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Original Article

Factors in Vaccine Refusal by Patients Applying for COVID-19 PCR Test

COVİD-19 PZR Testi için Başvuran Hastalar Tarafından Aşı Reddindeki Faktörler

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ABSTRACT

Objective: This study was designed to determine the reasons for vaccine rejection in patients who applied for the coronavirus disease-2019 (COVID-19) polymerase chain reaction (PCR) test but did not receive the vaccine.

Methods: The study was conducted prospectively in the emergency department of a tertiary hospital between 31.01.2022 and 31.05.2022. 1000 patients who applied for the COVID-19 PCR test and refused to be vaccinated were included. The COVID-19 status of the participants, reasons for their application, number of PCR tests, methods of obtaining information about the vaccine, and reasons for the rejection of the vaccine were questioned.

Results: 54.6% of the participants were male and 45.4% were female. 60.7% of the patients applied for testing due to symptoms, 25.4% due to contact with people with symptoms, and 23.9% due to travel. 43.3% of the cases had COVID-19 infection; 53.6% of them had tested an average of 2-5 times in the last year. Most of the information about the vaccine was taken from social media, television, medical publications, and people around, respectively. Of the participants, 62.0% believed that COVID-19 vaccines had side effects, 47.3% believed that it had no protection, and 30.9% believed that there was not enough study on the subject. As the age grew, the rate of learning information from social media increased.

Conclusions: The most common reasons for COVID-19 vaccine rejection were vaccine side effects, doubtful vaccine protection, and concerns about the lack of sufficient studies on the vaccine. The higher the education level, the higher the vaccine rejection rate.

Keywords: COVID-19, PCR test, vaccine refusal

ÖZ

Amaç: Bu çalışma, koronavirüs hastalığı-2019 (COVİD-19) polimeraz zincirleme reaksiyonu (PZR) testi yaptırmak nedeni ile başvuran fakat aşı yaptırmayan hastalarda aşı reddinin nedenlerini saptamak amacı ile düzenlenmiştir.

Yöntemler: Çalışma, 31.01.2022-31.05.2022 tarihleri arasında üçüncü basamak bir hastanenin acil servisinde prospektif olarak yürütüldü. COVİD-19 PZR testi için başvuran ve aşı olmayı reddeden 1000 hasta dahil edildi. Katılımcıların COVİD-19 durumları, başvuru nedenleri, PZR testi yapma sayıları, aşı için bilgi edinme yöntemleri ve aşı reddinin nedenleri sorgulandı.

Bulgular: Katılımcıların %54,6'sı erkek, %45,4'ü kadın idi. Hastaların %60,7'si semptomları, %25,4'ü semptomlu kişilerle temasları ve %23,9'u da seyahat nedeniyle test vermek için başvurmuşlardı. Olguların %43,3'ü COVİD-19 enfeksiyonunu geçirmiş; %53,6'sı son bir yıl içerisinde ortalama 2-5 defa test yaptırmışlardı. Aşı ile ilgili bilgilerin çoğu sırası ile sosyal medyadan, televizyonlardan, tıbbi yayınlardan ve çevredeki kişilerden alınmıştı. Katılımcıların %62,0'si COVİD-19 aşılarının yan etkilerinin olduğuna, %47,3'ü koruyuculuğunun olmadığına, %30,9'u ise konu ile ilgili yeterli çalışma yapılmadığına inanmakta idiler. Yaş küçüldükçe aşı ile bilgileri sosyal medyadan öğrenme oranı artmıştı.

Sonuçlar: COVİD-19 aşı reddinin en sık sebepleri aşı yan etkileri, aşının koruyuculuğunun şüpheli olması ve aşı hakkında yeterince çalışma yapılmamış olması kaygısı idi. Eğitim seviyesi arttıkça aşı ret oranı artmıştı.

