

COVID-19 Vaccine Hesitancy in Pregnancy: A Cross-Sectional Study

^{ORCID} Ayşegül ERCAN^a, ^{ORCID} Ebru ŞENOL^b, ^{ORCID} Aysun FIRAT^a

^aClinic of Gynecology and Obstetrics, İstanbul Training and Research Hospital, İstanbul, Türkiye

^bDepartment of Social Pediatrics, İstanbul University Institute of Health Sciences and Institute of Child Health, İstanbul, Türkiye

ABSTRACT Objective: As approval of one of many coronavirus disease-2019 (COVID-19) vaccines' use for pregnancy is getting closer, vaccine hesitancy may take place in pregnant individuals for this new vaccine. Our study aimed to evaluate vaccine acceptance and factors affecting vaccine acceptance in case of an approved COVID-19 vaccine for pregnant individuals. **Material and Methods:** Our study was designed as one group, cross-sectional, prospective study. Sample consisted of pregnant individuals who didn't have any chronic illnesses and didn't contract COVID-19 in the last 6 months. In-person style survey was used to collect data about demographics, knowledge about COVID-19 disease and its effects on pregnant individuals, vaccine acceptance and reasons for acceptance or refusal. Results were analyzed with descriptive statistics, chi-square test and Shapiro-Wilk test of normality using Number Cruncher Statistical System. **Results:** Among 250 participants, 183 (73.2%) reported they wouldn't accept COVID-19 vaccination if there was a safe and effective vaccine approved for use in pregnancy. Main reasons of refusal were the belief that vaccine hadn't been studied on humans enough or that it might have adverse effects on baby and/or pregnant individual. Only factor associated with vaccine acceptance was found to be knowing someone who had severe COVID-19 disease ($p=0.022$). **Conclusion:** Our study shows that vaccine hesitancy rates may be high among pregnant individuals when a COVID-19 vaccine is approved for use in pregnancy. The main reason for vaccine hesitancy is safety concerns.

Keywords: COVID-19 vaccines; pregnancy; vaccination refusal

Severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) [coronavirus disease-2019 (COVID-19)] pandemic continues to take lives worldwide.¹ While increasing numbers of new cases are still being reported in many countries and total mortality continues to rise, the successful development and year-end deployment of several vaccines for COVID-19 offer new hope that pandemic can finally be contained.

Gestation-associated physical, immunological and endocrinological changes typically place pregnant individuals and their fetuses at greater risk for severe complications caused by infectious diseases.² It is now known that people who contract COVID-19 during pregnancy are at increased risk for severe disease,

death and adverse pregnancy outcomes such as preterm delivery and cesarean delivery.³ Current data suggest that pregnant individuals are more likely to be admitted to intensive care unit, require invasive ventilation, receive extracorporeal membrane oxygenation, and die than non-pregnant women of reproductive age.⁴ Effects of COVID-19 on fetus are not completely understood. Intrauterine transmission can occur but appears to be rare; however, data suggest that neonates born to individuals with SARS-CoV-2 are more likely to be born preterm.^{5,6} When evaluating the course and possible complications of COVID-19 on pregnant individuals, factors other than pregnancy such as underlying medical conditions (eg, diabetes, obesity or heart disease) should also be considered.⁷

Correspondence: Ebru ŞENOL

Department of Social Pediatrics, İstanbul University Institute of Health Sciences and Institute of Child Health, İstanbul, Türkiye

E-mail: drebrusenol@gmail.com



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For many decades, the concept of passive immunization of neonate via maternal infection or immunization and transplacental passage of protective antibodies into the fetal/neonatal circulation has been well recognized, with protection acquired against tetanus, influenza and pertussis among other pathogens. Maternal vaccination can protect the mother, the fetus and the infant. Influenza vaccination during pregnancy is known to decrease the risk of severe disease in the mother, which positively impacts the fetus by reducing the risk of preterm birth and/or pregnancy loss, as well as providing protection for the infant during the first few months of life.⁸

Vaccination programs applied to pregnant individuals can prevent maternal morbidity and mortality, reduce in-utero or fetal disease rates and provide passive immunity to newborns.⁹ This tripple benefit requires rapid vaccine development and timely inclusion of pregnant individuals into vaccine trials.¹⁰

As of now, there is no SARS-CoV-2 vaccine approved or included in Emergency Use Authorization for pregnant women but many health authorities including Centers for Disease Control and Prevention (CDC), World Health Organization, American College of Obstetrician and Gynecologists and Royal College of Obstetricians and Gynecologists encourage pregnant individuals to get vaccinated.¹¹⁻¹⁴ As trials continue to include pregnant women and studies conducted on pregnant people who have had their vaccine results, we are getting closer to a vaccine approval for pregnant individuals (ClinicalTrials.gov Identifier: NCT04754594).¹⁵

It is known that concerns about safety of the vaccine during pregnancy, lack of knowledge about the disease and effectiveness of the vaccine, and whether the vaccine is recommended by healthcare professionals play role among factors that affect acceptance of vaccines during pregnancy.¹⁶ When there is a vaccine approved in pregnant women among the COVID-19 vaccine candidates, vaccine hesitancy may occur in pregnant individuals which may lead to vaccine refusal. Our study aimed to evaluate rates of vaccine acceptance and factors affecting vaccine acceptance in case of an approved COVID-19 vaccine for pregnant individuals.

