

The COVID-19 Pandemic: Teacher Candidates' Views regarding the Virus and Vaccination Process

Muhammed SALMAN¹

Kastamonu University

Mustafa Öztürk AKCAOĞLU²

Kastamonu University

Muammer ERGÜN³

Kastamonu University

Abstract

In order for societies to normalize in educational, economic, social and mental health areas, the COVID-19 pandemic must be ended as soon as possible. Currently, the most critical factor in eliminating the pandemic seems to be the vaccine. Vaccination is one of the most successful public health interventions and is a cornerstone for communicable disease prevention. Both current teachers and teacher candidates should be competent in the field of health literacy as well as in the education and training process. In this study, we tried to reveal the views of teacher candidates regarding COVID-19 and its vaccines based on the studies reporting that anti-vaccination increased in individuals with more education. Six hundred thirty-eight teacher candidates participated in the study. The research data were collected through an 11-item questionnaire, and the data were analyzed using descriptive and cross-tabulation analyzes. Research findings mainly showed that vaccine acceptance was low, and most of the participants thought the virus is artificial. Another finding of the research revealed that most of the participants who complied with all the rules regarding COVID-19 did not get the virus; however, it was seen that nearly all of the participants who caught COVID-19 had an infected individual in their family. Given the importance of vaccination, measures should be taken for vaccination hesitation and rejection.

Keywords: Teacher Candidates, Vaccine Hesitation, Vaccine Rejection, COVID-19 Pandemic

DOI: 10.29329/epasr.2021.373.9

¹Dr., Faculty of Education, Kastamonu University, Kastamonu, Turkey, ORCID: 0000-0003-2144-4842

Correspondence: msalman@kastamonu.edu.tr

² Dr., Faculty of Education, Kastamonu University, Kastamonu, Turkey, ORCID: 0000-0003-2155-4822, ozturk@kastamonu.edu.tr

³ Dr., Faculty of Education, Kastamonu University, Kastamonu, Turkey, ORCID: 0000-0003-1066-8066, mergun@kastamonu.edu.tr

Introduction

Systematic observations on how outbreaks emerge and spread are essential in terms of both prevention and the vaccine development process. The COVID-19 disease was declared a pandemic in March 2020 by the World Health Organization (2020). In the first place, each country announced its own protective measures to prevent the spread of the pandemic. To this end, such restrictions as temporarily closing educational institutions or shift work plans have been imposed by the governments because protective behaviors play an important role in managing pandemics (Bish & Michie, 2010). The COVID-19 pandemic has caused massive disruption to the education and training process, and there is currently uncertainty at all levels, from pre-school to higher education around the world.

With the emergence of the pandemic, educational institutions worldwide are making great efforts to meet the social-emotional needs of children and compensate for learning loss. In this direction, different scenarios that were not foreseen before have been tried. The resulting variations require that both current teachers and teacher candidates should be competent in the field of health literacy as well as in the education and training process.

Timely and accurate information plays a critical role in controlling the spread of disease and managing fear and uncertainty during the pandemic. In addition, the risk perception of the society and, to some extent, the anxiety related to the possibility of getting sick are effective on prevention behaviors and measures to be taken. Knowing what to do helps people feel more secure and strengthens the belief that they can take the necessary steps to protect themselves (Akdeniz et al., 2020). However, unfortunately, the uncertainty about how COVID-19 emerged and the subsequent measures to be taken to prevent the epidemic, along with the erroneous information shared on televisions and social media platforms, made it difficult to manage the process correctly.

Initially, experts stated in TV programs and social media accounts that the mask had no protection at all and even spread the disease more. Similar faulty statements, unfortunately, reduced participation, which would reduce the pace of the epidemic in the first place and led to the spread of rumors and conspiracy theories that would trigger social division (Cable News Network, 2020; Nguyen & Catalan, 2020).

Although society has been misled by such discussions and social media posts, it has adopted the suggested approaches to control the pandemic, such as self-quarantine, social distance, hygiene, and masks (Olaimat et al., 2020). As the process continued, individuals worldwide began to learn how to live in the pandemic process. However, the long duration of COVID-19, the questions about when and how it will end, and the different answers given to these questions have confused people's minds.

According to the researchers, the process, also called the new normal, has also started to deteriorate people's mental health (Cengizhan, 2021; Wang et al., 2020).

In order for societies to normalize in economic, social and mental health areas, this pandemic must be ended as soon as possible. The most crucial factor of this process seems to be the vaccine. Vaccination is one of the most successful public health interventions and is a cornerstone for communicable disease prevention (Andre et al., 2008; Salerno et al., 2019). However, unfortunately, different approaches, attitudes and negative opinions about COVID-19, which emerged at the beginning of the pandemic, have also been discussed for the COVID-19 vaccine.