Anahtar kelimeler: COVİD-19, PZR testi, aşı reddi

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INTRODUCTION

Coronavirus disease-2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pathogen that causes acute respiratory failure, emerged in Wuhan, China in December 2019 and caused a pandemic worldwide[1]. This disease normally occurs in animals. There are many theories about how it is transmitted to humans. The most prominent claim is that it is thought to be transmitted from bats in the animal market in Wuhan because of its similarity with Batcow[2]. Typical symptoms of COVID-19 include fever, cough, and shortness of breath. It can be transmitted as an asymptomatic or mild upper respiratory tract infection, or it can cause severe pneumonia, multiple organ failure, and consequently serious mortality[3]. According to the World Health Organization (WHO), there were 762,791,152 cases and 6,897,025 deaths as of April 12, 2023[4].

Antiviral drugs such as darunavir non-peptidyl HIV-1 protease inhibitor, noraminidase inhibitor oseltamivir, lopinavir and ritonavir combination, and favipravir were tried to reduce morbidity and mortality for treating COVID-19 disease[5-8]. However, their efficacy and complications became controversial in the ongoing processes, and they were removed from treatment[9-11]. Steroids can be used in moderate and painful cases, but routine use of corticosteroids is not recommended because they suppress cytokine storm[9].

Vaccine studies accelerated in COVID-19 disease because the drugs used did not reach sufficient efficacy. Advances in molecular biology and vaccine technology have accelerated the production of different vaccines. For this purpose, inactivation of the live pathogen (inactivated vaccines), virus-like particles (VLP, i.e. synthetically produced antigens of pathogens), viral vectors, and nucleic acid-based vaccines (mRNA, DNA vaccines) were produced and used. SinoVac, TurkoVac, Biontech, AstraZeneca, Moderna, and Sputnik vaccines in Turkey[10]. Free access to these vaccines was provided throughout the country.

Refusal to accept the vaccine despite having access to it is defined as refusal to be vaccinated[11]. Vaccine refusal is always in a certain segment of every society, and the reaction continues to increase. Opponents of vaccination may also include health professionals. The most prominent vaccine refusal attitude emerged in 1840 against the smallpox vaccine[12]. In general, vaccine safety, adverse effects of vaccines, reservations based on religious beliefs, reservations based on disinformation, doubts about the real need for vaccines, and misinformation about the effectiveness of vaccines are the most important reasons for refusal to vaccinate[13]. Family histories, opinions of friends, and previous personal experiences are among the personal reasons for vaccine refusal[14].

These reasons may also lead people to doubt the vaccination of their children. Therefore, the desired success in reducing the morbidity and mortality of the disease is not achieved.

In this study, we investigated the reasons for COVID-19 vaccine refusal, the perspective of COVID-19 vaccine refusers toward childhood vaccines, the ways in which individuals obtained information about the vaccine, and the demographic characteristics of the participants. Therefore, we understood and implement measures that can be taken to eliminate or reduce our participants' reservations about the COVID-19 vaccine.

MATERIALS and METHODS

The place where the study was conducted: This study was prospectively conducted between January 31, 2022 and May 31, 2022 with 1000 participants who applied to Istanbul Goztepe Prof. Dr. Suleyman Yalcin City Hospital for PCR testing and refused to be vaccinated.

Source of ethics: Ethics Committee approval dated 09.02.2022 and numbered 2022/0075 was obtained from Istanbul Medeniyet University Goztepe Training and Research Hospital Clinical Research Ethics Committee. Consent was obtained from all participants included in the study.

Type of research: This study is a "basic" research according to the types of scientific research. Since we have shaped our purpose through "survey and case study", descriptive research is considered in its subgroup.

Analyzed data: Patient's gender, age, educational status, occupation, reasons for application, presence of chronic diseases, where they obtained information about vaccination, status of getting COVID-19 disease, number of tests for COVID-19, their knowledge and comments on childhood vaccines, reasons for vaccine refusal for COVID-19.

How patient data are collected: For the sake of standardization, data from patients admitted only during the hours when the study coordinator was actively working in the admission area were recorded. At the time of admission, after the normal systemic examinations of the patients were performed, PCR tests were duly obtained, and the necessary treatments were administered. The data required for the study were collected. The purpose and objectives of the study, the

fact that personal information would not be shared with third parties and that the results could be published academically were clearly explained to the patients. The data of patients who accepted the conditions were included in the study.

