A community-based study in the central district of Giresun: COVID-19 vaccine hesitancy

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ABSTRACT
Thanks to immunization strategies, which is a multistakeholder process that includes scientific, political, and nongovernmental organizational pillars, deaths and the risk of severe disease caused by COVID-19 infection are prevented. However, to prevent the losses caused by vaccine hesitancy, it is important to reveal the causes. We aimed to determine the frequency of vaccine hesitancy in individuals registered in the central district of Giresun, Turkey, and to investigate the related factors. In this cross-sectional study, the sample was selected from the population aged over 18 years, who were eligible for COVID-19 vaccination but had not been vaccinated. The systematic sampling method was used to select the participants (n = 422) from a list of the entire population (n = 12,055). The dependent variable was “COVID-19 vaccine hesitancy.” Data were analyzed using the SPSS 22 software; descriptive, Chi-square, and logistic regression analyses were conducted. The rate of vaccine hesitancy was 58.9%. Vaccine hesitancy was higher in those who were old, employed, and had not been infected with COVID-19. After being given information, 55.8% of those who hesitated and 12.4% of those who resisted were convinced. Distrust in vaccines was the most frequent cause of vaccine hesitancy (32.5%). It was found that vaccine hesitancy was two times higher in those who had not had COVID-19 [OR = 1.95; 95% CI: 1.13–3.369], and 1.7 times higher in those who were employed [OR = 1.70; 95% CI: 1.06–2.74]. The fight against vaccine hesitancy and resistance must be based on active information, guidance, confidence, and a thorough understanding of the reasons.

Introduction
Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19), was first seen in China in December 2019 and caused the COVID-19 pandemic throughout the world, and as of March 11th, 2020, in Turkey.1 The immune response of the body against this virus is not known completely, and there is no specific and effective medicine for its treatment. Vaccination studies are important because herd immunity achieved naturally is not yet ensured. Immunization services are recognized by the World Health Organization (WHO) as one of the most important and cost-effective community health interventions in terms of preventing vaccine-preventable diseases and related deaths.2 Vaccination ensures personal immunization and contributes to reducing the frequency of the disease within that community by ensuring the contact of those who cannot be vaccinated. At this point, the herd immunity concept becomes prominent.3 Although the herd immunity rate is not yet clearly known for COVID-19, in recent studies, it is notified that it is necessary to keep the level of vaccination in the range of 84 to 90% to maintain protection.4

The presence of those who hesitate and are not vaccinated despite intense immunity studies interrupts the fight against the pandemic. With the introduction of the vaccines, positive attitudes, as well as concerns related to the vaccines, came to the fore. Vaccine hesitancy is defined as a “delay of vaccine acceptance or refusal, although vaccination services are available.” Refusal of all vaccines is defined as vaccine resistance.5 The WHO considers vaccine hesitancy to be one of the greatest 10 global health threats.6 We see that vaccine hesitancy is affected by various factors, such as cultural, environmental, corporate, economic, political, and health systems.7 Concerns about the effects of vaccines, low-risk perception/unknowing the severity of the disease, lack of information, concerns about the reliability of vaccines, defined as not medically necessary, and conspiracy theories may be listed as the frequent reasons among them.8 In the case of Turkey, religious reasons, and the foreign origins of the vaccine can be added.9 In a study conducted for COVID-19 vaccine hesitancy, it was stated that negative statements on the media were important.10 In the Turkish Report research,11 it is indicated that the most common views are distrust against the vaccines and disbelief in the effectiveness of the vaccines among those who do not consider vaccination.

