Sakarya Üniversitesi Holistik Sağlık Dergisi
Sakarya University Journal of Holistic Health
ISSN: 2687-6078 / SAUHSD 2023;6(2): 269-288
doi:10.54803/sauhsd.1234064
ARAŞTIRMA MAKALESİ

Attitudes of Pregnant Women toward the COVID-19 Vaccine

Öznur TİRYAKİ[1], Hamide ZENGİN[2], Aslı AKDENİZ KUDUBEŞ[2],
Emin Levent AKSOY[3], Mehmet Sühha BOSTANCI[4]

[1] Department of Midwifery, Faculty of Health Science, Sakarya University, Sakarya, Türkiye
[2] Faculty of health science, Bilecik Şeyh Edebali University, Bilecik, Türkiye
[3] Department of Obstetrics and Gynecology, Sakarya Research and Education Hospital, Sakarya, Türkiye
[4] Department of Obstetrics and Gynecology, Faculty of Medicine, Sakarya University, Sakarya, Türkiye
Öznur Tiryaki https://orcid.org/0000-0001-8788-3077
Hamide Zengin https://orcid.org/0000-0002-2389-6466
Aslı Akdeniz Kudubeş https://orcid.org/0000-0002-0911-8182
Emin Levent Aksoy https://orcid.org/0000-0002-4862-1231
Mehmet Sühha Bostancı https://orcid.org/0000-0002-4776-6244

Abstract
Objective: It was carried out to determine the attitudes of pregnant women toward the Covid-19 vaccine and related factors.
Methods: The correlational and descriptive study was conducted with 356 pregnant women. In the study, data were collected using an introductory questionnaire, "Attitudes towards Covid-19 Vaccine Scale", "Vaccination Hesitancy in Pandemics Scale", and "Covid-19 Vaccine Literacy Scale". Research data were analyzed with SPSS 25 package program. One-way ANOVA and Student-t test were used to determine the difference between the descriptive characteristics of the pregnant women participating in the study and the total and sub-dimension mean scores of the Attitude Scale towards the Covid-19 Vaccine. Pearson correlation analysis was used to determine the relationship between the Vaccine Hesitancy Scale in Pandemics, the Covid-19 Vaccine Literacy Scale, and the Attitudes Towards Covid-19 Vaccine Scale. Linear regression analysis was used to determine the factors affecting the Attitudes of Pregnants towards the Covid-19 Vaccine.
Results: It was concluded that 37.4% of the pregnant women did not have any Covid-19 vaccine, 62.6% had the Covid-19 vaccine before pregnancy, and 22.5% had the vaccine during pregnancy. In pregnant women, those who have hesitations about the vaccine in cases such as working, increase in education level, fear of contracting Covid-19 before birth, having pre-pregnancy Covid-19 vaccine, thinking that pregnant women may have Covid-19 vaccine, getting Covid-19 vaccine during pregnancy, etc. increase their attitudes towards vaccination.
Conclusion: Consider to change the conclusion: It was found that quite a few pregnant women received the Covid-19 vaccine during their pregnancy. Pregnant women's vaccination hesitancy influences their attitudes toward Covid-19.

Keywords: Pregnant, Covid-19 vaccine, attitude, severe acute respiratory syndrome coronavirus 2, hesitancy

Covid-19 Aşısına Karşı Gebelerin Tutumu

Öz
Amaç: Gebelerin Covid-19 aşısına karşı tutumlarının ve ilişkili faktörlerinin belirlenmesi amacıyla gerçekleştirilmiştir.
Yöntem: Tanımlayıcı ve ilişki arayıcı tipteki çalışma, 356 gebe ile gerçekleştirilmiştir. Araştırmada veriler tanıtıcı soru formu, "Covid-19 Aşısına Yönelik Tutumlar Ölçeği", "Pandemilerde Aşı Tereddüt Ölçeği" ve "Covid–19

Yazışma Adresi/Address for Correspondence:
Öznur TİRYAKİ
Sakarya University Faculty of Health Sciences, Esentepe Campus, Serdivan, Sakarya, Türkiye
Telefon/Phone: +90 505 883 6246 ***E-mail:*** oznuritiryaki@gmail.com
Geliş Tarihi/Received: 14.01.2023 | ***Kabul Tarihi/Accepted:*** 04.07.2023 | ***Yayım Tarihi/Published:*** 31.08.2023
Atıf/Cited: Tiryaki Ö, Zengin H, Akdeniz Kudubeş A, Aksoy EL, Bostancı MS. Attitudes of Pregnant Women toward the COVID-19 Vaccine.Sakarya Üniversitesi Holistik Sağlık Dergisi. 2023;6(2): 269-288.
doi:10.54803/sauhsd.1234064

Aşı Okuryazarlığı Ölçeği" kullanılarak toplanmıştır. Araştırma verileri, SPSS 25 paket programı ile analiz edilmiştir. Çalışmaya katılan gebelerin tanıtıcı özellikleri ile Covid-19 Aşısına Yönelik Tutum Ölçeği toplam ve alt boyut puan ortalamaları arasında farkın belirlenmesi One-way ANOVA ve Student-t testi ile yapılmıştır. Pandemilerde Aşı Tereddüt Ölçeği, Covid–19 Aşı Okuryazarlığı Ölçeği ve Covid-19 Aşısına Yönelik Tutumlar Ölçeği arasındaki ilişkinin belirlenmesi için Pearson korelasyon analizi kullanılmıştır. Gebelerin Covid-19 Aşısına Yönelik Tutumlarını etkileyen faktörlerin belirlenmesinde doğrusal regresyon analizinden yararlanılmıştır.
Bulgular: Gebelerin %37,4'nün hiç Covid-19 aşısı olmadığı, %62,6'sının gebelikten önce Covid-19 aşısı olduğu, %22,5'inin gebelikte aşısını yaptırdığı sonucuna ulaşılmıştır. Gebelerin çalışması, eğitim düzeylerinin artması, doğum öncesi Covid-19 geçirme korkusunun olması, gebelik öncesi Covid-19 aşısı olması, gebelere Covid-19 aşısının uygulanabileceğini düşünmesi, gebeliğinde Covid-19 aşısı olması, pandemide aşı tereddütü yaşamaması ve Covid-19 aşı okuryazarlığının olması Covid-19 aşısına yönelik tutumlarını arttırmaktadır.
Sonuç: Gebelerin, gebelikte Covid-19 aşısı yaptırma oranları oldukça düşük bulunmuştur. Gebelerde aşı tereddütünün olması Covid-19 aşı tutumunu etkilemektedir.

