COVID-19 vaccine acceptance in pregnant women

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Abstract

Objective: To determine vaccine acceptance and hesitancy attitudes toward coronavirus disease 2019 (COVID-19) vaccines in pregnant women.

Methods: Three hundred pregnant women were surveyed face to face with 40 questions. Sociodemographic characteristics, vaccination history, perception of risk for the COVID-19 pandemic, the impact of the COVID-19 pandemic, and acceptance of and attitude toward future COVID-19 vaccination were prospectively evaluated.

Results: Among all participants, 111 (37%) stated their intent to receive the vaccine if it were recommended for pregnant women. Most common refusal reasons were lack of data about COVID-19 vaccine safety in pregnant populations and possibility of harm to the fetus. There was a weak positive correlation between COVID-19 vaccine acceptancy and number of school-age children. Pregnant women in the first trimester expressed higher acceptance of COVID-19 vaccination than those in the second and third trimesters.

Conclusion: The present study reported low acceptance of COVID-19 vaccination in a sample of pregnant women. Concern about vaccine safety was the major reason for hesitancy. Identifying attitudes among priority groups will be useful for creating vaccination strategies that increase uptake during the current pandemic.

KEYWORDS
acceptance, COVID-19, hesitancy, pregnant women, severe acute respiratory syndrome coronavirus 2, vaccine

1 | INTRODUCTION

Although more than a year has passed since the severe respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic started, no specific treatment against the disease is available. According to WHO, more than two million deaths have been recorded worldwide up to February 2021. Therefore, it is important to avoid infection. In the absence of an effective treatment for coronavirus disease 2019 (COVID-19) non-pharmaceutical interventions are the only available methods of disease control. Social distancing, face masks, and personal hygiene are the most effective precautions, but maintaining these actions is not practicable in the long term. As a result, herd immunity by vaccination becomes the most effective eradication method, as in other viral epidemic diseases in the past.[1,2]

Research into development of a vaccine for SARS-CoV-2 was undertaken immediately after the disease was identified.[3] The success of a vaccine depends not only on its efficacy, but also its acceptance. However, vaccine hesitancy has become an important threat to global health, which was pointed out by WHO in 2019.[4] Several key factors behind vaccine hesitancy include fear or mistrust of the vaccine, underestimation of the value of the vaccine, and lack of access to the vaccine.[5]

Pregnant women are at increased risk of severe disease, intensive care unit admission, and invasive ventilation when compared with non-pregnant patients of the same age.[6-8] Therefore, pregnant women are classified as a high-risk population for COVID-19 infection.[9] Regarding this information, pregnant women have not been included in any COVID-19 vaccine clinical trials to date.[10] Even so, public health authorities, including the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine recommend that COVID-19 vaccines should be available for pregnant women if they prefer to be vaccinated.[11,12]

The confusion surrounding pregnant women has interfered with decision making about the COVID-19 vaccination. We hypothesized that pregnant women would avoid the COVID-19 vaccine because of the inconsistent available data. Our study aims to define COVID-19 vaccine acceptance and hesitancy status in a sample of pregnant women in Ankara, Turkey.

2 | MATERIALS AND METHODS

This prospective study was conducted in Ankara City Hospital between January 1, 2021 and February 1, 2021 with pregnant women who were seen for prenatal care. Data were collected using a face-to-face questionnaire. Written informed consent was obtained from all participants. The applied protocol was approved by the Turkish Ministry of Health and the Medical Research Ethics Department of the hospital (E2-20-126).

The stage of pregnancy of the patients was based on the last menstrual period or first-trimester crown-rump length. The questionnaire contained 40 questions about sociodemographic characteristics, vaccination history, perception of risk related to the COVID-19 pandemic, the impact of the COVID-19 pandemic, and acceptance of and attitude toward future COVID-19 vaccination. Indications of a high-risk pregnancy included preterm labor, gestational hypertension, gestational diabetes mellitus, fetal structural anomalies, multifetal pregnancy, epilepsy, and placenta previa.

