

ORIGINAL ARTICLE

Medicine Science 2023;12(1):36-45

COVID-19 vaccination literacy, attitude and hesitation towards vaccination and vaccination status of pregnant women

Aysegul Kilicli, Sahide Akbulut

Mus Alparslan University, Department of Nursing, Mus, Türkiye
Batman University, Faculty of Health Science, Department of Nursing, Batman, Türkiye

Received 24 October 2022; Accepted 31 December 2022
Available online 20.01.2023 with doi: 10.5455/medscience.2022.10.224

Copyright@Author(s) - Available online at www.medicinescience.org

Content of this journal is licensed under a Creative Commons Attribution-NonCommercial-NonDerivatives 4.0 International License.



Abstract

The study aims to determine COVID-19 vaccine literacy, attitude and hesitation towards the vaccine, and vaccination status of pregnant women in a rural region. This is a cross-sectional study. It was carried out between June 7 – 7 August 2022. 209 pregnant women were included in the study. The mean score of pregnant women was found to be COVID-19 vaccine literacy 2.5 ± 0.4 , attitude 3.1 ± 0.8 , and hesitation 7.7 ± 6.6 . It was found that 12.4% of the pregnant women had COVID-19 disease in their current pregnancy, and 7.2% of them had COVID-19 disease in the first trimester. It was determined that 34.4% of the pregnancy had a single dose, 30.2% had two doses, and most of them were BioNTech vaccines. Vaccine literacy was determined to be higher in pregnant women who are working, have social security, have a higher income than their expenses and have a master's degree. Those who are married, have social security, and have a female baby have a positive attitude for vaccines. There was a positive significant relationship between COVID-19 vaccine literacy and attitude, and a negative significant relationship between COVID-19 vaccine literacy and hesitancy. It was discovered that COVID-19 vaccine literacy is moderate, vaccination rates are low, and vaccination literacy influences vaccination attitudes and hesitation.

Keywords: COVID-19, pregnant, vaccination

Introduction

Vaccination is the most widely used protective application in the world for disease prevention. The purpose of vaccination programs is to prevent avoidable infectious diseases and disease-related mortality or permanent sequelae [1,2]. Vaccine is the ability of a person to access, process, and understand fundamental health information and services to make appropriate health decision regarding vaccinations [3].

The effect of the virus on the human body in the COVID-19

epidemic, the lack of treatment for the disease, contradictory informations about vaccination studies and inconsistent information about the advantages and disadvantages of vaccines spread rapidly in the mass media, causing individuals to believe incomplete and wrong information. Therefore, this situation prevents access to accurate information about COVID-19 disease and vaccines, leading to wrong decisions about getting vaccinated and increasing vaccine hesitancy [3-6]. In addition, reasons such as concerns about safety of the vaccines developed, short and long-term side effects of the vaccines and uncertainty

CITATION

Kilicli A, Akbulut S. COVID-19 vaccination literacy, attitude and hesitation towards vaccination and vaccination status of pregnant women. Med Science. 2023;12(1):36-45



Corresponding Author: Aysegul Kilicli, Mus Alparslan University, Department of Nursing, Mus, Türkiye
Email: aysegul_ay_9@hotmail.com

of protective effect of the vaccines, lack of information on safety of the vaccines, and the concern of the vaccine harming the fetus lead to an increase in the negative attitudes and hesitations of pregnant women [7-13]. Therefore, individuals seek information about COVID-19 disease and COVID-19 vaccine types from current and reliable sources. The attitudes of individuals about the vaccination are influenced by their opinions of the information they have obtained [12].

In researches evaluating individuals' attitude of towards COVID-19 vaccine types, it was revealed that almost all of the non-pregnant participants are willing to be vaccinated and have a positive attitude towards the vaccine. It was reported that people experiencing fear and anxiety about vaccine believe that the vaccine is effective against epidemics and are therefore willing to be vaccinated [12,14,15]. However, pregnant women constitute a risk group for pandemic infection. Because suppression of the immune system during pregnancy, they are more susceptible to pathogens and severe pneumonia. In latter stages of pregnancy, rise in diaphragm height, increase in oxygen demand, and edema of respiratory tract mucosa lower pregnant woman's tolerance to hypoxia [16]. Therefore, during pregnancy vaccination to prevent COVID-19 is essential. According to a research, after vaccination to prevent COVID-19, pregnant and non-pregnant women exhibited comparable levels of protection. In addition, it was claimed that complications such as premature birth, stillbirth, intrauterine growth retardation, and congenital anomalies do not increase following vaccination; nevertheless, further research is required on this topic [17]. Studies on COVID-19 vaccine types are still insufficient. Although the current COVID-19 vaccines have protective properties, it is stated that the attitudes towards these vaccines vary and the hesitation towards the vaccine is high in studies conducted on the pregnant population. It is reported that the perspective of the society towards vaccines and sociocultural factors have a significant effect on attitudes and hesitancy towards vaccines [11,13,18].

No research has been found examining the vaccination literacy of pregnant women, their attitudes towards the vaccine, their hesitancy, and their vaccination status against COVID-19 in the rural and conservative part of Eastern Anatolia, where fertility is high in Turkey [19]. Therefore, this research aimed to determine the vaccination literacy of pregnant women in rural region, their attitude and hesitance towards the vaccine, and their vaccination status.

Research questions

- What is the vaccination literacy of pregnant women in rural region, their attitudes and hesitations towards the vaccine, and their vaccination status?
- Is there a difference between scale mean scores according to the socio-demographic characteristics of the pregnant women in rural region?
- Is there a significant relationship between the scale and scale

sub-dimension mean scores of pregnant women in rural region?

Material and Methods

Research Type

This is a cross-sectional study. This research was carried out at Muş State Hospital Obstetrics and Gynecology Outpatient Clinic in the province of Muş between June 7–7 August, 2022.

Variables of the Study

Dependent variable: COVID-19 Vaccine Literacy Scale, Attitudes towards COVID-19 Vaccine Scale and Vaccine Hesitancy in Pandemic Scale mean scores.

Independent variable: Socio-demographic and obstetric characteristics of pregnant women.

Population and Sample

Population of research consisted of pregnant women who applied to Muş State Hospital Obstetrics and Gynecology Outpatient Clinic. Type I error 0.05, d:0.25 effect size or correlation coefficient, 80% power, GPower 3.1 program was used for the sample of the study, and the sample size was calculated. It was found that minimum of 199 people for difference analysis should be taken into the sample [20,21]. Total 209 pregnant women living participated in the study. Pregnant women included in the study were selected by simple random sampling method. Statistical significance level of the research was determined as $p < 0.05$, with a confidence interval of 95%.