Since the news that the COVID-19 virus has mutated began to spread, vaccine studies have come to the fore again. As a result, how this mutation will affect vaccines developed for the virus has emerged as a new problem. It is known that inaccurate and incomplete information in the press and social media environments regarding this question can change attitudes and behaviors related to vaccination (Dredze et al., 2016; Puri et al., 2020; Tustin et al., 2018). Mutations in the same day reflected in the written press in Turkey and examples of vaccines reveals this contradiction:

A member of the pandemic scientific board said in a statement about the coronavirus that mutated in England that: "The mutation can void such vaccines as Pfizer, Sputnik and Oxford which do not contain the full virus. But the Chinese vaccine containing full virus may be less affected by this mutation." (Hurriyet Newspaper, 2020).

Another newspaper, on the other hand, explained that "In case mutant viruses make the vaccine ineffective, it is stated that new vaccine technologies such as BioNTech and Moderna, which started to be used in the UK and the USA, makes it possible to make very rapid changes and updates on vaccines. However, for now, vaccines seem effective. Apart from mRNA, it is unknown whether it is the same for other conventional vaccines, such as the Chinese vaccine." (Bursalı, 2020).

One of the most interesting comments presented in the newspaper asserted that "While the virus is rapidly mutating, that is, it will turn into the common cold, you may not know, the flu, what is the relationship between the hasty availability and launch of the vaccine? We must know the economy-politics of health/medicine." (Yalçın, 2020).

These kinds of statements lead to a decrease in the trust of the society regarding the companies that develop vaccines and whether vaccines are needed. As a result, similar expressions that can affect the attitudes cause an increase in behavior related to vaccine hesitancy (Özceylan et al., 2020; Salerno et al., 2019).

Globally, vaccination is one of the most successful public health interventions and is crucial for the prevention of communicable diseases (Andre et al., 2008; Salerno et al., 2019), but vaccine

opposition and controversy have been increasing in recent years (Özceylan et al., 2020; Signorelli et al., 2018). Therefore, the world health organization has named vaccine hesitation as one of the ten most significant threats to global health in 2019 (World Health Organization, 2019). Therefore, as the vaccine development process continues, it becomes essential to start examining the level of individuals' acceptance of the COVID-19 vaccine. Currently, little is known about the factors affecting people's acceptance or rejection of a COVID-19 vaccine (Reiter et al., 2020). Since the beginning of the pandemic, many studies on attitude, awareness and protection methods towards COVID-19 have raised the awareness of citizens around the world. Similar studies about the COVID-19 vaccine should be carried out, and vaccine hesitations should be avoided. This type of information is useful for generating informed projections of what vaccine use may be in the future, as well as for developing strategies and improving acceptability.

Present Study

The opinions of teacher candidates who will educate future generations on the COVID-19 vaccine are important, because the perspectives of teachers as role models may directly affect their students' opinions on vaccination. However, unlike the previous programs, it is seen that there is no health-related course among the teaching profession courses in teacher training programs, which have been valid since 2017 (Yükseköğretim Kurulu, 2018). This situation may be reflected in the opinions of teacher candidates regarding the vaccination in the COVID-19 pandemic process. To this end, in this study, we tried to determine the views of teacher candidates towards COVID-19 and its vaccines based on the studies reporting that anti-vaccination increased in individuals with more education. In line with this aim, the opinions of the participants on vaccination, the origin of the virus and virus protection, and the availability of a therapeutic drug were determined and it was examined whether there was a relationship between these views. In addition, the relationships between these variables and grade level were examined.

Method

Participants and Design

This cross-sectional study was conducted online over a span of one week from December 2 to December 8, 2020. In order to design the online surveys, Google forms was used. Some questions were asked to teacher candidates about the COVID-19 vaccine through a questionnaire. Seven hundred students from a faculty of education participated in the study. Sixty-two forms were excluded from the analysis because of missing or incorrect data. In order to present an overview of the answers given to the questions, frequencies and percentages were calculated via descriptive analysis. In addition, we used cross-tabulation to interpret different questions together. Findings were presented by tabulating at the question level.

Information about the participants' department, grade level and gender distribution are presented in Table 1.

Table 1. Information about the participants

		Frequency	Percent
Department	Preschool Teaching	156	24.5
	Turkish Language Teaching	65	10.2
	Elementary Mathematics Teaching	52	8.2
	Social Studies Teaching	163	25.5
	Elementary School Teaching	79	12.4
	Guidance and Psychological Counselling	55	8.6
	Fine Arts Teaching	68	10.7
Grade Level	First	109	17.1
	Second	195	30.6
	Third	160	25.1
	Fourth	174	27.3
Gender	Male	139	21.8
	Female	499	78.2
Total		638	100.0

Measures

The questionnaire, developed by the researchers, contains 12 questions about COVID-19. Some of these questions are directly related to the pandemic, while others are about protection against the pandemic and vaccines.

