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COVID-19 Vaccine Hesitancy in Pregnant Women and Affecting Factors: Cross-Sectional Study

Gebelerin COVID-19 Aşı Karşıtlığı ve Etkileyen Faktörler: Kesitsel Bir Araştırma

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ABSTRACT Objective: The severe acute respiratory syndrome-coronavirus-2 virus is transmitted from person to person through contact, droplets, and airborne particles. The vaccine is effective in controlling the coronavirus disease-2019 (COVID-19) pandemic. Pregnant women due to changes in their bodies are vulnerable to infectious diseases, some of which can be prevented by vaccination. This study, it was aimed to examine the hesitancy of the COVID-19 vaccine in pregnant women and the factors affecting it. **Material and Methods:** The population of this cross-sectional study consisted of all pregnant women aged 15-49 years who applied to Mardin Training and Research Hospital. The convenience sampling method was used in the study, and all pregnant women (n=211) who applied to the hospital between October 10, 2022-December 23, 2022, met the inclusion criteria and agreed to participate in the study constituted the sample of the study. The data was collected using the "questionnaire form" and the "Vaccine Hesitancy Scale." Cronbach alpha value of the scale was found to be 0.790. and the total mean score was found to be 61.24±11.63 it was determined that the pregnant women had a "moderate" level of hesitancy to vaccination. **Results:** It has been concluded that the husband's education status, the gestation week, the number of pregnancies, the presence of chronic patients in the household, and the history of abortion were effective on the vaccine hesitancy in the pregnant woman. **Conclusion:** Pregnant women should be informed more about vaccination and encouraged to be vaccinated. More studies on the subject are needed.

Keywords: COVID-19 vaccine; pregnant women; vaccination hesitancy

ÖZET Amaç: Şiddetli akut solunum sendromu-koronavirüs-2 virüsü, insandan insana temas, damlacık ve havada asılı partiküller yoluyla bulaşmaktadır. Aşı, koronavirüs hastalığı-2019 [coronavirus disease-2019 (COVID-19)] pandemisini kontrol altına almada etkilidir. Gebeler vücutlarında meydana gelen değişiklikler nedeniyle, bazıları aşı ile önlenebilen bulaşıcı hastalıklarda savunmasız bir gruptur. Bu çalışmada, gebelerin COVID-19 aşı karşıtlığı ve etkileyen faktörleri incelemek amaçlanmıştır. **Gereç ve Yöntemler:** Kesitsel tipte olan bu çalışmanın evrenini Mardin Eğitim ve Araştırma Hastanesine başvuran 15-49 yaş aralığındaki tüm gebeler oluşturmaktadır. Çalışmada kolayda örnekleme yöntemi kullanılmış olup, 10 Ekim 2022-23 Aralık 2022 tarihleri arasında hastaneye başvuran, çalışmaya dâhil edilme kriterlerini karşılayan ve çalışmaya katılmayı kabul eden tüm gebeler (n=211) araştırmanın örneklemini oluşturmuştur. Veriler "anket formu" ve "Aşı Karşıtlığı Ölçeği" kullanılarak toplanmıştır. Ölçeğin Cronbach alfa değeri 0,790, toplam puan ortalaması 61,24±11,63 olarak bulunmuştur ve gebelerin aşı karşıtlığının "orta" düzeyde olduğu belirlenmiştir. **Bulgular:** Eş eğitim durumu, gebelik haftası, gebelik sayısı, hanede kronik hasta varlığı ve abortus öyküsünün gebelerde aşı karşıtlığı üzerinde etkili olduğu sonucuna varılmıştır. **Sonuç:** Gebelerin aşı konusunda daha çok bilgilendirilmeleri ve aşıya teşviklerinin sağlanması gerekmektedir. Konu ile ilgili daha çok çalışmaya ihtiyaç duyulmaktadır.