Inclusion and Exclusion Criteria of Research

Inclusion criteria; pregnant women who are literate and have no previous psychiatric history or diagnosis.

Exclusion criteria; pregnant women who do not meet the inclusion criteria.

Data Collection Process

Data were obtained through face to face interviews by researcher (A.K.) at Muş State Hospital Obstetrics and Gynecology Outpatient Clinic Obstetrics and Gynecology Outpatient Clinic between June 7 – August 7, 2022.

Data Collection Tools

Introductory Information Form, COVID-19 Vaccine Literacy Scale, Attitudes Towards COVID-19 Vaccine Scale, and Vaccine Hesitancy in Pandemics Scale were used to collect data.

Introductory Information Form

This was developed by the researchers, consists of a total of 35 questions (18 of which question sociodemographic

characteristics of pregnant women, 17 questions about the fertility characteristics) [3,4,22-24].

COVID-19 Vaccine Literacy Scale (COVID-19-VLS)

It was developed by Ishikawa et al. (2008) to examine health literacy for chronic diseases and adapted by Biasio et al. (2021) as the COVID-19 Vaccine Literacy Scale [22,25]. It was adapted to Turkish by Durmuş et al. (2021) [3]. It consists of 12 items and 2 sub-dimensions. Functional vaccine literacy is the ability of individuals to have simple reading and writing skills, to understand health education and vaccine-related materials. Communicative/Critical vaccine literacy focuses on cognitive efforts (problem solving and decision making) [22,26,27]. The scale is a 4-point Likert type. The communicative/critical dimension questions are coded as (1) Never, (2) Rarely, (3) Sometimes, (4) Often. Functional dimension expressions are reverse coded. The fact that the average of the scores obtained from the scale is close to 4 indicates that vaccine literacy is high [3,22]. Cronbach's alpha value of entire scale is 0.86, and for communicative/critical vaccine literacy and functional vaccine literacy dimensions are 0.91 and 0.86, respectively [3]. In this study, it was found 0.63 for total scale, 0.87 for communicative/critical vaccine literacy and 0.77 for functional vaccine literacy.

Attitude towards COVID-19 Vaccine Scale (ATVS-COVID-19)

It was created by Çirakoğlu (2011) to examine people's perceptions and attitudes towards the disease and their levels of anxiety and avoidance during the Swine Flu (H1N1) epidemic [28]. Scale of Attitudes towards COVID-19 Vaccine was adapted into Turkish during the COVID-19 outbreak by Geniş et al. (2020) [23]. The scale consists of 9 items and two subdimensions (positive attitude and negative attitude), it is a Likert type. High scores obtained from scale and sub-dimensions indicate that the attitude towards the vaccine is positive. Cronbach's alpha value of the scale is 0.80. This values are 0.96 and 0.78 in positive attitude and negative attitude sub-dimensions, respectively [23]. In this study, it was found 0.90 for scale, 0.92 for positive attitude and 0.81 for negative attitude.

Vaccine Hesitancy Scale in Pandemics (VHSP)

It was developed by Larson et al. (2015) and adapted for pandemics by Çapar et al. (2021) [4,24]. Scale is in five point Likert type and consists of 10 items and two subdimensions (lack of confidence and risk). It can be obtained 10-50 points from scale. High score indicates high vaccine hesitancy. Cronbach alpha is 0.90 (Çapar et al., 2021) [4]. In this study, it was found 0.83, for lack of confidence 0.82 and for risk sub-dimension 0.69.

Statistical Analysis

It was analyzed using SPSS 26.0 (IBM SPSS Statistics Version 26, SPSS Inc., Chicago, Illionus, ABD, 2019) package program. Number, percentage, mean±standard deviation, minimum and

maximum values from descriptive statistics were calculated. The Kolmogorow-Smirnow test was used to evaluate the conformity of continuous variables (age, gestational week in which COVID 19 disease experienced in this pregnancy, current gestational week, first marriage age, first gestational age, number of pregnancy, number of birth, number of living children, number of stillbirth, number of low, number of curettage, number of vaginal birth, number of cesarean deliveries, husband's age, COVID-19-VLS total and subscales, ATVS-COVID-19 total and subscales, VHSP total and subscales) to normal distribution. The difference in mean scale scores according to categorical variables (age group, marital status, family type, education status, income status, mother working status, social security status, cigarette, husband's age, husband education status, husband working status, current pregnancy trimester, baby's sex, problem status in pregnancy, having COVID-19 disease during pregnancy, trimester with COVID-19 disease during pregnancy, getting the COVID-19 vaccine during pregnancy, first dose of COVID-19 vaccine during pregnancy, second dose of COVID-19 vaccine during pregnancy, opinions on the COVID-19 vaccine in pregnancy, opinions on the effects of being vaccinated for COVID-19 during pregnancy on the baby) was determined by independent sample t-test or Man Whithney U test for two independent groups, and by One Way ANOVA or Kruskal Vallis for more than two groups. Spearman correlation analysis was used to identify correlation between numerical sociodemographic-obstetric variables and COVID-19-VLS, ATVS-COVID-19, VHSP total mean scores. Statistical significance was determined as $p < 0.05$, with a confidence interval of 95%.

Ethical Considerations

Ethics committee approval were obtained from Muş Alparslan University Scientific Research and Publication Ethics Committee (Date:30.05.2022 MAUN-SRPEC-Board Decision-8/45), and institutional permission were obtained from Mus Provincial Health Directorate (Date:08.06.2022). Written informed consent was received from pregnant women.

Results

The scale score averages of the pregnant women were determined as follows: COVID-19-VLS: 2.5 ± 0.4 , COVID-19-VLS functional: 2.6 ± 0.7 , COVID-19-VLS communicating and critical 2.3 ± 0.7 ; ATVS-COVID-19: 3.1 ± 0.8 , ATVS-COVID-19 positive sub-dimension 3.1 ± 1.0 , ATVS-COVID-19 negative 3.1 ± 0.8 ; VHSP: 27.7 ± 6.6 , VHSP lack of confidence 21.4 ± 5.7 , VHSP risk 6.3 ± 1.7 (Table 1).