The answers to all questions, except for two questions, consist of yes or no choices. There are seven choices in the question asking for the choice of the country that produces the vaccine. In addition, there are five different options in the question related to the measures taken against COVID-19. The questions can be grouped under three headings according to their content.

In the first group, the following two questions were asked about COVID-19:

Do you believe COVID-19 exists?

Is COVID-19 a natural virus or artificial?

In the second group, the following five questions were asked about protection from COVID-19 and treatment of COVID-19:

Do you believe there will be a vaccine that protects against COVID-19?

Do you comply with COVID-19 protection rules?

Could you get the COVID-19 vaccine?

If you had to get a vaccine, which country would you prefer?

Do you believe that there will be a therapeutic drug other than the protective vaccine?

In the third group, the following four questions were asked about being affected by COVID-19:

Have you caught COVID-19?

Does anyone in your family have COVID-19?

Do you have a chronic illness?

Does the thought of vaccines having side effects change your mind about getting vaccinated?

Ethical Considerations

Before conducting the present study, ethical approval was received from the research ethics board of the faculty where the research was carried out. The participants were informed through a consent form about the confidentiality of their responses before filling in the questionnaire and signed informed consent statements by choosing “I agree to participate”.

Findings

The first item of the questionnaire sought an answer for whether the participants believe in the existence of COVID-19, an effective COVID-19 vaccine and whether they will get vaccinated.

Table 2. Participants’ views regarding the belief in the existence of COVID-19, an effective COVID-19 vaccine and whether they will get vaccinated

	The belief in the existence of COVID-19		The belief in an effective COVID-19 vaccine		Whether the participants get vaccinated	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
No	616	96.6	163	25.5	348	54.5
Yes	22	3.4	475	74.5	290	45.5
Total	638	100.0	638	100.0	638	100.0

Findings regarding the first question revealed that among university students, there are still those who have this opinion (3.4%). As for the second question, we found that although the vaccine has been used in some countries, 25.5% of the participants still do not believe that a vaccine that protects from this virus will be found. The third question was about whether the participants will get vaccinated if an effective vaccine is developed. It was found that only 45.5% of the participants stated that they would get vaccinated.

The descriptive results regarding whether the COVID-19 virus is natural or artificial are presented in Table 3.

Table 3. Descriptive statistics regarding whether the novel coronavirus is natural or artificial

	Frequency	Percent
Natural	188	29.5
Artificial	450	70.5
Total	638	100.0

In Turkey, as in other parts of the world, there have been intensive discussions about whether the novel coronavirus was artificial. The findings obtained in this study show that 70.5% of the participants have the opinion that COVID-19 was produced in a laboratory environment.

In Table 4, participants' answers regarding the precautions taken against the COVID-19 were given.

Table 4. Descriptive statistics regarding the precautions taken against the COVID-19

Precautions	Frequency	Percent	Cumulative Percent
Face masks	9	1.4	1.4
Physical distancing	2	.3	1.7
Hygiene rules	7	1.1	2.8
Face masks and physical distancing	3	.5	3.3
Face masks and hygiene rules	48	7.5	10.8
Face masks, physical distancing and Hygiene rules	569	89.2	100.0
Total	638	100.0	

Participants were asked which one/ones of the recommended precautions they followed for protection from COVID-19. We found that 10.8% of the participants neglected at least one of the precautions.

In Table 5, the participants' views about their choice of producing country if they had to get vaccinated are presented.

Table 5. Descriptive statistics regarding the vaccine choice based on manufacturing countries

Manufacturing country	Frequency	Percent
The USA	24	3.8
Turkey	316	49.5
Germany	140	21.9
China	38	6.0
England	19	3.0
Russia	13	2.0
Does not matter	88	13.8
Total	638	100.0

49.5% of the participants answered the question "If you have to get vaccinated, which country would you prefer?" as Turkey. In the second place, the vaccine produced in Germany was preferred (21.9%). The least preferred vaccine was the one produced in Russia (2.0%).

Descriptive statistics regarding whether the participants or someone in participants' family have caught COVID-19, the participants' belief in the development of a therapeutic drug other than the protective vaccine, whether the thought of vaccine having side effects change participants' mind about getting vaccinated and whether the participants suffer from a chronic illness are presented in Table 6.

Table 6. Descriptive statistics related to COVID-19 and vaccine

	Have you caught Covid-19?		Has anyone caught Covid-19 in your family?		The belief in the development of a therapeutic drug other than the protective vaccine		The thought of vaccine having side effects		The existence of a chronic illness	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
No	561	87.9	410	64.3	295	46.2	122	19.1	577	90.4
Yes	77	12.1	228	35.7	343	53.8	516	80.9	61	9.6
Total	638	100.0	638	100.0	638	100.0	638	100.0	638	100.0

When Table 6 is examined, it can be seen that 12.1% of the participants stated that they were infected with the COVID-19 virus (N=510). When the participants were asked whether there is anyone in the family with the COVID-19 virus, 35.7% of the participants stated that at least one person in the family was infected with the virus. Furthermore, when the participants were asked whether a therapeutic drug other than the protective vaccine could be found, 46.2% of them stated that a therapeutic drug could not be found. On the other hand, 80.9% of the participants stated that the thought that the vaccine will have a side effect might affect their opinions about getting vaccinated. Finally, 9.6% of the participants expressed that they have a chronic illness.

