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Research Article

Status of COVID-19 Infection and Vaccination in People Aged 18 Years and over in a Town: A Cross-Sectional Study in Turkey

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Objective. The objective of this study was to evaluate the cases of COVID-19 infection in people >18 years old and to investigate attitudes against vaccination and vaccine hesitancy and the factors affecting them. *Methods*. The data collection form used in the study was prepared by the researchers by screening the relevant literature. People over the age of 18 who agreed to participate in the study were invited to the family health center, and a questionnaire was applied by face-to-face interview method. The application time of a survey was 5-10 minutes. A total of 229 people were reached. Percentage of reaching was 95,4%. *Results*. The mean age of the participants was $44,13 \pm 14,18$ years. 31,9% of the participants in the study had COVID-19 infections. 69,9% of those who had COVID-19 infection caught the disease in the last year, and 93,2% were followed at home. Among the people with whom the participants lived, 21,6% of those who had COVID-19 infection were hospitalized and 5,7% died. Of the participants who expressed their opinion, 32,1% think that COVID-19 vaccines have serious side effects. Postvaccine side effects developed in 32,9% of the participants who had the COVID-19 vaccine, and 11,0% had a postvaccine infection. *Conclusion*. The results of our study revealed that the COVID-19 vaccine was highly accepted among the adult population in Turkey during the pandemic period. However, through this study, we found concerns about the side effects of the vaccine, the lack of confidence in the vaccine ingredient, and the effectiveness of the vaccine.

1. Introduction

Coronavirus Disease (COVID-19) is a viral disease that was first identified in patients who developed respiratory illness in China in December 2019. The disease was declared a pandemic by the World Health Organization on March 11, 2020, after it was detected in more than 118,000 people in 114 countries [1]. As of May 5, 2022, the global number of confirmed cases is 512,6 million, and the total death toll is 6,2 million [2]. In 2020, global economic growth decreased by about 3,2%. 95 million people live in extreme poverty and 80 million people are undernourished compared to the previous period. The COVID-19 pandemic, which has devastated lives, is an important public health problem [3].

A number of symptoms have been described in relation to COVID-19. These include fever, chills, cough, shortness of breath, runny nose, loss of appetite, nausea, vomiting, diarrhea, fatigue, headache, myalgia, and loss of sense of smell and taste [4]. Long-term effects of infection include complications such as insomnia, depression, anxiety, thromboembolism, arrhythmia, myocarditis, kidney failure, liver damage, and posttraumatic stress disorder [5–8]. Frequent hand washing, wearing masks in the community, and maintaining social distancing are important to prevent the spread of COVID-19. Vaccines to prevent infection are considered the most promising approach for stopping the pandemic [9].

Vaccines are biological preparations that provide immunity against infectious diseases by stimulating a response to the antigen in the pathogen. Although the vaccine development process is usually long and arduous, COVID-19 vaccine studies have been carried out very quickly. COVID-19 vaccines are classified into four main categories, virus-containing vaccines, protein-based vaccines, viral vector vaccines, and nucleic acid vaccines [10]. Studies have shown

that the administration of two doses of vaccine significantly reduces severe illness, hospitalization, and death [11]. As of October 22, 2021, 11,6 billion doses of the vaccine have been administered worldwide. 65,4% of the world's population has received at least one dose of COVID-19 vaccine. Among people living in low-income countries, this rate is only 15,8% [12].

In Turkey, studies on COVID-19 started on January 10, 2020, and the first case was seen on March 11, 2020, following Europe and neighboring countries [13]. Two types of vaccines are generally used in our country as BioNTech and Sinovac. So far, the total number of cases has reached 14,8 million, and more than 97 thousand of our citizens have died due to COVID-19. As a result of the COVID 19 vaccine applications that started on January 14, 2021, the first dose of vaccines was administered to nearly 58 million people. The rate of second dose vaccination is 85,4% [14].

The most accurate way to protect against variants of the virus, which have emerged over time, is to give two doses of vaccine to at least 90% of the population. A part of Turkey's population still has not been vaccinated. Vaccine hesitancy, which is one of the individual reactions in epidemic control, is among the reasons for not being vaccinated [15].

