



Research Article

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A CROSS-SECTIONAL STUDY EVALUATING COVID-19 VACCINE LITERACY: THE EXAMPLE OF ANTALYA PROVINCE

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Abstract

Objectives: It is believed that the COVID-19 pandemic, which is a significant health concern, can be restrained through effective vaccination. In this regard, however, people's hesitancy toward vaccines stands out as an important obstacle to achieving community immunization. The aim of this study is to evaluate the factors that affect individuals' decisions to get a COVID-19 vaccine and to identify their literacy status for COVID-19 vaccines.

Materials and Methods: This study consisted of 388 people aged 18 and over who presented to the COVID-19 adult vaccination outpatient clinic at the University of Health Sciences Antalya Training and Research Hospital between July 1st and September 1st, 2021. The participants were asked a number of questions contained in the COVID-19 vaccine literacy scale, and answers were recorded.

Results: The participants' mean vaccination literacy score was considered moderate within the range of 2.95 ± 0.54 . The results revealed that the higher the education level of the participants, the higher the COVID-19 vaccine literacy, and that the COVID-19 vaccine literacy was higher among individuals who voluntarily got vaccinated.

Conclusion: By recognizing that individuals may have hesitancy about vaccination, relevant strategies should be developed for the vaccination with the aim of giving information to and instilling confidence in society rather than causing fear.

Keywords: COVID-19, health literacy, vaccine hesitancy, vaccine literacy.

Introduction

The management of the COVID-19 pandemic, which is an important health concern not only in our country but all over the world, is intended to protect health and prevent the spread of the COVID-19 virus by means of measures aimed at people and the environment. In addition to the measures, the devastating consequences of the disease have been sought to be prevented through scientific vaccine studies and vaccination that have gained momentum recently. In this respect, mRNA vaccines, viral vector-based vaccines, inactivated vaccines, and protein subunit vaccines developed for this purpose are the main approved vaccine types tested in clinical trials against the COVID-19 virus.¹

Vaccination is an essential health service that aims at community immunization against diseases, and it is the right of every individual to receive health care. However, it is absolutely necessary that people know their rights and responsibilities, as much as the importance of healthcare services they are offered in terms of personal and social aspects, so that an effective level of healthcare service can be achieved. Individuals are active decision-makers in the process of receiving the healthcare service, and their level of benefit from such services is directly related to the extent of their health literacy level.²

With the availability of COVID-19 vaccines, it is no longer a major barrier for most countries, yet people's hesitancy to get vaccinated remains a major challenge.³ In addition to problems such as not believing in the severity of the disease or the efficacy of the vaccine, as well as the concerns about possible side effects, misinformation also significantly affect vaccine acceptance.⁴

Within the same scope, vaccine rejection is an individual attitude that affects the entire society, and the idea of vaccine rejection spreads through interpersonal communication, especially through social media, leading to negative consequences in terms of community immunization.⁵ Instead of getting an expert opinion on health, some people tend to seek treatment by receiving advice from other people whom they communicate with on the Internet and social media.⁵ The main reason for vaccine hesitancy is considered as the sense of insecurity towards healthcare systems, and health literacy is believed to be a mediating factor in overcoming insecurity and vaccine hesitancy.⁶ By collecting relevant data on the following aspects, such as the factors influencing people's decisions to get a COVID-19 vaccine, whether they can get access to sufficient information about vaccination, as well as the extent that they discuss the information they have gained with other individuals, this study has aimed to evaluate the literacy levels of individuals for the COVID-19 vaccine.

Materials and Methods

Study design and participants

This cross-sectional and observational study consisted of people aged 18 and over who presented to the COVID-19 adult vaccination outpatient clinic at the University of Health Sciences Antalya Training and Research Hospital between July 1st and September 1st 2021, and volunteered to be involved in a clinical trial.

After the participants were asked questions about their sociodemographic characteristics, how they decided to get vaccinated, and their thoughts on COVID-19 vaccines in a face-to-face interview, they were asked the questions in the COVID-19 Vaccine Literacy Scale, and the answers were recorded.

Prior to the study, approval was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Antalya Training and Research Hospital as of 24.06.2021 with decision number 9/6. The study was conducted in accordance with the Declaration of Helsinki.

