Research Article

Evaluation of COVID-19 anxiety level and COVID-19 vaccine acceptance of the Turkish citizens during the pandemic period

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Abstract

Aim: In this work, we try to determine the effect of the coronavirus disease of 2019 (COVID-19) on Turkish citizens' anxiety levels and we try to investigate the COVID-19 vaccine acceptance rate among citizens. Moreover, the aforementioned two statistics are cross-correlated with each other. As final work, the reasons for the objection to the COVID-19 vaccine are observed.

Method: The survey was conducted on October 5, 2020, the survey link for the research was made available for participation to all adults aged 18 and over throughout Turkey through various media channels and social media platforms (WhatsApp, Instagram, Facebook). Data was collected via an online survey for 27 days, and the target sample was reached using the snowball method, concluding data collection on November 1, 2020. The survey data is analyzed by the Statistical Package for the Social Sciences (SPSS) programs.

Results: The mean age was 36.47 ± 12 years and 62% (1260) were women of the 2032 participants. COVID-19 vaccine behavior (COVID-B) was reported as 3.52 ± 1.0 (min 1, max5). 51.3% of the respondents were positive for the vaccination. 20.9% of the participants were completely positive for the vaccination. The most relevant (with 27.9%) reason for the hesitation is the safety of the vaccination. Furthermore, vaccine positivity was reported as proportional to the safety concerns about the COVID-19 pandemic ($r = 236$).

Conclusion: The report shows us that the rate of anxiety due to COVID-19 is related to the education level, which states that social awareness of the pandemic increased with the education level. However, there is no significant relationship between education level and COVID-19 vaccine acceptance. The most related factor to vaccine acceptance was the concern level of the people. We can say that the vaccine rate could be increased with knowledge of the pandemic.

Introduction

In January 2020, a new coronavirus, SARS-CoV-2, was identified as the cause of a viral pneumonia outbreak in the city of Wuhan, China [1]. Subsequently, due to the presence of COVID-19 cases in 113 countries outside of China and the rapid spread of the virus, a global pandemic was declared on March 11, 2020 [2]. In our country, the Turkish Ministry of Health established the COVID-19 Scientific Advisory Board on January 10, 2020, and the first COVID-19 case was announced on March 11, 2020.

The widespread transmission of cases worldwide and the relatively high mortality rates, as seen in historical pandemics, prompted the initiation of COVID-19 vaccine development efforts, recognizing that 'vaccination' is the most effective tool in combating the pandemic and the key to achieving herd immunity. However, given the speed of the pandemic, it was necessary to rapidly develop, prove the effectiveness of, and release a vaccine. During this process, concerns about mortality related to the COVID-19 pandemic and anxieties about the vaccines to be introduced to the market raised questions about how these concerns would affect vaccine acceptance.

In addition to the progression and dispensation of vaccines, a pivotal facet resides in the populace's inclination toward vaccination [3,4]. Preceding the pandemic, vaccine hesitancy was identified by the World Health Organization in 2019 as one of the foremost global health threats [5], and this concern escalated in the context of the COVID-19 pandemic. While anticipation for a COVID-19 vaccine was prevalent among communities at the onset of the pandemic, skepticism is now amplifying, and empirical evidence indicates a global decline in acceptance trends [3,4,6,7]. Consequently, the identification of predictive determinants for vaccination willingness is imperative for devising interventions to augment acceptance.

Various studies have underscored the significance of sociodemographic factors (e.g., diminished vaccine acceptance among females and younger individuals) concerning the reception of the COVID-19 vaccine [4,6,8,9], as well as for vaccines addressing other maladies in the past [10,11]. Distrust in research and vaccines, manifested in concerns about swift development, adverse side effects, and other unfavorable events, was recurrently cited as a cause for vaccine hesitancy [5], [12]. The lack of confidence in research may be attributed to the occasionally contradictory, swiftly evolving research landscape during the initial stages of the pandemic [13]. In this context, media communication, particularly through social media, appears to wield significant influence: Numerous studies have linked social media to apprehensions during the COVID-19 pandemic [14] and also to vaccine hesitancy and associated conspiracy theories [15,16]. While previous research concentrates on social media, the role of official media reporting (e.g., government and health authorities' websites) in relation to vaccine acceptance has been inadequately examined. Preliminary studies suggest that subjective levels of anxiety, fear, and individual risk constitute pivotal predictors of vaccine acceptance. Individuals exhibiting higher risk perception and heightened anxiety displayed significantly greater vaccine acceptance in Turkey, the UK [6], and France [8]. Anxiety has also been posited as a functional fear predicting public health compliance [17]. Nevertheless, inconsistencies in these findings underscore the need for a detailed examination of the role of fears and anxiety in the context of vaccine acceptance. Consequently, this study endeavors to disentangle distinct types of fears and anxiety in relation to vaccine acceptance.