Anahtar Kelimler: Gebe, Covid-19 aşısı, tutum, severe acute respiratory syndrome coronavirus 2, tereddüt

INTRODUCTION

The Covid-19 Pandemic has emerged as a serious public health problem and a process that requires urgent intervention. The World Health Organization (WHO) declared this process a pandemic on March 11, 2020 (1). The effect of the disease was seen more especially in pregnant women with chronic diseases and serious complications were seen more frequently in these patients compared to others. Compared to healthy pregnant women, pregnant women with Covid-19 are at greater risk of preterm birth. It carries the risk of giving birth 2-3 times earlier than those who do not have the presence of Covid-19 disease. In addition, negative socioeconomic factors also increase the risk of a severe Covid-19 course for pregnant women who have not had the Covid-19 vaccine (2). The Centers for Disease Control and Prevention (CDC) recommends the Covid-19 vaccine to women who are pregnant, breastfeeding, or planning a pregnancy. There is still ongoing research on evidence that the Covid-19 vaccine is safe and effective during pregnancy. As with all vaccines in general, there is no conclusive evidence yet that the Covid-19 vaccine causes reproductive problems in both men and women (3). In a study with 2,130 women from 18 countries, it was reported that the risk of preeclampsia, preterm labour, and maternal death in pregnant women who had the COVID-19 disease was higher than those who had not (4).

Vaccination status during pregnancy is important since pregnant women are not included in the study or are included in the following weeks of gestation in many scientific studies. Many studies have been conducted on the use of Covid-19 vaccines during pregnancy, and as of September 2021, the administration of Covid-19 vaccines to pregnant women has been started in 34 countries, including Switzerland, England, Norway, Spain,

Sweden, the USA, Finland, and Canada. In addition, it is emphasized that it is the policy of the Ministry of Health in these countries to encourage pregnant women to be vaccinated (5, 6). The WHO recommends the following vaccines for pregnant women: Janssen Ad26.COV2.S, Moderna mRNA-1273, AstraZeneca AZD1222, Sinopharm BIBP, Bharat Biotech BBV152, Sinovac-CoronaVac, Pfizer–BioNTech BNT162b2, and Novavax NVX-Co2373. However, due to limited experience with the MatrixMTM adjuvant of Novavax NVX-Co2373 vaccine, a benefit-risk assessment of this vaccine in pregnant women is recommended (7).

According to the "List of COVID-19 Vaccination Groups" determined by the Ministry of Health in Turkey, it has been recommended that mRNA (Pfizer-BioNTech) and inactive virus vaccine (CoronaVac vaccine of Sinovac Company) can be administered to pregnant women according to their age groups, vaccination is preferred not to be administered in the first trimester of pregnancy, and that lactating women with high risk of severe Covid-19 during lactation can be vaccinated at their own discretion. The Ministry of Health in the Republic of Turkey recommends the administration of the Covid-19 Pfizer-BioNTech vaccine during pregnancy and informs that it does not increase the risk of miscarriage (8). This study was conducted to determine pregnant women's attitudes toward Covid-19 vaccines and related factors.

METHODS

This study was carried out in a correlational and descriptive type. It was conducted between February 7 and March 31, 2022 in a training and research hospital with pregnant women. The population of the study consisted of all pregnant women (N:2814) who applied to the obstetrics clinic due to pregnancy registered in the hospital information management system. The sample group consisted of 356 pregnant women who agreed to participate in the study in accordance with the inclusion criteria. Inclusion criteria of the study: Pregnant woman who speaks and writes Turkish, aged 18 years or older, and voluntary participation in the study.

The first part of the questionnaire used to collect data consists of the "Descriptive Questionnaire" for demographic information, the second part "Attitudes toward the Covid-19 Vaccine Scale", the third part "Vaccination Hesitation in Pandemics Scale" and the last part of the "COVID-19 Vaccine Literacy Scale". The pregnant women who agreed to participate in the study were left alone for ten minutes in a suitable environment (social distance, disinfected pens, and use of masks by pregnant women and researchers) to fill out

the questionnaire and the completed forms were collected by the researchers.

Descriptive Questionnaire: This form contains questions pregnant women's demographic characteristics and health status.

The Attitudes toward the Covid-19 Vaccine Scale: It has nine items prepared in five-point Likert-type, two sub-dimensions (negative and positive attitudes) (9). Cronbach's alpha values of the scale were found as 0.80 for the total scale, 0.78 for the negative attitude sub-dimension, and 0.96 for the positive attitude sub-dimension. In this study, the alpha value was calculated as 0.858 for the total scale.

The Vaccine Hesitancy in Pandemics Scale: The scale is in 5-point Likert type, consists of two sub-dimensions and ten items (10). The high score obtained as a result of the scale indicates that the vaccine instability during the pandemic period is high. High scores on the lack of confidence sub-dimension indicate increased mistrust in vaccines during pandemics. Cronbach's alpha of the total scale was found as 0.901, and it was calculated as 0.718 in this study.