COVID-19 Vaccine Literacy Scale

Durmuş et al. conducted the construct validity and reliability of the Turkish version of the scale, which was originally developed by Ishikawa et al. and adapted as a COVID-19 vaccine literacy scale by Biasio et al.⁷⁻⁹

The scale consists of 12 questions, the first 4 of which aim to assess functional skills and the next eight questions to assess communicative-critical skills. The statements were rated using a 4-point Likert scale. Functional dimensions are expressed as follows: (4) Never, (3) Rarely, (2) Sometimes, and (1) Often, while communicative/critical dimensions are expressed as (1) Never, (2) Rarely, (3) Sometimes, and (4) Frequently. The mean value of the total scores on the scale being close to 4 is interpreted as a high level of vaccine literacy.⁷ Functional vaccine literacy is based on basic literacy skills, and the functional skill dimension is related to reading comprehension. On the other hand, communicative-critical vaccine literacy and the relevant skills are associated with an individual's ability to critically analyze knowledge and use it in life.^{7,9,10}

The sample size was calculated based on the information that the population aged 18 and over in Antalya was 2,132,480.¹¹ The sample, therefore, included 384 participants with a 95% confidence interval ($\alpha=0.05$), and 410 people were accessed within the specified time. However, 15 participants who declined to participate in the study and 7 participants with missing data were excluded from the study. The study was completed with 388 participants.

Statistical Analysis

Continuous data were presented with mean±standard deviation (SD) or median (min-max) and categorical data with frequency (n) and percentage (%). The normality assumptions were controlled by the Shapiro-Wilk test. The association between categorical data was determined by Pearson chi-square and Fisher's Exact test. The student's t-test was used for comparison of normally distributed numerical data between two groups. One-Way ANOVA was used for the comparison of parametric variables among three or more groups, and the Tukey HSD test was used as a post-hoc test for significant cases. Pearson correlation test was used to examine the relationship between the COVID-19 Vaccine Literacy Scale score and subscales. Multiple linear regression analysis was performed to determine the associated factors with the COVID-19 Vaccine Literacy level of participants. The variables with $p < 0.100$ in the univariate analyses were further tested in the multivariate model. Cronbach's alpha coefficient was calculated for the reliability analysis. Statistical analysis was made using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY). A two-sided p-value less than 0.05 was considered statistically significant.

Results

Of all the 388 participants in our study, 59.53% (n=231) were female, while 40.46% (n=157) were male. The mean age of the participants was 37.55 ± 14 (18-80) years. Table 1 presents the sociodemographic characteristics and decisions for vaccination of the participants.

The evaluation of the participants according to their sociodemographic characteristics indicated no statistical significance between the mean scores of the scale and its subscales according to age, gender, having a child, history of chronic disease, history of an allergy, and history of a COVID-19 infection. When evaluated according to education level, the vaccine literacy level was found to be significantly higher in the groups formed by university students and university graduates compared to the other groups ($p < 0.001$).

Of all the participants, 51.28% (n=199) stated that they had gained enough knowledge about COVID-19 vaccines, and 47.16% (n=183) stated that they thought to have received enough information about COVID-19 vaccines. In addition, 55.41% (n=215) of the participants stated that they found the COVID-19 vaccines safe. The literacy score of the participants who stated that they found the vaccines safe was found to be statistically significantly higher ($p = 0.002$).

Table 2 presents the mean scores of the participants received from the scale and its sub-scales in our study, and Table 3 presents the correlation between the scores of the scale and its sub-scales.

Table 1. Sociodemographic characteristics of the participants

| Variables | n | % |
|---------------------------------|----------|-------|
| Age (years), mean±SD / min-max | 37.55±14 | 18-80 |
| 18-30 | 153 | 39.43 |
| 30-40 | 73 | 18.81 |
| 40-50 | 94 | 24.22 |
| 50-60 | 39 | 10.05 |
| 60 and over | 29 | 7.47 |
| Gender | | |
| Female | 231 | 59.53 |
| Male | 157 | 40.46 |
| Educational background | | |
| Primary school | 40 | 10.30 |
| Secondary school | 39 | 10.05 |
| High school | 92 | 23.71 |
| University student | 64 | 16.49 |
| University | 153 | 39.43 |
| Marital status | | |
| Single | 196 | 50.51 |
| Married | 192 | 49.48 |
| Having a child | 209 | 53.86 |
| History of chronic disease | 92 | 23.71 |
| History of an allergy | 21 | 5.41 |
| History of a COVID-19 infection | | |
| No | 348 | 89.69 |
| Yes | 40 | 10.30 |
| Decision for vaccination | | |
| On my own accord | 304 | 78.35 |
| On my family's demand | 14 | 3.60 |
| On my employer's demand | 16 | 4.12 |
| For going abroad | 15 | 3.86 |
| I thought it would be mandatory | 39 | 10.05 |

