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Acceptability of covid-19 vaccine and factors affecting vaccine hesitation in pregnant health care workers

Gebe sağlık çalışanlarında covıd-19 aşısının kabul edilebilirliği ve aşı tereddütüne etkili faktörler

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ÖZ

Amaç: Gebe sağlık çalışanlarında COVID-19 aşısının kabul edilebilirliğini ve aşı tereddütünün ana nedenlerini belirlemek.

Gereçler ve Yöntem: 135 gebe sağlık çalışanına, COVID-19 aşısına yönelik algı ve tutumları ile aşının reddedilme nedenleri hakkında yüz yüze sorular soruldu. Katılımcılar (1) aşı olmak isteyip istemedikleri, (2) COVID-19 birimlerinde aktif olarak çalışıp çalışmadıkları ve (3) doktor veya başka bir sağlık çalışanı olup olmadıklarına göre değerlendirildi.

Bulgular: Altmış altı (%48.9) katılımcı, gebelere COVID-19 aşısı önerilmesi durumunda aşı olmak istediklerini belirtti. COVID-19 birimlerinde aktif çalışan doktor ve diğer sağlık personellerinin aşı olma eğilimlerinin daha fazla olduğunu gözlemledik. COVID-19 aşısının bebeğe zararlı olacağı düşüncesi, diğer sağlık çalışanları grubunda doktorlara göre anlamlı derecede yüksekti.

Sonuç :Bu çalışma, gebe sağlık çalışanları arasında aşı kabul oranının, sağlık çalışanı olmayan gebelere göre daha yüksek olsa bile, COVID-19 hastalığının "sürü bağışıklığı" için gereken oranın altında kaldığını ortaya koymuştur. Gebe kadınlarda aşının güvenliğine ilişkin veri eksikliği, aşı olma isteğinin önündeki en önemli engeldir. Gebelerin COVID-19 aşılarının faz-3 çalışmalarına dahil edilmesiyle bu engel ortadan kaldırılabilir.

Anahtar Kelimeler: COVID-19, sağlık çalışanları, gebelik, aşı kabul edilebilirliği, aşı tereddütü

ABSTRACT

Aim: To determine the acceptability of the corona-virus disease 2019 (COVID-19) vaccine and the main reasons for vaccine hesitation in pregnant health care workers (HCWs).

Materials and Methods: 135 pregnant HCWs were questioned face-to-face about perception and attitudes towards the COVID-19 vaccine and reasons for rejection of the vaccine. Participants were evaluated according to:(1) whether they wanted to be vaccinated, (2) whether they were actively working in COVID-19 units, and (3) whether they were a doctor or other healthcare professional.

Results: Sixty-six (48.9%) participants stated that they want to be vaccinated if the COVID-19 vaccine is recommended to pregnant women.We observed that active staff in COVID-19 units and doctors had more intention to be vaccinated.The thought that the COVID-19 vaccine would be harmful to the baby was significantly higher in other HCWs group than doctors.

Conclusion: The present study revealed that even if the rate of vaccine acceptance among pregnant HCWs was higher than pregnant non-HCWs, it remained below the rate required for "herd immunity" for COVID-19 disease. Lack of data on the safety of the vaccine in pregnant women is the most important obstacle. We can overcome obstacles only by including pregnant women in phase 3 studies of COVID-19 vaccines.

Keywords: COVID-19, health care workers, pregnancy, vaccine acceptance, vaccine hesitation

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INTRODUCTION

Considering the worldwide impact of the Coronavirus disease 2019 (COVID-19) caused by SARS-CoV-2 on social, economic, health and educational issues, there was an urgent need for therapeutic drugs and vaccines. Although effective antiviral therapy has not been found yet, effective and safe vaccines began to be administered in less than 1 year.

Mechanical, physiological and immunological changes of pregnancy may increase susceptibility to some infections. COVID-19 causes more intensive care admission, mechanical ventilation and death in pregnant women compared to their counterparts in reproductive age (1-3). The Centers for Disease Control and Prevention (CDC), the American College of Obstetricians and Gynecologists (ACOG), and the Society for Maternal-Fetal Medicine (SMFM) have included pregnancy as a risk factor for severe COVID-19, albeit the absolute risk for severe infection in pregnancy is low (4). For this reason, it is extra important to protect pregnant women from the hazardous effects of COVID-19 before they are exposed to the virus. It is necessary to include pregnanat women in vaccination studies and to include them in routine vaccination programs.