In terms of their sociodemographic characteristics, it was found that 39.7% of the pregnant women were between the ages of 25-29, 91.9% were married, 82.3% came from a nuclear family structure, 24.9% were secondary school graduates, 60.3% had income=expenses, 72.7%, 72% were unemployed, 72.2% had social security, 22.5% were smokers, 66% were in their third trimester and 14.8% of them had problems in their current pregnancy (Table 2).

Table 1. The pregnant women's mean scores of the COVID-19 Vaccine Literacy Scale, of the Attitudes towards the COVID-19 Vaccine Scale, of the Vaccine Hesitancy in Pandemics Scale and of these scales' sub-dimensions

Scales	Total Pregnancy (n=209)	
	Mean ($\pm$ SD)	Min-Max (Median)
COVID-19-VLS	2.5 ($\pm$ 0.4)	1-3.5 (2.5)
COVID-19-VLS Functional	2.6 ($\pm$ 0.7)	1-4 (2.75)
COVID-19-VLS Communicating and Critical	2.3 ($\pm$ 0.7)	1-4 (2.25)
ATVS-COVID-19	3.1 ($\pm$ 0.8)	1-4.89 (3)
ATVS-COVID-19 Positive	3.1 ($\pm$ 1.0)	1-5 (3.25)
ATVS-COVID-19 Negative	3.1 ($\pm$ 0.8)	1-4 (3)
VHSP	27.7 ($\pm$ 6.6)	14-46 (28)
VHSP Lack of Confidence	21.4 ($\pm$ 5.7)	11-40 (21)
VHSP Risk	6.3 ($\pm$ 1.7)	2-10 (6)

COVID-19-VLS: COVID-19 Vaccine Literacy Scale; ATVS-COVID-19: Attitudes Towards the COVID-19 Vaccine Scale; VHSP: Vaccine Hesitancy Scale in Pandemics

Table 2. The pregnant women's mean scores of COVID-19 Vaccine Literacy Scale, COVID-19 Vaccine Attitudes Scale, Vaccine Hesitancy in Pandemics Scale regarding their sociodemographic and obstetric characteristics

Sociodemographic and obstetric characteristics	Total Pregnancy (n=209)	COVID-19-VLS Total		ATVS-COVID-19 Total		VHSP Total	
	% (n)	Mean (±SD)	Test/p-value	Mean (±SD)	Test/p-value	Mean(±SD)	Test/p-value
Age							
19 years and under	2.9 (6)	2.1 (0.6)	H: 8.1	2.2 (0.8)	H: 8.9	33.1 (5.9)	F: 1.8
20-24 years old	24.4 (51)	2.5 (0.4)	p:0.08	3.1 (0.8)	p:0.06	27.5 (7.1)	p:0.1
25-29 years old	39.7 (83)	2.6 (0.3)		3.2 (0.8)		27.2 (6.5)	
30-34 years old	23.4 (49)	2.4 (0.4)		3.0 (0.8)		28.9 (6.9)	
35 years and older	9.6 (20)	2.5 (0.3)		3.3 (0.6)		26.1 (5.0)	
Marital status							
Married	91.9 (192)	2.5 (0.4)	U: 1371.5	3.1 (0.8)	U: 1162.5	27.5 (6.8)	U: 1267.5
Single	8.1 (17)	2.4 (0.5)	p:0.2	2.7 (0.7)	p:0.04	29.6 (4.8)	p:0.1
Family type							
Nuclear	82.3 (172)	2.5 (0.4)	U: 2647.5	3.1 (0.8)	U: 3094.5	27.6 (6.6)	U: 2963.5
Extended	17.7 (37)	2.4 (0.4)	p:0.1	3.1 (0.8)	p:0.7	28.3 (6.7)	p:0.5
Education status							
Illiterate	2.9 (6)	2.2 (0.4)	H: 23.3	2.8 (0.8)	H: 4.8	28.8 (5.7)	H: 4.7
Literate	5.7 (12)	2.2 (0.2)	p<0.01	2.6 (1.0)	p:0.5	29.2 (7.3)	p:0.5
Primary school	11.5 (24)	2.3 (0.3)		3.1 (0.7)		29.3 (7.0)	
Middle school	24.9 (52)	2.5 (0.3)		3.1 (0.8)		28.3 (7.2)	
High school	23.9 (50)	2.5 (0.4)		3.2 (0.9)		26.8 (6.4)	
Associate degree	13.9 (29)	2.6 (0.4)		3.2 (0.7)		27.3 (7.0)	
Bachelor degree	17.2 (36)	2.7 (0.4)		3.2 (0.7)		26.7 (5.5)	
Income status							
Income < Expense	58 (27.8)	2.4 (0.4)	H: 8.5	3.0 (0.8)	H: 3.5	28.7 (5.6)	H: 5.7
Income = Expense	60.3 (126)	2.5 (0.3)	p:0.01	3.1 (0.8)	p:0.1	27.8 (6.8)	p:0.05
Income > Expense	12.0 (25)	2.7 (0.3)		3.5 (0.9)		25.0 (7.5)	
Working status							
Yes	27.3 (57)	2.6 (0.3)	U: 3163.5	3.3 (0.8)	U: 3858.0	26.5 (6.6)	U: 3659.0
No	72.7 (152)	2.4 (0.4)	p<0.01	3.1 (0.8)	p:0.2	28.2 (6.6)	p:0.08
Social security status							
Yes	72.2 (151)	2.5 (0.4)	U: 3202.5	3.2 (0.7)	U: 3443.5	27.2 (6.4)	U:3813.5
No	27.8 (58)	2.3 (0.4)	p<0.01	2.8 (0.9)	p:0.01	29.0 (7.1)	p:0.14
Cigarette							
Yes	22.5 (47)	2.4 (0.4)	U: 3183.5	3.1 (0.7)	U: 3635.0	27.2 (6.4)	t:-0.5
No	77.5 (162)	2.5 (0.4)	p:0.08	3.1 (0.8)	p:0.6	27.9 (6.7)	p:0.5
Current pregnancy trimester							
First	9.6 (20)	2.3 (0.4)	H: 1.3	2.7 (1.0)	F: 2.9	30.9 (8.1)	H: 3.9
Second	24.4 (51)	2.5 (0.4)	p:0.5	3.1 (0.8)	p:0.2	27.1 (6.4)	p:0.1
Third	66.0 (138)	2.5 (0.4)		3.2 (0.7)		27.5 (6.4)	
Baby's sex							
Female	17.2 (36)	2.5 (0.4)	H:1.4	3.4 (0.7)	H: 11.4	29.6 (8.4)	H: 10.8
Male	34.4 (72)	2.5 (0.4)	p:0.4	3.0 (0.7)	p<0.01	25.5 (5.6)	p<0.01
Gender unknown	48.3 (101)	2.4 (0.4)		2.9 (1.0)		28.6 (6.2)	
Problem in pregnancy							
Yes	14.8 (31)	2.4 (0.4)	U: 2542.5	3.1 (0.8)	U: 2698.0	28.2 (6.4)	U: 2704.0
No	85.2 (178)	2.5 (0.4)	p:0.4	3.1 (0.8)	p:0.2	27.6 (6.7)	p:0.8