Vaccine hesitancy means delayed acceptance of vaccine administration despite the availability and accessibility of vaccine services [16]. Vaccine hesitancy occurs with the effects of individual, environmental, sociocultural, economic, political, and historical factors. Factors leading to vaccine hesitancy are complex and vary depending on time, place, and vaccines [17]. Vaccine hesitancy, which makes it difficult to reach herd immunity by reducing vaccination rates, was determined by the World Health Organization as one of the ten threats to global health in 2019 [18]. Addressing vaccination hesitancy, vaccine rejection, and opposition to vaccination is an important priority in the control of the COVID-19 pandemic as it increases the effectiveness of interventions needed in epidemic management [19].

In this study, we aimed to evaluate the cases of COVID-19 infection in people >18 years old and to investigate attitudes and behaviors against vaccination and to examine the causes of vaccine hesitancy and the factors affecting them.

2. Material and Methods

This study is cross-sectional and was conducted in the district of Kuzeykent in Kastamonu. Kastamonu is a city located in the Western Black Sea Region and constitutes 1,7% of Turkey's surface area. The population of the city center is 152,541. Kuzeykent is the largest district in the city center. Primary health care services are provided through the family health center located here.

The population of the study consists of people over the age of 18 registered in Kuzeykent family health center, corresponding to 20,993 people. Considering the 14,5% of the population aged 18 and over have not been vaccinated at least two doses throughout Turkey; the sample size for the study was determined as 200 with 95% confidence and 5% error. It was planned to carry out the study with 240 people by determining a substitute for every five participants.

Inclusion criteria were being aged over 18 years, accepting participation, and completing the questionnaire. Exclusion criteria included those who did not accept to participate and pregnant women.

The data collection form used in the study was prepared by the researchers by screening the relevant literature. The form consists of 26 questions. In the questionnaire form, the sociodemographic characteristics of the individuals, the presence of chronic diseases, the status of being infected with COVID-19, information about COVID-19 vaccines, and the reasons for not being vaccinated were questioned.

After obtaining the approval of the ethics committee, a list of people over the age of 18 registered in the family health center was obtained, and the appropriate sample size for each age layer was determined by weighting. Since it was aimed to reach 240 people, the interpersonal interval was $20993/240 = 87,47$. In order to determine the starting point, lots were drawn, 87 was added to the obtained number, and the next people were determined. People over the age of 18 who agreed to participate in the study were invited to the family health center, and a questionnaire was applied by face-to-face interview method. The data collection phase was completed in March 2022. The application time for a survey was 5-10 minutes. A total of 229 people were reached. Percentage of reaching was 95,4%.

Statistical analysis was performed with SPSS (Statistical Package for the Social Sciences) 22.0 program. Categorical variables are expressed as numbers and percentages, continuous variables as mean ± standard deviation and median. Categorical variables were compared using Pearson's chi-square and Fisher's exact tests.

3. Results

In the study, 229 people living in Kastamonu were examined. The mean age of the participants was $44,13 \pm 14,18$, and the median age was 44 (min: 18; max: 75) years. Table 1 presents the distribution of some descriptive characteristics of the participants. Of all participants, 64,6% were women, 24,0% were between 35 and 44 years old, 38,4% were primary school graduates, 80,8% were married, and 40,6% were employed. The income of 62,5% is equal to their expenses. 41,5% have a chronic disease.

Table 2 shows the distribution of the characteristics of the participants regarding the COVID-19 infection and vaccines. 31,9% of the participants in the study had COVID-19 infection. 69,9% of those who had COVID-19 infection caught the disease in the last year, and 93,2% were followed at home. The children of 18,1% of the participants who had children under the age of 18 and the other people with whom 38,4% of all participants lived had COVID-19 infection. Among the people with whom the participants lived, 21,6% of those who had COVID-19 infection were hospitalized and 5,7% died. Of the participants who expressed their opinion, 32,1% think that COVID-19 vaccines have serious side effects. 91,7% of the participants in the study had at least one dose of COVID-19 vaccine. Postvaccine side

Table 1: Some descriptive features of the participants, Kastamonu, 2022.