MATERIAL AND METHODS

Our study was designed as cross-sectional, prospective, in-person style survey. The study was approved by Ministry of Health and İstanbul Training and Research Hospital Clinical Research Ethical Committee (November 25, 2020/2631). Principles embodied in Declaration of Helsinki were followed.

Data were collected in Outpatient Obstetrics Clinics of İstanbul Training and Research Hospital between March and April 2021. Pregnant individuals over 18 years without any chronic illnesses were included. Pregnant individuals were asked to answer a structured survey which took approximately 5 minutes. Written informed consent was taken.

Structured survey in Turkish was formed by researchers based on the literature.^{9,17} Survey consisted of 15 questions. Four of the questions were about demographics such as age, occupation, education level and socioeconomic status. Two questions asked about gestational age and whether there was a problem related to this pregnancy. Next 5 questions asked about personal experience and knowledge of participants about COVID-19 disease. First of these questions examined participants' personal COVID-19 experience asking if they had someone in their social surroundings who had severe COVID-19 disease (admitted to intensive care unit or died from COVID-19). The second one asked about smoking status of the participants. Three questions about knowledge of COVID-19 were designed as 5 point Likert scale (strongly agree, agree, undecided, disagree, strongly disagree). These questions aimed to assess whether participants agreed to statements "Coronavirus infection affects pregnant women more severely compared to non-pregnant women of the same age", "Coronavirus infection in pregnancy can infect the fetus" and "Coronavirus vaccine is a safe and effective way of protection from coronavirus in healthy non-pregnant individuals". The last four questions of the survey were about coronavirus vaccine acceptance of pregnant participants. First of these questions asked whether participants would accept having a coronavirus vaccine if there was a vaccine approved as safe and effective during pregnancy. Other 2 questions asked about motivations for refusal or accept-

ance. These questions had structured pre-anticipated choices and an “other” option in which participants could specify their own reason. Participants could mark multiple choices as motivations for vaccine refusal or acceptance. The last question inquired where they would prefer to have the vaccine with answer options of “family medicine center”, “state hospitals”, “special hospitals”, “home”, and “other” to be specified.

STATISTICAL ANALYSIS

Statistical analyses were performed using the Number Cruncher Statistical System 2007 Statistical Software (Utah, USA) program. In addition to descriptive statistical methods (mean, standard deviation, frequency and percentage distributions), distribution of the variables were examined with Shapiro-Wilk test of normality and the chi-square test was used in comparison of the qualitative data. A p value <0.05 was evaluated as statistically significant.

RESULTS

The study was conducted with 250 voluntary pregnant women. Mean gestational age was 26.32±11.31 weeks, median gestational age was 30 weeks. Characteristics of the group, personal COVID-19 experience and smoking status are shown in [Table 1](#).

Among participants, 67 (26.8%) reported that they would accept COVID-19 vaccination if there was a safe and effective vaccine approved for use in pregnancy; while 183 (73.2%) reported they wouldn't accept. Motivations for acceptance and refusal of vaccine are shown in [Table 2](#).

When knowledge of participants about COVID-19 infection is evaluated, it was seen that 127 (49.8%) of participants “strongly agreed” or “agreed” to the statement “Coronavirus disease affected pregnant women more severely than non-pregnant women of the same age”, whereas 40 (16%) of participants “disagreed” or “strongly disagreed” to this statement.

TABLE 1: Characteristics, personal COVID-19 experience and smoking status of participants.

		n	%
Age	18-29	150	60.00
	30-39	89	35.60
	40-49	11	4.40
Employment status	Employed	59	23.60
	Non-employed	191	76.40
Healthcare worker	Yes	15	25.42
	No	44	74.58
Education	Elementary school	151	60.40
	High school	52	20.80
	University	47	18.80
Economic status	Minimum wage or below	153	61.20
	Above minimum wage	97	38.80
Trimester	1. trimester	53	21.20
	2. trimester	43	17.20
	3. trimester	154	61.60
High-risk pregnancy	Yes	48	19.20
	No	202	80.80
Personal COVID-19 experience	Yes	57	22.80
	No	193	77.20
Smoking	Everyday	13	5.20
	Somedays	28	11.20
	Never	209	83.60

TABLE 2: Women's motivations to accept or refuse a coronavirus vaccine when available.