Table 2. The participants' mean scores for COVID-19 vaccine literacy

| Scales | Mean | SD | Minimum | Maximum | Cronbach's Alfa |
|------------------------------|------|------|---------|---------|-----------------|
| Functional score | 3.02 | 0.81 | 1 | 4 | 0.778 |
| Communicative-critical score | 2.92 | 0.71 | 1 | 4 | 0.827 |
| COVID-19 vaccine literacy | 2.95 | 0.54 | 1 | 4 | 0.739 |

Table 3. Correlation between total scale scores and sub-scale scores

| Scales | 1 | 2 | 3 |
|---------------------------------|--------|--------|---|
| 1. Functional score | | | |
| R | 1 | | |
| P | - | | |
| 2. Communicative-critical score | | | |
| R | -0.043 | 1 | |
| P | 0.394 | - | |
| 3. COVID-19 vaccine literacy | | | |
| R | 0.465 | 0.865 | 1 |
| P | <0.001 | <0.001 | - |

(Pearson correlation test)

We found the COVID-19 vaccine literacy the highest with a score of 3.11 ± 0.51 in the group who thought they had gained enough knowledge about vaccines, while the mean functional score was statistically significantly lower ($p < 0.001$) within the range of 2.86 ± 0.82 in the group who had concerns about the adverse effects of vaccines in the upcoming years (Table 4).

The factors affecting the COVID-19 vaccine literacy score in the participants were evaluated in Table 5 by multiple linear regression analysis. The results showed that as the education level of the participants increased, so did the COVID-19 vaccine literacy ($\beta = 0.306$; $p < 0.001$) and that the COVID-19 vaccine literacy rate was higher in individuals who voluntarily got vaccinated ($\beta = 0.233$; $p < 0.001$).

Table 4. Comparison of the scale scores on the basis of the participants' opinions regarding the COVID-19 vaccines

| Variables | n | Functional score | | Communicative-critical score | | Total score | |
|---|-----|------------------|-------------------|------------------------------|-------------------|-----------------|-------------------|
| | | $\bar{X}\pm SS$ | Test value/ p | $\bar{X}\pm SD$ | Test value/ p | $\bar{X}\pm SD$ | Test value/ p |
| I believe that COVID-19 vaccines will be protective | | | | | | | |
| Yes | 252 | 3.14±0.74 | F=8.305 | 3.02±0.73 | F=6.561 | 3.06±0.52 | F=14.238 |
| No | 13 | 2.69±1.12 | p<0.001 | 2.77±0.53 | p=0.002 | 2.74±0.54 | p<0.001 |
| Not decided | 123 | 2.81±0.85 | | 2.74±0.66 | | 2.76±0.51 | |
| Significance | | 1-2, 1-3 | | 1-3 | | 1-2, 1-3 | |
| I think COVID-19 vaccines are safe | | | | | | | |
| Yes | 215 | 3.14±0.76 | F=8.870 | 2.97±0.76 | F=1.434 | 3.03±0.54 | F=6.577 |
| No | 21 | 2.46±1.05 | p<0.001 | 2.73±0.63 | p=0.240 | 2.64±0.59 | p=0.002 |
| Not decided | 152 | 2.92±0.81 | | 2.88±0.66 | | 2.90±0.51 | |
| Significance | | 1-2, 1-3, 2-3 | | | | 1-2, 1-3 | |
| I trust the declarations about COVID-19 vaccines | | | | | | | |
| Yes | 193 | 3.18±0.75 | F=11.266 | 2.97±0.8 | F=1.106 | 3.04±0.56 | F=6.557 |
| No | 39 | 2.56±0.94 | p<0.001 | 2.84±0.59 | p=0.332 | 2.75±0.51 | p=0.002 |
| Not decided | 156 | 2.94±0.8 | | 2.88±0.63 | | 2.90±0.5 | |
| Significance | | 1-2, 1-3, 2-3 | | | | 1-2, 1-3 | |
| I think I have gained enough knowledge about vaccines | | | | | | | |
| Yes | 199 | 3.23±0.71 | F=17.955 | 3.05±0.74 | F=13.862 | 3.11±0.51 | F=30.810 |
| No | 79 | 2.64±0.9 | p<0.001 | 2.57±0.69 | p<0.001 | 2.59±0.52 | p<0.001 |
| Not decided | 110 | 2.91±0.79 | | 2.93±0.59 | | 2.92±0.47 | |
| Significance | | 1-2, 1-3, 2-3 | | 1-2, 2-3 | | 1-2, 1-3, 2-3 | |
| I think that I have been given enough information about vaccines | | | | | | | |
| Yes | 183 | 3.17±0.73 | F=11.369 | 2.96±0.8 | F=0.683 | 3.03±0.54 | F=5.804 |
| No | 101 | 2.71±0.92 | p<0.001 | 2.86±0.64 | p=0.506 | 2.81±0.57 | p=0.003 |
| Not decided | 104 | 3.05±0.76 | | 2.92±0.62 | | 2.96±0.46 | |
| Significance | | 1-2, 2-3 | | | | 1-2 | |
| I have concerns about the unknown side effects of the vaccine in the upcoming years | | | | | | | |
| Yes | 200 | 2.86±0.82 | F=8.285 | 2.97±0.63 | F=2.786 | 2.93±0.52 | F=1.664 |
| No | 61 | 3.22±0.78 | p<0.001 | 2.73±0.84 | p=0.063 | 2.89±0.58 | p=0.191 |
| Not decided | 127 | 3.18±0.76 | | 2.95±0.75 | | 3.02±0.53 | |
| Significance | | 1-2, 1-3 | | | | | |