According to the data of the Ministry of Health dated October 5th, 2021, in Giresun Province, the vaccination rate of the population aged 18 years and over, who were vaccinated with at least one dose, was 88.9%. On the same date, there were 12,055 adults in total on the list of “Not Vaccinated” within the Public Health Management System (PHMS). Thanks to immunization studies, notable progress, albeit suboptimal, is being made in our country in terms of preventing death and severe
disease caused by COVID-19 infections. However, it is important to reveal the reasons to prevent the losses caused by vaccine hesitancy and resistance. The primary purpose of this study was to determine the frequency of vaccine hesitancy in individuals aged over 18 years registered in Giresun Province, Central District, and to investigate the related factors. Additionally, we aimed to define the causes of vaccine resistance and the settlements in which resistance was very dense, make contributions to immunization service planning, overcome vaccine hesitancy as a result of giving information, and increase the vaccination rates of the central district.

**Materials and methods**

**Sampling**

Our study was cross-sectional. The study population consisted of all individuals aged over 18 years who were eligible for COVID-19 vaccination but had not been vaccinated, and were registered in Giresun Province, Central District. There were 12,055 individuals in total on the list of “Not Vaccinated” within the PHMS, as of October 5th, 2021. The Epi-info program was used for sample calculation. The target population size was calculated as 384, among 12,055 registered people in the district with a 50% incidence, 5% margin of error, and 95% confidence interval. It was planned to reach 422 participants by adding 10% substitutes. The participants were determined using a systematic sampling method within a list involving the entire population. A random starting point was chosen and every 29th identity card number was added to the target population list.

**Inclusion and exclusion criteria**

Being registered in Giresun Province, Central District in the PHMS, and not being vaccinated against COVID-19 were determined as the inclusion criteria for the study. Not agreeing to participate in the study, being registered in other provinces or counties, and the individual’s telephone number not being registered in the system were taken as criteria for exclusion.

**Data collection**

A vaccine hesitancy questionnaire, which was created through a literature review, was administered to the participants, who agreed to participate. As a result of the pandemic, a questionnaire administration method via telephone was preferred. A brief information was given about the purpose of the study to the participants by calling via telephone; the informed consent text was read, and their consent was obtained verbally. Data were collected by the office-based team simultaneously during current filiation interviews. The aim of the study and the content of the interview was explained to the team by the researchers and was tested in a pilot study. The participants were called three times in total on different days and at different times and removed from the list if they could not be contacted. A brief informative text about the protectiveness of the COVID-19 vaccine was read to the participants at the end of the interview, and they were questioned about whether they wanted the vaccine. Participants who were still not convinced about vaccination were considered as having “vaccine resistance”.

**Variables**

The dependent variable was “COVID-19 vaccine hesitancy”. The dependent variable was evaluated using the question, “Please indicate whether you want to be vaccinated or not” within the questionnaire. The participants were classified as ‘vaccine accepting’ if they responded ‘yes’, ‘vaccine hesitant’ if they responded ‘maybe or not sure’, and ‘vaccine resistant’ if they responded ‘no’. However, in further analysis, according to Centers for Disease Control and Prevention (CDC) data, we evaluated those who did not receive a COVID-19 vaccine when available and those who were “hesitant”. The degree of vaccination acceptance was evaluated using the following options: “I certainly do not want, I do not want, I neither want nor do not want, I want, I certainly want”. Those who did not want vaccination and those who hesitated were recorded as “vaccine hesitancy present”. Reasons for vaccine resistance were also evaluated using the following options: “I do not trust (thinks that it is not tested sufficiently, considers as dangerous), I do not think that it is protective, I am afraid of needles, I am afraid of adverse effects, I think that I will overcome the disease with mild symptoms, I will be vaccinated but I am waiting to see its effects, religious reasons, I am waiting for a Turkish vaccine, I had the first dose and I do not want the second dose, I had the first two doses but I do not want the third dose, and other.” The level of vaccine hesitancy and reasons for not wanting vaccination were also investigated. Age, sex, neighborhood, education level, employment status, presence of chronic disease, previous COVID-19 infection status, the severity of previous COVID-19 infection, and perceived risk of catching COVID-19 were the independent variables. The level of education, being literate or not, and information on the school last graduated was questioned. Also, employment status was questioned, if employed, we asked if they were working remotely or going to their workplace. A five-point Likert-type scale was used to evaluate the severity of previous COVID-19 infection from “very mild” to “very severe”, also to evaluate the risk regarding COVID-19 from “very high” to “very low”. The items were determined upon a review of the relevant literature.