This study aims to bridge this gap concerning vaccine acceptance in the general population and its interrelation with fears, media consumption, and sociodemographic factors shortly after the commencement of vaccinations in Turkey. What factors influenced COVID-19 vaccine acceptance, and would the vaccine acceptance rate in Turkey be sufficient to establish effective herd immunity?

Material and methods

Prior to data collection, a pilot study involving 100 participants was conducted online to determine the required sample size, with a two-tailed alpha error rate of 0.05, a beta error rate of 0.2, and an 80% power calculation, indicating the need for a sample of 400 individuals. However, considering the nationwide and regional focus on five different regions within the country, it was decided that a minimum of 2000 participants would be required if the analyses were to be conducted at a multilevel level. On October 5, 2020, the survey link for the research was made available for participation to all adults aged 18 and over throughout Turkey through various media channels and social media platforms (WhatsApp, Instagram, Facebook). Data was collected via an online survey for 27 days, and the target sample was reached using the snowball method, concluding data collection on November 1, 2020.

The survey provides an explanation of the main purpose of the study and confidentiality. Participants are asked for their consent before starting the survey, and they are advised that they can exit the survey at any time if they do not wish to continue. The initial section of the survey consists of 9 personal and demographic questions. There are a total of 46 questions in the survey, which include 26 questions about vaccine knowledge and vaccination behavior, 2 questions evaluating sources of vaccine information, and 9 questions about COVID-19 pandemic concerns and COVID-19 vaccine hesitancy.

To assess whether the collected data was biased or not, the common variance method was computed. A two-stage strategy was used to analyze the collected data. In the first stage, data cleaning was conducted to identify and address any missing data, among other issues. Subsequently, the factorial validity and reliability of the measured scales were evaluated, and the common variance method was calculated using Herman's single-factor test. In the second stage, descriptive statistics were computed, and the proposed hypotheses were tested using various analyses.

In this study, the distribution of measured variables was assessed using the Shapiro-Wilk test. The results of the normality test indicated that the data were normally

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distributed, allowing for the use of parametric tests for further analysis. Data were detailed with mean ± standard deviation, and analyses were performed using one-way ANOVA. A t-test was conducted to understand the difference in outcome variables based on gender categories. The Pearson correlation coefficient was calculated to understand the relationships within and between continuous demographic variables and outcome variables. Pearson chi-square test was used to compare differences between categorical variables.

Statistical analyses were conducted using SPSS version 25. p – values <0.05 were considered statistically significant for test results, while p – values <0.01 were considered highly significant.

The research received approval from the Ethics Committee of Çukurova University Faculty of Medicine on September 4, 2020. Additionally, ethical permission was obtained from the Scientific Research Study Committee on COVID-19 of the Turkish Ministry of Health.

Results

Of the 2032 participants in the survey, 62% were women with an average age of 34.8 ± 10.89 years, and 38% were men with an average age of 38.04 ± 13.33 years. 21.6% of the participants had an education level of high school or below, while the rest had a bachelor's or postgraduate education level. 67.5% of the participants lived in provincial centers, with participation from a total of 56 provinces. 58.8% of the participants were married, and 49% had children. 45.1% of the participants worked in the healthcare sector, while the rest worked in non-healthcare fields.

When asked, 'Would you get vaccinated for COVID-19 if a vaccine were available?' 49.5% of respondents answered negatively, and 38.3% expressed indecision on the matter. Among parents (1375 participants) asked, 'Would you get your child vaccinated for COVID-19 if a vaccine were available?' 32.1% of parents answered 'no,' and 25.5% said they were 'undecided' (Table 1). When questioned about the reasons for their COVID-19 vaccine hesitancy, 20% of participants stated they had no hesitations, while vaccine safety was among the top concerns (Table 2).