The Covid-19 Vaccine Literacy Scale: It is a four-point Likert-type scale that consists of 12 items and two sub-dimensions (communicative/critical dimension and functional dimension) (11). A mean score of close to 4 on the scale indicates a high level of vaccine literacy. Cronbach's alpha values of the scale were 0.868 for the total scale, 0.915 for the communicative/critical skills sub-dimension, and 0.867 for the functional skills sub-dimension. In this study, the alpha value was calculated as 0.811 for the total scale.

Data analysis

Statistical Package for the Social Sciences 25.0 (SPSS) software package was used for the research data analysis. Mean and percentage calculations were used to analyze of descriptive data. The Shapiro-Wilk test was used to examine whether the data conformed to a normal distribution. One-way ANOVA and student's t-test were employed to determine the differences between the descriptive characteristics of the participants participating in the study and their mean scores on the total and sub-dimensions of the Attitudes toward the Covid-19 Vaccine Scale. Pearson correlation analysis was used to determine the relationship between the scales. Linear regression analysis was employed to determine the factors affecting participants' attitudes toward the Covid-19 vaccine. The significance level was accepted as 0.05.

Ethical aspects of the study

Before the study was initiated, institutional permission from the hospital where the research would be conducted, scientific research permission from the Ministry of

Health, and the approval of the Non-Interventional Scientific Research Ethics Committee (Ethics Committee No: 02.02.2022-16) were obtained. Before the study, the pregnant women were informed about the study by the researchers, and verbal and written consents were obtained within the framework of the voluntary principle. In addition, research and publication ethics were followed in the study.

RESULTS

This study revealed the factors affecting pregnant women's attitudes toward toward the Covid-19 vaccine. As a result of the Shapiro-Wilk analysis, it was determined that participants did not differ from each other in terms of descriptive characteristics and groups exhibited homogeneity ($p>0.05$). Table 1 presents participants' descriptive characteristics.

Table 1. Descriptive characteristics of participants

	n	**%**
Age		
19–29	200	56.2
30–39	148	41.6
40 years and older	8	2.2
Gestational age/week (GW)		
1-13. GW	41	56.2
14-26. GW	134	41.6
27-40. GW	8	2.2
How to get pregnant		
Spontaneous	345	96.9
IVF or IUI	11	3.1
Whether the pregnancy was planned		
Yes	258	72.5
No	98	27.5
Income status		
Good	80	22.5
Bad	12	3.4
Middle	264	74.2
Family type		
nuclear family	303	85.1
extended family	49	13.8
broken family	4	1.1
Employment status		
Yes	88	24.7
No	268	75.3

Level of education		
Primary/Secondary school	105	29.5
High School	130	36.5
University	112	31.5
Postgraduate education	9	2.5
Presence of chronic diseases		
Yes	32	9.0
No	324	91.0
Fear of Covid-19 contamination during hospital visits		
Yes	244	68.5
No	112	31.5
Fear of Covid-19 contamination from the hospital environment at delivery		
Yes	260	73.0
No	96	27.0
Fear of contracting Covid-19 during pregnancy		
Yes	262	73.6
No	94	26.4
Presence of people who have had Covid-19 in their circles		
Yes	264	74.2
No	92	25.8

The status of having been in quarantine		
Yes	180	74.2
No	176	25.8
Presence of people who died due to Covid-19 in their circles		
Yes	163	45.8
No	193	54.2
Having had Covid-19		
Yes	163	45.8
No	193	54.2
Having received the Covid-19 vaccine before pregnancy		
Yes	223	62.6
No	133	37.4
Which vaccine did you have? (N=241)		
SiNovac	60	24.89
Biontech	180	74.68
Turkovac	1	0.41
How many doses have you received		
None	133	37.4
1	29	8.1
2	153	43.0
3	37	10.4
4	4	1.1
Participant's opinion of whether the Covid-19 vaccine should be administered to pregnant women		
Yes	200	56.2
No	156	43.8
Receiving the Covid-19 vaccine during pregnancy		
Yes	80	22.5
No	276	77.5

It was determined that the mean scores of the participants on the Attitudes toward the Covid-19 Vaccine Scale were 29.66 + 6.72 on the total scale, 13.17 + 4.00 on the positive attitude sub-dimension, and 16.49 + 3.88 on the negative attitude sub-dimension. Participants' mean scores on the Vaccine Hesitancy in Pandemics Scale were 27.21 + 6.29 on the total scale, 21.23 + 5.60 on the lack of confidence sub-dimension, and 5.98 + 1.75 on the risk sub-dimension. In addition, the mean scores on the Covid-19 Vaccine Literacy Scale were 33.87 + 5.66 on the total scale, 19.81 + 2.95 on the functional vaccine literacy sub-dimension, and 23.05 + 4.98 on the communicative/critical literacy sub-dimension.

All of the pregnant women in the study reported that the long-term effects of the vaccine were not clear and that they did not have enough knowledge about its harm to the fetus.

A statistically significant difference was found between participants' mean scores on the total and sub-dimensions of the Attitudes toward the Covid-19 Vaccine Scale and the variables of employment status, level of education, fear of contracting the Covid-19 virus before pregnancy or current, having received the Covid-19 vaccine before pregnancy, thoughts about the administration of Covid-19 vaccine to pregnant women, and receiving the Covid-19 vaccine during pregnancy ($p<0.05$, Table 2). No statistically significant difference was found between participants' mean scores on the total and sub-dimensions of the Attitudes toward the Covid-19 Vaccine Scale and the variables of age, gestational age, duration of conception, whether the pregnancy was planned, income status, and family type ($p>0.05$, Table 2). In addition, there was no statistically significant difference between participants' mean scores on the total and sub-dimensions of the Attitudes toward the Covid-19 Vaccine Scale and the variables of the presence of chronic diseases, fear of Covid-19 contamination during hospital visits, fear of Covid-19 contamination from the hospital environment at birth, presence of people who have had Covid-19 in their circles, the status of having been in quarantine, presence of people who died due to Covid-19 in their circles, and having had Covid-19 ($p>0.05$, Table 2).