**Data analysis**

Data from the study were collected in a database, which was generated using the SPSS Statistics 22 program, and statistical analyses were conducted. Descriptive findings were grouped depending on the vaccine acceptance status. Mean, standard deviation, number, and percentage were used to express the descriptive statistics. The relationship between the independent variables and vaccine hesitancy was evaluated using the Chi-square test. Binary logistic regression analysis was applied to variables related to vaccine hesitancy. The dependent variable was transformed into dichotomous data for binary logistic regression analysis. Two groups were formed – vaccine acceptance and vaccine hesitancy. Resistant participants were added to the vaccine hesitancy group because some of them had
accepted the vaccine after information was given. The regression coefficient was calculated with a 95% confidence interval (CI) to calculate the odds ratio. \( P < 0.05 \) (two-sided) was accepted as statistically significant.

**Ethical considerations**

The necessary permits for the study were obtained from the Ministry of Health of Turkey, Giresun Provincial Directorate of Health, and the ethics board of Ordu University in accordance with the Helsinki Declaration. Informed consent of the participants was obtained verbally.

**Results**

The number of people who agreed to participate in the study and answered the questions was 380. Some of the participants were excluded from the study: 3.9% \((n = 16)\) lived outside the central district, and 3.4% \((n = 14)\) lived outside of Giresun Province. A total of 350 participants were included, and the participation rate of the survey was 82.9%. The characteristics of those who did not accept the interview could not be determined because the participant list contained only the name, surname, identity card number, and telephone number.

**Sociodemographic characteristics and COVID-19 anamnesis**

The average age of the participants was 36.6 ± 13.2 years. A total of 52.6% \((n = 184)\) of the participants were male, and 38.9% \((n = 136)\) had a university degree or higher. The majority consisted of those who were not employed (52.6%, \( n = 184\)); 47.4% \((n = 166)\) were employed and were going to work actively. A total of 82.6% \((n = 289)\) of the participants had no chronic disease (Table 1).

When the COVID-19 anamneses of the individuals were reviewed, it was determined that 49.4% \((n = 173)\) had been infected with COVID-19. It was determined that 56.6% \((n = 98)\) had mild infections, 23.1% \((n = 40)\) had a medium severity infection, and 20.3% \((n = 35)\) were infected severely. When the risk levels of the participants regarding COVID-19 were questioned, 5.4% \((n = 19)\) defined themselves as at no risk, 20.3% \((n = 71)\) said low risk, 16.9% \((n = 59)\) were medium risk, and 57.4% \((n = 201)\) considered themselves high risk (Table 1).

Vaccine hesitancy was found at higher rates in older participants than in those younger than 65 years, in those employed than in those unemployed, and in those who had not been infected with COVID-19. Furthermore, vaccine acceptance varied significantly depending on the severity of COVID-19 infection and the risk perceptions for contracting the disease \((p < .05)\).

**COVID-19 vaccine acceptance**

A total of 41.1% of all participants stated that they wanted to be vaccinated, 36.9% stated that they did not want to be vaccinated, and 22% stated that they were hesitant. The rate of vaccine hesitancy was determined as 58.9%. With the information provided at the end of the interview, 55.8% of those who were hesitant \((n = 43)\) and 12.4% of those who did not want vaccination \((n = 16)\) were convinced about vaccination. A total of 55.4% of all participants were convinced about vaccination.

When the reasons of the participants for not wanting vaccination were questioned, distrust in the vaccines and finding them dangerous were the most frequent reasons \(32.5%, n = 67\). The distribution of vaccine hesitancy causes is presented in Table 2.

A logistic regression analysis model consisting of five independent variables was applied to evaluate vaccine hesitancy factors. The model found that vaccine hesitancy was two times higher in those who had not been infected with COVID-19 than in those who had been infected \([\text{OR} = 1.955; 95\% \text{ CI}: 1.134–3.369]\), and 1.7 times higher in those who were employed than in those who were unemployed \([\text{OR} = 1.704; 95\% \text{ CI}: 1.060–2.740]\) (Table 3).

