

En Az İki Doz COVID-19 Aşısı Olan Sağlık Çalışanlarında SARS-CoV-2 Omicron Varyantı Pozitifliği Sonrası COVID-19 Aşı Tutumu

COVID-19 Vaccination Behavior After SARS-CoV-2 Omicron Variant Positivity in Healthcare Workers with at Least Two Doses of COVID-19 Vaccine

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ÖZET

Amaç: Sağlık çalışanları birinci basamak sağlık hizmetlerinde görev almalarına bağlı olarak bulaşıcı hastalıklar ve pandemiler açısından oldukça yüksek risk altında olan öncelikli bir gruptur. Toplumda rol model olan sağlık çalışanlarının aşı ve tedavilere yönelik davranışları, toplumsal olarak bir hastalıkla mücadele etme veya bir pandemiyi kontrol altına alma ve sonlandırma çabaları açısından önemli ölçüde insanları etkileyebilmektedir.

Materyal ve Metot: Bu çalışmada, en az 2 doz aşı sonrası SARS-CoV-2 omikron varyantı pozitif çıkan sağlık çalışanlarının COVID-19 aşı tutumlarının belirlenmesi amaçlanmıştır. Bu tanımlayıcı çalışma, en az 2 doz aşı yaptırdıktan sonra SARS-CoV-2 pozitif çıkan ve çalışmaya katılmaya gönüllü olan sağlık çalışanlarını kapsamaktadır. 15-28 Ekim 2022 tarihleri arasında gerçekleştirilen çalışmada 532 sağlık çalışanına ulaşılmış ve çevrimiçi anket şeklinde kesitsel bir çalışma gerçekleştirilmiştir.

Bulgular: Çalışmada 340 (%63,91) kadın, 192 (%36,09) erkek katılımcı bulunmaktadır. Katılımcıların 224 (%42,11)'ü laboratuvar teknisyeni, 198 (%37,22)'i diğer sağlık meslek mensubu, 78 (%14,66)'i biyolog ve 32 (%6,02)'si doktor idi. 364 (%68,42)'ünün kronik hastalığı yoktu ve kronik hastalığı olanların %35,71'inde hipertansiyon vardı. COVID-19 pozitif olan 32 (%6,02) hastada SARS-CoV-2 varyantı tespit edilmedi. Katılımcıların 508'i (%95,49) 3 doz COVID-19 aşısı olurken, 400'ü (%75,19) üçüncü doz için BioNTech aşısını tercih etti.

Sonuç: Sağlık çalışanları arasında aşının teşvik edilmesinde destekleyici ve bilgilendirici yaklaşım içeren çok yönlü veri derlemesinin önemli olduğu belirlenmiştir. Aşıların etkinliğini değerlendirmek için sağlık çalışanlarına doğru ve güncel bilimsel bilgiler sağlanmalıdır.

Anahtar Kelimeler: Sars-CoV-2, omikron varyantı, COVID-19, sağlık çalışanı, aşı davranışı.

ABSTRACT

Aim: Healthcare workers are a priority group that is at very high risk of infectious diseases and pandemics due to their work in primary healthcare services. The behavior of healthcare professionals who are role models in society towards vaccines and treatments can significantly affect people with respect to their efforts to combat a disease or control and end a pandemic.

Materials and Methods: This study aimed to determine healthcare workers' COVID-19 vaccine attitude who had positive Sars-CoV-2 omicron variant after receiving at least 2 vaccine doses. This descriptive study includes healthcare workers who tested positive for SARS-CoV-2 after receiving at least 2 doses of vaccine and volunteered to participate in the study. The study reached 532 healthcare professionals and a cross-sectional study was conducted as an online questionnaire between 15-28 October 2022.