Table 2. The effect of pregnant women's descriptive characteristics on their attitudes toward the Covid-19 vaccine

Variables		**Attitudes toward the Covid-19 Vaccine Scale**		
		positive attitude	**negative attitude**	**Total score**
		Mean ± SD	***Mean ± SD***	***Mean ± SD***
Age	19-29 years	16.31 ± 3.72	13.17 ± 3.86	29.48 ± 6.43
	30-39 years	16.66 ± 4.11	13.07 ± 4.21	29.74 ± 7.16
	40 years and older	17.75 ± 2.91	15.12 ± 2.94	32.87 ± 5.19
	Test value	F: 0.793	F: 0.997	F: 0.997
	**p*	p: 0.453	p: 0.370	p: 0.370
Gestational age/week (GW)	1-13. GW	16.46 ± 3.80	13.56 ± 3.91	30.02 ± 6.95
	14-26. GW	16.48 ± 3.95	13.41 ± 3.89	29.90 ± 6.90
	27-40. GW	16.50 ± 3.86	12.90 ± 4.13	29.40 ± 6.56
	Test value	F: 0.002	F: 0.846	F: 0.273
	**p*	p: 0.998	p: 0.430	p: 0.762
How to get pregnant	Spontaneous	13.13 ± 4.02	16.45 ± 3.90	29.58 ± 6.75
	IVF or IUI	14.45 ± 3.20	17.63 ± 2.76	32.09 ± 5.41
	Test value	t: -1.078	t: -0.994	t: 1.216
	***p*	p: 0.282	p: 0.321	p: 0.225
Whether the pregnancy was planned	Yes	13.23 ± 3.91	16.46 ± 3.80	29.69 ± 6.70
	No	13.02 ± 4.22	16.57 ± 4.10	29.58 ± 6.81
	Test value	t: 0.476	t: -0.239	t: 0.145
	***p*	p: 0.634	p: 0.811	p: 0.885
income status	Good	16.42 ± 4.12	13.60 ± 4.47	31.02 ± 7.28
	Bad	15.25 ± 3.01	12.83 ± 2.32	28.08 ± 5.23
	Middle	16.26 ± 3.79	13.06 ± 3.90	29.32 ± 6.57
	Test value	F: 3.425	F: 0.602	F: 2.321
	**p*	p: 0.084	p: 0.548	p: 0.100
Family type	Nucleus family	16.58 ± 3.88	13.24 ± 3.98	29.82 ± 6.74
	Extended family	16.14 ± 3.83	12.91 ± 4.07	29.06 ± 6.44
	Broken family	14.00 ± 3.46	11.00 ± 5.03	25.00 ± 8.48
	Test value	F: 1.103	F: 0.736	F: 1.247
	**p*	p: 0.333	p: 0.480	p: 0.289
Employment Status	Yes	14.00 ± 3.98	17.45 ± 3.86	31.45 ± 6.90
	No	12.90 ± 3.97	16.17 ± 3.83	29.07 ± 6.57
	Test value	**t: 2.224**	**t: 2.707**	**t: 2.906**
	***p*	**p: 0.025**	**p: 0.007**	**p: 0.004**

Level of education	Primary/Secondary school	15.91 ± 3.42	12.70 ± 3.70	28.61 ± 5.48
	High school	16.33 ± 3.94	13.00 ± 4.14	29.33 ± 6.76
	University	16.90 ± 3.99	13.50 ± 4.01	30.40 ± 7.26
	Postgraduate education	20.44 ± 4.30	17.00 ± 3.12	37.44 ± 7.33
	Test value	**F: 4.510**	**F: 3.626**	**F: 5.662**
	*p	**p: 0.004**	**p: 0.013**	**p: 0.001**
Presence of chronic diseases	Yes	13.12 ± 3.54	17.06 ± 3.86	30.18 ± 5.70
	No	13.17 ± 4.04	16.43 ± 3.89	29.61 ± 6.82
	Test value	t: -0.073	t: 0.872	t: 0.460
	**p*	p: 0.942	p: 0.367	p: 0.646
Fear of Covid-19 contamination during hospital visits	Yes	13.38 ± 3.73	16.55 ± 3.74	29.93 ± 6.18
	No	12.72 ± 4.51	16.35 ± 4.16	29.08 ± 7.77
	Test value	t: 1.443	t: 0.442	t: 1.113
	*p	p: 0.150	p: 0.658	p: 0.266
Fear of Covid-19 contamination from the hospital environment at birth	Yes	13.18 ± 3.38	16.54 ± 3.82	29.73 ± 6.37
	No	13.13 ± 4.32	16.35 ± 4.03	29.48 ± 7.63
	Test value	t: 0.111	t: 0.406	t: 0.300
	**p*	p: 0.912	p: 0.685	p: 0.764
Fear of contracting Covid-19 during pregnancy	Yes	13.44 ± 3.88	16.75 ± 3.82	30.19 ± 6.34
	No	12.41 ± 4.24	15.76 ± 3.95	28.18 ± 7.52
	Test value	**t: 2.156**	**t: 2.124**	**t: 2.154**
	**p*	**p: 0.032**	**p: 0.034**	**p: 0.012**
Presence of people who have had Covid-19 in their circles	Yes	13.07 ± 3.84	16.58 ± 3.75	29.66 ± 6.52
	No	13.45 ± 4.43	16.21 ± 4.23	29.67 ± 7.31
	Test value	t: -0.786	t: 0.787	t: -0.014
	**p*	p: 0.433	p: 0.432	p: 0.989
The status of having been in quarantine	Yes	13.40 ± 4.03	16.76 ± 4.06	30.16 ± 6.78
	No	12.93 ± 3.96	16.21 ± 3.67	29.15 ± 6.64
	Test value	t: 1.104	t: 1.327	t: 1.423
	**p*	p: 0.270	p: 0.185	p: 0.156
Presence of people who died due to Covid-19 in their circles	Yes	13.24 ± 3.91	16.72 ± 3.74	29.97 ± 6.83
	No	13.14 ± 4.04	16.39 ± 3.96	29.54 ± 6.68
	Test value	t: 0.206	t: 0.734	t: 0.546
	**p*	p: 0.837	p: 0.464	p: 0.586