Anahtar Kelimeler: COVID-19 aşıları; gebe kadınlar; aşı karşıtlığı

The World Health Organization (WHO) declared the coronavirus disease-2019 (COVID-19) (severe acute respiratory syndrome-coronavirus-2) outbreak, a worldwide pandemic on March 11, 2020, and reported approximately 753 million cases and 6.8 million deaths as of January 27, 2023.[1-3] Coronavirus gets transmitted through droplets, contact and airborne particles. Pregnant women who are infected

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with this virus are mildly or moderately ill in general. Although pregnancy is a physiological process, their bodies experience decreased lung capacity, increased oxygen consumption and changes in their physiological and immune systems during pregnancy. For this reason, pregnant women are considered a vulnerable group in various infectious diseases, some of which can be prevented by vaccination.[4-6] There is concrete evidence that the disease poses a more serious risk, especially for pregnant women who contract the virus in their third trimester.[7,8] In this population, the risk of admission to intensive care units is around 1% and the risk of invasive mechanical ventilation is around 0.3%.[8-10] To compare pregnant women who have contracted COVID-19 and those who have not, pregnant women who have contracted it, are at a higher death risk.[1,10] Being infected with COVID-19 can also increase the risk of stillbirth and premature birth.[11]

Vaccination is the most effective way to control the COVID-19 pandemic.[12,13] According to the WHO, more than 13 billion doses of vaccine have been administered worldwide as of 23 January 2023.[3] Besides the numerous advantages that vaccines offer to people, several factors such as inadequate knowledge about vaccines, anxiety and fright can also give rise to anti-vaccination beliefs among people. Anti-vaccination is conceptualized in several ways, such as "vaccine hesitation" and "vaccine rejection."[14]

In a meta-analysis study involving different countries, the prevalence of COVID-19 vaccine hesitancy was 49.2% and 13.4% in pregnant women in another study conducted in Japan.[5,15] In a study conducted in İzmir in 2021 and involving 403 people, pregnancy and breastfeeding were among the reasons for not being vaccinated among those who were not currently vaccinated.[16] However, according to the data obtained from the research carried out by the Centers for Disease Control and Prevention (CDC), no increase was observed in adverse conditions such as abortion, congenital anomalies, intrauterine development retardation, premature birth and stillbirth in pregnancies with COVID-19 vaccine.[17] Therefore, both the CDC and WHO recommend vaccination of pregnant and breastfeeding women.[7,18,19] The reluctance toward vaccination is popular worldwide, especially in low-to middle-income nations, because of uncontrolled, deceptive and inaccurate knowledge disseminated via various media, especially social media platforms. Along with the constrained information about safety regarding the vaccine of COVID-19, this means that expectant mothers may be tended more to reject the vaccine, which could lead to significant community health problems.[20] Although there are recommendations for the vaccination of pregnant women and available data on the effectiveness and safety of the COVID-19 vaccine, there still exist concerns and insufficient literature on the topic, leading to hesitations regarding getting this vaccination during pregnancy. Knowing the factors affecting COVID-19 vaccine hesitation in pregnant women may be effective in reducing vaccine hesitation.

The current study aspired to examine the contravention of pregnant women to have the COVID-19 vaccine along with the factors affecting it. Depending on this aim, the following questions were sought to be answered in the study:

(I.) What is the level of vaccine hesitancy in pregnant women?

(II.) What are the factors affecting vaccine hesitancy in pregnant women?

MATERIAL AND METHODS

This is cross-sectional research was carried out to examine the vaccine hesitancy among pregnant women and the factors influencing it.

The study population comprised pregnant women applying for follow-up at the obstetrics and gynecology outpatient clinic of a state hospital located in the southeastern region of Türkiye between October 10, 2022-December 23, 2022. The study used convenience sampling method, comprising pregnant women who met the inclusion criteria and were willing to participate in the study from those visiting the outpatient clinic of obstetrics and gynecology. The power analysis was performed using G*Power software (version 9.2; Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany). Based on the power analysis, the study determined that 208 individuals should be included to achieve a power of 85% at 0.05 significance level and 0.25 effect size, considering the critical F value of 2.4136389.

The study established inclusion criteria as follows; being aged 15-49 years and not having language problems. Pregnant women who wanted to discontinue at any stage of the study or did not fully complete the data collection forms were excluded from the study.

As data collection tools, the study used an "Information Form" and the "Vaccine Hesitancy Scale (VHS)."