Inclusion Criteria

- Being over eighteen years of age,
- Having a PCR test for COVID-19,
- Refusing to be vaccinated for COVID-19,
- Not having the disease severe enough to require hospitalization due to COVID-19,
- Voluntarily participating in the study and agreeing to the scientific publication of their data.

Although our study was conducted prospectively on 1000 subjects, individuals who received the COVID-19 vaccine were not included in the study; therefore, no comparison could be made with this group. The effect of the data of individuals who did not accept the existence and mortality of COVID-19 and believed that it was a conspiracy theory and therefore did not give COVID-19 PCR test on vaccine refusal could not be evaluated.

Statistical Analysis

In the study, the questionnaire was administered directly by the author of the study and recorded by the same person. The data were transferred to the IBM SPSS Statistics 23 program. While evaluating the study data, frequency distribution (number, percentage) was given for categorical variables. Chi-square test was used to determine the relationship between variables. $P<0.05$ was accepted for significance.

RESULTS

Most of the participants were between 18 and 30 years of age (49.8%), male (54.6%), university graduates (52.6%), actively working (94.4%) and without any chronic disease (82.6%) (Table 1).

60.2% of the participants stated that vaccines should be administered in childhood; only 43.3% had COVID-19; the most important source of information about vaccination was social media (35.5%); the most important reason for wanting to be tested (60.7%) was their symptoms; 18.3% had been tested at least ten times in the last year (Table 2). The top three reasons for refusing vaccination for COVID-19 were vaccine side effects, insufficient studies on the subject, and insufficient information about the vaccine. Other reasons are detailed in Table 2.

The results of the distribution of COVID-19 exposure, childhood vaccinations, number of tests performed in the last year, sources of information about vaccination, and reasons for refusal to be vaccinated are presented in Table 3. Accordingly, males had COVID-19 at a higher rate (48.5%) than females (p=0.001); they used social media more to obtain information about the vaccine (p=0.001). However, male participants were more likely

Table 1. Demographic distributions.

		n	%
Age	18-30	498	49.8
	31-55	366	36.6
	56-65	136	13.6
Gender	Male	546	54.6
	Female	454	45.4
Education	Literate	18	1.8
	Primary school	147	14.7
	High school	290	29.0
	University	526	52.6
	PhD	19	1.9
Profession	Student	182	18.2
	Self-employment	169	16.9
	Worker	126	12.6
	Civil servant	113	11.3
	Health worker	84	8.4
	Teacher	58	5.8
	Unemployed	56	5.6
	House wife	56	5.6
	Other	51	5.1
	Engineer	44	4.4
	Lawyer	35	3.5
	Religious officer	26	2.6
Marital Status	Single	617	61.7
	Married	383	38.3
Chronic disease status	No	826	82.6
	Yes	174	17.4
Chronic diseases	HT	42	4.2
	DM	36	3.6
	Asthma/COPD	29	2.9
	Heart disease	20	2.0
	Psychiatric illnesses	18	1.8
	Rheumatic diseases	14	1.4
	Kidney diseases	10	1.0
	Neurological diseases	9	0.9
	Cancer	6	0.6

HT: Hypertension, DM: Diabetes mellitus, COPD: Chronic obstructive pulmonary disease

to be undecided about childhood vaccination (26.7%). Women were more likely than men (27.8%) to follow medical publications to learn about vaccines (p=0.001). The proportion of men (53.8%) who believed that the vaccine had no protective effect was higher than that of women (Table 3).

The results of the comparison of educational status and other parameters are summarized in Table 4. Accordingly, those with university education stated that childhood vaccines should not be administered at a higher rate (20.6%) than those with lower education (primary and high school) (p=0.001) and that they used social media to obtain information about vaccines at a higher rate (47.9%) (p=0.001). University students and university graduates reported that they had been tested less frequently in the past year; they were more likely to believe that the vaccine had side effects (62.6%) and that it had no protective effect (52.8%) (Table 4). Regarding the source of information for vaccination, high school graduates (29.0%) were more likely than university graduates (20.6%) to follow medical publications (Table 4).