(One-way ANOVA with Tukey HSD test)

Table 5. Factors associated with COVID-19 vaccine literacy in participants

| Model | COVID-19 vaccine literacy | | | | | | 95% Confidence Interval | |
|--|---------------------------|-------|---------|--------|--------|-------|-------------------------|-------|
| | B | SE | β | T | Sig. | VIF | Lower | Upper |
| Educational background | 0.121 | 0.019 | 0.306 | 6.371 | <0.001 | 1.07 | 0.084 | 0.158 |
| Being married | -0.083 | 0.052 | -0.077 | -1.598 | 0.111 | 1.081 | -0.185 | 0.019 |
| History of COVID-19 | 0.104 | 0.082 | 0.059 | 1.263 | 0.207 | 1.015 | -0.058 | 0.266 |
| Getting vaccinated on his/her own accord | 0.304 | 0.062 | 0.233 | 4.933 | <0.001 | 1.038 | 0.183 | 0.425 |

(R=0.417, R²=0.174, p<0.001)

Discussion

In this study, which was conducted with the aim of examining the approaches to COVID-19 vaccines in the community and the relationship of such approaches with COVID-19 vaccine literacy, as well as the factors affecting relevant literacy, we found the vaccine literacy status of the participants moderate. The results also implied that the higher the level of education, the higher the literacy and that COVID-19 vaccine literacy was higher in individuals who were vaccinated voluntarily.

The promising results of vaccine applications aimed at limiting the pandemic caused by the SARS-CoV-2 virus have been demonstrated by various studies around the world. A study conducted by Benenson et al. with healthcare workers in a hospital with a high incidence of COVID-19 cases in Israel reported that after two doses of the BNT162b2 vaccine, the number of new cases decreased significantly, indicating that effective vaccination would lead to a safer environment throughout the community.¹² The intermediate results of the Phase-3 study, during which the efficacy of the CoronaVac vaccine in Turkey was evaluated with participants aged 18-59 years, showed that the vaccine had good efficacy for symptomatic SARS-CoV-2 infection and severe course of COVID-19 infection that required hospitalization, and that it has a good safety profile in terms of adverse effects in this population.¹³ These situations may contribute to the reduction of concerns about the course of the infection in the community with COVID-19 vaccines.