Statistical analyses were performed using SPSS 17 (SPSS Inc., Chicago, IL, USA). The Shapiro–Wilk test and Kolmogorov–Smirnov test were used to determine the distribution of normality, and χ^2 test was used to compare categorical data. The continuous variables were presented as mean and standard deviations.

Groups were compared with Spearman's rho test for correlation between sociodemographic variables and COVID-19 vaccine acceptance. A type-1 error below 0.05 was considered statistically significant.

3 | RESULTS

Sociodemographic features of participants are shown in Table 1. Of 300 pregnant women who completed the questionnaire, 111 (37%) stated their intent to receive the vaccine if it were recommended

TABLE 1 Sociodemographic data[a]

Characteristic	Value
Age	27.99 ± 5.6
Gravidity	2.32 ± 1.37
Parity	1.01 ± 1.08
Gestational week	28.74 ± 8.88
Number of people in the household	3.13 ± 1.21
Number of school age children	0.46 ± 0.90
Co-morbidity	0.07 ± 0.28
Number of people in the household >65 year	0.03 ± 0.17
Income (month) (Turkish Lira)	4176.74 ± 2431.99
High-risk pregnancy	92 (30.7)
Education status	
None	4 (1.3)
Primary school	76 (25.4)
Secondary school	148 (49.3)
University	72 (24)
Career	
Housewife	231 (77)
Government official	46 (15.3)
Private sector	12 (4)
Worker	11 (3.7)
Husband's career	
Worker	120 (40)
Government official	76 (25.3)
Merchant	63 (21)
Private sector	41 (13.7)

[a]Values are given as mean ± standard deviation or as number (percentage).

for pregnant women. Ninety-two (30.7%) of the participants were regarded as experiencing high-risk pregnancies.

Coronavirus disease 2019 vaccine acceptance rates and comparisons of the answers of patients with high-risk and low-risk pregnancies are given in Table 2. We did not find a significant difference between high-risk and low-risk groups.

A summary of the reasons for refusing the COVID-19 vaccine is given in Table 3. Pregnant women who said they would refuse the vaccine stated their most important concerns as: (1) a lack of data about COVID-19 vaccine safety in the pregnant population, and (2) the possibility of harm to the fetus.

The correlation between COVID-19 vaccine acceptance and sociodemographic features is presented in Table 4. A weak positive correlation was observed between COVID-19 vaccine acceptance and the number of school-age children in the household ($P < 0.05$).

When we compared first-trimester pregnant women with second- and third-trimester pregnant women, women in their first trimester expressed greater interest in receiving the COVID-19 vaccination than others ($P < 0.05$).

TABLE 2 COVID-19 vaccine acceptance rates and comparisons of the answers of patients with high-risk and low-risk pregnancies[a]

