phobia Scale total score	Security staff vs Nurse	p=0.002
Table 4	Occupation	COVID-19 Phobia Scale total score	Security staff vs Midwife	p<0.001
Table 4	Occupation	COVID-19 Phobia Scale total score	Security staff vs Health officer	p<0.001
Table 4	Occupation	COVID-19 Phobia Scale total score	Security staff vs Dietitian	p=0.010
Table 4	Occupation	COVID-19 Phobia Scale total score	Security staff vs Medical secretary	p<0.001
Table 4	Occupation	COVID-19 Phobia Scale total score	Security staff vs Other	p=0.005
Table 4	Work unit	Positive vaccine attitude	Intensive care vs Polyclinic	p=0.001
Table 4	Work unit	Positive vaccine attitude	Intensive care vs Education nursing	p=0.001
Table 4	Work unit	Negative vaccine attitude	Intensive care vs Administrative/management unit	p=0.027
Table 4	Occupation	Positive vaccine attitude	Physician vs Nurse	p=0.003
Table 4	Occupation	Negative vaccine attitude	Physician vs Nurse	p<0.001

Only statistically significant pairwise comparisons are presented. Post-hoc comparisons were performed using Dunn's test following significant Kruskal–Wallis analyses.