The Information Form included 24 questions developed by the researchers to evaluate the socio-demographic and pregnancy-related information of pregnant women (age, educational status, husband's educational status, number of pregnancies, gestational week, history of abortus, COVID-19 status, etc.) and their views on vaccination.

The study used the long form of the VHS. The long form of the scale, consisted of 21 items and 4 subdimensions. The subdimensions were determined as "A-Benefit and protective value of vaccine; B-Vaccine repugnance; C-Solutions for non-vaccination; and D-Legitimization of vaccine hesitancy." The scale uses a 5-point Likert-type rating system, ranging from 1 (Strongly disagree) to 5 (Strongly agree). "Benefit and protective value of vaccine" subdimension items are scored inversely. The scale has no calculated cut-off value. An increase in the scale score also increases the anti-vaccination/hesitation. The internal consistency coefficient for the long form of the original scale is 0.855, while it was found to be 0.790 for the present study.[21]

The pregnant women, who applied for follow-up at the outpatient clinics of obstetrics and gynecology unit of a state hospital located in the southeastern region of Türkiye between October 10, 2022-December 23, 2022 and met the inclusion criteria, were provided with information about the study and were invited to participate in the study. The participating pregnant women provided their informed consent. Data collection included interviewing the participants face to face. The data collection forms took approximately 10-15 minutes to complete. A total of 211 pregnant women were contacted for the study.

The data collected from the research were analyzed by use of the SPSS (IBM SPSS Statistics AMOS 22.0 software). Descriptive data about pregnant women were calculated by taking the number-percentage distributions and averages. In all analyses, the study employed $p<0.05$ as the significance level and the threshold to adjust the statistical significance of the study. The total mean score of the scales was calculated and the Kolmogorov-Smirnov normality test was used for the data to determine the suitability of the scale score for normal distribution. Since the scale score was normally distributed, the One-way ANOVA test served to determine any significant divergence between the means of three or more groups and the Bonferroni test as a post-hoc analysis served to identify the groups that contributed to the significant difference. The independent-t test served to evaluate the means between 2 independent groups.

All necessary permissions were obtained from Mardin Provincial Directorate of Health, Mardin University Non-Interventional Ethics Committee (date: October 13, 2022, no: 2022/12-9) and from Kilincarslan et al. (2020) who measured the reliability and validity of the VHS in Turkish. The study was conducted in compliance with the principles outlined in the Declaration of Helsinki. Prior to data collection, the participants were provided with necessary information about the research and gave their informed consent.

RESULTS

Of the pregnant women, 83.4% were aged 18-35 years, 6.2% were illiterate and 28% were primary school graduates. Among their husbands, 30.3% were high school graduates and 53.6% had a regular job. Of the participants, 76.3% had children and 31.7% had three or more children. Of them, 87.0% were non-smokers and 7.6% had a chronic disease. Table 1 displays the sociodemographic characteristics of the participants.

Of the participants, 84.8% were between 28-42 weeks and 6 days of gestation and 79.6% had 2 or more pregnancies. Of them, 31.8% had a history of abortion and 27.9% had 2 or more abortions. Of them, 36.0% had COVID-19 disease and 1.9% were hospitalized due to COVID-19 disease. Among the participants, 58.3% were vaccinated against COVID-

TABLE 1: Socio-demographic characteristics of pregnant women.

Characteristics		Number	Percentage (%)
Age	<18 years old	3	1.4
	18-35 years old	176	83.4
	>35 years old	32	15.2
Husband's age	18-35 years old	151	71.6
	>35 years old	60	28.4
Education status	Illiterate	13	6.2
	Primary school graduate	51	24.2
	Secondary school graduate	59	28.0
	High school graduate	50	23.6
	Bachelor's degree and above	38	18.0
Husband's education status	Illiterate	4	1.9
	Primary school graduate	36	17.1
	Secondary school graduate	47	22.3
	High school graduate	64	30.3
	Bachelor's degree and above	60	28.4
Husband's employment status	Regular/salaries employee	113	53.6
	Irregular/seasonal/freelancer	98	46.4
Having children	Yes	160	76.3
	No	50	23.7
Number of children	1	60	37.3
	2	50	31.1
	3 or more	51	31.6
Having a disabled child	Yes	5	2.4
	No	206	97.6
Smoking status	Yes	26	12.3
	No	185	87.7
Chronic disease status	Yes	16	7.6
	No	195	92.4
Chronic disease in the household	Yes	36	17.1
	No	175	82.9
Total		**211**	**100**