COVID-19-VLS: COVID-19 Vaccine Literacy Scale; ATVS-COVID-19: Attitudes Towards the COVID-19 Vaccine Scale; VHSP: Vaccine Hesitancy Scale in Pandemics; t: Independent Sample t test; U: Man Whitney U test; F: One Way ANOVA; H: Kruskal Wallis Test

Table 3. The pregnant women's mean scores of COVID-19 Vaccine Literacy Scale, COVID-19 Vaccine Attitudes Scale, Vaccine Hesitancy in Pandemics Scale mean scores according to their experiences, feelings and thoughts regarding COVID-19 and its vaccine in their current pregnancy

Characteristics of pregnant women's experiences with COVID-19 disease and vaccine	Total Pregnancy (n=209)	COVID-19-VLS Total		ATVS-COVID-19 Total		VHSP Total	
	% (n)	Mean (±SD)	Test/p-value	Mean (±SD)	Test/p-value	Mean(±SD)	Test/p-value
Having COVID-19 disease during pregnancy							
Yes	12.4 (26)	2.4 (0.3)	U: 2099.0	3.1 (0.8)	U: 2376.0	27.5 (6.4)	t: -0.2
No	87.6 (183)	2.5 (0.4)	p:0.3	3.1 (0.8)	p:0.9	27.7 (6.7)	p:0.8
Trimester with COVID-19 disease during pregnancy							
First	7.2 (15)	2.4 (0.2)	H: 3.3	3.0 (0.9)	H: 1.3	28.0 (7.2)	F: 0.5
Second	4.3 (9)	2.5 (0.3)	p:0.1	3.0 (0.4)	p:0.5	27.6 (4.2)	p:0.6
Third	1.0 (2)	2.7 (0.05)		3.9 (1.3)		23.0 (9.8)	
Getting the COVID-19 vaccine during pregnancy							
Yes	34.4 (72)	2.6 (0.4)	U: 4145.5	3.2 (0.7)	U: 4348.5	25.6 (5.5)	U: 3505.5
No	65.6 (137)	2.4 (0.4)	p:0.05	3.1 (0.8)	p:0.1	28.8 (6.9)	p<0.01
1st dose of COVID-19 vaccine during pregnancy							
BioNTech	24.4 (51)	2.5 (0.4)	F: 1.3	3.2 (0.6)	F: 0.05	25.7 (4.5)	H: 0.5
Sinovac	9.6 (20)	2.7 (0.3)	p: 0.2	3.2 (0.9)	p: 0.9	25.1 (7.6)	p:0.7
Turcovac	0.5 (1)	2.25		3.4		33.0	
2nd dose of COVID-19 vaccine during pregnancy							
BioNTech	22.5 (47)	2.5 (0.4)	F: 0.7	3.2 (0.5)	F: 0.05	25.5 (4.3)	F: 0.9
Sinovac	7.2 (15)	2.6 (0.3)	p:0.4	3.2 (1.1)	p:0.9	25.0 (8.7)	p:0.4
Turcovac	0.5 (1)	2.25		3.4		33.0	
Opinions on the COVID-19 vaccine in pregnancy							
I think it's harmful, risky	35.9 (75)	2.4 (0.3)	H: 11.9	2.8 (0.8)	F: 0.05	31.0 (7.1)	F: 0.09
I am scared	5.3 (11)	2.3 (0.4)	p<0.01	3.1 (0.5)	p:0.9	29.0 (3.7)	p:0.4
I think it is protective and useful	26.8 (56)	2.6 (0.3)		3.5 (0.8)		23.9 (5.5)	
I'm not sure, I'm undecided, I don't know	32.1 (67)	2.4 (0.4)		3.2 (0.7)		27.0 (5.5)	
Opinions on the effects of being vaccinated for COVID-19 during pregnancy on the baby							
I think it will benefit	23.0 (48)	2.6 (0.4)	F: 1.5	3.6 (0.8)	F: 15.3	23.3 (5.5)	F: 22.5
I'm undecided, I don't know, I'm not sure	43.1 (90)	2.5 (0.4)	p:0.2	3.1 (0.6)	p<0.01	27.6 (5.4)	p<0.01
I think it will hurt	34.0 (71)	2.5 (0.4)		2.8 (0.8)		30.9 (7.1)	

COVID-19-VLS: COVID-19 Vaccine Literacy Scale; ATVS-COVID-19: Attitudes Towards the COVID-19 Vaccine Scale; VHSP: Vaccine Hesitancy Scale in Pandemics; t: Independent Sample t test; U: Man Whitney U test; F: One Way ANOVA; H: Kruskal Wallis Test

There was a significant difference between the mean scores of COVID-19-VLS based on education (H:23.3, p-value<0.01), income (H:8.5, p-value:0.01), employment (U:3163.5, p-value<0.01) and social security (U:3202.5, p-value<0.01) status of the pregnant women. It was discovered that pregnant women with a master's degree, whose income is higher than their expenses, who are working and who have social security, have higher COVID-19 vaccine literacy (Table 2).

A significant difference was found between pregnant women's mean scores of ATVS-COVID-19 according to their marital status (U:1262.5, p-value:0.04), social security status (U: 3443.5, p-value:0.01), and gender of their babies (H:11.4, p-value<0.01). It was determined that those who are married, have social security and have a female baby have positive attitude towards

the COVID-19 vaccine (Table 2).

A significant difference was determined between the mean VHSP scores of the pregnant women according to the sex of their babies (H:10.8, p-value<0.01), and those with a female baby had higher hesitation (Table 2).

It was found that 12.4% of the pregnant women had COVID-19 disease in their current pregnancy, 7.2% had COVID-19 disease in the first trimester, 34.4% had COVID-19 vaccine in this pregnancy, and 24.4% had the first dose of BioNTech vaccine. 30.2% of the pregnant women were vaccinated two doses of COVID-19 vaccine and 22.5% received BioNTech vaccine. It was revealed that 35.9% of the pregnant women think that the COVID-19 vaccine during pregnancy is harmful and risky,

and 23.0% think that the COVID-19 vaccine during pregnancy benefits the baby (Table 3).

