ORIGINAL ARTICLE

Attitudes towards COVID-19 vaccination, vaccine hesitancy and vaccine literacy among unvaccinated young adults

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ABSTRACT

BACKGROUND

Herd immunity is necessary to control the coronavirus disease 2019 (COVID-19) pandemic. Unfortunately, attaining herd immunity is a significant challenge for current healthcare systems worldwide, and the prevalence of hesitancy toward COVID-19 vaccination remains high. The aim of this study was to determine pandemic vaccine hesitancy, attitudes towards COVID-19 vaccination, and COVID-19 vaccine literacy level among unvaccinated young adults.

METHODS

This cross-sectional study was carried out in the province of Çorum in Turkey. Unvaccinated young adults (n=860) between the ages of 18-30 years studying medicine and non-medical sciences at a university were included in the study. Socio-demographic form, and the scales on pandemic vaccine hesitancy, attitudes towards the COVID-19 vaccine, and COVID-19 vaccine literacy were used to collect the research data. The data were analyzed using percentages, median values, and multiple linear regression analysis.

RESULTS

The study was completed with 860 participants. In the group, 73.8% of participants were 18-24 years old, 67.7% were women and 68.0% were infected with the virus. The median scores from the pandemic vaccine hesitancy scale, vaccine literacy and vaccine attitudes were 33, 27 and 30 respectively. Use of social media per day, vaccine literacy and COVID-19 vaccine attitude were effective factors on pandemic vaccine hesitancy (p<0.05). Negative attitude to vaccines was the most influential risk factor of vaccine hesitancy (Beta = 0.248).

CONCLUSION

Pandemic vaccine hesitancy coincides with low vaccine literacy and negative attitudes towards vaccines. COVID-19 vaccination information campaigns should promote group strategies, focusing on emphasising the safety of the vaccine and offer reassurance.

Keywords: Vaccine hesitancy, literacy, attitudes, pandemic, young adults

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INTRODUCTION

The development of vaccines is one of the greatest public health achievements in promoting global health. The burden of communicable diseases and lost years of life have been reduced by vaccination programs that contribute to the strengthening of the health system from a holistic point of view.[1-3] By preventing 2-3 million deaths annually, vaccines are one of the most cost-effective ways to avoid disease. Despite all these remarkable developments, anti-vaccination attitude is a phenomenon that hinders progress in the fight against vaccine-preventable diseases and is powered by the current of vaccine hesitancy. The reasons for the growing vaccine hesitancy around the world are complex. Ignorance, difficulty in accessing vaccines or lack of confidence are the main reasons for not getting vaccinated. Vaccine hesitancy is among the top 10 threats to global health according to the World Health Organization (WHO),[4] and there is an urgent need to identify the psychological and socio-demographic factors associated with this hesitation.[5]

Since the Middle Ages [6] (bubonic plague: 1347/COVID-19:2019), there has been an increase in the frequency of pandemics and epidemics. Overcoming the pandemic crisis depends on mass immunity and successfully tackling vaccine hesitancy.[7]

Hesitation about vaccination is theorized to depend on a number of cognitive, social and contextual factors [8] such as subjective risk perception,[9] psychological tendencies, fear of side effects, personal beliefs [10] and established beliefs and prejudices about vaccines. One of the lessons learned from past pandemics has been vaccine hesitancy. As with the swine flu, SARS, and MERS pandemics, immediately after the announcement of the COVID-19 pandemic by the WHO, discourses about vaccine opposition, vaccine hesitancy or vaccine resistance began to spread.[11,12]

In the period of September 2021 to February 2022, Ireland comprised 89.8% of people who received at least two doses. Western European countries with lower rates include the Netherlands (77.2%), Germany (73.4%), Italy (72.8%) and Luxembourg (72.4%).[13]

This resistance, hesitation and opposition has accelerated the production and spread of numerous conspiracy theories about vaccines through social media.[14] In the pandemic era, the world is faced with the spread of the "COVID-19 infodemic" which creates confusion and risk-taking behaviors that can be harmful to health, leads to distrust of healthcare, and undermines public health response.[15] Another determinant of vaccine hesitancy is vaccine literacy (VL).[16] In parallel with the rapid development of vaccines in the fight against COVID-19 globally, reports have emerged characterizing individuals who are vaccine hesitant. In the literature, it has been shown that the intention to vaccinate was higher in those who perceived COVID-19 as a serious illness and those who had been infected with coronavirus.[17-19] On the other hand, it has been suggested that the perceived risk of vaccination is influenced by the innovation and rapid development of vaccines, emphasizing fearful cognitions about the speed and new technologies used that are unlike traditional vaccine development approaches.[19,20]