19 and 81.7% were vaccinated during pregnancy. Among those who were not vaccinated, 50.5% stated that they would refuse to get vaccinated. In addition, 40.8% of them were informed about COVID-19 vaccine by health personnel.

Table 2 shows the pregnancy characteristics, statuses of COVID-19 disease and vaccination.

In this study, VHS total mean score is 61.24±11.63. Therefore, hesitancy level to vaccination among pregnant women was moderate. The subdimension mean scores of the scale are as follows: "benefit and protective value of vaccine" 19.20±4.65; "vaccine repugnance" 18.90±5.82; "solutions for non-vaccination" 14.04±5.11 and "legitimization of vaccine hesitancy" 9.09±4.60. Table 3 presents the mean scores of the VHS and its subdimensions for pregnant women.

Comparing the pregnant women's age and their scores from the subdimensions, there was a significant difference in the subdimension of "benefit and protective value of vaccine" (p=0.012). The difference found is between the groups aged 18-35 and over 35. Comparison of the "benefit and protective value of vaccine" subdimension scale score with the pregnant women's age showed that pregnant women aged 18-35 years had low scores (18.79±4.77). When

TABLE 2: Pregnancy characteristics, statuses of COVID-19 disease and vaccination.

Characteristics		Number	Percentage (%)
Pregnancy week	0-13 weeks and 6 days	3	1.5
	14-27 weeks and 6 days	29	13.7
	28-42 weeks and 6 days	179	84.8
Type of pregnancy	Normal	206	97.6
	Assisted reproductive techniques	5	2.4
Number of pregnancies	First pregnancy	43	20.4
	2 or more	168	79.6
History of abortion	Yes	67	31.8
	No	144	68.2
Number of abortions	1 abortion	49	72.1
	2 or more	19	27.9
Had COVID-19 disease	Yes	76	36.0
	No	135	64.0
Hospitalization due to COVID-19 disease	Yes	4	1.9
	No	207	98.1
Vaccination against COVID-19	Yes	124	58.3
	No	87	41.7
Type of vaccine	Sinovac	16	12.9
	Biontech	108	87.1
When the vaccine is administered	Pre-pregnancy	101	81.7
	During pregnancy	23	18.3
Intention to be vaccinated (if not vaccinated)	Yes	41	37.6
	No	55	50.5
	Undecided	13	11.9
Vaccination status other than COVID-19 vaccine (influenza, tetanus, etc.)	Yes	185	87.7
during pregnancy	No	26	12.3
Vaccination of household members	Yes	184	87.2
	No	27	12.8
Be informed by health personnel about the COVID-19 vaccine	Yes	86	40.8
	No	125	59.2
Total		**211**	**100**

COVID-19: Coronavirus disease-2019.

the gestational week of the pregnant women was compared with the scores yielded from the scale of anti-vaccination and its subdimensions, the difference between the "VHS" and gestational week (p=0.010) and between the "legitimization of vaccine hesitancy" subdimension and gestational week was significant (p=0.016). Pregnant women in the first trimester had higher scores for "VHS" (80.33±21.45) and "legitimization of vaccine hesitancy" (16.00±9.54) than those in the second and third trimesters. A significant difference was found between the intention to be vaccinated and the scores obtained by pregnant women from the "benefit and protective value of vaccine" (p<0.001), "solutions for non-vaccination" (p=0.019), and "legitimization of vaccine hesitation" subdimensions (p=0.037). The difference was significant between those who intended to be vaccinated and those who did not and between those who intended to be vaccinated and those who were undecided in terms of "benefit and protective value of vaccine." There was a significant difference between those who intended to be vaccinated and those who did not in terms of "solutions for non-vaccination" and "legitimization of vaccine hesitancy." The "benefit and protective value of vaccine" subdimension score was higher in those who intended to be vacci-

TABLE 3: The mean scores of the "VHS" and its subdimensions.