Results of cross-tabulations regarding whether the participant or someone in the family has caught COVID-19 showed that 93.5% of the participants who caught COVID-19 had someone in their family who got this virus. A statistically significant relationship was found between the presence of an individual caught in the family with COVID-19 and the participants caught with COVID-19 ($\chi^2(1, N = 638) = 127.25, p < .001$).

Results of cross-tabulations between whether the participant has caught COVID-19 and obeying the COVID-19 precautions revealed that 89.2% of the participants obey all three precautions, mandatory face masks, physical distance and hygiene rules. 10.8% of the participants state that they violate at least one of these three rules. The rate of those who stated that they had the virus, although they stated that they obeyed all the rules, is 11.1%. Among those who do not obey at least one rule, the rate of getting the virus was found to be 20.3%. In the light of these data, it can be said that when all the rules are followed, the rate of protection from the virus is 88.9%. A statistically significant relationship at $p = .05$ level was found between obeying the rules and the participants' catching COVID-19 ($\chi^2(1, N = 638) = 4.93, p=0.027$).

Results of cross-tabulations between whether COVID-19 is natural or artificial and whether the participant believes there will be a vaccine that protects against novel coronavirus indicated that 25.5% of the participants do not believe that a vaccine that protects from the virus will be found. 83.4% of these participants stated that they believed the virus was produced in a laboratory environment. On the other hand, 85.6% of those who say that the virus is natural stated that they do not believe that the vaccine will be found. A statistically significant relationship has been found

between the participants' not believing that a vaccine that protects from COVID-19 will be found and the production of the virus in a laboratory environment ($\chi^2(1, N = 638) = 17.54, p=0.000$).

Results of cross-tabulations between the participants' views regarding whether COVID-19 is natural or artificial and whether the participant will get vaccinated implied that 78.7% of those who said that they would not get vaccinated also stated that the virus was produced in the laboratory. It was found that 39.4% of those who said the virus was of natural origin stated that they would not be vaccinated. A statistically significant relationship was found between the participants who said that they would not have the COVID-19 vaccine and the production of the virus in the laboratory ($\chi^2(1, N = 638) = 24.78, p=0.000$).

Results of cross-tabulations examining the relationship between whether the participants' could get vaccinated and whether the thought of vaccine's having side effects would change their mind about getting vaccinated revealed that 78.3% of those who said they would get vaccinated stated that the thought that the vaccine would have side effects would change the idea of vaccination. 78.3% of those who said they would get vaccinated stated that the thought that the vaccine would have side effects would change the idea of vaccination. 83.0% of those who do not want to be vaccinated state that they can change their idea of vaccination due to side effects ($\chi^2(1, N = 638) = 127.26, p=0.000$).

Results of cross-tabulations indicating the relationship between the source of novel coronavirus and whether the participants believe that there will be a therapeutic drug other than the protective vaccine revealed that 74.6% of the participants who do not believe that a therapeutic drug other than the preventive vaccine will be found also believe that the virus was produced in the laboratory. On the contrary, 60.1% of those who believe that COVID-19 is a natural virus also believe that there will be a therapeutic drug other than the protective vaccine. A statistically significant relationship was found between the participants' views of a therapeutic drug other than the COVID-19 preventive vaccine and the thought of whether the virus should be natural or not ($\chi^2(1, N = 638) = 4.32, p=0.038$).

Results of cross-tabulations between whether an effective vaccine will be developed and whether the participants believe that there will be a therapeutic drug other than the protective vaccine showed that 70.6% of the participants who do not believe that there will be a protective vaccine do not also believe that a therapeutic drug will be found. 86.0% of those who believe that a therapeutic drug will be found also believe that a protective vaccine will be found. A statistically significant relationship was found between the participants' views of a therapeutic drug other than the COVID - 19 protective vaccine and the opinion of whether or not an effective vaccine will be developed ($\chi^2(1, N = 638) = 52.06, p=0.000$).

Results of cross-tabulations between the source of novel coronavirus and the grade level of the participants were examined. It was found that 66.1% of the first-year students, 67.7% of the second-year students, 68.1% of the third-year students and 78.7% of the fourth-year students thought that the virus was produced in the laboratory environment. Pearson's Chi-Square coefficient was analyzed to test whether this increase according to grade level was significant. As a result of the analysis, a statistically significant relationship was found between the participants' thought whether the Covid-19 virus was produced in a laboratory environment and the grade levels of the participants ($\chi^2 (1, N = 638) = 7.88, p=0.048$).