Having had Covid-19	Yes	13.56 ± 3.84	16.61 ± 3.98	30.17 ± 6.72
	No	12.84 ± 4.11	16.38 ± 3.78	29.23 ± 6.71
	Test value	t: 1.696	t: 0.544	t: 1.322
	$^{**}p$	p: 0.091	p: 0.587	p: 0.187
Fear of contracting the Covid-19 virus before pregnancy	Yes	13.35 ± 3.89	16.72 ± 3.85	30.07 ± 6.47
	No	12.72 ± 4.25	15.89 ± 3.90	28.61 ± 7.25
	Test value	t: 1.340	**t: 1.834**	**t: 1.858**
	$^{**}p$	p: 0.181	**p: 0.047**	**p: 0.044**
Having received the Covid-19 vaccine before pregnancy	Yes	14.57 ± 3.55	17.44 ± 3.78	31.72 ± 6.08
	No	11.37 ± 3.82	14.88 ± 3.50	26.12 ± 6.34
	Test value	**t: 8.138**	**t: 6.350**	**t: 8.125**
	$^{**}p$	**p: 0.000**	**p: 0.000**	**p: 0.000**
Participant's opinion of whether the Covid-19 vaccine should be administered to pregnant women	Yes	14.83 ± 3.52	17.58 ± 3.77	32.16 ± 6.03
	No	12.69 ± 4.00	15.08 ± 3.56	26.46 ± 6.20
	Test value	**t: 4.327**	**t: 6.344**	**t: 8.721**
	$^{**}p$	**p: 0.000**	**p: 0.000**	**p: 0.000**
Receiving the Covid-19 vaccine during pregnancy	Yes	14.83 ± 3.52	18.01 ± 4.04	32.85 ± 6.34
	No	12.69 ± 4.00	16.05 ± 3.72	28.74 ± 6.55
	Test value	**t: 4.327**	**t: 4.068**	**t: 4.967**
	$^{**}p$	**p: 0.000**	**p: 0.000**	**p: 0.000**

*One-Way ANOVA Test; ** Student t Test; SD: Standard Deviation

When the relationship between the Attitudes toward the Covid-19 Vaccine Scale, the Vaccine Hesitancy in Pandemics Scale, and the Covid-19 Vaccine Literacy Scale was examined, the mean score on the total Attitudes toward the Covid-19 Vaccine Scale was found to have a high-level, negative, and powerful significant correlation with the mean score on the total Vaccine Hesitancy in Pandemics Scale; a moderate, negative, and advanced-level, significant correlation with the mean score on the lack of confidence sub-dimension; a moderate, negative, and advanced-level, significant correlation with the mean score on the risk sub-dimension ($p<0.01$). While no correlation could be found between the mean score on the total Attitudes toward the Covid-19 Vaccine Scale and the mean scores on the total Covid-19 Vaccine Literacy Scale and the functional vaccine literacy sub-dimension, there was a low-level, positive, and advanced-level correlation with the communicative/critical literacy sub-dimension ($p<0.01$).

Table 3. Correlation between variables

	1	2	3	4	5	6	7	8	9
1. Attitudes toward the Covid-19 Vaccine Scale	1.000								
2. Attitudes toward the Covid-19 Vaccine Scale –Positive Attitude	0.858*	1.000							
3. Attitudes toward the Covid-19 Vaccine Scale –Negative Attitude	0.848*	0.456*	1.000						
4. Vaccine Hesitancy in Pandemics Scale	-0.728*	-0.689*	-0.551*	1.000					
5. Vaccine Hesitancy in Pandemics Scale - Lack of confidence	-0.660*	-0.664*	-0.459*	0.963*	1.000				
6. Vaccine Hesitancy in Pandemics Scale -Risk	-0.499*	-0.347*	-0.508*	0.507*	0.255*	1.000			
7. Covid-19 Vaccine Literacy Scale	0.100	0.036	0.137*	0.015	0.007	0.034	1.000		
8. Covid-19 Vaccine Literacy Scale - Functional vaccine literacy	0.010	-0.030	0.047	0.045	0.024	0.084	0.477*	1.000	
9. Covid-19 Vaccine Literacy Scale - Communicative/Critical literacy	0.108*	0.058	0.127*	-0.009	-0.007	-0.011	0.854*	-0.500	1.000

*$p < 0.001$

As a result of the analyses, the variables that statistically significantly affected participants' mean scores on the total and sub-dimensions of the Attitudes toward the Covid-19 Vaccine Scale (employment status, level of education, fear of contracting the Covid-19 virus before pregnancy, fear of contracting the Covid-19 virus, the status of having received the Covid-19 vaccine before pregnancy, participant's opinion of whether the Covid-19 vaccine should be administered to pregnant women, and whether the participant had received a Covid-19 vaccine during pregnancy) and their mean scores on the total Vaccine Hesitancy in Pandemics Scale and the Covid-19 Vaccine Literacy Scale were included in the regression model. In accordance with this, three models were developed (Table 4).