A significant difference was found between the mean scores of COVID-19-VLS according to the opinions of pregnant women regarding COVID-19 vaccine (H:11.9, p-value<0.01), and those who thought that the vaccine was protective and beneficial during pregnancy had higher COVID-19 vaccine literacy (Table 3).

A significant difference was determined between the mean scores of ATVS-COVID-19 according to the opinions of pregnant women regarding the effects of being vaccinated against COVID-19 on baby (F:15.3, p-value<0.01), and it was revealed that those who thought that the vaccine would benefit during pregnancy showed more positive attitudes (Table 3).

A significant difference was determined between the mean VHSP

scores according to vaccination status (U:3505.5, p-value<0.01). Those who do not have the COVID-19 vaccine in this pregnancy were found to be more hesitant about the vaccine. There was a significant difference between the VHSP mean scores of pregnant women based on their thoughts on the effects of being vaccinated against the baby (F:22.5, p-value<0.01). It was revealed that those who think that getting COVID-19 vaccine during pregnancy will harm the baby have more hesitation towards the vaccine (Table 3).

A moderately significant correlation was determined between the mean scores of COVID-19-VHLS and average score of ATVS-COVID-19, ATVS-COVID-19 positive, and ATVS-COVID-19 negative, respectively (r: 0.30, r: 0.27, r: 0.24, p-value<0.01). Accordingly, as COVID-19 vaccine literacy of pregnant women increases, there is an increase in positive and negative attitude towards vaccine (Table 4).

Table 4. The correlation between the pregnant women's mean scores of the COVID-19 Vaccine Literacy Scale, the Attitudes towards the COVID-19 Vaccine Scale, the Vaccine Hesitancy in Pandemics Scale and their sub-dimensions

Sociodemographic and obstetric characteristics	SCALES								
	1	2	3	4	5	6	7	8	9
1. COVID-19-VLS Total	1								
2. COVID-19-VLS Functional	r:0.84 p<0.01	1							
3. COVID-19-VLS Communicating and Critical	r:0.08 p:0.20	r:-0.40 p<0.01	1						
4. ATVS-COVID-19 Total	r:0.30 p<0.01	r:0.32 p<0.01	r:-0.09 p:0.17	1					
5. ATVS-COVID-19 Positive	r:0.27 p<0.01	r:0.30 p<0.01	r:-0.09 p:0.17	r:0.89 p<0.01	1				
6. ATVS-COVID-19 Negative	r:0.24 p<0.01	r:0.25 p<0.01	r:-0.07 p:0.27	r:0.86 p<0.01	r:0.57 p<0.01	1			
7. VHSP Total	r:-0.28 p<0.01	r:-0.29 p<0.01	r:0.12 p:0.07	r:-0.70 p<0.01	r:-0.74 p<0.01	r:-0.51 p<0.01	1		
8. VHSP Lack of Confidence	r:-0.25 p<0.01	r:-0.27 p<0.01	r:0.14 p:0.04	r:-0.68 p<0.01	r:-0.75 p<0.01	r:-0.46 p<0.01	r:0.97 p<0.01	1	
9. VHSP Risk	r:-0.26 p<0.01	r:-0.24 p<0.01	r:0.02 p:0.72	r:-0.52 p<0.01	r:-0.45 p<0.01	r:-0.48 p<0.01	r:0.60 p<0.01	r:0.44 p<0.01	1

COVID-19-VLS: COVID-19 Vaccine Literacy Scale; ATVS-COVID-19: Attitudes Towards the COVID-19 Vaccine Scale; VHSP: Vaccine Hesitancy Scale in Pandemics; r: Spearman's rho Coefficient

A moderately significant negative correlation was determined between pregnant women's mean scores of COVID-19-VHLS and their mean scores of VHSP, VHSP lack of confidence, and VHSP risk, respectively (r:-0.28, r:-0.25, r:-0.26, p-value<0.01). This shows that as COVID-19 vaccine literacy of pregnant women increases, mistrust, risk perception and hesitations towards the vaccine decrease (Table 4).

A moderately correlation was determined between mean COVID-19-VLS functional scores of pregnant women and their mean scores of ATVS-COVID-19 (r: 0.32, p-value<0.01). Accordingly, as functional COVID-19 vaccine literacy of pregnant women

increases, their positive attitudes towards vaccine increase. A moderate correlation was determined between COVID-19-VLS functional and VHSP mean scores of pregnant women (r:-0.29, p-value<0.01). Accordingly, as functional COVID-19 vaccine literacy of pregnant women increases, their hesitations towards vaccine decrease (Table 4).

A highly correlation was found between ATVS-COVID-19 mean scores of pregnant women and their VHSP, VHSP lack of confidence and VHSP risk means scores, respectively (r: -0.70, r: -0.68, r: -0.52, p-value<0.01) (Table 4). Accordingly, as positive attitudes of pregnant women towards COVID-19 vaccine

increase, their fear, risk perception, and hesitation towards the vaccination diminish.

In this pregnancy of pregnant women, a positive correlation was determined between their COVID-19 vaccine literacy and their gestational age at which they had COVID-19 disease ($r:0.44$,

$p\text{-value}:0.02$), their age at first marriage ($r: 0.18$, $p\text{-value}<0.01$), their age at first pregnancy ($r: 0.2$, $p\text{-value}<0.01$), total number of their births ($r:0.22$, $p\text{-value}<0.01$). A negative significant correlation was determined between COVID-19 vaccine literacy and the number of pregnancies, living children, stillbirths, vaginal births (Table 5).