	Number (n)	Percentage (%)
Gender ($n = 229$)		
Female	148	64,6
Male	81	35,4
Age ($n = 229$)		
<25	24	10,5
25-34	40	17,5
35-44	55	24,0
45-54	47	20,5
55-64	44	19,2
≥65	19	8,3
Education level ($n = 229$)		
Illiterate	11	4,8
Primary school	88	38,4
Middle school	73	31,9
College or university	57	24,9
Marital status ($n = 229$)		
Married	185	80,8
Single	35	15,3
Other	9	3,9
Working status ($n = 229$)		
Employed	93	40,6
Unemployed	136	59,4
Income level ($n = 229$)		
Under expenses	58	25,3
Equal to expenses	143	62,5
Above expenses	28	12,2
Presence of chronic disease ($n = 229$)		
Yes	95	41,5
No	134	58,5

Table 2: Characteristics of participants regarding COVID-19 infection and vaccines, Kastamonu, 2022.

	Number (n)	Percentage (%)
Being infected by COVID-19 ($n = 229$)		
Yes	73	31,9
No	156	68,1
Being followed-up for COVID-19 ($n = 73$)		
At home	68	93,2
At hospital	5	6,8
Time of being infected by COVID-19 ($n = 73$)		
Within the last one year	51	69,9
Earlier than one year	22	30,1
Being infected by COVID-19 in children <18 years old ($n = 105$)		
Yes	19	18,1
No	86	81,9
Being infected by COVID-19 in other people they live with ($n = 229$)		
Yes	88	38,4
No	141	61,6
Being followed-up for COVID-19 in other people they live with ($n = 88$)		
At home	69	78,4
At hospital	19	21,6
Exitus status from COVID-19 infection in other people they live with ($n = 88$)		
No	83	94,3
Yes	5	5,7
Thinking that COVID-19 vaccines have serious side effects		
Yes	63	32,1
No	133	67,9
COVID-19 vaccination status ($n = 229$)		
Vaccinated	210	91,7
Unvaccinated	19	8,3
Experiencing side effects after COVID-19 vaccination ($n = 210$)		
Yes	69	32,9
No	141	67,1
Infection status after getting a COVID-19 vaccine ($n = 210$)		
Yes	23	11,0
No	187	89,0
Willing to have COVID-10 vaccination in young children <18 years old ($n = 184$)		
Yes	137	74,5
No	47	25,5

effects developed in 32,9% of the participants who had COVID-19 vaccine, and 11,0% had postvaccine infection. 74,5% of the participants who expressed an opinion want their child under the age of eighteen to be vaccinated against COVID-19.

Table 3 presents the status of having COVID-19 infection according to some characteristics of the participants. Accordingly, 33,8% of women, 28,4% of men; 40,6% of those younger than 35 years, 14,3% of those older than 55 years; 26,3% of those with middle school and below education level, 36,2% of those with high school and above education level; 30,8% of married, 36,4% of unmarried; 41,9% of employed, 25,0% of unemployed; 30,1% of those whose an income equal to their expenses, 36,2% of those whose income is below their expenses; 21,1% of those with chronic disease, 39,6% of those without chronic disease; 11,0% of those who were vaccinated, 42,1% of those who were not vaccinated had COVID-19 infection. There was a statistically significant difference between the participants in terms of COVID-19 infection status according to age, employment status, presence of chronic disease, and COVID-19 vaccination status ($p < 0,05$).

Table 4 shows the status of thinking that COVID-19 vaccines have serious side effects according to some characteristics of the participants who expressed their opinions. Accordingly, 37,9% of women, 22,2% of men; 45,0% of those aged 45-54 years, 22,2% of those over 55 years; 30,1% of those with middle school and below education level, 33,6% of those with high school and above education level; 30,0% of married people, 41,7% of unmarried people; 25,3% of

Table 3: Status of having COVID-19 infection according to some features of the participants, Kastamonu, 2022.