Vaccine literacy is an important component not only as a level of knowledge about vaccines, but also for national vaccine coverage in a functioning health system.[21,22] However, limited VL is rarely taken into account when reviewing vaccine hesitancy factors.[22] Medical countermeasures (MCMs) are central to the public health response to mitigate the impact of pandemics.[23] Vaccination is the most effective medical countermeasure for contagious disease especially in epidemics and pandemics. This requires developing a well-matched, safe, and effective vaccine in the shortest time possible; determining the appropriate dose; and administering it promptly. Giving priority to vaccination to the adult and elderly group has resulted in more than one-third of cases clustering in adolescents and young adults in the COVID-

19 pandemic. This situation has made it mandatory to make changes in vaccination schedules. [24]

Studies have also indicated that the novelty and rapid development of vaccines may have impacted the perceived risk of vaccination, with highlighted fearful cognitions concerning the pace and novel technologies utilized (i.e., mRNA vaccines) contrasting with conventional vaccine development approaches.[20] Among promotive factors, trust in health officials has been highlighted as a possible factor which may decrease individual perception of vaccination risks.[7] Despite these preliminary advances, several factors of importance remain uninvestigated.

It is accepted that if a certain part of the society is immune to an agent by any means, the chain of transmission will be broken and the spreading will stop. The end of the COVID-19 pandemic will be possible with the provision of mass immunity. Vaccine hesitancy among young adults may delay the formation of the herd immunity, therefore it should be prevented by scientific evidence, consistent communication, and improving individual VL levels.

A study among 4,571 Norwegian adults showed that perceived risk of vaccination, belief in the superiority of natural immunity, fear that a significant number of other persons were infected by the virus, and trust in the dissemination of vaccine-related information by health officials were identified as key variables related to vaccine hesitancy.[7]

Hence, at least a fraction of the remaining unvaccinated population might still be reached and decide to become vaccinated. Further research, however, is needed to identify the underlying reasons for vaccine hesitancy of those remaining unvaccinated and to provide guidance on how to design appropriate interventions to reach them specifically. The aim of this study is to determine pandemic vaccine hesitancy, COVID-19 vaccine literacy level, and attitudes towards COVID-19 vaccination in the vaccination period among unvaccinated young adults.

METHODS

Research design
This cross-sectional study was carried out in the province of Çorum in Turkey from January to April 2021.

Study subjects
Two faculties of medicine and engineering science were included the study (n=2760). We calculated the minimum sample size based on the assumption that COVID-19 vaccine acceptance is 50%. Participants without COVID-19 vaccination were randomly selected from an online survey. Unvaccinated young adults (n=860) between the ages of 18-30 years studying medicine and non-medical sciences at a university were included in the study. Primary inclusion criteria for the participating participants were being of Turkish nationality and aged between 18-30 years. The single exclusion criterion was having been vaccinated.

Data collection
A questionnaire consisting of a socio-demographic information form and the scales of pandemic vaccine hesitancy, attitudes towards the COVID-19 vaccine, and COVID-19 vaccine literacy was used to collect the research data.

Demographic questionnaire
A demographic information form was designed by the researchers to gather personal information from participants. Participants were asked to report their age, gender, type of education, the presence of chronic illness, use of social media per day, and whether they were infected with COVID-19.

Pandemic vaccine hesitancy scale
The "vaccine hesitancy scale in pandemics" was made by modifying the original items of the "vaccine hesitancy scale" developed by Larson,[25] and its reliability and validity were determined by Çapar and Çýnar.[26] This scale is a 5-point

Likert type measurement tool, where 1=Strongly disagree, 2=Disagree, 3=Neither agree or disagree, 4=Agree, 5=Strongly agree. High scores from the scale indicate high vaccine hesitancy in pandemics.