Table 5. The correlation between the numerical sociodemographic and obstetric characteristics of pregnant women and their mean scores of the COVID-19 Vaccine Literacy Scale, the Attitudes towards the COVID-19 Vaccine Scale, and the Vaccine Hesitancy in Pandemics Scale

Sociodemographic and obstetric characteristics	Total Pregnancy (n=209) Mean ($\pm$ SD)	COVID-19-VLS Total		TVS-COVID-19 Total		VHSP Total	
Age	27.6 ($\pm$ 5.2)	$r:-0.03$	$p:0.6$	$r:0.05$	$p:0.4$	$r:-0.03$	$p:0.6$
Gestational week in which COVID 19 disease experienced in this pregnancy	12.8 ($\pm$ 8.2)	$r:0.44$	$p:0.02$	$r:0.23$	$p:0.2$	$r:-0.14$	$p:0.4$
Current gestational week	27.6 ($\pm$ 9.1)	$r:0.02$	$p:0.77$	$r:0.04$	$p:0.4$	$r:0.02$	$p:0.6$
First marriage age	22.2 ($\pm$ 3.3)	$r:0.18$	$p<0.01$	$r:0.07$	$p:0.2$	$r:-0.03$	$p:0.6$
First gestational age	23.2 ($\pm$ 3.7)	$r:0.2$	$p<0.01$	$r:0.08$	$p:0.2$	$r:-0.09$	$p:0.1$
Number of pregnancy	2.4 ($\pm$ 1.5)	$r:-0.2$	$p<0.01$	$r:-0.04$	$p:0.5$	$r:0.02$	$p:0.7$
Number of birth	1.2 ($\pm$ 1.3)	$r:0.22$	$p<0.01$	$r:-0.04$	$p:0.5$	$r:0.03$	$p:0.6$
Number of living children	1.1 ($\pm$ 1.2)	$r:-0.2$	$p<0.01$	$r:-0.02$	$p:0.7$	$r:0.02$	$p:0.7$
Number of stillbirth	0.04 ($\pm$ 0.2)	$r:-0.15$	$p:0.02$	$r:0.002$	$p:0.9$	$r:-0.02$	$p:0.7$
Number of low	0.1 ($\pm$ 0.5)	$r:0.02$	$p:0.7$	$r:-0.06$	$p:0.3$	$r:-0.007$	$p:0.9$
Number of curettage	0.1 ($\pm$ 0.4)	$r:-0.04$	$p:0.5$	$r:0.04$	$p:0.5$	$r:-0.05$	$p:0.4$
Number of vaginal birth	0.9 ($\pm$ 1.1)	$r:-0.22$	$p<0.01$	$r:-0.1$	$p:0.14$	$r:0.05$	$p:0.4$
Number of cesarean deliveries	0.2 ($\pm$ 0.5)	$r:-0.09$	$p:0.1$	$r:0.09$	$p:0.15$	$r:-0.03$	$p:0.6$

COVID-19-VLS: COVID-19 Vaccine Literacy Scale; ATV-S-COVID-19: Attitudes Towards the COVID-19 Vaccine Scale; VHSP: Vaccine Hesitancy Scale in Pandemics; r : Spearman's rho Coefficient

Discussion

All available information and research on COVID-19 vaccines have revealed positive findings. However, the concepts of COVID-19 vaccination, vaccine literacy, attitudes towards vaccines and hesitancy are issues that need to be addressed seriously in pregnant women. The findings of the study conducted for this purpose were discussed.

In a study conducted in Ethiopia, rate of acceptance of COVID-19 vaccine by pregnant women was found 40.08%. It was stated that approximately 81.8% of the pregnant women had information about the vaccine and 37.9% of them got this information from health workers [29]. In a study conducted on vulnerable groups such as pregnant and lactating women with 1249 participants, it was determined that 41.8% of participants had limited information about suitability of vaccines [10]. A study conducted in Thailand reported that 60.8% of pregnant women accepted vaccine, and more than half (55.8%) of pregnant women who accepted vaccine preferred in second trimester. Fear of vaccine harming the baby, side effects, and distrust of vaccine efficacy were the most common reasons for rejection [30]. In a metaanalysis reported overall rate of pregnant women vaccinated

against COVID-19 as 27.5%. It was also stated that advanced age, race, ethnicity, trust in COVID-19 vaccine types and fear of COVID-19 during pregnancy are among the factors affecting vaccine acceptance [31]. A study in both pregnant and lactating women revealed that majority of pregnant women (85.6%) were in third trimester and 97.2% of them were not vaccinated during pregnancy. The study stated that 13.3% of pregnant women refused to be vaccinated despite doctor's advice. It also reported that as the education level of pregnant women increased, rejection of vaccine increased, 56.8% of the pregnant women refused to be vaccinated despite the vaccination recommendation, and 28.4% of them had commitments to the vaccine [32]. A study conducted in USA stated that pregnant women living in the countryside had a lower vaccination rate than pregnant women living in the center [18]. A study of 885 pregnant women reported that the functional (2.9) and communicative-critical vaccination literacy (3.3) of pregnant women for COVID-19 were above average [22]. In this study, it was found that COVID-19 vaccine literacy (2.5), functional vaccine literacy (2.6), and communicative-critical vaccine literacy (2.3) of pregnant women living in rural area were moderate. It was determined that as age, education and income level for COVID-19 increase, vaccine literacy,

especially functional vaccine literacy, increases. This study showed that vaccine literacy is higher in pregnant women who are working, have social security, do not smoke and think that the vaccine is protective and beneficial. In addition, it was found that vaccine literacy increased as first marriage age, first pregnancy age, total number of births and gestational age with COVID-19 disease increased. It was determined that as the total number of pregnancies, living children, stillbirths, vaginal births and age of spouse increased, vaccination literacy decreased. While this findings support results of previous studies, it shows that COVID-19 vaccine literacy of pregnant women living in rural area is significantly affected by their current obstetric characteristics. Muş province, which is a rural area and located in Eastern Anatolia, is one of the provinces with the highest fertility rate (TFR: 2.7). Individuals living in the region are mostly conservative and adhere to religious beliefs. It is the most underdeveloped province in the country that migrates to the west in the region [19,33]. This shows that women living in the region, especially pregnant women, should be evaluated carefully during pandemic process. Therefore, it is thought that these findings will make an important contribution to the literature.

The sociocultural characteristics of the society in which the pregnant women live and the level of vaccination literacy significantly affect their attitudes towards vaccination. A study stated that 79.6% of participants had a negative attitude towards COVID-19 vaccine, 96.8% were worried about the vaccine, and 84.1% were willing to be vaccinated in the future [34]. Another study reported that 36% of pregnant women had a negative attitude towards getting vaccinated during pregnancy and their concerns about safety of their babies were at the forefront. It was also stated that the probability of vaccination of pregnant women increased as age, education level, income level and gestational week increased [35]. In Saudi Arabia it was reported that 68% of pregnant women were willing to be vaccinated, and that COVID-19 vaccine rejection increased in non-working and low-educational pregnant women [36]. In another study was reported that COVID-19 vaccine effectiveness was 90% showed that 52.0% of pregnant women and 73.4% of non-pregnant women were willing to be vaccinated and had a positive attitude towards vaccine. In addition, the study noted that among the most important indicator of vaccine acceptance are safety or efficacy, concern about COVID-19 [11]. A study conducted in Turkey revealed that 50.8% of participants did not want to be vaccinated in pregnancy, and 3.8% of pregnant women changed their views positively after giving information about vaccine studies. In addition, it was stated that 37% of pregnant women would refuse to be vaccinated even if the safety of the vaccine was proven [37]. The fact that there was no research that evaluated COVID-19 vaccine attitude of pregnant women in pregnancy with a scale shows importance of this research. This study determined that mean attitude score of participants towards COVID-19 was 3.1 and pregnant women had a moderately positive attitude towards vaccine. It was revealed that attitude of pregnant women who are married, whose spouse is between the ages of 31-35, who have