Results: It was determined that 340 (63.91%) of them were female and 192 (36.09%) were male. 224 (42.11%) were laboratory technicians, 198 (37.22%) were other healthcare professionals, 78 (14.66%) were biologists and 32 (6.02%) were physicians. 364 (68.42%) of them did not have chronic disease and 35.71 % of those with chronic disease had hypertension. Sars-CoV-2 variant was not detected for the 32 (6.02%) who were COVID-19 positive. 508 (95.49%) of the participants received 3 doses of COVID-19 vaccine and 400 (75.19%) preferred BioNTech vaccine for the third dose.

Conclusion: It has been determined that a multifaceted data compilation with a supportive and informative approach is important in promoting vaccination among healthcare professionals. Healthcare workers should be provided with accurate and up-to-date scientific information to evaluate effectiveness of vaccines.

Keywords: SARS-CoV-2, omicron variant, COVID-19, healthcare worker, vaccine behavior.

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (Sars-CoV-2) was first discovered in Wuhan city of China's Hubei province in 2019 and has spread worldwide causing a pandemic (1). COVID-19 has become a rapidly growing major public health crisis with disquieting variants of Sars-CoV-2 that have increased contagiousness those can cause severe disease and significant adverse effects in the COVID-19 epidemiology (2). Approximately 762 million people have been affected by this virus since the pandemic was declared by the World Health Organization (WHO) on March 11, 2020 and approximately 6.5 million deaths have been reported by February 2023 (3). It is clearly seen that the number of deaths may increase with the effects of variants along with the ongoing mutations in Sars-CoV-2 virus genome and the already threatening consequences of the epidemic may become more serious (4). It is known that there is an urgent need for effective and safe COVID-19 vaccines to control the pandemic and reduce the burden of COVID-19 worldwide in addition to effective public health measures. Hundreds of research and development institutions around the world are working at an unprecedented pace to develop vaccines to end the COVID-19 pandemic (5). A total of 13.339.265.403 COVID-19 vaccine doses have been administered as of February 11, 2023 according to WHO data (3). The first emergency use approval for the inactivated Sars-CoV-2 vaccine CoronaVac (Sinovac Life Sciences, Beijing, China) was issued on January 13, 2021 in Türkiye (6). The adoption and implementation of the COVID-19 vaccine play an important role to fight against the pandemic. Health workers (HW) are priority individuals because they take part in primary health care services, exposed to COVID-19 and have a high risk of severe disease among the high-risk groups accepted as candidates for early vaccination in Türkiye (7).

However, it has been reported that some HW in Türkiye, as well as in the world, were infected with COVID-19 with Sars-CoV-2 Omicron variant positive after at least 2 doses of vaccines (8). It is important to consider the attitudes of healthcare professionals towards the developed COVID-19 vaccines to better identify the barriers against widespread vaccination. Overall acceptance of the vaccine by healthcare professionals will also affect society's attitude. Therefore, healthcare professionals become particularly important through role modeling as well as advising patients and communities (9). WHO recognizes vaccine-acquired immunization as one of the most cost-effective methods in preventing vaccine-preventable diseases and deaths from these diseases (10). In this study, it is aimed to evaluate the attitudes of laboratory HWs for these vaccines after they have been vaccinated against COVID-19 at least 2 doses but relapsed with the omicron variant.

MATERIALS AND METHODS

This study was approved by the Clinical Research Ethics Committee of Yıldırım Beyazıt University Yenimahalle Training and Research Hospital with decision number 2022-58. Research data was collected digitally from employees who were positive for Sars-CoV-2 RT-PCR at least 20 days after receiving at least 2 doses of COVID-19 vaccine in order to determine their attitudes towards COVID-19 vaccines between October 15, 2022 and October 25, 2022 in Ankara Provincial Health Directorate Public Health Molecular Diagnosis Laboratory. The population of this study consisted of individuals over the age of 18, working in the Molecular Diagnosis Laboratory of Ankara Provincial Health Directorate those volunteered for the study. It is a single-center study. The number of HWs included were 532 in the laboratory between 15 and 25 October 2022 with a written questionnaire using the snowball sampling method with Scale of Attitudes Towards COVID-19 Vaccine developed by Geniş et al and presented in "Attitudes Towards COVID-19 Vaccine Scale Scoring: In 2020". The scale was prepared as a five-point Likert type and consists of 9 questions. The questionnaire consists of 3 main parts (11).