A comparison of age and other parameters is shown in Table 5. In our study, age distribution was evaluated in three groups as 18-30 years, 31-55 years, and 56-65 years. Patients younger than 18 years were not included in this study because they were admitted to the pediatric emergency department. In addition, we did not have any patient aged >65 years. Accordingly, the rates of having COVID-19 disease were close to each

Table 2. Distribution of COVID-19 and vaccination status.

		n	%
Childhood vaccinations	Must be done	602	60.2
	Must not be done	174	17.4
	Undecided	224	22.4
COVID-19 transmission status	No	567	56.7
	Yes	433	43.3
Information source for vaccination	Social media	355	35.5
	TV	241	24.1
	Medical publications	206	20.6
	People around me	198	19.8
Reason for testing	Symptom	607	60.7
	Person contact	254	25.4
	Travel/event	239	23.9
Number of tests performed in the last year	1-2 test	122	12.2
	2-5 tests	536	53.6
	5-10 tests	159	15.9
	10 and more	183	18.3
Reason for vaccine refusal	I am worried about side effects	620	62.0
	I do not believe in protection	473	47.3
	I think not enough work has been done	309	30.9
	I do not have sufficient information about vaccination	184	18.4
	I find vaccine ingredients dangerous	173	17.3
	I think that the vaccine will cause other diseases	155	15.5
	I do not believe that COVID-19 is a natural disease	109	10.9
	I think it causes infertility	82	8.2
	Because of my chronic diseases	31	3.1
	Other	5	0.5

COVID-19: Coronavirus disease-2019

other in the age groups (p=0.514). Those in the 31-55 age group were more likely (74.0%) to state that childhood vaccines should be administered (p=0.001). Those in the 18-30 age group were more likely (40.2%) than others to have accessed information about vaccines through social media (p=0.001). In all three age groups, the maximum number of vaccinations received in a year was between two and five (p=0.001). The number of tests performed in a year increased with age. The highest rate of receiving ten or more vaccinations in a year (24.3%) was found in the 56-65 age group. Regarding the source of vaccine acquisition, the groups were similarly influenced by their environment. Those aged 56-65 years underwent more tests (Table 4, 5). Younger and middle-aged people were more concerned about the side effects of the vaccine and were more likely to report that they believed the vaccine was not protective than those aged 56 and over. Those who refused vaccination because of other diseases (18.5%), who stated that the vaccine would cause other diseases (39.0%), who stated that they did not have enough information about the vaccine (34.6%), and who stated that the substances contained in the vaccine were dangerous (28.7%) were higher in the group older than 56 years. In our study, the rate of participants who were concerned that the vaccine caused infertility was 8.2% (n=82) in general.

The proportions of those who had and had not had COVID-19 who believed that childhood vaccines should be administered were close to each other (61.7% and 59.1%, respectively).

DISCUSSION

Thanks to vaccination programs, one of the most important elements of primary medical care, many diseases that posed significant public health problems in the past have lost their former importance. In our

Table 3. Examination of the relationship between gender, COVID-19, and vaccination status.

		Male		Female		Chi-square	p-value
		n	%	n	%		
COVID-19 transmission status	No	281[b]	51.5	286[a]	63.0	13.424	0.001*
	Yes	265[a]	48.5	168[b]	37.0		
Childhood vaccinations	Must be done	320	58.6	282	62.1	15.838	0.001*
	Must not be done	80[b]	14.7	94[a]	20.7		
	Undecided	146[a]	26.7	78[b]	17.2		
Vaccine information source	People around me	96	17.6	102	22.5	51.467	0.001*
	TV	127	23.3	114	25.1		
	Medical publications	80[b]	14.7	126[a]	27.8		
	Social media	243[a]	44.5	112[b]	24.7		
Number of tests in the last year	1-2 test	69	12.6	53	11.7	3.461	0.326
	2-5 tests	294	53.8	242	53.3		
	5-10 tests	77	14.1	82	18.1		
	10 and more	106	19.4	77	17.0		
Reasons for refusing vaccination	I am worried about side effects	342	62.6	278	61.2	-	-
	I do not believe in protection	294	53.8	179	39.4		
	I think not enough work has been done	157	28.8	152	33.5		
	Because of my chronic diseases	20	3.7	11	2.4		
	I think that the vaccine will cause other diseases	76	13.9	79	17.4		
	I do not believe that COVID-19 is a natural disease	59	10.8	50	11.0		
	I do not have sufficient information about vaccination	102	18.7	82	18.1		
	I find vaccine ingredients dangerous	105	19.2	68	15.0		
	I think it causes infertility	79	14.5	3	0.7		
	Other	5	0.9	0	0.0		