Results of cross-tabulations between whether the participants believe there will be a vaccine that protects against COVID-19 and the grade level of the participants revealed that the rate of students who do not believe that a vaccine that protects from COVID-19 will be found has increased from 22.9% to first-year students to 31.6% in the fourth year. However, the Pearson Chi-Square coefficient between these two variables was not significant ($p>0.05$). While first-year students constitute 15.32% of total non-believers, this rate rises to 33.7% in the fourth year. A statistically significant relationship at $p\leq.05$ level was found between the participants' thought that there would be a vaccine protecting against COVID -19 and the class levels of the participants. As the grade level increases, the proportion of students who do not believe that a vaccine that protects from COVID-19 will be found increases. A statistically significant relationship was found between the participants' thought that there would be a vaccine protecting against COVID -19 and the grade levels of the participants ($\chi^2 (1, N = 638) = 7.23, p = 0.020$).

Results of cross-tabulations between whether the participants will get vaccinated and the grade level of the participants showed that the participants who say that if the novel coronavirus vaccine application starts, they will not be vaccinated constitute 54.5% of the total participants. When the vaccination status of the participants is examined by grade level, it was found that 16.4% for those who say no to vaccination was first year students, while this rate rises to 27.6% in the fourth year. The Pearson Chi-Square test result was found to be $\chi^2 = 8.162$ and $p = 0.043$. This finding shows that as the class level increases, the students who think about not having vaccination increase.

62.7% of those who believe that there will be both a therapeutic medicine and a protective vaccine believe that the origin of the COVID-19 virus is natural. On the contrary, 87% of those who believe that both the COVID-19 vaccine will not be available and that there will not be any medicine to treat this virus believe that this virus is produced in the laboratory environment ($\chi^2 (1, N = 638) = 17.54, p = 0.000$).

Discussion, Conclusion and Recommendations

Vaccines play a key role in preventing the increase in pandemics. There are seven vaccines authorized and approved as of December 2020 and 55 vaccine candidates in the development process in the world (Craven, 2020). Following the approval, distribution and administration process of some vaccines, the issues of vaccine rejection and vaccine hesitation have gained importance. To this end, in this study, we specifically aimed to determine the opinions of teacher candidates about the COVID-19 pandemic and protective vaccine. It is important that studies on vaccine hesitation are carried out at all stages of the vaccination process. The reason for this is that the anti-vaccine debate that started even before the pandemic process continues in the discussion programs on both social media and television.

The findings of the study revealed that most of the participants believed the presence of the COVID-19 virus. However, it is noteworthy that even in December 2020, some participants (3.4%) still do not believe that the virus exists. The fact that the participant group consists of teacher candidates makes this situation even more interesting. On the other hand, while a great majority of the participants believe that an effective vaccine will be found, 25.5 of them do not. During the data collection, discussions about the mutation may have increased the belief that the effect of vaccines will be eliminated. On the other hand, 54.5 of the participants stated that they would not get vaccinated. This indicates vaccine rejection is a widespread phenomenon among teacher candidates in Turkey. The reason for this may be the absence of a course among the teaching profession courses, which could provide health literacy, in the teacher training programs that have been implemented since 2018.

Another finding of the study is that the participants who do not believe that there will be a preventive vaccine against COVID-19 also do not believe that a therapeutic drug will be found, and there is a significant positive relationship between these two variables. In other studies, it is seen that there is a similar level of vaccine hesitation and rejection in different countries (Synnott, 2020). In an early study with regard to vaccine development, Chesser et al. (2020) revealed that 68% of the participants would get a COVID-19 vaccine. In the study carried out by Lazarus et al. (2020), it was found that 45.1% of the Russian participants had a negative opinion about vaccination. In another study, published in September 2020, 31% of the participants were undecided, and 3% rejected (Salali & Uysal, 2020), while another study published in December found that 57% of the participants did not want to have the vaccine or were undecided. However, there are some other studies with higher acceptance rates (Barello et al., 2020; Dror et al., 2020).

Another question sought an answer for whether the new type of coronavirus was artificial or natural. 70.5% of the participants believe that the virus is an artificial virus produced in a laboratory environment. In other studies, it was found that the number of participants who thought that the virus

was produced in a laboratory environment was lower (54%) (Salali & Uysal, 2020). This may be due to the increasing widespread misinformation and conspiracy theories in social media and other digital environments, as emphasized in different studies (Chou et al.; Frenkel et al., 2020; Pennycook et al., 2020).

Nearly half of respondents stated that they would prefer the vaccine produced in Turkey if vaccination was obligatory. The vaccine produced in Germany took second place in preferences (21.9%). Results of a survey conducted across the country in Turkey show similar rates (Erdem, 2020). This may be because the founders of the company producing vaccines in Germany are Turkish. The results may suggest that people's sense of belonging increases their trust in vaccines. It is also stated that there is a positive relationship between patriotism and beliefs in conspiracy theories (Rieger, 2020), so each individual may rely more on the vaccine produced by their country (Rieger & He-Ulbricht, 2020).