Another study evaluating the effectiveness of the CoronaVac vaccine in elderly individuals in Turkey, in comparison to younger adults, reported that the administration of two doses of CoronaVac vaccine in the geriatric population with an average age of 78 years was 85.3% effective against the COVID-19 virus, and this rate was 97.4% in the younger group with an average age of 48 years.¹⁴

Although the positive effects of these vaccines have been demonstrated by studies, negative attitudes towards the acceptance of vaccines and the lack of willingness of individuals to get a vaccine constitute serious obstacles related to immunization.

Around the world, many studies are available to examine approaches to COVID-19 vaccines and their relationship with health literacy, as well as the factors affecting literacy.

In a study evaluating COVID-19 vaccine willingness in Australia before the introduction of vaccines and at a time when the number of cases was quite low, factors such as being female, being younger, having poor health literacy, and lower educational background were directly associated with reluctance to be vaccinated. In the same study, the desire to protect oneself and others were shown as one of the most important reasons for vaccine acceptance.¹⁵ In our study, however, no significant difference was found in the scores on the COVID-19 vaccine literacy scale and subscale groups by age, gender, having a child, history of chronic disease, history of allergy, and history of a COVID-19 infection. Considering the reasons that led people to decide to get vaccinated, it was determined that 78.35% of them decided to get vaccinated voluntarily on their own accord, whereas 3.60% of them decided to get vaccinated upon the request of their families. In addition, 10.1% of the participants in our study stated that they decided to get vaccinated, considering that COVID-19 vaccines would be mandatory in the future.

A study evaluating COVID-19 vaccine hesitancy in the USA has reported that people who believe the vaccine is unsafe to have less knowledge about the virus and are less educated than people who believe the vaccine is safe.¹⁶ In our study, the literacy scores of the participants who stated that they found the vaccines safe turned out to be statistically significantly higher. These situations suggest that low literacy levels may be a significant barrier to trust in COVID-19 vaccines.

Moreover, an online survey conducted in Croatia for the purpose of evaluating the COVID-19 vaccine literacy among people aged 18 and over has indicated that the participants have a moderate level of vaccine literacy with a score of 2.37 ± 0.54 .¹⁷ We employed the same scale in our study, in which we found the mean literacy score 2.95 ± 0.54 . In addition, the aforementioned study concluded that the level of vaccination literacy increases with the level of education while decreasing with age.¹⁷ Similarly, our study determined that literacy level increased with education level, but no significant difference was found in the scale scores as to age. It is an expected situation that education levels and literacy rates are correlated.

Biasio et al. used online questionnaires in order to evaluate the COVID-19 vaccine literacy of people aged 18 and over in Italy and reported the mean functional score of the participants as 2.92 ± 0.70 and the mean communicative-critical score as 3.27 ± 0.54 .⁹ In our study, however, the mean functional score of the

participants was 3.02 ± 0.81 , which was higher than that of Biasio et al., while the mean communicative-critical score was lower with 2.92 ± 0.71 .

In the Turkish validity and reliability study conducted by Durmuş et al., using online questionnaires with the participation of 596 individuals residing in Turkey, the participants' mean score for the COVID-19 vaccine literacy was 2.54 ± 0.56 , while it was 2.40 ± 0.75 for functional skills, and 2.60 ± 0.69 for communicative-critical skills.⁷ The fact that the mean score of all three groups in our study was higher than that of Durmuş et al. may be related to the fact that our sample consisted of people who presented to COVID-19 outpatient clinics for vaccination, that the majority of them were university students or university graduates, and that the welfare level of Antalya province was relatively higher than some other provinces.

The significance of our research lies in the fact that all data were collected by face-to-face interview technique. In addition, as far as is known, our study is the first to evaluate COVID-19 vaccine literacy in Turkey, apart from the one regarding Turkish validity and reliability.

Our study with 388 participants can be generalized to the population of Antalya province, though it does not give an idea about the extent of COVID-19 vaccine literacy around Turkey, which is the limitation of our study.

In conclusion, although vaccine literacy levels are not considered as low in our study, it should be noted that vaccine hesitancy is not always caused by a lack of knowledge. It should, thus, be acknowledged that individuals may be hesitant due to the unknowns of the pandemic that cannot be predicted even by health authorities, and consequently, vaccination incentive strategies should be developed with the aim of giving society clearer information and confidence rather than fear.

Ethical considerations: Ethical approval was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Antalya Training and Research Hospital as of 24.06.2021 with decision number 9/6.

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