[a, b]Shows percentage differences between groups (highest percentage), *p<0.05

COVID-19: Coronavirus disease-2019

country, a national vaccination program for many diseases has been in place for nearly a hundred years. Important vaccination studies for COVID-19 disease caused by the SARS-CoV-2 virus were finalized in a short time, and vaccination campaigns were initiated. In Turkey, the inactive vaccines SinoVac and TurkoVac and the viral vector vaccines Biontech, AstraZeneca, Moderna, and Sputnik were administered free of charge to the public[15].

Except for those who refused to be vaccinated, the entire population was vaccinated at different doses[16]. Despite the successful results of vaccination programs in protecting against diseases, there has been a global anti-vaccination movement that has been going on for nearly 180 years[12]. Advances in communication technology have made the anti-vaccination movement more visible. While the arguments of anti-vaccinationists have not changed much over the past two centuries, their disinformation capabilities and their ability to manipulate the public have evolved and changed[17].

In a review examining the acceptance of COVID-19 vaccines and comparing data from many countries, it was found that the countries with the highest vaccine acceptance rates were India (93%), China (91%), the United Kingdom (86%), South Africa (82%), Denmark (80%), and South Korea (80%), respectively[18]. The lowest acceptance rate was reported in Saudi Arabia (22%). The opposing arguments regarding the acceptance and rejection of COVID-19 vaccines also differed during the process. Globally, while the vaccine rejection rate was 21% in March 2020, it increased to 36% by July 2020 and decreased again to 16% in September 2020. This shows how easily it can be manipulated to persuade the public

Table 4. Examination of the relationship between educational status, COVID-19, and vaccination status.

		Primary education and below		High school		University and above		Chi-square	p-value
		n	%	n	%	n	%		
Childhood vaccinations	Must be done	106	64.2	182	62.8	314	57.6	19.758	0.001*
	Must not be done	11[b]	6.7	51[b]	17.6	112[a]	20.6		
	Undecided	48	29.1	57	19.7	119	21.8		
Vaccine information Source	People around me	49[a]	29.7	69[a]	23.8	80[b]	14.7	139.801	0.001*
	TV	75[a]	45.5	74[a]	25.5	92[b]	16.9		
	Medical publications	10[b]	6.1	84[a]	29.0	112[a]	20.6		
	Social media	31[b]	18.8	63[b]	21.7	261[a]	47.9		
Number of tests in the last year	1-2 test	21	12.7	31	10.7	70	12.8	14.666	0.023*
	2-5 tests	82	49.7	142	49.0	312	57.2		
	5-10 tests	34	20.6	47	16.2	78	14.3		
	10 and more	28	17.0	70[a]	24.1	85[b]	15.6		
Reasons for refusing vaccination	I am worried about side effects	105	63.6	174	60.0	341	62.6	-	-
	I do not believe in protection	63	38.2	122	42.1	288	52.8		
	I think not enough work has been done	40	24.2	109	37.6	160	29.4		
	Because of my chronic diseases	20	12.1	3	1.0	8	1.5		
	I think that the vaccine will cause other diseases	25	15.2	51	17.6	79	14.5		
	I do not believe that COVID-19 is a natural disease	13	7.9	34	11.7	62	11.4		
	I do not have sufficient information about vaccination	61	37.0	59	20.3	64	11.7		
	I find vaccine ingredients dangerous	24	14.5	53	18.3	96	17.6		
	I think it causes infertility	17	10.3	39	13.4	26	4.8		
	Other	4	2.4	1	0.3	0	0.0		

[a, b]Shows percentage differences between groups (highest percentage), *p<0.05

COVID-19: Coronavirus disease-2019

to accept vaccines or to worry them into refusing them. Among the countries with the highest rates of vaccine refusal is Turkey. In June 2020, the vaccine refusal rate in Turkey was 51%[19]. Among the most common reasons for refusal were concerns that the vaccine was too new, might have too many side effects, and therefore might not be safe. In this group, although the rate was low, there were also those who thought that COVID-19 was a biological weapon and refused to be vaccinated. These results are similar to the concerns in our study. Unlike in our study, there was also a concern that not enough scientific studies were conducted during vaccine production.