**Discussion**

This study presents findings on the prevalence of vaccine hesitancy in people who had not been vaccinated against the COVID-19 vaccine in the central district of Giresun, Turkey. As a result of the study, vaccine hesitancy and vaccine resistance were found in almost three in every five people as of the date of the study \((22\% \text{ hesitance, } 36.9\% \text{ resistance})\).

Vaccine acceptance increased to 55.4% by convincing half of the hesitant participants and one in every 10 people still refused vaccination after being given

### Table 1. Vaccine acceptance per sociodemographic and COVID-19-related variables.

| Vaccine Acceptance | Total \(\chi^2\) | \(p\) |
|--------------------|----------------|------|
| Yes | Hesitant | No | \(\%\) | \(\%\) | \(\%\) | \(\%\) |
| Sex | | | | | | |
| Male | 80 | 43.5 | 42 | 22.8 | 62 | 33.7 | 184 | 52.6 | 0.43 |
| Female | 64 | 38.6 | 35 | 22.1 | 67 | 40.4 | 166 | 47.4 |
| Age groups | | | | | | |
| 18–64 years | 141 | 42.1 | 75 | 22.4 | 119 | 35.5 | 335 | 95.7 | 0.049 |
| 65–95 years | 3 | 20.0 | 2 | 13.3 | 10 | 66.7 | 15 | 4.3 |
| Level of Education | | | | | | |
| Primary and below | 23 | 39.7 | 13 | 22.4 | 22 | 37.9 | 58 | 16.6 | 0.176 |
| Secondary – High | 75 | 48.1 | 29 | 18.6 | 52 | 33.3 | 156 | 44.5 |
| University and higher | 46 | 33.8 | 35 | 25.7 | 55 | 40.4 | 136 | 38.9 |
| Working status | | | | | | |
| Employed | 57 | 34.3 | 41 | 24.7 | 68 | 41.0 | 166 | 47.4 | 0.049 |
| Unemployed | 87 | 47.3 | 36 | 19.6 | 61 | 33.2 | 184 | 52.6 |
| Chronic disease | | | | | | |
| Yes | 30 | 49.2 | 10 | 16.4 | 21 | 34.4 | 61 | 17.4 | 0.311 |
| No | 114 | 39.4 | 67 | 23.2 | 108 | 37.4 | 289 | 82.6 |
| Disease severity* | | | | | | | | | |
| Mild | 84 | 48.6 | 41 | 23.7 | 17.2 | 27.7 | 173 | 49.4 | 0.002 |
| Severe | 60 | 33.9 | 36 | 20.3 | 81 | 45.8 | 177 | 50.6 |

*Within those who had COVID-19 \((n = 173)\).
Several behavioral and demographic factors influence vaccination beliefs. In this study, those who had not been infected with COVID-19, those who were infected mildly among those who were infected, and those who defined themselves as having a low risk of catching COVID-19 reported more vaccine hesitancy and resistance. This finding suggests that hesitancy is more common in those who do not take this disease seriously and who do not experience anxiety. This finding is also consistent with that of Hwang et al., who reported that less or no fear of COVID-19 are one of the predictors of vaccine hesitancy. Additionally, Kricorian et al. indicated that those who knew less about the virus and the vaccine had less willingness to receive the COVID-19 vaccine. In accordance with our results, Salali and Uysal demonstrated that participants who had higher COVID-19-related anxiety scores had higher odds of vaccine acceptance. In multiple variable analyses, only not being infected with COVID-19 was a risk factor for not being vaccinated. This could be explained by the “vaccination complacency,” which exists where perceived risks are low, and vaccination is not deemed a necessary preventive action. Other life/health responsibilities that might be seen to be more pertinent could lead to vaccine hesitancy. The immunization program’s success may, paradoxically, result in complacency and ultimately, hesitancy, as individuals weigh the risks of vaccination with a particular vaccine against the risks of the disease the vaccine prevents, when that disease is no longer common.