According to Model 1, the attitudes of pregnant women toward the Covid-19 vaccine were increased by having a job, a high level of education, having a fear of contracting the Covid-19 virus before pregnancy, having a fear of contracting the Covid-19 virus, having received the Covid-19 vaccine before pregnancy, thinking that pregnant women can be administered the Covid-19 vaccine, receiving the Covid-19 vaccine during pregnancy, having no vaccine hesitancy during the pandemic, and having Covid-19 vaccine literacy. In Model 1, pregnant women's descriptive characteristics, vaccine hesitancy in pandemics, and Covid-19 vaccine literacy explained 59.4% of their attitudes toward the Covid-19 vaccine. It was found that pregnant women's employment status, level of education, thoughts that pregnant women can be vaccinated against Covid-19, and mean scores on the total Covid-19 Vaccine Literacy Scale increased their attitudes toward the Covid-19 vaccine by 0.071 (β=0.071), 0.081 (β=0.081), 0.122 (β=0.122), and 0.085 (β=0.085) times, respectively, and that their mean scores on the Vaccine Hesitancy in Pandemics Scale decreased their attitudes by 0.643 (β=-0.643) times. In addition, it was determined that status of employment, level of education, thought that pregnant women can be vaccinated against Covid-19, mean scores on the total Vaccine Hesitancy in Pandemics Scale and Covid-19 Vaccine Literacy Scale affected participants' attitudes toward the Covid-19 vaccine statistically significantly ($p<0.05$, Table 4).

According to Model 2, believing that the Covid-19 vaccine can be administered to pregnant women and a lack of vaccine hesitancy during the pandemic increased positive attitudes toward the Covid-19 vaccine. In Model 2, the descriptive characteristics of pregnant women, vaccine hesitancy in pandemics, and Covid-19 vaccine literacy explained 51.9% of their attitudes toward the Covid-19 vaccine.

While pregnant women's thought that they can be vaccinated against Covid-19 increased their attitudes toward the Covid-19 vaccine by 0.135 (β=0.135) times, it was determined that the Vaccine Hesitancy in Pandemics Scale decreased the attitudes by 0.614 (β=-0.614) times. In addition, the thought that pregnant women can be vaccinated against Covid-19 and mean scores on the total Vaccine Hesitancy in Pandemics Scale were found to have a statistically significant effect on pregnant women's attitudes toward the Covid-19 vaccine ($p<0.05$, Table 4).

Model 3 suggests that vaccination hesitancy during the pandemic and vaccine literacy increase attitudes toward Covid-19. In Model 3, pregnant women's descriptive characteristics, vaccine hesitancy in pandemics, and Covid-19 vaccine literacy explained 26.1% of their attitudes toward the Covid-19 vaccine. It was determined that pregnant women's mean scores on the total Covid-19 Vaccine Literacy Scale increased their attitudes toward the Covid-19 vaccine by 0.120 (β=0.120) times and that the Vaccine Hesitancy in Pandemics Scale decreased the attitudes by 0.482 (β=-0.482) times. In addition, it was found that the mean Vaccine Hesitancy in Pandemics Scale and the Covid-19 Vaccine Literacy Scale scores statistically significantly affected their attitudes toward the Covid-19 vaccine ($p<0.05$, Table 4).

Table 4. The predictive power of pregnant women's descriptive characteristics, Vaccine Hesitancy in Pandemics, and COVID-19 Vaccine Literacy on the change in attitudes toward the Covid-19 vaccine

Variable	Model 1					Model 2					Model 3				
	Attitudes toward the Covid-19 Vaccine Scale Total Scale					Attitudes toward the Covid-19 Vaccine Scale – Positive Attitude Sub-scale					Attitudes toward the Covid-19 Vaccine Scale –Negative Attitude Sub-scale				
	B	**SE**	**β**	**t**	**p**	**B**	**SE**	**β**	**t**	**p**	**B**	**SE**	**β**	**t**	**p**
Employment status	1.102	0.551	0.071	1.999	0.046	0.479	0.357	0.052	1.342	0.181	0.623	0.399	0.069	1.560	0.120
Level of Education	3.481	1.506	0.081	2.311	0.021	1.604	0.976	0.063	1.644	0.101	1.877	1.090	0.076	1.721	0.086
Fear of contracting the Covid-19 virus before at birth	1.146	0.667	0.075	1.720	0.086	0.630	0.432	0.069	1.458	0.146	0.517	0.483	0.059	1.071	0.285
Having received the Covid-19 vaccine before pregnancy	1.152	0.607	0.083	1.899	0.058	0.540	0.393	0.065	1.373	0.171	0.612	0.439	0.076	1.394	0.164
Participant's opinion of whether the Covid-19 vaccine should be administered to pregnant women	1.652	0.604	0.122	2.736	0.007	1.083	0.391	0.135	2.768	0.006	0.569	0.437	0.073	1.301	0.194
Receiving the Covid-19 vaccine during pregnancy	0.308	0.625	0.019	0.493	0.623	0.015	0.405	0.002	0.036	0.971	0.293	0.453	0.032	0.648	0.518
Vaccine Hesitancy in Pandemics Scale	-0.688	0.040	-0.643	-17.130	0.000	-0.390	0.026	-0.614	-15.010	0.000	-0.297	0.029	-0.482	-10.225	0.000
Covid-19 Vaccine Literacy Scale	0.101	0.042	0.085	2.428	0.016	0.019	0.027	0.027	0.701	0.484	0.082	0.030	0.120	2.726	0.007
R			**0.771**					**0.720**					**0.601**		
R^2			**0.594**					**0.519**					**0.261**		
F			**56.312**					**41.416**					**21.734**		
P			**0.000**					**0.000**					**0.000**		
Durbin Watson (1.5–2.5)			**1.781**					**1.786**					**2.026**		

B: Unstandardized Beta; SE: Standard Error; β: Standardized Beta β; R: correlation; R2: correlation coefficient (explained variance ratio); F: model statistics; p: level of significance

DISCUSSION

It was concluded that 37.4% of the pregnant women participating in the study had not received a Covid-19 vaccine, 62.6% had received a Covid-19 vaccine before pregnancy and 22.5% had received the vaccine during pregnancy. A study of 16 countries with 5294 pregnant women found a variable acceptance of the Covid-19 vaccine (80% in India and Mexico; less than 45% in Russia, the USA, and Australia) (12). A study conducted in France and another conducted in Italy reported that 29.5% and 28.2% of pregnant women had been vaccinated against Covid-19 respectively (13, 14). In other studies, this rate was shown as 34.1% and 57.4% (15, 16). The reason for this difference in the literature can be explained by the fact that the studies were conducted at different times.