Williams et al.[20] evaluated the factors affecting voluntary acceptance of COVID-19 vaccine on 527 people in the United Kingdom in April 2020. In the study, the vaccine acceptance rate was found to be higher in the patient group at high risk for COVID-19. In the same study, it was shown that skepticism toward vaccines increased with increasing educational status. In our study, high-risk patients requiring hospitalization were excluded. This exclusion was influenced by the concern that risky conditions requiring inpatient hospitalization might inadvertently change the opinions of vaccine opponents and thus disrupt the standard of care. Our study also showed that suspicion and concern about childhood vaccination programs increased with increasing educational attainment. We believe that the increase in the rate of disinformation with the development of technology and the ease of access to this misinformation

Table 5. Examination of the relationship between age groups, COVID-19, and vaccination status.

		Age 18-30		Age 31-55		Age 56-65		Chi-square	p-value
		n	%	n	%	n	%		
COVID-19 transmissing status	No	290	58.2	205	56.0	72	52.9	1.330	0.514
	Yes	208	41.8	161	44.0	64	47.1		
Childhood vaccinations	Must be done	250[b]	50.2	271[a]	74.0	81	59.6	59.678	0.001*
	Should not be done	104[a]	20.9	54	14.8	16[b]	11.8		
	Undecided	144[a]	28.9	41[b]	11.2	39[a]	28.7		
Vaccine information source	People around me	93	18.7	79	21.6	26	19.1	24.958	0.001*
	TV	91[b]	18.3	107[a]	29.2	43[a]	31.6		
	Medical publications	114	22.9	71	19.4	21	15.4		
	Social media	200[a]	40.2	109[b]	29.8	46	33.8		
Number of tests in the last year	1-2 test	81[a]	16.3	16[b]	4.4	25[a]	18.4	56.513	0.001*
	2-5 tests	240[b]	48.2	244[a]	66.7	52[b]	38.2		
	5-10 tests	83	16.7	50	13.7	26	19.1		
	10 and more	94	18.9	56	15.3	33	24.3		
Reasons to refuse vaccination	I am worried about side effects	295	59.2	264	72.1	61	44.9	-	-
	I do not believe in protection	260	52.2	189	51.6	24	17.6		
	I think not enough work has been done	164	32.9	104	28.4	41	30.1		
	Because of my chronic diseases	1	0.2	5	1.4	25	18.4		
	I think that the vaccine will cause other diseases	57	11.4	45	12.3	53	39.0		
	I do not believe that COVID-19 is a natural disease	51	10.2	34	9.3	24	17.6		
	I do not have sufficient information about vaccination	79	15.9	58	15.8	47	34.6		
	I find vaccine ingredients dangerous	86	17.3	48	13.1	39	28.7		
	I think it causes infertility	30	6.0	49	13.4	3	2.2		
	Other	0	0.0	4	1.1	1	0.7		

[a, b]Shows percentage differences between groups (highest percentage), *p<0.05

COVID-19: Coronavirus disease-2019

and misleading information are also effective in this increase.

In a study conducted by Charron et al.[21] on 3938 individuals, it was investigated where parents with children between the ages of one and fifteen obtained information about vaccines and the reasons for vaccine refusal and acceptance. Accordingly, it was found that women's sources of information about vaccination were mostly health professionals. However, parents who were under the age of thirty and had higher educational attainment and better income used the internet at a higher rate to obtain information about vaccination. In the group that preferred health professionals as a source of information, vaccine refusal was found to be lower than that in those who only used the internet. In this study, the use of social media was the most common source of information among the non-vaccinated group. In our study, male participants used television programs and social media at higher rates as sources of information about vaccines. However, women followed scientific publications for information at higher rates. Again, in our study, while primary and high school graduates mostly obtained information about vaccines from people around them and television programs, those with university and doctoral education mostly used social media as a source of information. Simultaneously, in our study, the rate of obtaining information from social media increased with decreasing age. Social media and the internet are easily accessible, but in contrast, they are also an uncontrollable source of information. Therefore, it can mislead the public. To mitigate this risk, we believe that it may be appropriate to employ more health professionals who are directly specialized in this field in "information sources" and to work harder to make official information more popular. Furthermore, unnecessary discussions about vaccination by health professionals in public arenas do more harm than a good. This is because imposing misinformation on the public in this way may be a justification for vaccine refusal. It is also the duty of health professionals to avoid taking initiatives that may cause public concern, such as identifying the causes of vaccine refusal and developing strategies to combat them.