social security, whose baby is a girl, and who think that getting COVID-19 vaccine during pregnancy will benefit baby, have a positive attitude towards vaccine. It was determined that as age and income level increased, positive attitude towards vaccination increased. In addition, it was observed that 34.4% of the pregnant women had a single dose, 30.2% had two doses, and the majority of these vaccines were BioNTech vaccine. The findings support the results of previous study and show that pregnant women living in rural areas have positive attitude towards vaccine.

Level of hesitation towards COVID-19 vaccines in pregnant women is higher due to possible effects of vaccine on baby and pregnant woman. A meta-analysis study reported that rate of vaccine hesitancy in pregnant women was 49%. In terms of time factor in studies conducted since the beginning of the pandemic, vaccine hesitancy was found to be 58.0% in studies conducted in 2020, 38.1% in studies conducted in the first six months of 2021, and 42.0% in studies conducted in the second six months of 2021. These rates show that there is a moderate level of hesitation about vaccination in pregnant women [38]. It was stated in a study conducted in the USA that only 35.7% of pregnant women accepted to be vaccinated, 57.4% had only one dose vaccine during their pregnancy, and hesitancy of COVID-19 vaccination is high in pregnant women who live in big cities and have high education and income levels [39]. A meta-analysis study stated that the rate of vaccinated pregnant women was 27.5%, and advanced age, ethnicity, race, and confidence in COVID-19 vaccines were among the factors affecting vaccine acceptance during pregnancy [31]. A study conducted in Japan reported the COVID-19 vaccination rate of pregnant women as 13.4% and the vaccination hesitancy rate as 50.9%. The main reasons for hesitation included factors such as adverse reactions, adverse effects on the fetus and concerns about breastfeeding, and lack of confidence in government [8]. A multicenter study stated that 52.0% of pregnant women would agree to receive the COVID-19 vaccine during their pregnancy if they believed that the vaccine would be 90% effective. It was reported that the rate of vaccination acceptance of pregnant women varies between 28.8-84.4% according to the countries, while the acceptance level is above 80% in India and Mexico, it is below 45% in the USA, Australia and Russia [11]. A study conducted in Turkey stated that 28.5% of pregnant women refused to be vaccinated, and those with low education level (33.3%) and those who did not work in any job (47.1%) stated that vaccination rejection was higher [40]. This study measured the mean score of the vaccine hesitancy scale for COVID-19 as 27.7, the lack of confidence in the vaccine as 21.4, and the risk perception as 6.3. According to this result, it can be claimed that pregnant women have hesitations above the average. It was determined that vaccination hesitancy is higher in pregnant women whose baby is a girl, who did not have vaccine in this pregnancy and who think that vaccine will harm baby. The findings support previous study results. However, it shows that although pregnant women living in rural areas have a positive attitude towards vaccine, their hesitation is at a high level. Despite the high level of hesitation,

it was found that 34.4% of pregnant women had vaccine in this pregnancy, 34.4% had a single dose, 30.2% had two doses, and most of the vaccines were BioNTech vaccine. This shows that pregnant women are highly vaccinated and they prefer to have the BioNTech vaccine.

It is stated that as COVID-19 vaccine literacy increases, positive attitude increases and hesitation decreases [22]. This study determined that as functional and critical vaccine literacy for COVID-19 increases in pregnant women, positive attitude towards vaccine increases. As positive attitude towards vaccine increased, lack of confidence and risk perception and hesitation decreased. Research findings support the results of the study.

Limitations

The research findings cannot be generalized to the population since the research was conducted only in Muş State Hospital Obstetrics and Gynecology Polyclinic.

Conclusion

This study determined that COVID-19 vaccine literacy of pregnant women affected their attitudes and hesitations towards vaccination, and accordingly, that their vaccination rates were low. It also revealed that COVID-19 vaccine literacy was affected by their obstetric characteristics. According to the study, reasons such as lack of evidence-based findings regarding effect of COVID-19 vaccines on mother and baby during pregnancy, the uncertainty of long-term effects of vaccine, lack of confidence in existing data, and health policies applied resulted in both high hesitations of pregnant women and low vaccination rates. Healthcare professionals should support pregnant women in their antenatal care and monitoring with evidence-based information about indications, contraindications and side effects of COVID-19 vaccine.

Conflict of interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical approval

Ethics committee approval and institutional permission were obtained from Muş Alparslan University Scientific Research and Publication Ethics Committee (Date:30.05.2022 MAUN-SRPEC-Board Decision-8/45).