Scale and subdimensions	n	Minimum	Maximum	Mean	Std. deviation
VHS	211	38.00	105.00	61.24	11.63
Benefit and protective value of vaccine	211	5.00	25.00	19.20	4.65
Vaccine repugnance	211	6.00	30.00	18.90	5.82
Solutions for non-vaccination	211	5.00	25.00	14.04	5.11
Legitimization of vaccine hesitancy	211	5.00	25.00	9.09	4.60

VHS: Vaccine Hesitancy Scale.

nated, and the "solutions for non-vaccination" and "legitimization of vaccine hesitation" subdimension scores were higher in those who did not intend to be vaccinated. Comparison of the husbands' age and the scores they obtained from the subdimensions showed a significant difference in the "benefit and protective value of vaccine" subdimension (p=0.021). Analysis of the difference between the "benefit and protective value of vaccine" subdimension score and the husbands' age indicated that the husbands over 35 years of age had high scores (20.37±4.20). When the total scale score and the subdimensions scores were compared with the smoking status of the pregnant women, there was a significant difference in the "benefit and protective value of vaccine" subdimension (p=0.031). The scale subdimension score was found to be high in pregnant women who smoked (21.00±4.30). Considering the number of pregnancies, the difference was significant between the mean total scores of those with first pregnancy and those with 2 or more pregnancies (p=0.003). The scores of those with 2 or more pregnancies were higher (62.33±11.82). There was a significant difference between having a chronic patient in the household and the "VHS" (p=0.027) and the "vaccine repugnance" subdimension (p=0.009). Accordingly, pregnant women with chronic patients in the household had higher "VHS" score (65.42±12.15) and "vaccine repugnance" subdimension score (21.19±5.13). A meaningful difference was found (p=0.033) between the scores of pregnant women with a history of abortion from the VHS (63.75±13.75) and the scores from the subdimensions of "solutions for non-vaccination" (p=0.030; mean±Sd=15.18±5.15) and "legitimization of vaccine hesitancy" (p=0.051; mean±Sd=10.07±5.24). Those who had a history of abortion were found to have higher scores from the scale. There was a significant difference between the pregnant women's COVID-19 vaccination and their scores from the "benefit and protective value of vaccine" (p<0.001), "solutions for non-vaccination" (p<0.001), and "legitimization of vaccine hesitancy" (p=0.028) subdimensions. While the "benefit and protective value of vaccine" subdimension score was higher in those who had the COVID-19 vaccine, the "solutions for non-vaccination" and "legitimization of vaccine hesitancy" subdimension scores were higher in those who were not vaccinated. Considering the husbands' educational status, there was a meaningful difference between the VHS score, "benefit and protective value of vaccine" and "legitimization of vaccine hesitancy" subdimensions scores of those secondary school graduates and those with bachelor's degree or higher. The scores of the husbands who graduated from a secondary school were found to be higher.

No statistically significant difference was found between the total scale score and the subdimensions and the educational status, husband's employment status, type of pregnancy, having a child, number of children, having a disabled child, history of COVID-19, hospitalization due to COVID-19, type of COVID-19 vaccine, when the vaccine was administered, vaccination status other than COVID-19 vaccine (influenza, tetanus, etc.), vaccination of household members, and being informed by health personnel about COVID-19 vaccine (p>0.05). Table 4 illustrates the distribution of mean scores that pregnant women obtained from the "VHS" and its subdimensions according to their characteristics.

TABLE 4: The distribution of the mean scores obtained from "VHS" and its subdimensions according to the characteristics of the pregnant women.