In the United Kingdom, a study on vaccine acceptance and refusal was conducted involving 849 participants. In the study, the prominent reasons for vaccine refusal were found to be vaccine side effects, lack of sufficient studies on vaccination; distrust of the doctor on the subject, and some conspiracy theories[22]. In the same study, vaccine refusal was found to be higher in young and female participants. In our study, women were statistically more likely than men to be against childhood vaccinations. Young people between the ages of 18 and 30 years were more opposed to childhood vaccines than the 56-65 age group. This suggests that young people have a more skeptical view of vaccination programs. Disinformation on social media is believed to be effective in this result. One way to prevent young people from having preconceived ideas about vaccination may be to explain why vaccines are given from primary school onwards.

The WHO working group (SAGE) conducted a study in Malaysia on COVID-19 vaccine refusal[23]. Among the prominent reasons for refusal in the study, trust in the vaccine, defined as the 3c (confidence, complacency and convenience) model, the necessity of the vaccine, and compliance/access to the vaccine were identified. In our study, the highest reasons for vaccine refusal in all age groups were possible side effects of the vaccine, doubt about the protection of the vaccine, and lack of adequate studies, which is consistent with the confidence step of the same model. In our study, it was found that social media platforms, which are not properly controlled by the authorities, were the most frequently used sources for information in all age groups, although they were more frequently used by young people. Again, considering the age groups, the young group using social media for information is the group that believes the least in the necessity of childhood vaccinations. Three-fifths of our participants believed in the COVID-19 symptom and came to be tested for it, yet refused to be vaccinated. This result shows that people are confused about the issue.

In a meta-analysis of 4299 publications analyzing factors affecting COVID-19 vaccine refusal, it was found that those with a master's degree were less at risk of vaccine refusal than those without a master's degree[24]. In contrast, in our study, as the level of education increased, the rate of considering childhood vaccinations decreased, and the preference for medical sources of information about vaccines increased. Although the level of education increased, social media continued to be the most frequently used source. Compared with COVID-19 vaccines, childhood vaccination programs are practiced whose effectiveness has been known for years and a certain atmosphere of trust has been established.

In a meta-analysis study conducted in 2020 on the refusal of childhood vaccines, it was found that 1557 parents refused the vaccine due to lack of trust in the vaccine and its side effects[25]. In our study population, which included individuals who refused COVID-19 vaccines, the most common reasons in all age and education groups were again reasons involving vaccine safety. Regardless

of whether the vaccine is new or not, whether there are sufficient studies or not, the main reason for vaccine refusal in individuals in the community is always vaccine safety. Those who refused vaccination due to "insecurity" did not provide any convincing concrete evidence in this regard.

Sometimes the reasons for refusing the COVID-19 vaccine can also be based on conspiracy theories and myths[26]. These conspiracy theories can be that the spread of COVID-19 is over 5G, that COVID-19 is a biological weapon. These theories are also supported by some health professionals. The misguidance of some healthcare professionals is the most encouraging point for supporters of this theory. One-tenth of the cases in our study stated that they did not believe in COVID-19. A successful fight against misconceptions is possible only if all aspects of the effects of vaccines are shared in an accurate, transparent, reliable, and controllable manner.