The first part of the questionnaire consists of sociodemographic characteristics of the respondents such as age, gender, education level; the second part covers health status of the participants, their COVID-19 and vaccination history and the third part collected information about the attitude of HWs towards the COVID-19 vaccine. The scoring of the abovementioned scale" consists of 2 subsections containing 9 items. Positive attitude items are as follows: "I want my family to get the vaccine developed for this disease", "I would like to have the vaccine developed for this disease at the first opportunity", "I think everyone should have the vaccine developed for this disease", "I trust the explanations about the vaccine developed". Negative attitude items are as follows: "The vaccine developed may cause the transmission of the disease", "I think that the vaccine developed does not have a protective effect", "The vaccine developed is dangerous", "I think that the effectiveness of the developed vaccine has not been adequately tested". The statements in the scale were evaluated as "I totally disagree. (1)", "I disagree. (2)", "I am undecided. (3)", "I agree. (4)" and "I totally agree. (5)" Items in the negative attitude sub-section (5, 6, 7, 8 and 9th items) are scored inversely. A value between 1 and 5 is obtained by dividing the total score obtained by summing the item scores in the scale sub-section by the number of items in that sub-section. High scores obtained from the positive attitude sub-section (items 1, 2, 3 and 4) indicate that the attitude towards the vaccine is positive. It is calculated after the items in the negative attitude sub-section are reversed and the high scores in this sub-dimension indicate that the negative attitude towards the vaccine is less. Inverse items are coded as 1→5; 2→4; 3→3; 4→2; 5→1 (11).

Statistical Analysis

Statistical analyzes were carried out with SPSS (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.) Frequency tables and descriptive statistics were used to interpret the findings. Non-parametric methods were utilized for measurement values without normal distribution. “Mann-Whitney U” test (Z-table value) was used to compare the measurement values of two independent groups and the "Kruskal-Wallis H" test (χ^2 -table value) method was used to compare the measurement values of three or more independent groups in accordance with non-parametric methods. Bonferroni-Dunn post hoc test was applied for pairwise comparisons of variables with significant differences for three or more groups. “Spearman” correlation coefficient was used to examine the relationships of two quantitative variables that do not have a normal distribution. The statistical significance level was accepted as $p < 0.05$.

RESULTS

340 HWs (63.91%) were women, 238 (44.73%) were in the 30-39 age group and 158 (29.7%) were undergraduates in this study. 224 (42.11%) employees were laboratory technicians, 364 (68.42%) did not have a chronic disease and 35.71% of those with chronic diseases had hypertension (Table 1).

Table 1. Sociodemographic characteristics of healthcare workers.

Variable (N=532)	n	%
Gender		
Female	340	63.9
Male	192	36.1
Age Distribution		
18-29	80	15.03
30-39	238	44.74
40-49	154	28.95
50-59	55	10.34
=> 60	5	0.93
Education Level		
Primary School	8	1.5
Middle School	30	5.64
High School	60	11.28
Associate degree	224	42.11
Bachelor	158	29.7
Graduate	52	9.77
Occupation		
Physician/Doctor	32	6.01
Biologist	78	14.66
Laboratory Technician	224	42.11
Other Healthcare Professionals	198	37.22
Chronic Disease		
Yes*	168	31.58
No	364	68.42
Name of Disease*		
Asthma	12	7.14
Diabetes mellitus	38	22.62
Hypertension	60	35.71
Cardiovascular disease	13	7.74
Hypothyroidism	10	5.95
Other	35	20.84

Viral variant could not be determined in the Sars-CoV-2 RT-PCR test positivity that occurred at least 20 days after at least two doses of vaccination of 32 HW (6.02%). 508 (95.49%) had 3 doses of COVID-19 vaccine and 400 (75.19%) of them was 3 doses of BioNTech while 52 HWs (9.77%) were regularly vaccinated against influenza every year (Table 2).