In the multiple analysis, vaccine hesitancy was observed as 2.7 times greater in employed individuals. This result can be attributed to the employees’ fear of disruption of work due to vaccine-related adverse effects, which was supported by previous studies. However, the findings of the current study do not support the review of Troiano and Nardi which indicates that unemployed people had a lower acceptance.

One in every three participants reported that they considered the vaccines dangerous because they had not been tested sufficiently and had not been vaccinated due to distrust. One in every five participants stated that they were not vaccinated because they were afraid of the adverse effects. These results are in accord with recent studies, indicating that, lack of confidence, concerns about safety and considering the vaccine risky were identified as factors of COVID-19 vaccine hesitancy. It is noteworthy that the most common reasons for not being vaccinated were similarly distrust of the current vaccines and not believing in the effectiveness of the vaccines in the Turkey. Conducted in 12 provinces in April 2021. Another study conducted by Murphy in the United Kingdom with over 30,000 participants, it was reported that the participants had a high level of distrust in the COVID-19 vaccine. Lucia et al. showed that lack of trust and misinformation affected the low rates of acceptance (57–69%) among the public for the COVID-19 vaccine.

Looking closer, contrary to previous findings, we have found no considerable differences between vaccine hesitancy and genders, age groups or education levels in further analysis. This study has some limitations. The sample representativeness may have been affected by the cross-sectional method and the low response rate. The participants were selected from a list involving the entire unvaccinated population. The participant list could not be weighted according to age, sex, or sociodemographic characteristics because it only included the identity card

Table 2. Relation of vaccine hesitancy causes to vaccine acceptance.

| Vaccine Acceptance * | Total | \( \chi^2 \) | p |
|----------------------|-------|------------|---|
| Yes | n | % | n | % | n | % | n | % | n | % | p |
| I do not trust, them because | 0 | 0 | 17 | 25.4 | 50 | 74.6 | 67 | 32.5 | 66.56 | <0.001 |
| I think that they were not tested sufficiently, I find vaccines dangerous. | 0 | 0 | 17 | 36.2 | 30 | 63.8 | 47 | 22.8 | 38.00 | <0.001 |
| I am afraid of adverse effects | 0 | 0 | 11 | 35.5 | 20 | 64.5 | 31 | 15 | 23.864 | <0.001 |
| I do not think they are protective | 0 | 0 | 10 | 50 | 10 | 50 | 20 | 9.7 | 12.78 | <0.001 |
| I will be vaccinated but I am waiting to see their effects | 0 | 0 | 10 | 50 | 10 | 50 | 20 | 9.7 | 12.78 | <0.001 |
| Those who did not indicate | 0 | 0 | 8 | 50 | 8 | 50 | 16 | 7.8 | 13.65 | 0.001 |
| reason | | | | | | | | | | |
| I am waiting for a Turkish vaccine | 0 | 0 | 8 | 53.3 | 7 | 46.7 | 15 | 7.3 | 13.851 | 0.001 |
| Pregnancy planning/ pregnancy/lactation | 0 | 0 | 6 | 60 | 4 | 40 | 10 | 4.9 | 11.02 | 0.004 |

*Excluding those who wanted to be vaccinated (n = 206).

Table 3. Binary logistic regression results of the variables related to COVID-19 vaccine hesitancy.