Questions	Answer	Want to be vaccinated (n = 111; 37%)	Do not want to be vaccinated (n = 189; 63%)	P value	HRP (n = 92; 30.7%)	LRP (n = 208, 69.3%)	P value
Have you ever been vaccinated?	Yes	98 (88.3)	170 (89.9)	0.653	80 (87)	188 (90.4)	0.375
	No	13 (11.7)	19 (10.1)		12 (13)	20 (9.6)	
Have you been vaccinated in the last 5 years?	Yes	94 (84.7)	152 (80.4)	0.354	77 (83.7)	169 (81.3)	0.611
	No	17 (15.3)	37 (19.6)		15 (16.3)	39 (18.7)	
Was the influenza vaccine recommended in the present pregnancy?	Yes	9 (8.1)	13 (6.9)	0.693	4 (4.3)	18 (8.7)	0.187
	No	102 (91.9)	176 (93.1)		88 (95.7)	190 (91.3)	
If the influenza vaccine was recommended, would you have vaccinated in the present pregnancy?	Yes	62 (55.9)	53 (28)	**0.000**	43 (38.7)	72 (34.6)	**0.046**
	No	49 (44.1)	136 (72)		49 (41.3)	136 (65.4)	
Have you been vaccinated for influenza in the present pregnancy?	Yes	3 (2.7)	2 (1.1)	0.363	1 (1.1)	4 (1.9)	1
	No	108 (97.3)	187 (98.9)		91 (98.9)	204 (98.1)	
Was the tetanus vaccine recommended in the present pregnancy?	Yes	87 (78.4)	146 (77.2)	0.821	76 (82.6)	157 (75.5)	0.172
	No	24 (21.6)	43 (22.8)		16 (17.4)	51 (24.5)	
Have you been vaccinated for tetanus in the present pregnancy?	Yes	79 (71.2)	128 (67.7)	0.533	71 (77.2)	136 (65.4)	**0.042**
	No	32 (28.8)	61 (32.3)		21 (22.8)	72 (34.6)	
Are you going to have your baby vaccinated after birth?	Yes	110 (99.1)	186 (98.4)	1	90 (97.8)	206 (99)	0.399
	No	1 (0.9)	3 (1.6)		2 (2.2)	2 (1)	
Do you have a high risk of COVID-19 transmission at work?	Yes	9 (8.1)	15 (7.9)	0.958	5 (5.4)	19 (9.1)	0.276
	No	102 (91.9)	174 (92.1)		87 (94.6)	189 (90.9)	
Did you have close contact with a COVID-19-positive person?	Yes	17 (15.3)	33 (17.5)	0.630	18 (19.6)	32 (15.4)	0.370
	No	94 (84.7)	156 (82.5)		74 (80.4)	176 (84.6)	
Did you care about hand hygiene during the pandemic?	Yes	111 (100)	189 (100)		92 (100)	208 (100)	
	No						
Did you care about social distancing during the pandemic?	Yes	111 (100)	189 (100)		92 (100)	208 (100)	
	No						
Did you care about using a mask during the pandemic?	Yes	111 (100)	189 (100)		92 (100)	208 (100)	
	No						
Did you have COVID-19 in this pregnancy?	Yes	14 (12.6)	24 (12.8)	0.552	11 (12)	26 (12.5)	0.632
	No	97 (87.4)	165 (87.2)		81 (88)	180 (86.5)	
Have you heard about the COVID-19 vaccine before?	Yes	109 (98.2)	187 (98.9)	0.901	90 (97.8)	206 (99)	1
	No	2 (1.8)	2 (1.1)		2 (2.2)	2 (1)	
Do you think that you have enough information about the COVID-19 vaccine?	Yes	38 (34.2)	38 (20.1)	**0.007**	25 (27.1)	51 (24.5)	0.626
	No	30 (27)	72 (38.1)		27 (29.3)	75 (36.1)	
Do you think that the COVİD-19 vaccine carries the possibility of harm for your baby?	Yes	48 (43.2)	169 (89.4)	**0.000**	68 (74)	149 (71.6)	0.684
	No	63 (56.8)	20 (10.6)		24 (26)	59 (28.4)	
If the COVID-19 vaccine were recommended for pregnant women, would you have vaccinated?	Yes	111 (100)			38 (41.3)	73 (35.1)	0.304
	No		189 (100)		54 (58.7)	135 (64.9)	

The bold characters were used to signify the significant "P" values P<0.05.

Abbreviations: COVID-19, coronavirus disease 2019; HRP, high-risk pregnancy; LRP, low-risk pregnancy.

[a]Values are given as number (percentage).