	Yes		No	
	Number (*n*)	Percentage (%)	Number (*n*)	Percentage (%)
Being infected by COVID-19				
Gender (*n* = 229)				
Female	50	33,8	98	66,2
Male	23	28,4	58	71,6
$\chi^2 = 0{,}700$	$p = 0{,}403$			
Marital status (*n* = 229)				
Married	57	30,8	128	69,2
Not married	16	36,4	28	63,6
$\chi^2 = 0{,}505$	$p = 0{,}477$			
Age (*n* = 229)				
<35	26	40,6	38	59,4
35-44	22	40,0	33	60,0
45-54	16	34,0	31	66,0
≥55	9	14,3	54	85,7
$\chi^2 = 13{,}006$	$p = 0{,}005$			
Education level (*n* = 229)				
Middle school or lower	26	26,3	73	73,7
High school or over	47	36,2	83	63,8
$\chi^2 = 2{,}532$	$p = 0{,}112$			
Working status (*n* = 229)				
Employed	39	41,9	54	59,1
Unemployed	34	25,0	102	75,0
$\chi^2 = 7{,}295$	$p = 0{,}007$			
Income level (*n* = 229)				
Under expenses	21	36,2	37	63,8
Equal to expenses	43	30,1	100	69,9
Above expenses	9	32,1	19	67,9
$\chi^2 = 0{,}717$	$p = 0{,}699$			
Presence of chronic disease (*n* = 229)				
Yes	20	21,1	75	78,9
No	53	39,6	81	60,4
$\chi^2 = 8{,}761$	$p = 0{,}003$			
Being vaccinated for COVID-19 (*n* = 229)				
Yes	23	11,0	187	89,0
No	8	42,1	11	57,9
$\chi^2 = 14{,}447$	$p < 0{,}001$			

Table 4: Status of thinking that COVID-19 vaccines have serious side effects according to some features of the participants, Kastamonu, 2022.

	Yes		No	
	Number (*n*)	Percentage (%)	Number (*n*)	Percentage (%)
Thinking that COVID-19 vaccines have serious side effects				
Gender (*n* = 196)				
Female	47	37,9	77	62,1
Male	16	22,2	56	77,8
$\chi^2 = 5{,}135$	$p = 0{,}023$			
Age (*n* = 196)				
<35	22	40,7	38	59,3
35-44	11	22,9	33	77,1
45-54	18	45,0	31	55,0
≥55	12	22,2	54	77,8
$\chi^2 = 9{,}172$	$p = 0{,}027$			
Education level (*n* = 196)				
Middle school or lower	25	30,1	58	69,9
High school or over	38	33,6	75	66,4
$\chi^2 = 0{,}270$	$p = 0{,}603$			
Marital status (*n* = 196)				
Married	48	30,0	112	70,0
Not married	15	41,7	21	58,3
$\chi^2 = 1{,}834$	$p = 0{,}176$			
Working status (*n* = 196)				
Employed	20	25,3	59	74,7
Unemployed	43	36,8	74	63,2
$\chi^2 = 2{,}827$	$p = 0{,}093$			
Income level (*n* = 196)				
Under expenses	19	39,6	29	60,4
Equal to expenses	39	32,0	83	68,0
Above expenses	5	19,2	21	80,8
$\chi^2 = 3{,}207$	$p = 0{,}201$			
Presence of chronic disease (*n* = 196)				
Yes	25	30,1	58	69,9
No	38	33,6	75	66,4
$\chi^2 = 0{,}270$	$p = 0{,}603$			
Being vaccinated for COVID-19 (*n* = 196)				
Yes	49	27,4	130	72,6
No	14	82,4	3	17,6
$\chi^2 = 21{,}516$	$p < 0{,}001$			

employed, 36,8% of nonemployed; 39,6% of those whose income is below their expenses, 19,2% of those whose income is above their expenses; 30,1% of those with chronic disease, 33,6% of those without chronic disease; 27,4% of those who have been vaccinated, 82,4% of those who have not been vaccinated for COVID-19 think that COVID-19 vaccines have serious side effects. There was a statistically

significant difference in terms of thinking that COVID-19 vaccines have serious side effects according to gender, age, and COVID-19 vaccination status ($p < 0, 05$).