Of the participants in our study, 43.1% expressed a moderate level of concern about contracting the virus themselves, while the highest percentage, 38%, indicated that they were very concerned about the virus spreading to their families. This means that the concern over the virus spreading to their families was higher than the concern about contracting it personally. Concerns about the potential lethality of the COVID-19 virus were at a moderate level, with 32.4% expressing such concerns. 5% of participants stated that they had no concerns about contracting the virus themselves, while 2.3% had no concerns about it spreading to their families, and 2.4% had no concerns about the virus being lethal (Table 3). To assess the level of concern about the danger of the pandemic, we asked the question 'How concerned are you about the danger of the COVID-19 pandemic?' Participants provided a rating on a scale from 1 (least concerned) to 10 (most concerned) (Table 4).

Table 1: COVID-19 Vaccination Behavior of Participants.

	If a COVID-19 Vaccine Was Available, Would You Get It?		If a COVID-19 Vaccine Was Available, Would You Have Your Child Vaccinated?	
	n	%	n	%
I Will Definitely Do	90	4.4	77	3.8
I Will Do	158	7.8	126	6.2
I'm undecided	778	38.3	519	25.5
I don't do	607	29.9	432	21.3
I definitely wouldn't	399	19.6	220	10.8
Total	2032	% 100	1375	% 67.6

Table 2: COVID-19 Vaccine Concerns of Participants.

Are you hesitant about getting the COVID-19 vaccine?	n	%
I have no hesitation	424	20.9
I'm worried about quality control	223	11
I am anxious about the safety of the vaccine	566	27.9
I'll wait for it to be adequately tested in other people	513	25.2
I'll wait because I'm pregnant	3	0.1
I think it is better to become immune by recovering from the disease than the vaccine.	34	1.7
I'm not sure about the effect of the vaccine	212	10.4
I think I will have a mild Covid-19 disease	20	1
Other	37	1.8
Total	2032	100

Table 3: COVID-19 Virus Anxiety Level of Participants.

	What is the level of anxiety concerning the COVID-19 virus infecting you?		What is the level of anxiety concerning the COVID-19 virus infecting your family?		What is the level of Anxiety About the COVID-19 Virus Lethality?	
	n	%	n	%	n	%
No Anxious	101	% 5	47	% 2.3	49	% 2.4
Little Anxious	371	% 18.3	161	% 7.9	243	% 12
Moderately Anxious	876	% 43.1	549	% 27	659	% 32.4
Very Anxious	358	% 17.6	503	% 24.8	567	% 27.9
Extremely Anxious	326	% 16	772	% 38	514	% 25.3
Total	2032	% 100	2032	% 100	2032	% 100

When we compared socio-demographic characteristics by education level and gender, we identified significant differences in the level of concern about vaccine safety and efficacy in relation to gender. We found that males had significantly higher concerns about vaccines compared to females (p = 0.002). Furthermore, COVID-19 vaccine behavior and concern about the danger of the COVID-19 pandemic also varied by gender. We found that males were significantly more moderate in their acceptance of COVID-19 vaccines compared to females (p = 0.0001). We did not observe a significant relationship between education level and COVID-19 vaccine acceptance (p = 0.352). However, concern about the danger of the pandemic and concern about the potential lethality of the COVID-19 virus varied significantly by education level (p = 0.011, p = 0.0001) (Table 5).

There was no significant difference detected between age and concern about the potential lethality of the COVID-19 virus ($r = -0.013$). COVID-19 vaccine acceptance was positively correlated with age ($r = 0.157$). We found a positive relationship and positive correlation between the COVID-19 vaccine acceptance rate and concerns about the potential lethality of the COVID-19 virus and the danger of the pandemic ($r = 0.206$, $r = 0.236$). In other words, as concerns increased, vaccine acceptance also increased (Table 6).

Table 6: Relationship of COVID-19-related anxiety with age and COVID-19 vaccine acceptance.

Variables	Relation with Age	COVID-19 Vaccine Acception
COVID-19 Vaccine Behavior	.157**	
Anxiety about the COVID-19 Lethality Level	- 0.013	.206**
Anxiety About the Danger of the COVID-19 Pandemic	- 0.092*	.236**
Pearson Correlation Coefficient (r)		
*p < 0,05 , **p < 0,01		

Table 4: Participants' level of anxiety about the danger of the COVID-19 pandemic.

Evaluation	n	Percent (%)
1	504	24.8
2	225	11.1
3	358	17.6
4	376	18.5
5	200	9.8
6	182	9
7	97	4.8
8	47	2.3
9	14	0.7
10	29	1.4
	2032	100

Table 5: Relationship analysis of variables with gender and educational status.