TABLE 3 Summary of the reasons for refusing the COVID-19 vaccine[a]

Questions	Answer	Refuse to get vaccinated (n = 189)	HRP (n = 54)	LRP (n = 135)	P value
Afraid of injection	Yes	8 (4.2)	1 (1.9)	7 (5.2)	0.304
	No	181 (95.8)	53 (98.1)	128 (94.8)	
Vaccine will harm my body	Yes	34 (18)	15 (27.8)	19 (14.1)	**0.027**
	No	155 (82)	39 (72.2)	116 (85.9)	
Vaccine will cause COVID-19 infection	Yes	17 (9)	6 (11.1)	11 (8.1)	0.495
	No	171 (91)	48 (88.9)	124 (91.9)	
Vaccine will harm my baby	Yes	79 (41.7)	28 (51.9)	51 (37.8)	0.076
	No	110 (58.3)	26 (48.1)	84 (62.2)	
COVID-19 is not a serious disease	Yes	5 (2.6)	3 (5.6)	2 (1.5)	0.115
	No	184 (97.4)	51 (94.4)	133 (98.5)	
I have low risk for COVID-19 infection	Yes	6 (3.2)	3 (5.6)	3 (2.2)	0.238
	No	183 (96.8)	51 (94.4)	132 (97.8)	
I believe that even if I am sick my baby and I will not encounter any negative events	Yes	2 (1)	1 (1.9)	1 (0.7)	0.500
	No	187 (99)	53 (98.1)	134 (99.3)	
I do not think the vaccine will work	Yes	51 (27)	2 (3.7)	49 (36.3)	**0.000**
	No	138 (73)	52 (96.3)	86 (63.7)	
Family members have hesitancy toward the COVID-19 vaccine	Yes	34 (18)	1 (1.9)	33 (24.4)	**0.000**
	No	155 (82)	53 (98.1)	102 (75.6)	
Lack of data about COVID-19 vaccine safety in pregnant women	Yes	124 (65.6)	34 (63)	90 (66.7)	0.628
	No	65 (34.4)	20 (37)	45 (33.3)	

The bold characters were used to signify the significant "P" values P<0.05.
Abbreviations: COVID-19, coronavirus disease 2019; HRP, high-risk pregnancy; LRP, low-risk pregnancy.
[a]Values are given as number (percentage).

TABLE 4 The correlation between COVID-19 vaccine acceptance and sociodemographic features

	Age	Gravidity	Parity	Gestational week	Number of householders	Number of school kids	Co-morbidity	Number of householders >65 year	Monthly income (TL)
r value[a]	−0.010	0.84	0.075	0.038	0.093	0.135	0.030	−0.050	−0.034
P value[a]	0.865	0.148	0.195	0.509	0.110	**0.020**	0.600	0.387	0.555

The bold characters were used to signify the significant "P" values P<0.05.
Abbreviations: COVID-19, coronavirus disease 2019; TL, Turkish lira.
[a]Correlation analyses with Spearman test.

4 | DISCUSSION

The present study reported low acceptance of COVID-19 vaccination in a sample of pregnant women. The vaccine acceptance group thought they were informed adequately about the COVID-19 vaccine when compared with the vaccine refusal group (P < 0.05). Media resources were their main source of information. Public information sources are essential to reach all populations with details of the importance of vaccination.

Influenza vaccination acceptance was similar to COVID-19 vaccination acceptance among the participants. When the COVID-19 vaccine acceptance and refusal groups were compared, the refusal group expressed lower influenza vaccine acceptance. This result is consistent with vaccine hesitancy, which has been a growing

problem in public health over the last decade.[4] Özceylan et al.[13] reported a 2% decrease in the vaccination rate in Turkey from 2016 to 2018 compared with similar developed countries. Underestimation of the efficacy of the vaccine and lack of trust were two main reasons for vaccine hesitancy.[5,14] In our study, mistrust of the vaccine was the third most frequent reason for vaccine refusal.

Tetanus toxoid administration during pregnancy is part of the health policy in Turkey and is being followed closely by both obstetricians and family doctors. Among the participants of this study, tetanus vaccine acceptance was much higher than for both COVID-19 and influenza vaccines. Acceptance rates for tetanus vaccination were similar in both COVID-19 vaccine acceptance and refusal groups. Therefore, pregnant women understand the positive effects that tetanus vaccination has on maternal and neonatal health

by preventing infectious morbidity and mortality.[15–17] This example points to the importance of pursuing vaccination as a health policy strategy, especially during a pandemic.