Characteristics		VHS mean±Sd	Benefit and protective value of vaccine mean±Sd	Vaccine repugnance mean±Sd	Solutions for non-vaccination mean±Sd	Legitimization of vaccine hesitancy mean±Sd
*Age	< 18 years[a]	74.33±30.50	23.00±3.46	22.00±12.16	16.33±9.61	13.00±10.58
	18-35 years[b]	61.11±11.49	18.79±4.77	19.10±5.70	14.11±5.18	9.11±4.61
	>35 years[c]	60.72±9.65	21.09±3.33	17.56±5.86	13.47±4.35	8.59±3.79
	Statistical analysis	F=1.96	F=4.49	F=1.37	F=0.51	F=1.27
		p=0.143	**p=0.012**	p=0.256	p=0.597	p=0.282
	Difference		b-c			
*Husband's educational status	Illiterate[a]	58.50±2.52	18.75±0.96	17.75±2.06	13.50±0.58	8.50±2.65
	Primary school graduate[b]	62.28±13.39	19.81±5.39	18.47±6.52	14.28±5.67	9.72±5.62
	Secondary school graduate[c]	66.09±13.16	19.21±3.90	20.28±5.52	15.74±4.66	10.85±5.03
	High school graduate[d]	61.91±10.37	18.66±5.33	19.45±6.14	14.53±5.12	9.27±4.60
	Bachelor and higher degree[e]	56.30±8.91	19.43±4.09	17.58±5.26	12.10±4.75	7.18±2.76
	Statistical analysis	F=5.33	F=0.41	F=1.67	F=3.84	F=4.83
		p<0.001	p=0.798	p=0.158	p=**0.005**	**p<0.001**
	Difference	c-e, d-e, e-d- c			c-e, e-c	c-e, e-c
*Gestational week	0-13 weeks and 6 days (first trimester)[a]	80.33±21.45	20.67±5.86	24.33±4.93	19.33±4.93	16.00±9.54
	14-27 weeks and 6 days (second trimester)[b]	59.00±9.37	19.86±3.76	17.72±5.40	13.34±5.06	8.07±3.54
	28-42 weeks and 6 days (third trimester)[c]	61.28±11.56	19.07±4.77	19.00±5.87	14.07±5.10	9.14±4.59
	Statistical analysis	F=4.75	F=0.51	F=1.94	F=1.89	F=4.23
		p=0.010	p=0.599	p=0.146	p=0.153	**p=0.016**
	Difference					a-b. a-c. b-a. c-a.
**Intention to be vaccinated	Yes	63.49±16.95	22.00±3.22	18.95±7.30	13.90±5.94	8.63±5.89
	No	64.49±9.89	15.76±5.14	20.73±5.51	16.71±4.03	11.29±4.84
	Undecide[d]	59.31±6.50	17.54±4.16	18.00±5.03	14.62±4.31	9.15±3.02
	Statistical analysis	F=0.867	F=23.86	F=1.54	F=4.09	F=3.40
		p=0.423	p<0.001	p=0.219	p=0.019	p=0.037
	Difference	a-b,b-a	a-b, a-c, c-a, b-a, c-a		a-b, b-a	a-b, b-a
**Husband's age	18-35 years	60.97±11.52	18.74±4.75	18.83±5.60	14.09±5.17	9.32±4.63
	>35 years	61.92±11.97	20.37±4.20	19.10±6.42	13.93±5.00	8.52±4.53
	Statistical analysis	t=-0.531	t=-2.324	t=-0.305	t=0.204	t=1.141
		p=0.603	**p=0.021**	p=0.760	p=0.839	p=0.255

TABLE 4: The distribution of the mean scores obtained from "VHS" and its subdimensions according to the characteristics of the pregnant women *(continued)*.