| | B (SE) | Wald | p | Exp(B) | 95% Confidence Interval |
|---|---|---|---|---|---|
| Age | 0.00 (0.009) | 1.087 | 0.297 | 1.009 | 0.992 | 1.026 |
| Sex | | | | | | |
| Female | REF | | | | | |
| Male | 0.020 (0.241) | 0.007 | 0.934 | 1.020 | 0.637 | 1.635 |
| Being infected with COVID-19 | | | | | | |
| Yes | REF | | | | | |
| No | 0.670 (0.278) | 5.823 | 0.016 | 1.955 | 1.134 | 3.369 |
| Working status | | | | | | |
| Unemployed | REF | | | | | |
| Employed | 0.533 (0.242) | 4.840 | 0.028 | 1.704 | 1.060 | 2.740 |
| Risk perception for catching the disease | | | | | | |
| High | REF | | | | | |
| Low | 0.117 (0.323) | 0.132 | 0.716 | 0.889 | 0.472 | 1.674 |
| Constant | 0.023 (0.342) | 0.005 | 0.946 | 1.023 | | |

\( R^2 = 0.040 \) (Cox&Snell), 0.053 (Nagelkerke), \( \chi^2(8) = 3.158, \) p > 0.05 (Hosmer&Lemeshow).

information. Although the COVID-19 pandemic has been in our lives for approximately 2 years, the pathophysiology of the disease and methods of protection have not yet been clarified. Disease management plans, diagnoses, and treatment guides are also changing continuously in line with scientific studies. Access to current and correct information is not always very clear or easy. From this point of view, it can be said that the pandemic became an epidemiologic, “the fact that the excessive information load brings wrong or unreliable information along with it, inevitably, a misinformation epidemic.” This may cause panic and fear in communities, and it may make the fight against the disease difficult and increase stigmatization. Therefore, one of the duties of medical staff and healthcare managers is to provide current and correct information to the community in relation to the disease and protection. In our study, one in every two hesitant people was convinced of vaccination with the brief information given to eliminate doubts about the vaccine.
numbers of the citizens. For this reason, it was accepted as randomly distributed in terms of age, sex, and neighborhood. Another limitation is that our findings and the participation rate may be influenced by possible selection bias because respondents were not interviewed face-to-face, which could limit the generalizability of our sample. Additionally, because the study was conducted by an office-based team simultaneously during current online filiation interviews with patients with COVID-19, attention was given to keeping the questionnaire brief and concise, which limits the results. Finally, combining the ‘resistant’ group with the ‘hesitant’ group could result in the loss of some statistical results while splitting the outcome variable into two.

Conclusion

Considering that permanent immunity against COVID-19 (naturally or acquired) has not developed, the assumption that the COVID-19 pandemic will end shortly is not likely. However, the fact that the vaccines help prevent severe disease and death makes us think that those who are vaccinated will be protected despite the virus continuing to circulate.30,31

Those who do not want vaccination mostly comprise those who have not been infected with COVID-19 and who consider themselves risk-free/with low risk in terms of catching the disease. Vaccine resistance was higher in participants who had been infected mildly. These findings indicate that people are not aware of the severity of COVID-19 and the complications caused by it. Increasing public information about the disease will be useful. The health system and central government should be transparent and reassuring of the impact and severity of the pandemic. Sharing the experiences of patients who were severely infected or physicians’ recommendations can be helpful. It is seen that vaccine hesitancy is higher in those who work actively. Posters, hand-outs, and educational materials about the possible adverse effects and protective-ness of vaccines can be presented at collective working places such as public service buildings, schools, factories, and among tradesmen.

Considering these results, it can be said that informing about the reliability and adverse effects of the vaccines by reaching those who were not vaccinated made a difference. Accordingly, it may be recommended to provide more explicit and clear information about COVID-19 and vaccines intended for the entire community and the specific groups determined within the study through medical staff and media tools.

With many COVID-19 vaccines being developed, the hesitation and acceptance of COVID-19 vaccines in the community should be well understood to reach the vaccination levels that will provide herd immunity. The pandemic will lose its impact only in places where the rates of herd immunity are high and will cease to be a feared disease. For this, we must overcome vaccine hesitancy and immunize the masses against the disease. Future research in this area should focus on qualitative studies with a focus on in-depth interviews, to understand the underlying, root factors of vaccine rejection.