Numerous vaccine efficacy and safety studies were performed during the H1N1 pandemic with pregnant women. The results demonstrated influenza-related morbidity in pregnant patients and confirmed infection in their neonates were decreased.[18] Women's health authorities have recommended that pregnant women discuss vaccination decisions with their healthcare providers.[11,12] However, it is important to underline, when estimating risks and benefits of vaccines, that no study to date has provided evidence of fetal and neonatal safety with the COVID-19 vaccine.[19]

The greatest concern about the COVID-19 vaccine in the refusal group was a lack of data about safety in the pregnant population. Despite the CDC deeming pregnant women as a high-risk population, no vaccine trials have focused on pregnant women for COVID-19. The Advisory Committee on Immunization Practices published a recommendation for use of the COVID-19 vaccine for pregnant women despite their exclusion from clinical trials.[19,20]

Anxiety was more prevalent in high-risk pregnant women compared with low-risk pregnant women.[21] We thought that this anxiety level might induce COVID-19 vaccine acceptance in high-risk pregnant women, but we did not find a difference in COVID-19 vaccine acceptance between high-risk and low-risk groups. We did find greater influenza and tetanus vaccine acceptance in the high-risk group compared with the low-risk group. Lack of COVID-19 vaccine safety data in pregnancy may have contributed to this finding.

Among respondents who were experiencing a low-risk pregnancy and who refused vaccination, three main reasons for refusal emerged: (1) the COVID-19 vaccine could be harmful to their health, (2) the vaccine could fail to work, and (3) family members were hesitant toward the COVID-19 vaccine ($P < 0.05$). This result made us think that mistrust of the COVID-19 vaccine is more evident in the low-risk pregnancy group and proper information must be given to them.

A positive correlation was found between COVID-19 vaccine acceptance and the number of school-age children in the household ($P < 0.05$). Participants in households with school-age children expressed higher anxiety about the risk of transmission by these children to members of the household. A recent meta-analysis[22] published about the role of children in household transmission of SARS-CoV-2 found the acquisition risk to be quite low. Confusion and misinformation about COVID-19 transmission appears to continue, and this topic should be clarified within communities while general acceptance of the vaccine is crucial for herd immunity.

Participants in their first trimester expressed greater interest in receiving the COVID-19 vaccination compared with participants in their second and third trimesters ($P < 0.05$). Suzuki and Eto[23] showed that depression and anxiety were common symptoms during the first trimester of pregnancy, and Suzuki[24] also published new results indicating that women in their first trimester of pregnancy during the COVID-19 epidemic may present increased psychological distress compared with previous years. This offers an explanation for the findings of the present study.

Numerous studies have demonstrated that the best approach to protect neonates during early infancy is through passive placental antibody transfer by vaccine efficacy.[18,25] However, almost half of pregnant women refusing the vaccine cited potentially harmful effects of the COVID-19 vaccine to their fetus as a reason for refusal. Once again the importance of proper explanation about the vaccine becomes significant.

The main strengths of the present study were its novelty, prospective design, and number of study parameters.

In conclusion, the benefits of the COVID-19 vaccine are promising and it is recommended by health authorities for administration during pregnancy. To the best of our knowledge, this is the first study evaluating attitudes of pregnant women toward the COVID-19 vaccine. Concern about vaccine safety is a major obstacle to vaccination, especially for newly developed vaccines. Tetanus toxoid vaccines have been used for years to prevent infectious morbidity, which is known to negatively impact maternal and neonatal health. We believe that pregnant women should be included in vaccine trials as soon as possible. Identifying attitudes among priority groups will be useful to create vaccination strategies in the prevention and control of COVID-19.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

AUTHOR CONTRIBUTIONS

SGA prepared and wrote the original draft and contributed to data collection. DO contributed to data collection, analysis and interpretation. AA and DMB contributed to data collection. AT performed the literature search. OMT performed the project development. DS was responsible for conceptualization, methodology, visualization, and reviewing and editing.

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