When the first three doses of COVID-19 vaccines were examined, 8,7% (20 people) received three doses, 42,8% (98 people) received two doses, 3,1% (7 people) received one dose of BioNTech vaccine; 10,5% (24 people) had three doses, 9,2% (21 people) had two doses of Sinovac vaccine; 17,5% (40 individuals) appear to have received two doses of Sinovac and one dose of BioNTech vaccine.

Persons who do not have at least two doses of COVID-19 vaccine make up 65,4% (26 persons) of the total participants. When the reasons for not having two doses of COVID-19 vaccine were examined, 5,4% of the participants (17 people) were worried about the side effects of the vaccine, 57,7% (15 people) thought that the vaccine ingredient was not safe, 26,9% (7 people) thought that the vaccine was not effective, 23,1% (6 people) did not have time and opportunity to get vaccinated, 11,5% (3 people) were waiting for Turkish vaccination, 7,7% (2 people) had health problems, and 3,8% (1 person) stated that they had religious concerns.

4. Discussion

In our study, 8,3% of the participants were not vaccinated against COVID-19. In a study conducted in England and Turkey, 3% of participants refused to be vaccinated [20]. In a worldwide study, 14,2% of the participants stated that they did not agree to be vaccinated with a proven, safe, and effective vaccine [21]. In a study in China, the rate of those who did not agree to receive a successfully developed and approved COVID-19 vaccine was found to be 8,7% [22]. In a study in Indonesia, 6,7% of participants did not want to be vaccinated for COVID-19 even if the vaccine is 95% effective [23]. In a study conducted in the United Kingdom, 9,1% of respondents stated that they absolutely do not want to be vaccinated against COVID-19 [24]. In a study in Saudi Arabia, 7,0% of respondents reported hesitation against the COVID-19 vaccine [25]. The results of our study were parallel with those in the literature.

Among the reasons for not being vaccinated among those who did not receive two doses of COVID-19 vaccine among the study participants, the first reason is worrying about the side effects of the vaccine, thinking that the vaccine ingredient is unsafe, and thinking that the vaccine is ineffective. In a study conducted in the United Arab Emirates, the three most common reasons why participants were not vaccinated for COVID-19 were thinking that the vaccine was not effective, not meeting the criteria to be vaccinated, and believing that the vaccine had many side effects [26]. In a study from Chile, when the reasons for not being vaccinated were examined, the first reason was the side effects of the vaccine, the second reason was that they did not have enough information about vaccines, and the third reason was that they preferred others to be vaccinated [27]. In a study from Japan, the most common reasons for not getting a COVID-19 vaccine are concerns about side effects and safety in particular, side effects of all vaccines in general, attitudes towards the safety of vaccines, and waiting to learn more about vaccines [28]. When the reasons for not being vaccinated are examined, concerns about side effects and the ineffectiveness/safety of the vaccine appear as common reasons in all studies.

About one-third of respondents in our study think that COVID-19 vaccines have serious side effects. In a study conducted in Malaysia, 24,6% of participants stated that COVID-19 vaccines have side effects [29]. In a study conducted in Bangladesh, 46,2% of respondents believed that COVID-19 vaccines have side effects, while 16,4% said they thought the side effects could be life-threatening [30]. In a study in the United States, 63,5% of participants stated that they were worried about the side effects of the vaccine [31]. The variability of the results obtained in these studies may be related to the time periods, in which the studies were conducted and the differences in knowledge levels about vaccines between countries.