There was a statistically significant difference between the mean scores of pregnant women who had a job, had a postgraduate degree, had a fear of contracting the Covid-19 virus, had received the Covid-19 vaccine before pregnancy, had positive ideas about the administration of the Covid-19 vaccine to pregnant women, and received the Covid-19 vaccine during pregnancy on the total and subdimensions of the Attitudes toward the Covid-19 Vaccine Scale ($p<0.05$). Contrary to the results of our study, a study showed that being in the third trimester of pregnancy increased the intention to have the Covid-19 vaccine, and variables of age and income level did not have any effect, similar to our study (17). Similarly, in another study, it was determined that those with a high education level had a positive attitude toward the Covid-19 vaccine (15). Huddleston et al. revealed that working full-time, having a university or higher education, high-income level, and having high anxiety about Covid-19 during pregnancy affected the rates of getting the Covid-19 vaccine more (16).

According to the models created in the study, it was determined that the attitudes of pregnant women toward the Covid-19 vaccine were increased by having a job, a high level of education, having a fear of contracting the Covid-19 virus before pregnancy, having received the Covid-19 vaccine before pregnancy, thinking that pregnant women can be administered the Covid-19 vaccine, receiving the Covid-19 vaccine during pregnancy, having no vaccine hesitancy during the pandemic, and having Covid-19 vaccine literacy ($p<0.05$, Table 4). Unlike our study, it has been shown in a study that it is more effective in accepting to be vaccinated with income level (18). Studies indicated that there was a positive relationship between vaccine acceptance and higher education levels,

employment, increasing age, high income, being married, and having health insurance (12, 19-22). It was shown that high levels of Covid-19 knowledge also led to increased vaccine acceptance (23). It was stated that the vaccine acceptance increased in pregnant women who thought that the Covid-19 vaccine strengthened immunity and believed that the benefits of the vaccine outweighed the risks to be taken (24). A study conducted in India revealed that vaccine hesitancy affected attitudes toward vaccines, similar to our study (25). It was reported that the provision of reliable information by healthcare professionals about Covid-19 vaccines increased vaccine acceptance (26). A systematic review of pregnant and lactating mothers' attitudes toward the Covid-19 vaccine showed that the geographical region (regions with a high incidence of the disease) and the presentation of reliable information about the vaccine resulted in positive attitudes toward the vaccine (27). The information obtained from the literature supports the findings in the models created. In the literature, apart from the variables examined in this study, it was emphasized that variables, such as mistrust against the vaccine, thought that the vaccine protection is inadequate, and the desire to get a locally developed vaccine affected attitudes toward the Covid-19 vaccine in pregnant women (28, 29). Participants' attitudes toward the Covid-19 vaccine were affected by the variables examined in the study at a rate of 26-59%, and we find this to be quite acceptable.

CONCLUSION

Vaccination during pregnancy is an issue that needs to be handled carefully because pregnant women cannot be included in scientific studies for safety reasons or are included in later weeks of pregnancy. Pregnant women's lack of knowledge about vaccines' harmful effects on the fetus and their long-term effects causes a negative attitude toward the vaccine. Pregnant women's concerns about vaccines must be addressed by healthcare professionals. Pregnant women should be informed about the possible and uncertain risks of vaccines, and their vaccination should be planned. After the vaccination of pregnant women, they should be followed up and data about their status should be collected. There is a need to collect post-vaccination surveillance data on the long-term effects of vaccines on the pregnant woman and the fetus following vaccination at any time of pregnancy.

Ethical Approval: This study was approved by Sakarya University Non-interventional Scientific Research Ethics Committee with (Date: February 2, 2022) and (Decision no:16). This study conformed to the Helsinki Declaration of Human

Rights and respected the individual rights of the patients and voluntarily participations.

Authors Contributions: The authors confirm contribution to the paper as follows: *Study Conception and Design*; ÖT, HZ, ELA *Fundings, Materials*; ÖT, ELA, MSB, *Data Collection and/or Processing*; ÖT, HZ, AAK, ELA, MSB *Analysis and/or Interpretation;* HZ, AAK, *Literature Review, Writing;* ÖT, HZ, AAK, *Critical Review, Supervision;* ELA, MSB

Conflict of Interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Financial support: The authors disclose not receipt of financial support for the research.

Plagiarism Statement: This article has been scanned by iThenticate.

REFERENCES

1. T.C Sağlık Bakanlığı. https://covid19asi.saglik.gov.tr/TR-77706/covid-19-asisi-ulusal-uygulama-stratejisi.html Erişim tarihi: 17.04.22.
2. TTB, TJOD ve HASUDER'in Gebelikte COVID-19 Aşılamasıyla İlgili Güncel Durum Değerlendirmesi. 07.09.2021 (https://www.ttb.org.tr/985yiq0 Erişim tarihi: 17.04.22)
3. Centers for Disease Control and Preventitaion (CDC). COVID-19 Vaccines While Pregnant or Breastfeeding. Updated Mar. 3, 2022 https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/pregnancy.html#:~:text=COVID%2D19%20vaccination%20is%20recommended,it's%20time%20to%20get%20one. Erişim Tarihi: 14.05.2022.
4. T.C. Sağlık Bakanlığı COVID-19 Aşısı Bilgilendirme Platformu, https://covid19asi.saglik.gov.tr/arama?_Dil=1&p=gebeler, Erişim Tarihi:17.04.2022.
5. The Pfizer BioNTech (BNT162b2) COVID-19 vaccine: What you need to know, https://www.who.int/news-room/feature-stories/detail/who-can-take-the-pfizer-biontech-covid-19-vaccine.
6. The Sinovac COVID-19 vaccine: What you need to know, https://www.who.int/news-room/feature-stories/detail/the-sinovac-covid-19-vaccine-what-you-need-to-know.
7. World Health Organisation. Questions and Answers: COVID-19 vaccines and pregnancy 15 February 2022.
8. T.C Sağlık Bakanlığı. https://covid19asi.saglik.gov.tr/TR-85130/29-covid-19-mrna-asisi-

gebelere-uygulanabilir-mi.html Erişim tarihi: 17.04.22.