Variables	Gender	Mean Value ± sd	p
COVID-19 Vaccine Behavior	Female	3.31 ± 0.96	0.001
	Male	3.73 ± 1.04	
Anxiety About the COVID-19 Lethality Level	Female	3.28 ± 2.04	0.059
	Male	3.83 ± 2.23	
Anxiety About the Danger of the COVID-19 Pandemic	Female	3.60 ± 0.94	0.001
	Male	3.52 ± 0.91	
	Education Level		
COVID-19 Vaccine Behavior	Read and Write	3.00 ± 1.41	0.352
	Primary School	3.62 ± 0.58	
	Secondary School	3.17 ± 1.69	
	High School	3.46 ± 0.99	
	University	3.44 ± 1.05	
	Master Degree	3.56 ± 1.00	
Anxiety about the COVID-19 Lethality Level	Read and Write	3.58 ± 0.50	0.0001
	Primary School	3.78 ± 0.86	
	Secondary School	4.33 ± 0.84	
	High School	3.54 ± 0.98	
	University	3.49 ± 0.95	
	Master Degree	3.72 ± 0.85	
Anxiety About the Danger of the COVID-19 Pandemic	Read and Write	3.63 ± 1.77	0.011
	Primary School	3.35 ± 1.89	
	Secondary School	2.71 ± 2.87	
	High School	3.41 ± 2.17	
	University	3.65 ± 2.24	
	Master Degree	3.24 ± 1.84	
With one-way ANOVA.			

Discussion

In our study, when we compare education level with COVID-19 vaccine behavior, we observe that the analysis of the relationship between education level and COVID-19 vaccine acceptance is complex. The highest rate of COVID-19 vaccine acceptance was observed in the following order: primary school, master's degree, high school, and middle school graduates, and the lowest COVID-19 vaccine acceptance rate was only among those who were literate. Our findings partly overlap with other study results. In studies conducted worldwide, the population with lower education levels had lower acceptance rates for COVID-19 vaccines, with the exception of a study conducted in Turkey by Salali and colleagues [18]. In Turkey, unlike other countries, a negative correlation was found between COVID-19 vaccine acceptance and education level [18,19].

When examining the relationship between COVID-19 vaccine acceptance and gender, in the United States, male participants were found to be more likely to respond positively to getting vaccinated for COVID-19 compared to female participants, which was attributed to females being more cautious in avoiding risky behaviors and taking precautions [20]. In a study conducted in France, the vaccine refusal rate was found to be higher in women [21]. In a review, COVID-19 vaccine acceptance was lower in women than in men [18]. In a study conducted in Israel, a positive relationship was found between male gender and COVID-19 vaccine acceptance, and it was interpreted that this could be due to the gender-based differences in COVID-19 mortality, which might motivate men to accept the vaccine [22]. Our findings in this study were consistent with the literature. Overall, when examining COVID-19 vaccine acceptance in various countries, in the United States, approximately 23.4% of participants stated that they would refuse the COVID-19 vaccine when it became available [23]. Another study in the United States found that approximately 20% of Americans intended to refuse the COVID-19 vaccine that would be subject to standard vaccine safety protocols if it were available today (i.e., at the end of March 2020 for study participants) [24]. In another study, 57.6% of participants planned to get vaccinated, 31.6% were undecided, and 10.8% had no intention of getting vaccinated [25]. In a study with 2200 participants in the United States, it was found that only three out of four individuals would get vaccinated if a COVID-19 vaccine were available, and only 30% would want to get vaccinated as soon as the vaccine became available [26,27]. In a study conducted in France, 24% of participants refused the COVID-19 vaccine [21]. Globally,

according to studies on COVID-19 vaccine acceptance rates conducted in 33 different countries on December 25, 2020, among representative adults, the highest COVID-19 vaccine acceptance rates were found in Ecuador (97.0%), Malaysia (94.3%), Indonesia (93.3%), and China (91.3%). However, the lowest COVID-19 vaccine acceptance rates were found in Kuwait (23.6%), Jordan (28.4%), Italy (53.7%), Russia (54.9%), Poland (56.3%), the United States (56.9%), France (58.9%), Saudi Arabia (64.7%), and Turkey (66.0%). The Middle East was among the regions with the lowest COVID-19 vaccine acceptance rates globally [28]. In Turkey, in studies conducted in the first three months after the declaration of the pandemic, the rate of those stating that they would not get the SARS-CoV-2 vaccine ranged from 14% to 26%. It showed that one in every two individuals in the society would accept a potential COVID-19 vaccine for all family members and themselves. In addition to indecisive individuals, approximately one-fifth of the population refused the vaccine, and only 10% of the society considered getting their children vaccinated [29].