Table 2. Sars-Cov-2 omicron variant 19 transmission status and vaccination history of healthcare workers.

Variable (N=532)	n	%
Sars-CoV-2 omicron variant		
Yes	500	93.98
Variant not determined	32	6.02
Covid-19 Vaccination		
2 Doses	24	4.51
3 Doses	508	95.49
If you had a choice in the COVID-19 vaccination before you had any vaccinations yet		
wouldn't consider getting the vaccine and will never get another dose.	48	9.02
Sinovac®	152	28.57
BioNTech®	304	57.14
Turkovac®	27	5.07
Moderna®	0	0
Sputnik V®	1	0.2
Regular Annual Influenza Vaccine		
Annual	52	9.77
Some Years	184	34.59
No Vaccination	296	55.64

It was found that the difference between the scale of attitudes towards COVID-19 vaccine according to healthcare workers' age class ($p=0,296$), gender ($p=0,831$), and chronic disease status ($p=0.061$) of was not significant in statistical evaluation.

The scale of attitudes towards COVID-19 vaccine was statistically significant in terms of positive attitudes ($p=0.010$) according to the professions and education levels of healthcare professionals. It was determined that the positive attitude scores of undergraduate and graduates compared to high school degrees and doctors/biologists compared to other health personnel were significant and higher ($p=0.005$) towards COVID-19 vaccine according to this significant difference (Table 3). The attitudes towards COVID-19 vaccine obtained in this study in which HWs who had a positive Sars-CoV-2 omicron variant at least 20 days after receiving at least 2 doses of Covid-19 vaccine are given in Table 4.

Positive attitude scores of those who want to have Sinovac®, BioNTech and Turkovac are significantly higher when compared with HWs who have tested positive for the omicron variant at least 20 days after receiving at least 2 doses of COVID-19 vaccine and no longer choose to receive a new dose of COVID-19 vaccine ($p=0.008$). A statistically significant difference was found in attitudes towards COVID-19 vaccine among HWs compared to those who do not have

influenza vaccination and those who receive regular influenza vaccination every year and some years (p=0.002). It has been determined that those who had regular influenza vaccination every year and some years and had 2nd dose or 3rd dose of COVID-19 vaccine may want to have a new dose vaccine. Their negative attitude towards the vaccine was less when compared to HWs who had positive omicron variant at least 20 days after receiving at least 2 doses of COVID-19 vaccine and no longer preferred to receive a new dose of COVID-19 vaccine. The percentage of responses given to the positive/negative attitude scale is given in Table 5.

Table 3. Comparison of attitudes towards COVID-19 vaccine according to sociodemographic characteristics of healthcare workers.