Another finding of the research revealed that 88.9 of the participants who complied with all the rules regarding COVID-19 did not get the virus. 20.3% of the participants who neglected at least one of the rules got the virus. On the other hand, as a result of the analysis, it was seen that 93.5% of the students who caught COVID-19 had an infected individual in their family. This situation can be accepted as an indication that COVID-19 preventive methods are neglected within the family. The data in the statements made by the Ministry of Health in November 2020 also support that the transmission increases within the family (Koca, 2020).

The results also demonstrated that 85.6% of the participants (N=161) who stated that the virus is natural do not believe that an effective vaccine will be developed against the virus. This may be due to the explanations based on previous experiences that the vaccine development process takes too much time.

Approximately one-third of the participants who believed the virus is artificial stated that they would get vaccinated. Furthermore, 60.6% of the participants, who believed the virus is natural, stated that they would get vaccinated. In the research conducted by Salali and Uysal (2020), it was found that those who think the virus is natural more accept vaccination. The similarity that emerges in these two studies means that as the opinion that the virus is natural increases, the rate of vaccination acceptance increases.

Research findings show that as the grade level increases, the views with regard to the percentages of the virus being produced in the laboratory environment (from 66.1% to 78.7%), the idea that there will be no effective COVID-19 vaccine (from 15.32% to 33.7%) and vaccine rejection (from 16.4% to 27.6%) increase. These findings may mean that the skepticism that is part of scientific

thinking increases as participants get closer to graduation. Similar findings are seen in other studies (Akdeniz et al., 2020; Harapan et al., 2020).

Another finding revealed that 87% of the participants, who believed that both an effective vaccine and a curative drug would not be available, believed that the virus was produced in the laboratory environment. The widespread use of conspiracy in digital media environments theories such as reducing the world population may have led to an increase in ideas that this virus was produced in a laboratory.

Conclusion

Teaching and learning about health problems are essential for the future of humanity and are regarded as direct components of the education process. In this context, health literacy is important to be successful in dealing with health problems that arise with pandemics. The curricula at all levels need to be urgently restructured to gain health literacy. To this end, teacher training programs should also be redeveloped in accordance with health education in order to help students make informed decisions about their future lives and health.

Individuals living in Turkey are predominantly and increasingly hesitant about the origins of the virus and the vaccine. The reason for the emergence of this hesitation may be the fact that sometimes incorrect and sometimes contradictory statements take place in digital and published media. In fact, scientists interpret new data (such as mutation) emerging in the process of accessing scientific knowledge as approaching the result rather than reducing the value of science. However, the fact that only selected titles are included in the presentation of scientific information, that the people making the explanations are far away from being scientific, and the scientists make different explanations about the same subject generally mislead individuals.

It is vital to use an effective vaccine to end the pandemic. Considering the rate of vaccine hesitations, the authorized persons and institutions have an essential role in eliminating or at least reducing this hesitation. To this end, declarations about vaccination should be made from a single office, and the scientists who made the explanation should include individuals who are trusted by society. Besides, the opinions of those who experience vaccine hesitation should be approached with respect, and they should be persuaded to be vaccinated. On the other hand, considering the high hesitation rate of teacher candidates, who constitute the study group of this study, it is predicted that the negative situation regarding vaccination will increase even more. If this hesitation experienced by the teachers of the future is reflected in the students to be educated, it will be more challenging to eliminate the vaccine hesitation. For this reason, it is necessary to raise awareness of the individuals, especially teachers and teacher candidates in order to gain health literacy and eliminate vaccination hesitation. In this respect, it is vital to include socially important and scientifically based topics such

as pandemics into teacher training programs. In addition, setting up vaccination persuasion teams across the country can be useful in order to fight against vaccine hesitations stemming from insufficient knowledge.

Limitations

The results of this study should be considered in light of some limitations. In this study, no formal random sampling framework was used because the data was collected from a mid-sized state university located in the Black Sea Region, Turkey. Collecting data from other universities would be better in terms of representing the population. In addition, the data collection instruments used in this study are limited to self-report tools. Because of this, future studies can include qualitative or mixed-method research designs. Finally, the inferences regarding the variables of this study have to be made with caution because the findings rely on cross-sectional analysis. More information with regard to vaccine hesitation can be learned through longitudinal data.