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Abbreviations

SARS-CoV-2 Severe acute respiratory syndrome coronavirus 2
COVID-19 Coronavirus disease 2019
WHO World Health Organization
PHMS Public Health Management System
CDC Centers for Disease Control and Prevention

References

1. TR Ministry of Health. Covid 19 vaccine information platform; 2021 [accessed 2021 Oct 10]. https://covid19.traglik.gov.tr/?gid=710K0CQ\w8eOLRhCh1AR1sAOx5CF-ZUeG7Aqy1CBuGj
2. Kadkhoda K. Herd immunity to COVID-19. Am J Clin Pathol. 2021;15(4):471–472. PMID: 33399182. doi:10.1093/ajcp/aqaa272.
3. World Health Organization SAGE Working Group. Report of the SAGE working group on vaccine hesitancy; 2014 [accessed 2021 Oct 15]. https://www.who.int/immunization/sage/meetings/2014/october/1_Report_WORKING_GROUP_vaccine_hesitancy_final.pdf.
4. World Health Organization. Ten threats to global health in 2019; 2019 [accessed 2021 Oct 20]. https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019.
5. European Centre for Disease Prevention and Control. Technical report: rapid literature review on motivating hesitant population groups in Europe to vaccinate; 2015. https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/vaccination-motivating-hesitant-populations-europe-literature-review.pdf.
6. Department of Vaccine Preventable Diseases. The expanded program on immunization. Ankara, Turkey: Republic of Turkey Ministry of Health; 2018 [accessed 2019 Feb 19]. https://dosya.ism.saglik.gov.tr/Ekleneti/46316,2018-subat-gbp-ehitimpdf.pdf.070.
7. Alcoholic HE, Çöl M. Vaccination attitude towards novel coronavirus disease. Status of Covid-19 vaccination and immunization services in Turkey during the new coronavirus pandemic. Ankara, Turkey: Turkish Medical Association; 2021.
8. Ozbalci E, Aydin ES, İpek I, Özen N, Yüceler M, Ateto O, Mayda HS, Kartanci MY, Güçlü S, Akdoğan Ş, et al. The knowledge and opinions of the faculty of medicine students about vaccination, immunization, vaccine hesitination and COVID-19 vaccine. TÜRK HİYEN ve Deney. Biyoloji Dergisi. 2021;78:317–332. doi:10.5505/ TurkHijyen2021.39205.
9. Turkish Report. Are you considering getting a coronavirus vaccine? Turkey; 2021 [accessed 2021 Nov 26]. https://www.turkiyearam.com/arastirma/koronavirus-asisi-olmaydusunuyor-musunuz-2-4230.
12. İkışiğ H, Akif Sezer M, Taşçi Y, Maral I. COVID-19 vaccine hesitancy: a community-based research in Turkey. Int J Clin Pract. 2021;75(8):1–9. PMID: 33973322. doi:10.1111/ijcp.14336.

13. Lucia VC, Kelekari A, Afonso NM. COVID-19 vaccine hesitancy among medical students. J Public Heal (United Kingdom). 2021;43(3):445–449. https://doi.org/10.1093/pubmed/fdaa230.

14. Centers for Disease Control and Prevention. Estimates of vaccine hesitancy for COVID-19; [accessed 2021 Oct 12]. https://data.cdc.gov/stories/s/Vaccine-Hesitancy-for-COVID-19/cnd2-a6zr/.

15. Murphy J, Vallières F, Bentall RP, Shevlin M, McBride O, Hartman TK, McKay R, Bennett K, Mason L, Gibson-Miller J, et al. Psychological characteristics associated with COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom. Nat Commun. 2021;12(1). PMID: 33397962 PMCID: PMC7782692. doi:10.1038/s41467-020-20226-9.

16. Sallam M. COVID-19 vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates; 2021. PMID: 33669441. doi:10.3390/vaccines9020160.

17. Saluja S, Nak Lam C, Wishart D, McMorris A, Cousineau MR, Kaplan CM. Disparities in COVID-19 vaccine hesitancy among Los Angeles county adults after vaccine authorization. Prev Med Reports. 2021;24:101544. https://doi.org/10.1016/j.pmedr.2021.101544.