9. 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(7), 306-328. doi: 10.46872/pj.127
10. Çapar H, Çınar F. Pandemilerde Aşı Tereddüt Ölçeği: Türkçe Geçerlik Ve Güvenirlik Çalışması. Gevher Nesibe Journal Of Medical & Health Sciences. 2021; 12 (6): 40-45. doi:10.46648/gnj.198.
11. Durmuş A, Akbolat M, Amarat M. COVID-19 Aşı Okuryazarlığı Ölçeği'nin Türkçe geçerlilik ve güvenirliliği. Cukurova Medical Journal. 2021; 46(2): 732-741. doi:10.17826/cumj.870432
12. 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 coun tries. Eur J Epidemiol. 2021 Feb; 36(2):197–211. doi:10.1007/s10654-021-00728-6 PMID:33649879.
13. Egloff C, Couffignal C, Cordier AG, et al. Pregnant women's perceptions of the COVID-19 vaccine: A French survey. PLoS ONE. 2022; 17(2): e0263512. doi: 10.1371/journal.pone.0263512.
14. Carbone L, Mappa I, Sirico A, et al. Pregnant women perspectives on SARS-COV-2 vaccine: Condensation: Most of Italian pregnant women would not agree to get the SARS-COV-2 vaccine, irrespective of having features of high risk themselves, or being high-risk pregnancies. American Journal of Obstetrics & Gynecology MFM. 2021 Mar 23;100352. doi:10.1016/j.ajogmf.2021.100352.
15. Cui Y, Binger K, Palatnik A. Attitudes and Beliefs Associated With COVID-19 Vaccination During Pregnancy. JAMA network open. 2022; 5(4), e227430-e227430.
doi: 10.1001/jamanetworkopen.2022.7430
16. 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. doi:10.1016/j.ajogmf.2021.100507.
17. Goncu Ayhan S, Oluklu D, Atalay A, et al. COVID-19 vaccine acceptance in pregnant women. International Journal of Gynecology & Obstetrics. 2021; 154(2): 291-296.
18. Skirrow H, Barnett S, Bell S, et al. Women's views on accepting COVID-19 vaccination during and after pregnancy, and for their babies: A multi-methods study in the UK. BMC Pregnancy Childbirth. 2022; 22(1): 1-15. doi: 10.1186/s12884-021-04321-3.

19. Ceulemans M, Foulon V, Panchaud A, et al. Vaccine Willingness and Impact of the COVID-19 Pandemic on Women's Perinatal Experiences and Practices—A Multinational, Cross-Sectional Study Covering the First Wave of the Pandemic. Int. J. Environ. Res. Public Health. 2021;18(7): 3367. doi:10.3390/ijerph18073367.
20. Levy AT, Singh S, Riley LE, et al. Acceptance of COVID-19 vaccination in pregnancy: A survey study. Am J Obstet Gynecol MFM. 2021; 3(5): 100399. doi:10.1016/j.ajogmf.2021.100399.
21. Mappa I, Luviso M, Distefano FA, et al. Women perception of SARS-CoV-2 vaccination during pregnancy and subsequent maternal anxiety: A prospective observational study. J Matern Neonatal Med. 2021; 1-4. doi:10.1080/14767058.2021.1910672.
22. Stuckelberger S, Favre G, Ceulemans M, et al. SARS-CoV-2 Vaccine Willingness among Pregnant and Breastfeeding Women during the First Pandemic Wave: A Cross-Sectional Study in Switzerland. Viruses. 2021; 13(7): 1199.
23. Tao L, Wang R, Han N, et al. Acceptance of a COVID-19 vaccine and associated factors among pregnant women in China: A multi-center cross-sectional study based on health belief model. Hum Vaccines Immunother. 2021; 17(8): 1-10. doi:10.1080/21645515.2021.1892432.
24. Gencer H, Özkan S, Vardar O, et al. The effects of the COVID 19 pandemic on vaccine decisions in pregnant women. Women Birth. 2022; 35(3): 317-323. doi:10.1016/j.wombi.2021.05.003.
25. Kumari A, Mahey R, Kachhawa G, et al. Knowledge, attitude, perceptions, and concerns of pregnant and lactating women regarding COVID-19 vaccination: A cross-sectional survey of 313 participants from a tertiary care centre of North India. Diabetes Metab Syndr. 2022; 16(3): 102449. doi:10.1016/j.dsx.2022.102449.
26. 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 Vaccines Immunother. 2021; 17(10): 1-6. doi:10.1080/21645515.2021.1924018.
27. Januszek SM, Faryniak-Zuzak A, Barna´s E, et al. The Approach of Pregnant Women to Vaccination Based on a COVID-19 Systematic Review. Medicina. 2021; 57(9): 977. doi:10.3390/medicina57090977
28. Yıldız Z, Gencer E, Gezegen NF. Covid 19 Pandemi Sürecinde Geliştirilen Aşılara Karşı Bireylerin Tutumlarının Değerlendirilmesi Üzerine Uygulamalı Bir Çalışma. Gümüşhane Üniversitesi

Sosyal Bilimler Enstitüsü Elektronik Dergisi. 2021; 12(3): 877-889.

29. Aloğlu N, Sönmez M. Türkiye'de Covıd-19 Pandemisi Ve Aşısına Yönelik Tutum Ve Davranışların Bazı Değişkenler İle İncelenmesi. Usaysad Derg. 2021; 7(3): 520-535.