There are six leading vaccine candidates for COVID-19. Two of them are messenger RNA-based, two are viral vector-based and two are recombinant protein-based vaccines. The six vaccine candidates use different technologies. Most vaccines work by introducing an antigen into the body to produce an immune response. The antigen can be an infectious agent that has been inactivated or a purified protein from the infectious agent. In contrast, the COVID-19 mRNA vaccines work by carrying the genetic information necessary to manufacture the spike protein of SARS-CoV-2, the protein found on the surface of the virus. Once the vaccine is injected into muscle cells, they manufacture the spike protein, which is recognized by the immune system.

Pregnant women have traditionally been excluded from clinical trials of new drugs and vaccines due to concerns about their effects on the fetus. To date, none of the COVID-19 vaccines have been tested regarding the safety, immunogenicity, reactogenicity and efficacy of the vaccine on pregnant women and fetuses. This situation leads to a lack of knowledge about the effects of the vaccine on pregnancy and fetus, leading to mistrust and even rejection of the vaccine in pregnant women (5).

ACOG and SMFM suggested that COVID-19 vaccines should not be withheld from pregnant or breastfeeding women (6-7). Also CDC and the Advisory Committee on Immunization Practices (ACIP) recommended that pregnant health care workers (HCWs) are in the priority group to be vaccinated (8). The role of HCWs in vaccination is to provide information and advice for the public, as well as to be a role model to the society with their attitude towards vaccination. Pregnant HCWs are one of the groups that work actively in the field and have the highest risk of transmission. However, there is no study on the acceptance of the COVID-19 vaccine among this group in the literature yet.

In the present study, we aimed to determine the acceptability of the vaccine and the main reasons for vaccine hesitation in pregnant HCWs who have more knowledge and experience about vaccination, the COVID-19 disease and easy access to scientific literature.

MATERIALS AND METHODS

This prospective study was conducted between February 1, 2021 and April 1, 2021 with pregnant healthcare workers who were working in Ankara City Hospital. At the time of the study, healthcare professionals were entitled to COVID-19 vaccination and we conducted the study with HCWs who were not vaccinated. The questionnaires were applied face-to-face. The study was approved by the Turkish Ministry of Health and Ankara City Hospital Ethics Committee (E2-21-49). Written informed consent was obtained from all participants. In the questionnaire, demographic characteristics and vaccination history, perception and attitudes about COVID-19, knowledge about the COVID-19 vaccine, reasons for rejection of the vaccine were questioned.

Participants were evaluated according to: 1) whether they wanted to be vaccinated, 2) whether they were actively working in COVID-19 units, and 3) whether they were a doctor or other healthcare professional.

Statistical analyses were performed by Statistical Package for the Social Sciences version 25.0 (IBM Corp., Armonk, NY, USA). Visual (histograms, probability plots) and analytical methods (Shapiro-Wilk's test and Kolmogorov-Smirnow test) were used in order to determine the normality of distribution. Chi-square ($\chi 2$) test was used for comparison of categorical data. A type-1 error below 0.05 was considered statistically significant.

RESULTS

135 pregnant women who completed the questionnaire were included in our study. Descriptive characteristics of the patients are given in Table 1.

Table 1: Sociodemographic characteristics of the participants

Variables		(n =135) N (%), Mean ± SD, Median (min-max)
Age		31.2 ± 4.9
Gravidity		2 (1-6)
Parity		1 (0-3)
Gestational week		24 (5-40)
Number of household members		3 (2-5)
Number of school kids		0 (0-2)
Number of pregnant women with comorbidity		0 (0-2)
Number of > 65-years-old household members		0 (0-1)
Income per month (Turkish Lira)		10772.6 ± 4848.3
High-risk pregnancy		28 (%20.7)
Number of active workers in COVID-19 units		52 (%38.5)
Recover from COVID-19 in the past		19 (%14.1)
Taking medication for COVID-19 previously		8 (% 5.9)
Hospitalized for COVID-19 previously		7 (%5.2)
Having a COVID-19 antibody test		48 (%35.6)
COVID-19 antibody titer		4.1 ± 3.8
Maternal education status	High school	2 (%1.5)
	University graduates	133 (%98.5)
Career	Doctor	53 (%39.3)
	Nurse - Midwife	62 (%45.9)
	Psychologist- Physiotherapist	13 (%9.6)
	Medical secretary	7 (%5.2)
Spouse career	Government official	120 (%89)
	Private sector	6 (%4.4)
	Merchant	6 (%4.4)
	Worker	3 (%2.2)

. Fifty-three (39.3%) of the respondents were doctors. Fifty-two (38.5%) of the participants were actively working in COVID-19 units.