		Scale of attitudes towards the Covid-19 vaccine			
Variable (N=532)	n	Positive Attitude		Negative Attitude	
		$\bar{x} \pm . SD$	Median (IQR)	$\bar{x} \pm SD$	Median (IQR)
Gender					
Female	340	3.50±1.36	4.0 (2.8)	4.02±0.76	4.2 (1.0)
Male	192	3.44±1.39	4.0 (2.6)	4.12±0.66	4.2 (0.8)
Statistical Analysis		Z=-0.213		Z=-0.968	
p-value		p=0.831		p=0.333	
Age Distribution					
18-29	80	3.19±1.53	3.8 (2.9)	4.15±0.79	4.2 (1.0)
30-39	238	3.51±1.39	4.0 (2.8)	4.13±0.68	4.2 (0.8)
40-49	154	3.40±1.35	3.8 (2.0)	3.99±0.69	4.0 (0.8)
50-60	60	3.90±0.99	4.0 (1.3)	3.82±0.90	4.1 (1.6)
Statistical Analysis		$\chi^2 = 3.695$		$\chi^2 = 4.697$	
p-value		p=0.296		p=0.195	
Education Level					
Primary/Middle School	38	3.72±1.10	3.8 (1.4)	3.89±0.51	4.0 (0.5)
High School	60	3.65±1.39	4.0 (2.1)	4.12±0.62	4.2 (0.5)
Associate degree	224	3.69±1.29	4.0 (1.8)	4.04±0.77	4.2 (1.0)
Bachelor	158	2.86±1.47	2.8 (2.6)	4.14±0.73	4.2 (1.0)
Graduate	52	3.28±1.32	3.8 (2.0)	3.99±0.82	4.2 (1.2)
Statistical Analysis		$\chi^2 = 13.231$		$\chi^2 = 3.524$	
p-value		p=0.010		p=0.474	
Differentiation		(2-4.5)			
Occupation					
Physician/Biologist	110	3.75±1.43	4.5 (1.8)	4.27±0.48	4.2 (0.6)
Laboratory Technician	224	3.63±1.28	4.0 (1.9)	4.01±0.82	4.2 (1.0)
Other Healthcare Professionals	198	3.15±1.37	3.5 (2.0)	4.00±0.73	4.0 (1.0)
Statistical Analysis		$\chi^2 = 10.491$		$\chi^2 = 3.806$	
p-value		p=0.005		p=0.149	

**“Mann-Whitney U” test (Z-table value) for comparison of measurement values of two independent groups was used for data without normal distribution; “Kruskall-Wallis H” test statistics (χ^2 -table value) were used to compare three or more independent groups.

The attitudes towards COVID-19 vaccine obtained in this study in which HWs who had a positive Sars-CoV-2 omicron variant at least 20 days after receiving at least 2 doses of Covid-19 vaccine are given in Table 4.

Table 4. Comparison of healthcare professionals' attitudes towards COVID-19 vaccine preference according to health status and flu vaccine history.

		Scale of attitudes towards COVID-19 vaccine			
Variable (N=532)	n	Positive Attitude		Negative Attitude	
		$\bar{x} \pm S.S.$	Median (IQR)	$\bar{x} \pm S.S.$	Median (IQR)
Chronic Disease					
No	364	3.61±1.29	4.0 (2.0)	4.02±0.74	4.0 (1.0)
Yes	168	3.20±1.48	3.8 (2.5)	4.14±0.70	4.2 (0.6)
Statistical Analysis		Z=-1.873		Z=-1.454	
p-value		p=0.061		p=0.146	
Covid-19 Vaccination					
2 doses	24	2.38±1.14	2.3 (1.4)	4.10±0.69	4.2 (0.8)
3 doses	508	3.53±1.36	4.0 (2.3)	3.21±1.10	3.2 (1.7)
		Z=-2.671		Z=-2.967	
p-value		p=0.008		p=0.003	
Choice for a new dose of Covid-19 vaccine					
I wouldn't consider getting vaccinated, I won't do it again.	48	2.57±1.14	2.5 (1.9)	3.09±0.83	3.1 (1.3)
Sinovac®	152	3.51±1.33	4.0 (2.4)	3.96±0.71	4.0 (1.3)
BioNTech®	304	3.61±1.38	4.0 (1.8)	4.21±0.60	4.2 (0.6)
Turkovac®	27	3.63±1.32	4.0 (2.4)	4.19±0.65	4.3 (1.0)
Statistical Analysis		$\chi^2 = 14.327$		$\chi^2 = 37.27$	
p-value		p=0.002		p<0.001	
Differentiation		(1-2.3.4)		(1-2.3.4)	
Regular Annual Influenza Vaccine					
Annual	52	3.70±1.39	4.0 (1.7)	4.45±0.49	4.4 (0.7)
Some Years	184	3.59±1.44	4.0 (2.5)	4.22±0.59	4.3 (0.6)
No Vaccination	296	3.40±1.34	3.8 (2.5)	3.93±0.78	4.0 (1.0)
Statistical Analysis		$\chi^2 = 3.442$		$\chi^2 = 15.251$	
p-value		p=0.179		p<0.001	
Differentiation				(1.2-3)	

**“Mann-Whitney U” test (Z-table value) for comparison of measurement values of two independent groups was used for data without normal distribution; “Kruskall-Wallis H” test statistics (χ^2 -table value) were used to compare three or more independent groups.