References

- World Health Organization (WHO). Global Immunization Data 2014. Available from: https://www.who.int/immunization/monitoring_surveillance/global_immunization_data.pdf Date of Access: 06.08.2022
- World Health Organization (WHO). Ten threats to global health in 2019. Available from: <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019> Date of Access: 06.08.2022
- Durmuş A, Akbolat M, Amarat M. Turkish validity and reliability of COVID-19 Vaccine Literacy Scale. *Cukurova Med J* 2021;46:732-41.
- Çapar H, Çınar F. Vaccine Hesitancy Scale in Pandemics: Turkish Validity And Reliability Study. *Gevher Nesibe Journal Of Medical & Health Sciences*. 2021;6:40-5.
- Aydın AF. Disinformation in social media in post-truth period: The COVID-19 (new Coronavirus) pandem process. *Asya Studies*. 2020;4:76-90.
- Bandari R, Zhou Z, Qian H, et al. A resistant strain: Revealing the online grassroots rise of the antivaccination movement. *Computer*. 2017;50:60-7.
- Ayhan SG, Oluklu D, Atalay A, et al. COVID-19 vaccine acceptance in pregnant women. *International Journal of Gynaecology and Obstetrics*. 2021;154:291-6.
- Hosokawa Y, Okawa S, Hori A, et al. The prevalence of COVID-19 vaccination and vaccine hesitancy in pregnant women: An internet-based cross-sectional study in Japan. *J Epidemiol*. 2022;32:188-94.
- Katzman JG, Katzman JW. Primary care clinicians as COVID-19 vaccine ambassadors. *J Prim Care Community Health*. 2021;12:21501327211007026.
- Kumari A, Ranjan P, Chopra S, et al. Knowledge, barriers and facilitators regarding COVID-19 vaccine and vaccination programme among the general population: A crosssectional survey from one thousand two hundred and forty-nine participants. *Diabetes Metab Syndr*. 2021;15:987-92.
- Skjefte M, Ngirbabul M, Akeju O, et al. COVID 19 vaccine acceptance among pregnant women and mothers of young children: results of a survey in 16 countries. *Eur J Epidemiol*. 2021;36:197-211.
- Türktemiz H, Ünal Ö. The mediating role of information seeking behavior and vaccine information belief in the effect of COVID-19 Fear on Vaccine Attitude. *BAUN Health Sci J*. 2021;10:367-78.
- Yasmin F, Najeeb H, Moeed A, et al. COVID-19 vaccine hesitancy in the United States: A systematic Review. *Front Public Health*. 2021;9:1-17.
- Doğan MM, Düzel B. Fear-Anxiety Levels in Covid-19. *Turkish Studies*. 2020;15:739-52.
- Paul E, Steptoe A, Fancourt D. Attitudes towards vaccines and intention to vaccinate against COVID-19: Implications for public health communications. *Lancet Reg Health Eur*. 2021;100012:1-10.
- Özcan H, Elkoca A, Yalçın Ö. COVID-19 infection and its effects on pregnancy. *Anatolian Clinic Journal of Medical Sciences*. 2020;25:43-50.
- Desdicioglu R, Aşvar FB, Yavuz AF. COVID-19 Vaccines and Pregnancy. *Ankara Med J*. 2021;4:672-86.
- Razzaghi H, Kahn KE, Masalovich S, et al. COVID-19 vaccination and intent among pregnant women. *Public Health Rep*. 2021;333549221099244:1-12.
- Turkish Statistical Institute (TURSTAT) 2021. Birth statistics. Retrieved from <https://data.tuik.gov.tr/Bulten/Index?p=Dogum-Istatistikleri-2021-45547> date access: 06.08.2022
- Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*. 2007;39:175-91.
- Cohen J. Statistical power analysis. *Current Directions in Psychological Science*. 1992;1:98-101.
- Biasio LR, Bonaccorsi G, Lorini C, Pecorelli S. Assessing COVID-19 vaccine literacy: A preliminary online survey. *Hum Vaccin Immunother*. 2021;17:1304-12.
- Geniş B, Gürhan N, Koç M, et al. Development of Perception and Attitude Scales Related with COVID-19 Pandemia. *Pearson Journal of Social Sciences - Humanities*. 2020;5:306-328.
- Larson HJ, Jarrett C, Schulz WS, et al. Measuring vaccine hesitancy: The development of a survey tool. *Vaccine*. 2015;33:4165-75.
- Ishikawa H, Takeuchi T, Yano E. Measuring functional, communicative, and critical health literacy among diabetic patients. *Diabetes Care* 2008;31:874-9.

26. Inoue M, Takahashi M, Kai I. Impact of communicative and critical health literacy on understanding of diabetes care and self-efficacy in diabetes management: a cross-sectional study of primary care in Japan. *BMC Fam Pract.* 2013;14:40.
27. Nutbeam D. Health literacy as a public health goal: A challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International* 2000;15:259-67.
28. Çırakoğlu O. The Investigation of Swine Infl uenza (H1N1) Pandemic Related Perceptions in terms of Anxiety and Avoidance Variables. *Turkish Journal of Psychology.* 2011;26:49-64.
29. Taye EB, Taye ZW, Muche HA, et al. COVID-19 vaccine acceptance and associated factors among women attending antenatal and postnatal cares in Central Gondar Zone public hospitals, Northwest Ethiopia. *Clin Epidemiol Glob Health.* 2022;14:100993.
30. Pairat K, Phaloprakarn C. Acceptance of COVID-19 vaccination during pregnancy among Thai pregnant women and their spouses: A prospective survey. *Reprod Health.* 2022;19:1-11.
31. Galanis P, Vraika I, Siskou O, et al. Uptake of COVID-19 vaccines among pregnant women: A Systematic Review and Meta-Analysis. *Vaccines* 2022;10:766.
32. Riad A, Jouzová A, Üstün B, et al. COVID-19 vaccine acceptance of pregnant and lactating women (PLW) in Czechia: An analytical cross-sectional study. *Int J Environ Res Public Health.* 2021;18:13373.
33. Arslan Ö. A sustainable economic development based on natural agriculture and livestock breeding in Muş province. *Journal of Social Sciences of Mus Alparslan University.* 2018;6:75–90.
34. Di Giuseppe G, Pelullo CP, Polla GD, et al. Exploring the willingness to accept SARS-CoV-2 vaccine in a university population in Southern Italy, September to November 2020. *Vaccines* 2021;9:275.
35. Geoghegan S, Stephens LC, Feemster KA, et al. "This choice does not just affect me." Attitudes of pregnant women toward COVID-19 vaccines: A mixed-methods study. *Hum Vaccin Immunother.* 2021;17:3371-6.
36. Ghamri RA, Othman SS, Alhiniah MH, et al. Acceptance of COVID-19 vaccine and associated factors among pregnant women in Saudi Arabia. *Patient Prefer Adherence.* 2022;16:861-73.
37. Saçınıtı KG, Oruç G, Şükür YE, Koç A. A survey study on the attitudes of pregnant women to COVID-19 vaccine in Turkey. *J Turk Ger Gynecol Assoc.* 2022;23:122-3.
38. Bianchi FP, Stefanizzi P, Di Gioia MC, et al. COVID-19 vaccination hesitancy in pregnant and breastfeeding women and strategies to increase vaccination compliance: a systematic review and meta-analysis. *Expert Rev Vaccines.* 2022;1-12.
39. Huddleston HG, Jaswa EG, Lindquist KJ, et al. COVID-19 vaccination patterns and attitudes among American pregnant individuals. *Am J Obstet Gynecol MFM.* 2022;4:100507.
40. Ekmez M, Ekmez F. Assessment of factors affecting attitudes and knowledge of pregnant women about COVID-19 vaccination. *J Obstet Gynaecol.* 2022;1:1-7.