In our study, 82,4% of the participants who were not vaccinated against COVID-19 thought that the COVID-19 vaccine has serious side effects. In another study conducted in Turkey, 75,9% of individuals who did not think or were undecided about getting vaccinated reported that they were afraid of its side effects because the COVID-19 vaccine is a new vaccine [32]. In a study conducted in Kuwait, 91,2% of those who refused to be vaccinated stated that they were worried about the possible side effects of the COVID-19 vaccine [33]. 85,1% of respondents who were not willing to receive the COVID-19 vaccine in Uganda expressed concern about side effects. This frequency was found as 79,3% in the USA [34]. In a study conducted in Bangladesh, 78,5% of participants who were reluctant to receive the COVID-19 vaccine stated that they were worried about the side effects of the vaccine [35]. Despite the fact that the studies were carried out in different periods of the pandemic, the common point of all these studies is that a significant part of the participants who do not have the COVID-19 vaccine and do not plan to be are worried about the side effects of the vaccines.

In our study, 37,9% of women and 22,2% of men thought that COVID-19 vaccines have serious side effects. According to the results of a European-wide study, among respondents who were unsure about vaccination, 36% of women and 19% of men said they were worried about the potential side effects of the vaccine [36]. In a Canadian study, female participants reported that they were more concerned about short- and long-term vaccine side effects than male participants [37]. The fact that anxiety and negative attitudes towards vaccines are observed more frequently in women than in men may be associated with stronger immune reactivity of women.

In our study, there was a statistically significant difference in terms of being vaccinated against COVID-19, depending on whether the COVID-19 vaccines have side effects. As stated earlier, one of the most important factors affecting the decision to vaccinate is the side effect of the vaccine. In this case, it is an expected result that those who think that the vaccine has side effects are not vaccinated.

In our study, one out of every seven people in individuals over 55 years of age had a COVID-19 infection, while this

frequency nearly triples in the population under 35 years old. This may be related to the stricter implementation of the lockdown and isolation measures applied in Turkey for a long time in the older age group. In addition, the information in the media explaining the disease is more lethal in older ages and does not affect young people much might cause less attention to mask, distance, and hygiene rules in young people.

In our study, three-quarters of the participants want their child to be vaccinated against COVID-19. In another study conducted in Turkey, 38,4% of the participants stated that they would vaccinate their children if a vaccine for COVID-19 was developed [38]. In a study conducted in Israel, 70% of the population stated that they would have their child vaccinated against COVID-19 [39]. According to the results of China's meta-analysis of 29 studies to assess the global COVID-19 vaccination willingness for children, the worldwide vaccine acceptance rate is 61,4%, varying between 21,6% and 91,4% between countries and regions [40]. Over time, the realization that COVID-19 vaccines are effective and safe, contrary to concerns, may have lessened parents' concerns about vaccinating their children.

5. Conclusion

The results of our study are in accordance with the figures previously reported in different parts of the world and revealed that the COVID-19 vaccine was highly accepted among the adult population in Turkey during the pandemic period. However, through this study, we found three key factors that significantly influence participants' attitudes towards the COVID-19 vaccine. These were concerns about the side effects of the vaccine, the lack of confidence in the vaccine ingredient, and the effectiveness of the vaccine. Revealing the reasons affecting vaccine hesitancy is of great importance for the development and design of policies to be formed against this situation.

Our findings are likely to reflect general vaccine attitudes and beliefs and clear information about vaccine safety, efficacy, and side effects may be needed to increase vaccination intentions. Health education targeting various sociodemographic groups should be considered as a priority to increase people's behavior to get COVID-19 vaccine. In addition, it will be beneficial to inform the public in a transparent manner, taking into account the concerns of the public, through the media, politicians, and health professionals.

Data Availability

Data used in this study can be provided on reasonable request.

Additional Points

Key Findings. (i) COVID-19 vaccine was highly accepted among the adult population in Turkey during the pandemic period. (ii) Three key factors that significantly influence participants' attitudes towards the COVID-19 vaccine include concerns about the side effects of the vaccine, the lack of confidence in the vaccine ingredient, and the effectiveness of the vaccine. (iii) Health education targeting various sociodemographic groups should be considered as a priority to increase people's behavior to get COVID-19 vaccine.

Conflicts of Interest

The authors declare no conflict of interest to disclose.

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