When cross-sectional studies on COVID-19 vaccine acceptance are conducted at different times, different vaccine acceptance rates can be obtained, even in just a few months. The passage of time after the vaccine is released increases vaccine acceptance rates to some extent. However, for us to definitively reach this conclusion, the sample must consist of the same individuals in all studies. Our study was conducted at the beginning of the pandemic before the vaccines were available. Conducting a new study would be useful in determining the change in COVID-19 vaccine acceptance rates.

When we examined COVID-19 vaccine behaviors and reasons, similar to other vaccines, the greatest obstacle to vaccine acceptance in COVID-19 vaccines was found to be concerns about vaccine safety. One of the first reasons for distrust in COVID-19 vaccines found in studies conducted worldwide is the belief that the vaccines were not tested sufficiently in enough people due to their rapid development. Many studies have come to this conclusion [20,21,30,31]. In our questions aimed at understanding COVID-19 vaccine hesitancy and reasons, we found that 20.9% of participants had no hesitation in getting the COVID-19 vaccine, 27.9% were concerned about the safety of the vaccine, and 25.2% believed it had not been tested enough in others. There is a strong and significant inverse relationship between concern about vaccine safety and efficacy and COVID-19 vaccine acceptance. Our study's findings are consistent with the literature. If we want to increase COVID-19 vaccine acceptance in our country and achieve successful herd immunity, we need to address concerns about vaccine safety and efficacy.

Another factor that increases vaccine acceptance is concerns about the pandemic. In our study, we found that participants were most concerned about contracting COVID-19 themselves, with the highest percentage stating they were 'moderately concerned,' while concern about it spreading to their families was 'very concerning' in most cases. Concerns about the potential lethality of COVID-19 were also moderate.

According to a study conducted in the United States one week after the pandemic declaration, the level of concern about the pandemic among participants was moderate, and it was found to be more concerning for their families to get sick than for themselves to get infected [32]. In a study conducted in China, the level of concern about COVID-19 was measured at 2.4 out of 5 [33]. In a study involving 1090 participants from 41 countries worldwide, the level of concern about the COVID-19 pandemic was measured at 6.4 out of 10 [34]. Compared to the literature, our study found that the level of concern among the Turkish population was lower. Individuals who were highly concerned about getting infected were less likely to refuse the vaccine [18]. In France, it was also found that vaccine refusal was lower in those who were highly concerned about COVID-19 [21]. According to a study conducted in Germany in January 2021, concerns about COVID-19 infection and fears about its impact on health were significantly positively correlated with vaccine acceptance [35]. In a study conducted in Turkey, individuals with low COVID-19 anxiety were more likely to refuse the vaccine, and those who were highly concerned about getting infected themselves or their loved ones were more willing to get vaccinated [36].

Our study also found a strong and significant positive correlation between concerns about the potential lethality of the COVID-19 virus and the danger of the pandemic and COVID-19 vaccine acceptance. In conclusion, addressing concerns about vaccine safety and efficacy and increasing awareness of the risks of COVID-19 can be effective strategies to improve vaccine acceptance rates and achieve herd immunity.

Conclusion

During the COVID-19 pandemic, it is crucial to enlighten the public about the dangers of the outbreak and educate them on the preventive measures that can be taken. However, when conducting this education, it is essential for the public, especially the highly educated group, to stay as far away as possible from speculative information presented by social media and various publications that have not been proven to be accurate. This is because an increase in vaccine literacy does not necessarily lead to a proportional increase in vaccine acceptance. This situation suggests the presence of circumstances that can create information pollution and confusion regarding vaccine acceptance.

The increase in COVID-19 vaccine acceptance with age may indicate that the older population, which has more access to technology, is more exposed to speculative information about vaccines. Therefore, combating COVID-19 vaccine hesitancy in our country and worldwide requires joint efforts from governments, health policymakers, and media sources, including social media companies.

The growing concerns about the potential lethality of the COVID-19 virus contribute to an increase in COVID-19 vaccine acceptance. Presenting pandemic-related data to the public without concealing it will increase the public's awareness of COVID-19 mortality, thus enhancing vaccine acceptance.

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