In another study examining COVID-19 vaccine refusal and factors affecting vaccine acceptance, it was emphasized that parents with a higher educational background may be exposed to more misinformation by relying on a critical thinking attitude[27]. In our study, the rate of thinking that childhood vaccines should not be administered was higher among university/doctorate graduates than among primary school and below graduates. The rate of learning information about vaccines from people around them and from television was higher in high school and below graduates than in university/doctorate graduates. Interestingly, the rate of learning information about vaccines from medical publications was higher in high school graduates than in university/doctorate graduates.

In the same study mentioned above, women's concerns about the safety of vaccines and lack of confidence in the quality and objectivity of information provided by health professionals were similar to the results of our study[27]. In our study, the rate of thinking that childhood vaccines should not be administered was higher in women than in men, whereas the rate of undecided vaccination was higher in men than in women. The rate of learning information about vaccination from medical publications was higher in women than in men, whereas the rate of learning from social media was higher in men than in women. Although the inclusion criteria differed, women were more prone to vaccine refusal in relation to the sources of information.

In a study examining the demographic characteristics of vaccine refusal in India, although 39% of mothers were concerned about the side effects of vaccines, almost all of them (97%) thought that childhood vaccines should be administered[28]. In our study, 60.2% of the participants believed that childhood vaccines should be administered. This difference may be due to differences in education models, religious beliefs, access to vaccines, and facilities in different countries.

Healthcare professionals play an important role in informing the public correctly. Despite this, some refuse vaccination altogether. In a systematic review by Biswas et al.[29], it was reported that approximately one-fifth of healthcare workers worldwide refused the COVID-19 vaccine. In Turkey, only 68.6% of healthcare workers can accept vaccination[30].

Among the reasons for refusing the vaccine, the claim that it causes infertility, which is considered a conspiracy theory, is one of the most frequently put forward myths[31]. In our study, the occupational groups with the highest rate of refusal were clergy, self-employed, and workers. The fact that it is not among the three most common causes in each occupational group is an important indicator. In addition, when we compare it with the educational level of the individuals, we see that this reason is most frequently cited only by those with literate, high school, and primary education. It may be thought that there is a relationship with the level of education, but despite this, it was not among the most common reasons for vaccine refusal at any level of education. In the population of our study, such unfounded conspiracy theories cannot be considered among the main reasons for vaccine refusal.

One aspect of our study different from other studies is that it only included individuals who applied for COVID-19 testing but refused to be vaccinated. In this prospective study of 1000 subjects, individuals who received the COVID-19 vaccine were not included; therefore, no comparison could be made with this group. At the same time, individuals who completely refused the vaccine, did not believe in COVID-19, believed that COVID-19 was a conspiracy theory, and did not give a PCR test could not be included in the study. Therefore, the effect of the demographic structure of these groups on vaccine refusal could not be evaluated. In this study, the sample size was not calculated and the sampling method could not be used. Therefore, the power analysis could not be carried out. These points are also among the limitations of this study.

CONCLUSION

Only individuals who were tested for COVID-19 but refused vaccination were included in our study.

Regardless of age, gender, and educational status, our participants mostly refused to be vaccinated on the grounds that vaccines contain side effects, have no protective effects, there were not enough studies. The belief that the vaccine had no protective effect was higher in men. Refusal rates increased with increasing educational attainment. Women were more likely to object to childhood vaccines. Social media was used at the highest rate to obtain information about vaccines. The younger the age, the more social media was used as a source of information. One out of every five participants referred to people in their neighborhood as a source of information. Sixty percent of the participants applied to the emergency room because of their symptoms. One out of every ten participants reported that they did not believe in COVID-19.

Ethics

Ethics Committee Approval: Ethics Committee approval dated 09.02.2022 and numbered 2022/0075 was obtained from Istanbul Medeniyet University Goztepe Training and Research Hospital Clinical Research Ethics Committee.

Informed Consent: Consent was obtained from all participants included in the study.

Peer-review: Externally and internally peer-reviewed.

Author Contributions

Surgical and Medical Practices: F.A., B.A., O.F.G., Concept: B.A., Design: F.A., B.A., G.A.S., S.A., Data Collection and/or Processing: F.A., B.A., O.F.G., C.N., Analysis and/or Interpretation: F.A., B.A., G.A.S., Literature Search: F.A., C.N., Writing: F.A., B.A., S.A.

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