The answers of the participants to the questionnaire are given in Table 2.

Table 2: Comparison of the answers of the pregnant women who want to vaccinate and do not want to vaccinate, who work and do not work actively in COVID-19 units, and doctors and other healthcare professionals

Questions	Answers	Want to vaccinate n: 66 (% 48.9)	Do not want to vaccinate n:69 (% 51.1)	p value*	Work actively in COVID-19 units n:52 (%38.5)	Do not work actively in COVID-19 units n:83 (%61.5)	p value*	Doctor n:53 (%39.3)	Other health-care professional n:82 (%60.7)	p value*
Have you ever been vaccinated?	**Yes**	66 (%100)	67 (%97.1)	.497	52 (%100)	81 (%97.6)	.523	53 (%100)	80 (%97.6)	.520
	No		2 (%2.9)			2 (%2.4)			2 (%2.4)	
Have you been vaccinated in the last 5 years?	**Yes**	50 (%75.8)	55 (%79.7)	.581	42 (%80.8)	63 (%75.9)	.508	47 (%88.7)	58 (%70.7)	**.014**
	No	16 (%24.2)	14 (%20 .3)		10 (%19.2)	20 (%24.1)		6 (%11.3)	24 (%29.3)	
Was the influenza vaccine recommended in this pregnancy ?	**Yes**	13 (%19.7)	5 (%7.2)	**.033**	10 (%19.2)	8 (%9.6)	.111	17 (%32.1)	1 (%1.2)	**.001**
	No	53 (%80.3)	64 (%92.8)		42 (%80.8)	75 (%90.4)		36 (%67.9)	81 (%98.8)	
If influenza vaccine was recommended in this pregnancy, would you get vaccinated ?	**Yes**	33 (%50)	11 (%15.9)	**.001**	18 (%34.6)	26 (%31.3)	.691	26 (%49.1)	18 (%22)	**.001**
	No	33 (%50)	58 (%84.1)		34 (%65.4)	57 (%68.7)		27 (%50.9)	64 (%78)	
Have you been vaccinated for influenza in this pregnancy?	**Yes**	7 (%10.6)	3 (%4.3)	.201	5 (%9.6)	5 (%6)	.508	9 (%17)	1 (%1.2)	**.001**
	No	59 (%89.4)	66 (%95.7)		47 (%90.4)	78 (%94)		44 (%83)	81 (%98.8)	
If tetanus vaccine was recommended in this pregnancy, would you get vaccinated ?	**Yes**	45 (%68.2)	44 (%63.8)	.589	35 (%67.3)	54 (%65.1)	.789	37 (%69.6)	52 (%63.4)	.444
	No	21 (%31.8)	25 (%36.2)		17 (%32.7)	29 (%34.9)		16 (%30.2)	30 (%36.6)	
Have you been vaccinated for tetanus vaccine in this pregnancy?	**Yes**	28 (%42.4)	29 (%42)	.963	22 (%42.3)	35 (%42.2)	.987	25 (%47.2)	32 (%39)	.349
	No	38 (%57.6)	40 (%58)		30 (%57.7)	48 (%57.8)		29 (%52.8)	50 (%61)	
Are you going to have the baby's routine vaccinations?	**Yes**	66 (%100)	67 (%97.1)	.497	52 (%100)	81 (%97.6)	.523	52 (%100)	80 (%97.6)	.520
	No		2 (%2.9)			2 (%2.4)			2 (%2.4)	