18. Ethics Board of Ordu University. Ethical approval no: 2021/240. Ordu.

19. World Health Organization. Subject in focus: developing trans-disciplinary science: infodemiology, the science behind infodemic management; 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200707-covid-19-sitrep-169.pdf.

20. Hwang SE, Kim WH, Heo J. Socio-Demographic, psychological, and experiential predictors of COVID-19 vaccine hesitancy in South Korea, October-December 2020. Hum Vaccin Immunother. 2022 Dec 31;18(1):1–8. Epub 2021 Oct 6. PMID: 34614382; PMCID: PMC8920123. doi:10.1080/21645515.2021.1983389.

21. Kricorian K, Civen R, Equils O. COVID-19 vaccine hesitancy: misinformation and perceptions of vaccine safety. Hum Vaccin Immunother. 2022 Dec 31;18(1):1950504. Epub 2021 Jul 30. PMID: 34325612; PMCID: PMC8920251. doi:10.1080/21645515.2021.1950504.

22. Salali GD, Uysal MS. COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel coronavirus in the UK and Turkey. Psychol Med. 2020;26:28. doi:10.1017/S0033291720004067.

23. MacDonald NE. Vaccine hesitancy: definition, scope and determinants. Vaccine. 2015;33(34):4161–4164. https://doi.org/10.1016/j.vaccine.2015.04.036.

24. King WC, Rubinstein M, Reinhart A, Mejia R. COVID-19 vaccine hesitancy January-May 2021 among 18–64 year old US adults by employment and occupation. Prev Med Reports. 2021;24:101569. PMID: 34603943. doi:10.1016/j.pmedr.2021.101569.

25. Štěpánek L, Janošíková M, Nakládalová M, Štěpánek L, Boríková A, Vílova H. Motivation to COVID-19 vaccination and reasons for hesitancy in employees of a Czech tertiary care hospital: a cross-sectional survey. Vaccines. 2021;9(8):863. PMID: 34451988. doi:10.3390/vaccines9080863.

26. Shen X, Dong H, Feng J, Jiang H, Dowling R, Lu Z, Lv C, Gan Y. Assessing the COVID-19 vaccine hesitancy in the Chinese adults using a generalized vaccine hesitancy survey instrument. Hum Vaccin Immunother. 2021 Nov 2;17(11):4005–4012. PMID: 35016491; PMCID: PMC8828104. doi:10.1080/21645515.2021.1953343.

27. Yahia AIO, Alshahrani AM, Alsaleh MTH, Alqarni MMM, Abdulrahim TKA, Heba WPH, Alqarni TAA, Alharthi KAZ, Buhran AAA. Determinants of COVID-19 vaccine acceptance and hesitancy: a cross-sectional study in Saudi Arabia. Hum Vaccin Immunother. 2021 Nov 2;17(11):4015–4020. Epub 2021 Aug 5. PMID: 34353226; PMCID: PMC8828146. doi:10.1080/21645515.2021.1950506.

28. Troiano G, Nardi A. Vaccine hesitancy in the era of COVID-19. Public Health. 2021 ;194:245–251. Epub 2021 Mar 4. PMID: 33965796; PMCID: PMC7931735. doi:10.1016/j.puhe.2021.02.025.

29. Neumann-Böhme S, Varghese NE, Sabat I, Barros PP, Brouwer W, van Exel J, Schreyögg J, Stargardt T. Once we have it, will we use it? a European survey on willingness to be vaccinated against COVID-19. Eur J Health Econ. 2020;21(7):977–982. https://doi.org/10.1007/s10198-020-01208-6.

30. Lavine JS, Bjornstad ON, Antia R. Immunological characteristics govern the transition of COVID-19 to endemcity. Science. 2021;80:371, 741–745. doi:10.1126/science.ab6552.

31. Nature. The virus becoming endemic is likely; 2022 [accessed 2021 Oct 10]. https://www.nature.com/articles/d41586-021-00396-2.