Table 5. Distribution of frequencies obtained from the scale of attitudes of healthcare workers towards COVID-19 vaccine.

Statement	I strongly disagree. n (%)	I disagree. n (%)	I'm undecided n (%)	I agree. n (%)	Strongly Agree n (%)
I would like my family to have the vaccine developed for this disease.	57 (10.71)	30 (5.64)	38 (7.14)	141 (26.51)	266 (50)
I would like to have the vaccine (a new dose) developed for this disease at the first opportunity.	46 (8.65)	50 (9.4)	38 (7.14)	88 (16.54)	310 (58.27)

I think everyone should have the vaccine developed for this disease.	48 (9.02)	51 (9.59)	16 (3.01)	202 (37.97)	215 (40.41)
I trust the statements about the vaccine developed	110 (20.68)	86 (16.17)	82 (15.41)	140 (26.31)	114 (21.43)
Developed vaccine can cause disease transmission	391 (73.5)	102 (19.17)	29 (5.45)	7 (1.32)	3 (0.56)
I think that the developed vaccine has no protective effect	364 (68.42)	148 (27.82)	10 (1.88)	9 (1.69)	1 (0.19)
Developed vaccine is dangerous	256 (48.12)	174 (32.71)	94 (17.67)	6 (1.13)	2 (0.37)
I think the effectiveness of the developed vaccine has not been sufficiently tested.	219 (41.16)	180 (33.83)	60 (11.28)	46 (8.65)	27 (5.08)
I think I can survive the epidemic without a vaccine.	400 (75.19)	108 (20.30)	16 (3.01)	6 (1.13)	2 (0.37)

DISCUSSION

Vaccination is considered as one of the greatest achievements in public health and a life-saving invention capable of controlling and eradicating infectious diseases in many parts of the world (12). Total doses of COVID-19 vaccines applied in Türkiye is 152.718.197 as of May,2023 and the rate of second dose administration at age 18 and over is 85.70%. The number of vaccinated HWs is over one million (13). This study is one of the first studies to evaluate the attitudes of healthcare professionals towards COVID-19 vaccines who had positive omicron variant after at least two doses of vaccination while public debate on vaccination necessity and vaccine safety continues. The aim of the study was to obtain subjective evaluation of health professionals about receiving another COVID-19 vaccine dose after receiving at least two doses of COVID-19 vaccines at least 20 days after being positive with the omicron variant those work at the Ankara Public Health Molecular Diagnosis Laboratory. It is one of the laboratories with the highest test capacity authorized for the diagnosis of Sars-CoV-2 in Türkiye. The data obtained at the end of the study is in line with the positive attitude of the participants towards their own vaccine who believe that the pandemic will end in this way. This attitude coincides with the results of the study conducted in Greece in 2022 which reported Sars-Cov-2 positivity despite full-dose vaccination and the study conducted in Italy in 2021 which showed that the Sars-CoV-2 COVID-19 vaccine could be the only way to end the pandemic (8,13).

A positive attitude towards vaccines is expected from health professionals considering their scientific and medical training. Positive behaviors of healthcare professionals

towards vaccination can positively affect the rate of vaccination in the public as revealed in a study (14). A study carried out in Israel observed a difference in COVID-19 vaccine acceptance rates between doctors and nurses. Differences in vaccine acceptance rates among occupational categories (doctors vs. nurses) have been observed for seasonal influenza and COVID-19 vaccines. Nurses were found to accept fewer vaccines than doctors with 92% and 69% for influenza and 78% and 61% respectively (p<0.1) (15). It was determined that other healthcare professionals (administrative staff, technicians, cleaners, and security guards) had a more negative attitude towards the COVID-19 vaccine compared to doctors/nurses in studies reported from Israel, Congo, Belgium, France, Nepal and Slovenia and as consistent with our study (16-17).