Characteristics		VHS mean±Sd	Benefit and protective value of vaccine mean±Sd	Vaccine repugnance mean±Sd	Solutions for non-vaccination mean±Sd	Legitimization of vaccine hesitancy mean±Sd
**Smoking status	Yes	60.27±15.00	21.00±4.30	16.88±6.65	12.54±5.93	9.85±6.08
	No	61.38±11.12	18.95±4.65	19.19±5.67	14.26±4.97	8.98±4.37
	Statistical analysis	t=-0.36	t=-2.13	t=-1.89	t=-1.61	t=0.69
		p=0.719	**p=0.031**	p=0.059	p=0.108	p=0.491
**Number of pregnancies	First pregnancy	57.00±9.89	18.44±4.57	17.58±5.59	12.86±5.20	8.12±3.91
	2 or more	62.33±11.82	19.39±4.66	19.24±5.86	14.35±5.06	9.34±4.74
	Statistical analysis	t=-2.72	t=-1.19	t=-1.68	t=-1.71	t=-1.56
		p=0.003	p=0.232	p=0.095	p=0.088	p=0.120
**The presence of d	Yes	65.42±12.15	20.19±4.46	21.19±5.13	14.61±5.19	9.41±5.02
chronic patient in the househol	No	60.38±11.36	18.99±4.67	18.43±5.87	13.93±5.10	9.02±4.53
	Statistical analysis	t=2.392	t=-1.414	t=2.865	t=0.725	t=0.467
		p=0.027	p=0.159	**p=0.009**	p=0.469	p=0.641
**History of abortion	Yes	63.75±13.75	19.63±4.41	18.87±6.09	15.18±5.15	10.07±5.24
	No	60.08±10.35	19.00±4.75	18.92±5.73	13.52±5.03	8.63±4.22
	Statistical analysis	t=2.152	t=0.912	t=-0.067	t=2.213	t=1.975
		p=0.033	p=0.363	p=0.948	**p=0.030**	**p=0.051**
**Vaccination against COVID-19	Yes	60.24±12.68	20.67±3.63	18.36±5.89	12.72±5.26	8.50±4.64
	No	62.64±9.88	17.15±5.13	19.67±5.69	15.91±4.28	9.91±4.45
	Statistical analysis	t=-1.48	t=5.52	t=-1.62	t=-4.85	t=-2.21
		p=0.141	**p<0.001**	p=0.107	**p<0.001**	**p=0.028**

*One-way ANOVA; **Independent t-test; COVID-19: Coronavirus disease-2019.

DISCUSSION

Although there were no pregnant women in the vaccine development trials, in early 2021, the utilization of the Pfizer/BioNTech (Germany) vaccine among pregnant women was endorsed by the Food and Drug Administration, followed by the European Medicines Agency.[22] Although research has reported that pregnancy and breastfeeding are important reasons for not being vaccinated during pregnancy, vaccinations is the most efficient way to manage the COVID-19 pandemic.[12,13,16]

This study found the mean total score of the VHS as 61.24 (moderate level) for the pregnant women. Egloff et al. found that 76.9% (468) of the pregnant women who refused COVID-19 vaccination expressed more fear toward the potential adverse effects of the vaccine on the fetus than contracting COVID-19.[23] In the study of Miraglia Del Giudice et al. examining the COVID-19 vaccine hesitancy and readiness to be vaccinated among pregnant women in Italy, the vaccine hesitancy score was found to be high in 86.4% of pregnant women who were unvaccinated.[24] In the same study and similar studies, the majority of the participants stated that there was inadequate information regarding the safety of the vaccine in pregnant women and they were especially concerned about the side effects on the fetus.[24-30] Therefore, vaccine hesitancy among pregnant women may be attributed to their fears about the potential adverse effects of the vaccine on the fetus rather than on themselves.

The educational level of the pregnant women did not impact vaccine hesitancy, however the educational level of their husbands did ($p<0.001$). In the literature, there are studies with similar results to this study, as well as studies claiming that the level of education in pregnant women is effective on COVID-19 vaccination, willingness to be vaccinated and vaccine hesitancy.[18,26,31,32] In the study of Ghamri et al., 32.4% of the university graduates stated that they were not vaccinated or did not want to be vaccinated.[32] In the study of Sezerol and Davun, the VHS score of pregnant women with a university degree was found to be the highest with 33.96±5.91.[18] The study of Miraglia Del Giudice et al., stated that of the pregnant women, those who were uneducated had a higher belief that the vaccine might have side effects on the fetus, 21.3% received vaccination during pregnancy and the majority of them were university graduates.[24] As indicated in the findings from various studies, the effect of the education level of pregnant women on vaccine hesitancy may vary. The decision-making position of men due to societal gender roles may have influenced vaccine hesitancy among women.