	n	%
I would accept coronavirus vaccine, because: (n=67)		
It protects me from coronavirus disease and its consequences.	43	62.32
It protects my baby from coronavirus disease and its consequences before birth.	37	55.55
I think vaccination is the only way to end the pandemic.	27	40.30
I think I am in a high risk group for coronavirus.	18	26.87
It protects my baby from coronavirus disease and its consequences after birth.	12	17.91
Other reasons	2	2.99
I would not accept coronavirus vaccine, because: (n=183)		
It might have side effects on me.	109	59.56
It might have side effects on my baby.	124	67.76
I think vaccine is not studied on humans enough.	96	52.46
I don't believe vaccination is necessary.	26	14.21
I believe other measures will be enough to protect me.	22	12.02
Coronavirus is not a dangerous or risky disease.	12	6.56
Other reasons	12	6.56

Among participants, 100 (40%) “strongly agreed” or “agreed” that “coronavirus may infect the fetus” and another 100 (40%) participants were indecisive about this statement. As 102 (40.8%) of participants “strongly agreed” or “agreed” to the statement “coronavirus vaccine is a safe and effective way of protection from coronavirus disease” 118 (47.2%) were indecisive about this statement.

Age groups, educational levels, economic or employment status did not differ between vaccine acceptance and refusal groups. Vaccine acceptance also was not affected by pregnancy trimester, existence of high risk pregnancy or smoking. Vaccine acceptance group had higher personal experience of severe COVID-19 disease ($p=0.022$). There was no difference in answers to questions regarding knowledge about the coronavirus infection between vaccine acceptance and refusal groups.

Most of the pregnant women in this study ($n=138$, 55.2%) reported that they would prefer to be vaccinated at state hospitals, whereas 56 (22.4%) would prefer family medicine centers and 43 (17.2%) would prefer to be vaccinated at their homes.

DISCUSSION

In our study, 73.2% of participating pregnant women reported that they would not accept COVID-19 vac-

ination if there was a safe and effective vaccine approved for use in pregnancy. Participants were mostly concerned that vaccine might have side effects on themselves or on their babies. Only factor related to vaccine acceptance was found as having someone in their social surrounding who had severe COVID-19 disease.

It has not been possible to increase vaccine uptake rates in pregnancy even for vaccines which are recommended and applied to pregnant individuals for many years by health authorities. According to CDC data, acceptance of tetanus-diphtheria-acellular pertussis (Tdap) vaccine in pregnancy is 48.8%, while this rate is around 50% for influenza vaccine in United States.¹⁸ Studies in other countries show influenza vaccine uptake rates between 6.5% and 76% and influenza vaccine uptake rates between 4.8% and 74%.¹⁹⁻²³ Our study showed 26.8% intention for acceptance, but vaccine uptake may actually be lower than this intention as shown in the study by Bettinger et al.²⁴ This acceptance rate is lower than the results of most studies on influenza and Tdap vaccine. This could be a result of the COVID-19 vaccines' being very new and unfamiliar.

Latest CDC data show 31% vaccination coverage among pregnant people aged 18-49 years, but only 21% was vaccinated during pregnancy whereas 10% was vaccinated before pregnancy.²⁵ Similar ac-

ceptance rates in our study suggest that vaccination coverage may remain low even if there is an approved vaccine for use in pregnancy.

Studies show that knowledge about infection and also perception of personal risk for infection are important determinants of vaccine acceptance in pregnant individuals.^{24,26} Almost half of our group agreed to the fact that COVID-19 disease affected pregnant women more severely, but again almost half of them were indecisive about effectiveness of COVID-19 vaccines. Lack of knowledge on effectiveness of vaccines may have contributed to low rates of vaccine acceptance. In our study the only factor associated with vaccine acceptance was having someone in one's social surrounding who had severe COVID-19 infection. This is consistent with previous studies as these individuals probably had better perception of personal risk for infection.

Safety concerns are also a known factor for vaccine hesitancy especially during pregnancy. In a study conducted in France with 2,045 pregnant participants, 24% of the participants who did not get vaccinated reported concerns about their babies' health and 12.6% reported concerns regarding their own health.²⁷ Another study in Australia about influenza and pertussis vaccination during pregnancy showed that primary determinants of vaccine uptake were healthcare provider recommendation and belief that maternal vaccination is safe.²⁸ The most common reasons for vaccination refusal in our study were safety concerns such as the belief that vaccine hadn't been studied on humans long enough or that it might have adverse effects on baby/mother.

Strengths of our study are that it is about a current subject and it gives a clue about what to expect in the near future when a COVID-19 vaccine will probably be approved for pregnant individuals. Limitations of our study are that it was conducted in a single center and with relatively limited number of participants.

CONCLUSION

Our study shows that vaccine hesitancy may play an important role when there is an approved COVID-19 vaccine for pregnant individuals in near future. Main concerns of pregnant individuals about vaccination were safety issues. In order to increase vaccine acceptance and uptake among pregnant individuals, it is very important to make sure that these individuals are well informed about the course of disease, safety of vaccine and possible side effects.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

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

All authors contributed equally while this study preparing.

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