References

- Akdeniz, G., Kavakci, M., Gozugok, M., Yalcinkaya, S., Kucukay, A., & Sahutogullari, B. (2020). A survey of attitudes, anxiety Status, and protective behaviors of the university students during the COVID-19 outbreak in Turkey. *Frontiers in Psychiatry, 11*(695), 1-9. <https://doi.org/10.3389/fpsyt.2020.00695>
- Andre, F. E., Booy, R., Bock, H. L., Clemens, J., Datta, S. K., John, T. J., Lee, B. W., Lolekha, S., Peltola, H., & Ruff, T. (2008). Vaccination greatly reduces disease, disability, death and inequity worldwide. *Bulletin of the World Health Organization, 86*, 140-146. <https://doi.org/10.2471/BLT.07.040089>
- Barello, S., Nania, T., Dellafiore, F., Graffigna, G., & Caruso, R. (2020). 'Vaccine hesitancy among university students in Italy during the COVID-19 pandemic. *European Journal of Epidemiology, 35*(8), 781-783. <https://doi.org/10.1007/s10654-020-00670-z>
- Bish, A., & Michie, S. (2010). Demographic and attitudinal determinants of protective behaviours during a pandemic: A review. *British Journal of Health Psychology, 15*(4), 797-824. <https://doi.org/10.1348/135910710X485826>
- Bursalı, O. (2020). Süper bulaştırıcı virüs, Türkiye’de var mı, aşılar iptal olur mu, daha tehlikeli mi? *Cumhuriyet*. <https://www.cumhuriyet.com.tr/yazarlar/orhan-bursali/super-bulastirici-virus-turkiyede-var-mi-asilar-iptal-olur-mu-daha-tehlikeli-mi-1800436>
- Cable News Network. (2020). *Online petition urges a SoCal school district to close due to coronavirus outbreak*. <https://edition.cnn.com/2020/02/04/us/coronavirus-school-district-petition-trnd/index.html>
- Cengizhan, S. (2021). The Effects of COVID-19 Process on Time Management of Foreign Language Teacher Candidates. *Educational Policy Analysis and Strategic Research, 16*(2), 295-312.
- Chesser, A., Drassen Ham, A., & Keene Woods, N. (2020). Assessment of COVID-19 Knowledge Among University Students: Implications for Future Risk Communication Strategies. *Health Education and Behavior, 47*(4), 540-543. <https://doi.org/10.1177/1090198120931420>

- Chou, W.-Y. S., Gaysynsky, A., & Vanderpool, R. C. The COVID-19 misinfodemic: Moving beyond fact-checking. *Health Education and Behavior*, 48(1), 9-13. <https://doi.org/10.1177/1090198120980675>
- Craven, J. (2020). *COVID-19 vaccine tracker*. Regulatory Affairs Professionals Society. <https://www.raps.org/news-and-articles/news-articles/2020/3/covid-19-vaccine-tracker>
- Dredze, M., Broniatowski, D. A., Smith, M. C., & Hilyard, K. M. (2016). Understanding Vaccine Refusal: Why We Need Social Media Now. *American Journal of Preventive Medicine*, 50(4), 550-552. <https://doi.org/10.1016/j.amepre.2015.10.002>
- Dror, A. A., Eisenbach, N., Taiber, S., Morozov, N. G., Mizrahi, M., Zigron, A., Srouji, S., & Sela, E. (2020). Vaccine hesitancy: the next challenge in the fight against COVID-19. *European Journal of Epidemiology*, 35(8), 775-779. <https://doi.org/10.1007/s10654-020-00671-y>
- Erdem, A. K. (2020). Kovid-19 aşısı anketi sonuçlandı. *Independent Türkçe*. Retrieved 08.12 from <https://bit.ly/3gJCGVB>
- Frenkel, S., Alba, D., & Zhong, R. (2020). Surge of virus misinformation stumps Facebook and Twitter. *The New York Times*. https://www.bridgeportedu.net/cms/lib/CT02210097/Centricity/Domain/3754/Costello_Journalism_11_3_23.3_31.pdf
- Harapan, H., Wagner, A. L., Yufika, A., Winardi, W., Anwar, S., Gan, A. K., Setiawan, A. M., Rajamoorthy, Y., Sofyan, H., & Mudatsir, M. (2020). Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia. *Frontiers in Public Health*, 8, 381-381. <https://doi.org/10.3389/fpubh.2020.00381>
- Hurriyet Newspaper. (2020). Prof. Dr. Muhammed Emin Akkoyunlu: Çin aşısı ikinci tip koronavirüste daha avantajlı olabilir. *Hürriyet*. <https://www.hurriyet.com.tr/gundem/prof-dr-muhammed-emin-akkoyunlu-cin-asisi-ikinci-tip-koronaviruste-daha-avantajli-olabilir-41695166>
- Koca, D. F. (2020, December 22). Ev içi bulaşma oranı. *Anadolu Ajansı*. <https://www.aa.com.tr/tr/koronavirus/bakan-koca-kovid-19da-ev-ici-bulasma-oranlarinin-yuzde-85e-yukseldigini-acikladi/2085572>
- Lazarus, J. V., Ratzan, S. C., Palayew, A., Gostin, L. O., Larson, H. J., Rabin, K., Kimball, S., & El-Mohandes, A. (2020). A global survey of potential acceptance of a COVID-19 vaccine. *Nature Medicine*, 1-4. <https://doi.org/10.1038/s41591-020-1124-9>
- Nguyen, A., & Catalan, D. (2020). Digital mis/disinformation and public engagement with health and science controversies: fresh perspectives from Covid-19. *Media Communication*, 8(2), 323-328. <https://doi.org/10.17645/mac.v8i2.3352>
- Olaimat, A. N., Aolymat, I., Elshahry, N., Shahbaz, H. M., Holley, R. A., & hygiene. (2020). Attitudes, anxiety, and behavioral practices regarding COVID-19 among university students in Jordan: A cross-sectional study. *The American Journal of Tropical Medicine*, 103(3), 1177-1183. <https://doi.org/10.4269/ajtmh.20-0418>
- Özceylan, G., Toprak, D., & Esen, E. S. (2020). Vaccine rejection and hesitation in Turkey. *Human Vaccines Immunotherapeutics*, 16(5), 1034-1039. <https://doi.org/10.1080/21645515.2020.1717182>

- Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science*, 31(7), 770-780. <https://doi.org/10.1177/0956797620939054>
- Puri, N., Coomes, E. A., Haghbayan, H., & Gunaratne, K. (2020). Social media and vaccine hesitancy: new updates for the era of COVID-19 and globalized infectious diseases. *Human Vaccines & Immunotherapeutics*, 16(11), 2586-2593. <https://doi.org/10.1080/21645515.2020.1780846>
- Reiter, P. L., Pennell, M. L., & Katz, M. L. (2020). Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? *Vaccine*, 38(42), 6500-6507. <https://doi.org/10.1016/j.vaccine.2020.08.043>
- Rieger, M. O. (2020). *COVID-19 Conspiracy Beliefs among Students in China and Germany—Causes and Effects*. (Working Paper). uni-trier.de/fileadmin/fb4/prof/BWL/FIN/Files/conspiracies3.pdf
- Rieger, M. O., & He-Ulbricht, Y. (2020). German and Chinese dataset on attitudes regarding COVID-19 policies, perception of the crisis, and belief in conspiracy theories. *Data in Brief*, 33, 106384. <https://doi.org/https://doi.org/10.1016/j.dib.2020.106384>
- Salali, G. D., & Uysal, M. S. (2020). COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel coronavirus in the UK and Turkey. *Psychological Medicine*, 1-3. <https://doi.org/10.1017/S0033291720004067>
- Salerno, M., Mizio, G. D., Montana, A., & Pomara, C. (2019). To be or not to be vaccinated? That is the question among Italian healthcare workers: a medico-legal perspective. *Future Medicine*, 14(9s), 51-54. <https://doi.org/10.2217/fmb-2018-0241>
- Signorelli, C., Iannazzo, S., & Odone, A. (2018). The imperative of vaccination put into practice. *The Lancet Infectious Diseases*, 18(1), 26-27. [https://doi.org/10.1016/S1473-3099\(17\)30696-5](https://doi.org/10.1016/S1473-3099(17)30696-5)
- Synnott, C. K. (2020). College students' COVID-19 vaccine hesitancy. *The Journal of Higher Education Management*, 36(1). <https://doi.org/10.2139/ssrn.3753756>
- Tustin, J. L., Crowcroft, N. S., Gesink, D., Johnson, I., Keelan, J., & Lachapelle, B. (2018). User-Driven Comments on a Facebook Advertisement Recruiting Canadian Parents in a Study on Immunization: Content Analysis [Original Paper]. *JMIR Public Health Surveill*, 4(3), e10090. <https://doi.org/10.2196/10090>
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R. S., Choo, F. N., Tran, B., Ho, R., Sharma, V. K., & Ho, C. (2020). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain, Behavior, and Immunity*, 87, 40-48. <https://doi.org/https://doi.org/10.1016/j.bbi.2020.04.028>
- World Health Organization. (2019). *Top ten threats to global health in 2019*. <https://www.who.int/emergencies/ten-threats-to-global-health-in-2019>
- World Health Organization. (2020). *Coronavirus disease (COVID-19) Situation Report—126*. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200525-covid-19-sitrep-126.pdf?sfvrsn=887dbd66_2
- Yalçın, S. (2020). Mutasyon kafada olmalı. *Sözcü*. https://www.sozcu.com.tr/2020/yazarlar/soneryalcin/mutasyon-kafada-olmali-6177382/?utm_source=gazeteoku&utm_medium=referral

Yükseköğretim Kurulu. (2018). *Yeni öğretmen yetiştirme lisans programları*. Yükseköğretim Kurulu.
<https://www.yok.gov.tr/kurumsal/idari-birimler/egitim-ogretim-dairesi/yeni-ogretmen-yetistirme-lisans-programlari>