The scale consists of 10 items contained in two sub-dimensions. The first sub-dimension "lack of confidence" consists of 8 items (M1-R, M2-R, M3-R, M4-R, M5-R, M6-R, M7-R, M8-R). Items with the letter "R" are reversed items. High scores in this sub-dimension indicate that the mistrust towards vaccines increases in pandemics. The second sub-dimension "risk" consists of 2 items (M9, M10). High scores in this sub-dimension indicate that the risk of vaccination is high in pandemics.[26]

Attitudes towards the COVID-19 vaccine

The scale has 9 items and two sub-dimensions (positive and negative attitude). The statements in the scale are evaluated as "Strongly disagree (1)", "Disagree (2)", "Undecided (3)", "Agree (4)", "Strongly agree (5)". Items in the negative attitude sub-dimension are scored inversely. A value between 1-5 is obtained by dividing the total score obtained by summing the item scores in the scale sub-dimension by the number of items in that sub-dimension. High scores obtained from the positive attitude sub-dimension indicate that the attitude towards the vaccine is positive. The items in the negative attitude sub-dimension (Items 5-9) are calculated after they are reversed, and the high scores in this sub-dimension indicate that the negative attitude towards the vaccine is less. [27]

COVID-19 vaccine literacy scale

The scale was developed by Biasio et al.[28] to assess vaccine literacy (VL) skills and perceptions of COVID-19 vaccine candidates, and attitudes and beliefs about available vaccines in the general population. Vaccine literacy level had already been validated in terms of content and structure [29] and was evaluated by adapting a 14-item self-report scale for vaccination of adults. [30]

From a psychometric point of view, functional VL questions are about language, including the semantic system, while interactive-critical questions focus more on cognitive efforts such as problem solving and decision making. Each response is on a 4-point Likert-type scale (for functional dimension: 4 - never, 3- rarely, 2 - sometimes, 1 – often; for interactive critical dimension: 1 - never, 2 - rarely, 3 - sometimes, 4 - frequently). High scores from the scale indicate a high VL level.[28] Adaptation of the scale to Turkish was made by Durmuþ et al.[31]

Statistical analysis

All analyses were carried out using SPSS, version 21. Skewness and kurtosis values indicated non-normal distribution. The data were described using percentages, median values, and analyzed by linear regression analysis. The hierarchical multiple linear regression analysis was performed for pandemic vaccine hesitancy. The unstandardized regression coefficients (β) and standardized regression coefficients (Beta) were used to quantify the associations between variables. Significance levels were set at the 5% level.

Ethical clearance

Ethics committee approval of this study, which was planned in accordance with the Helsinki Principles, was obtained from Hitit University Non-Invasive Ethical Committee (2021/152).

RESULTS

The research was completed with 860 participants. Of the study group, 73.8% were in the 18-24 age group with a mean age of 22.9±3.3 years, 67.7% were women, 76.3% had medical education, 52.8% used social media for 4 hours or more per day. It was determined that 68.0% of the participants were infected with the COVID-19 virus (Table 1).

The distribution of the scores of the participants from the scales is given in Table 2.

Table 1. Demographic and descriptive data
of the subjects (n=860)

Variables	n (%)
Gender	
Male	278 (32.3)
Female	582 (67.7)
Age (years) (Mean ± SD)	22.9±3.3
Education type	
Medical	186 (23.7)
Non-medical	674 (76.3)
Presence of chronic illness	
Yes	106 (12.3)
No	754 (87.7)
Use of social media in daily (hour)	
<4	406 (47.2)
≥4	454 (52.8)
Infected with COVID-19	
Yes	275 (32.0)
No	585 (68.0)

The median scores from the pandemic vaccine hesitancy scale was 33, the median of the scores from the lack of confidence sub-dimension was 27, and the median of the scores from the risk sub-dimension was 6. While the median of the scores of the participants from the vaccine literacy scale was 27, the median of the scores from the vaccine attitude scale was 30, the median of the scores from the positive sub-dimension of this scale was 14 and the median of the scores from the negative sub-dimension was 16.

Similar associations were found in the multivariate linear regression analysis in Table 3. In particular, participants with low vaccine literacy and negative attitudes to vaccines were significantly more likely to hesitate ($p < 0.05$). Negative attitude to vaccines was the most influential risk factor of vaccine hesitancy (Beta = 0.248).