A study from the United Arab Emirates revealed the lowest willingness or negative attitude towards the vaccine among doctors contrary to other data (18). Approximately 93.37% of the population of age 18 and over received a dose of COVID-19 vaccine in Türkiye, as of October 2021. Studies have shown that vaccination of HWs with influenza vaccine reduces patient deaths and staff shortages (19). It would be reasonable to expect a similar benefit from COVID-19 vaccination. It was found that participants who had the flu vaccine were more willing to be vaccinated against COVID-19 in a study conducted in Italy (20).

It is possible to express that 28.19% of the healthcare professionals who participated in our study had influenza vaccine every year or some years and this situation created a positive perception of vaccination in general. It was determined that the negative attitude of those who have regular influenza vaccine every year and some years are less than those who are not vaccinated according to this result (9). Although sociodemographic characteristics such as age, education level and income status can affect people's attitudes about a subject positively or negatively, the gender and age classes of HWs did not affect their attitudes towards the COVID-19 vaccine in our study. It was identified that increasing age and education level in the USA positively affected attitudes towards the COVID-19 vaccine and the acceptance of these vaccines increased contrary to our study (21). Several studies reported that the vulnerability to environmental factors will increase with increasing age and positive attitude for the vaccine will increase accordingly (22).

I Pfizer-BioNTech® s the most preferred vaccine with a rate of 75.19% by Ankara Public Health Molecular Diagnostics Laboratory healthcare professionals. The choices were 20.68% "Strongly Disagree" and 16.17% "I do not agree." for the statement "I trust the explanations made about the developed vaccine". Our research results support studies conducted in other countries. Healthcare workers' absence of fear about vaccine safety, useful information about the vaccine provided by them and having their relatives get these vaccines

will affect the rate of vaccination in the community (23). It was determined that the physicians' knowledge level about the vaccine is high (75.3%) and a significant relationship was found between the vaccination rate and the level of knowledge in a study evaluating physicians in Türkiye about influenza vaccine in which doctors who regularly vaccinate their patients and healthcare professionals every year encourage them to vaccinate (24).

More than 2/3 of healthcare professionals stated that they would recommend COVID-19 vaccine to their colleagues and immediate family members as reported in the study. More than half of the healthcare professionals reported that they would recommend the improved vaccine to their elementary family members in our study. COVID-19 disease poses a great threat especially for people with chronic diseases such as hypertension, diabetes, asthma, and obesity (25). This will affect attitude towards vaccines developed against Sars-CoV-2 infection. However, no significant difference was found between the positive and negative attitudes of HWs with chronic diseases towards re-administration of COVID-19 vaccine doses in this study. In our study, it was determined that a certain number of healthcare professionals had varying opinions about the COVID-19 vaccine. They were cautious for more than one vaccine dose and the main concern was that vague trust in the vaccine.

CONCLUSION

This study found that a multifaceted intervention consisting of a supportive and informative approach is critically important for promoting COVID-19 vaccination among healthcare professionals. It is crucial to implement vaccination programs to ensure social immunity as well as personal protective measures to control the epidemic. Lack of information among healthcare professionals shows that the leading decisive aspects are not different from the population in extraordinary conditions such as pandemics despite many scientific studies on efficacy, safety, and side effects for current COVID-19 vaccines. We determined that the appetite to have a COVID-19 vaccine among healthcare professionals varied by age, gender, and role in the laboratory with the highest acceptance rate among physicians and research scientists as a result of our study. Vaccination hesitancy and safety concerns were higher for laboratory technicians and other health personnel. Vaccine safety, possible side effects, efficacy and duration of vaccine development were identified as important factors affecting participants' concerns. The authors believe findings of this study can guide public health campaigns, particularly healthcare professionals, to increase COVID-19 vaccine acceptance. All HWs should access to accurate and up-to-date scientific information about vaccines at the same time

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