Of the participants, 84.8% were in their third trimester. However, those who were in their first trimester had higher total mean scores (80.33±21.45). In the study of Egloff et al., more than 50% of the pregnant women who accepted to receive vaccine were in the 31-42 weeks of gestation, which is in the third trimester.[23] In the study of Yoon et al., most pregnant women who accepted to receive vaccine were in their third trimester, whereas there were very few women in their first trimester.[26] The findings of this study are nourished by the literature, suggesting that most pregnant women who accept to be vaccinated are in their third trimester. The reasons for vaccine hesitancy among some pregnant women may be attributed to the awareness that during the first trimester of pregnancy, the organs and systems of the embryo are forming and the belief that any harmful agent during this period could negatively impact the embryo's development.

Of the participants, 79.6% had 2 or more pregnancies and the total mean score of the VHS was 62.33±11.82, while this score was 57.00±9.89 in those who had first pregnancy. The total vaccine hesitancy score of those with their first pregnancy was found to be lower. In the study of Ghamri et al., the rate of refusal to be vaccinated was found to be higher in those with less than 5 pregnancies compared to those with more than 5 pregnancies.[32] On the other hand, Polat et al., reported that vaccine rejection was higher in multipars.[33] In another study conducted on pregnant women, refusal to accept vaccination was lower in those with 3 or more pregnancies compared to those who had their first and second pregnancies.[30] Similar results of the studies conducted in Türkiye suggest that the uncertainty about the impact of COVID-19 on pregnancy and the higher value attributed to the first pregnancy by families may also have influenced vaccine hesitancy.

In this study, the presence of chronic patients in the household was found to be associated with vaccine hesitancy. Those who had chronic patients in the household had a higher total score of vaccine hesitancy. In the study of Miraglia Del Giudice et al., having at least one chronic patient in the household did not have any effect on willingness to be vaccinated.[24] The result of this study raise concern that COVID-19 side effects due to vaccination may have a worse effect on those with chronic diseases.

In this study, there was a meaningful difference between pregnant women who had a history of abortion and those who did not in terms of the total mean score from the scale. The total mean score was higher among women with a history of abortion (63.75±13.75). No study was found in the literature indicating the vaccination willingness of pregnant women who had a history of abortion. However, there are studies evaluating the relationship between abortion and vaccination. The study of Citu et al. found no significant difference regarding abortion between pregnant women who were in the first trimester and those who were vaccinated against COVID-19 and those who were not.[22] Rimmer et al. conducted meta-analysis research and systematic review, suggesting no significant difference regarding the risk of abortion between the vaccination group and non-vaccination and placebo groups.[34] There are no studies proving that the vaccine has a risk of abortion. A history of miscarriage among the pregnant women may have caused fear of experiencing the same situation in subsequent pregnancies. Therefore, it is important to encourage pregnant women with a history of abortion to get vaccinated.

This study is limited to pregnant women who were admitted to a state hospital within certain dates and agreed to participate in the study. The findings of the study represent its own population.

CONCLUSION

Hesitancy of COVID-19 vaccination is still a major public health concern during pregnancy. Various sociodemographic characteristics influence COVID-19 vaccine hesitancy in pregnancy. Concerns related to vaccine hesitancy, particularly for newly developed vaccines, are the biggest barrier to vaccination. As evidence-based information about inoculation against COVID-19 during pregnancy increases, our understanding of the efficacy of COVID-19 inoculation in pregnant women will increase.

Pregnant women should be informed more about vaccination and encouraged to be vaccinated. Further research should be conducted on the subject.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Sibel İçke;* ***Design:*** *Sibel İçke, Sema Çifçi;* ***Control/Supervision:*** *Sibel İçke, Sema Çifçi;* ***Data Collection and/or Processing:*** *Sibel İçke, Sema Çifçi;* ***Analysis and/or Interpretation:*** *Sibel İçke, Sema Çifçi;* ***Literature Review:*** *Sibel İçke, Sema Çifçi;* ***Writing the Article:*** *Sibel İçke, Sema Çifçi;* ***Critical Review:*** *Sibel İçke, Sema Çifçi;* ***Materials:*** *Sibel İçke, Sema Çifçi.*

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