DISCUSSION

This study shows that pandemic vaccine hesitancy in young adults depends on vaccine literacy and attitudes to vaccines. In our study, pandemic vaccine hesitancy and negative attitudes to vaccines were high, whereas vaccine literacy was low among young adults. Similarly, in Maltese and Austrian communities, COVID-19 vaccine hesitancy and negative attitudes were found. [32,33] Prior studies have reported results on vaccine hesitancy and refusal which differed significantly from country to country.[34-36] Globally, there is a wide variation in vaccine hesitancy and refusal, ranging from 20% to 90%.[34,36,37] Our citywide research, conducted during the COVID-19 vaccination campaigns in Turkey, found a relatively high pandemic vaccine hesitancy. Our current study also identified that different factors are associated with pandemic vaccine hesitancy. The rapid development of vaccines in the COVID-19 pandemic will be effective in the acceptance of vaccines to be developed in current or future pandemics. The dominant factors influencing the acceptance of these new vaccines are concerns about vaccine risk, safety and efficacy. Common factors contributing to hesitation towards COVID-19 vaccines include fear of side effects and concerns about vaccine safety and effectiveness.[38] Previous studies suggested that VL is associated with vaccine perception.[28,39] Perceptions regarding future COVID-19 vaccines, along with beliefs about vaccination, were mostly positive and significantly associated with functional and interactive-critical VL scale.[22] As a matter of fact, in the present study, lack of confidence in vaccines and

Table 2. The distribution of the scores from the scales

Scales	Mean	SD	Median	Min	Max
Pandemic Vaccine Hesitancy (total)	32,4	5,6	33	10,0	48,0
Lack of confidence sub-dimension	26,2	5,8	27	8,0	40,0
Risk sub-dimension	6,2	1,9	6	2,0	10,0
Vaccine literacy	27,3	6,5	27	12,0	49,0
Attitudes towards the COVID-19 vaccine (total)	30,1	6,8	30	9,0	45,0
Positive vaccine attitude sub-dimension	13,9	3,8	14	4,0	20,0
Negative vaccine attitude sub-dimension	16,3	4,0	16	5,0	25,0

Table 3. Regression predicting of pandemic vaccine hesitancy

Variables	β (regression coefficient)	Beta	p value
Age	-0.028	0.016	0.613
Gender	-0.324	0.027	0.408
Education type	0.798	0.060	0.065
Presence of chronic illness	0.323	0.020	0.548
Use of social media in daily	-0.827	0.073	0.024
Infected with COVID-19	0.496	0.042	0.199
Vaccine literacy	-0.131	0.149	0.000
COVID-19 vaccine attitude	0.397	0.284	0.000

Note : Beta=satndardized regresion coefficient

perception of vaccination risks came to the fore at the height of pandemic vaccine hesitancy. In addition, it was determined that the VL was weak and the negative attitude towards the vaccine was high in the participants. Pandemic vaccine hesitancy has increased with the lack of confidence in the vaccine. Limited VL as a component of vaccine acceptance and adequate herd immunity is rarely considered when reviewing factors for vaccine hesitancy.[22] Health literacy has a great role in the adoption and implementation of preventive health behaviors, especially vaccination. VL is a subset of health literacy and a determinant in examining attitudes towards vaccination.[40] In previous studies, it had been reported that there were limitations in the health literacy levels of students training at medical faculties.[41,42] On the other hand, it has been shown that COVID-19 vaccine hesitancy was high in students training in medicine and health sciences.[43] However, the use of social media platforms to seek and share health-related information may influence decision-making about COVID-19 vaccination.[44] Vaccine misinformation and fake news on social media can increase vaccine hesitancy levels, hinder progress towards mass immunity, and increase the number of new cases of COVID-19 variants.[45] All these results suggest that strategies to increase vaccine literacy should be considered first in vaccination campaigns, especially among young people.

The main limitation of our study is the timing of the survey in the early months of 2021. At that time, vaccination was common in the fragile and in essential working segments of the society (elderly, chronic disease, health personnel, teachers, etc.). In future research studies, the dynamics of vaccine hesitancy in pandemics should be closely monitored and vaccine literacy should be enhanced during school and university periods.

CONCLUSIONS

In summary, pandemic vaccine hesitancy is a phenomenon that coincides with low VL and negative attitudes towards vaccines among unvaccinated young adults. The fight against this phenomenon must be included in the pandemic action plans. In addition, pandemic action plans should be updated for young adults as well as at risk groups.

CONFLICT OF INTEREST

Competing interests: No relevant disclosures.

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CONTRIBUTORS

GY contributed to planning of research, data analysis, writing, and English editing;

EKcontributed to data analysis;AÇ and BD contributed to data collection. All authors have read and approved the final manuscript.

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