Do you work actively in COVID-19 units (out-patient clinic / service or intensive care unit) ?	**Yes**	34 (%51.5)	18 (%26.1)	**,002**	52 (%100)	83 (%100)		28 (%52.8)	24 (%29.3)	**,006**
	No	32 (%48.5)	51 (%73.9)					25 (%47.2)	58 (%70.7)	
Have you had close contact with a COVID-19 positive person?	**Yes**	27 (%40.9)	25 (%36.2)	.577	32 (%61.5)	20 (%24.1)	**.001**	28 (%52.8)	25 (%47.2)	**.006**
	No	39 (%59.1)	44 (%63.8)		20 (%38.5)	63 (%75.9)		25 (%47.2)	58 (%70.7)	
If medicine to treat COVID-19 is found, would you get vaccinated?	**Yes**	47 (%71.2)	35 (%50.7)	**,015**	29 (%55.8)	53 (%63.9)	.349	33 (%62.3)	49 (%59.8)	.771
	No	19 (%28.8)	34 (%49.3)		23 (%44.2)	30 (%36.1)		20 (%37.7)	33 (%40.2)	
Do you think the pandemic will end with the COVID-19 vaccine?	**Yes**	47 (%71.2)	32 (%46.4)	**.003**	32 (%61.5)	47 (%56.6)	.573	30 (%56.6)	49 (%59.8)	.717
	No	19 (%28.8)	37 (%53.6)		20 (%38.5)	36 (%43.4)		23 (%43.4)	33 (%40.2)	
Do you suggest that your family members get the COVID-19 vaccine?	**Yes**	60 (%90.9)	51 (%73.9)	**.010**	45 (%86.5)	66 (%79.5)	.299	45 (%84.9)	66 (%80.5)	.512
	No	6 (%9.1)	18 (%26.1)		7 (%13.5)	17 (%20 .5)		8 (%15.1)	16 (%19.5)	
Did you get COVID-19 in this pregnancy?	**Yes**	8 (%12.1)	11 (%15.9)	.523	11 (%21.2)	8 (%9.6)	.061	8 (%15.1)	11 (%13.4)	.784
	No	58 (%87.9)	58 (%84.1)		41 (%78.8)	75 (%90.4)		45 (%84.9)	71 (%86.6)	
Do you have fear of death due to COVID-19 ?	**Yes**	19 (%28.8)	21 (%30.4)	.834	15 (%28.8)	25 (%30.1)	.875	18 (%34)	22 (%26.8)	.375
	No	47 (%71.2)	48 (%69.6)		37 (%71.2)	58 (%69.9)		35 (%66)	60 (%73.2)	
Do you feel any physical symptoms when you think you infected by SARS-COV-2? (palpitations, sweating, etc.)	**Yes**	33 (%50)	22 (%31.9)	**.032**	31 (%59.6)	24 (%28.9)	**.001**	24 (%45.3)	31 (%37.8)	.388
	No	33 (%50)	47 (%68.1)		21 (%40.4)	59 (%71.1)		29 (%54.7)	51 (%62.2)	
Do you think you have been adequately informed about the COVID-19 vaccine?	**Yes**	30 (%45.5)	20 (%29)	**.048**	24 (%46.2)	26 (%31.3)	.083	27 (%50.9)	23 (%28)	**.007**
	No	36 (%54.5)	49 (%71)		28 (%53.8)	57 (%68.7)		26 (%19.7)	59 (%72)	
Do you think COVID-19 vaccine could be harmful for you?	**Yes**	24 (%36.4)	52 (%75.4)	**.001**	28 (%53.8)	48 (%57.8)	.650	25 (%47.2)	51 (%62.2)	.086
	No	42 (%63.6)	17 (%24.6)		24 (%46.2)	35 (%42.2)		28 (%52.8)	31 (%37.8)	

Do you think COVID-19 vaccine could be harmful for your fetus/baby?	**Yes**	29 (%43.9)	60 (%87)	**.001**	32 (%61.5)	57 (%68.7)	.395	27 (%50.9)	62 (%75.6)	**.003**
	No	37 (%56.1)	9 (%13)		20 (%38.5)	26 (%31.3)		26 (%49.1)	20 (%24.4)	
Has the trimester (the week) of your pregnancy affected your decision to be vaccinated?	**Yes**	48 (%72.7)	41 (%59.4)	.146	38 (%73.1)	51 (%61.4)	.165	36 (%67.9)	53 (%64.6)	.694
	No	18 (%27.3)	28 (%40.6)		14 (%26.9)	32 (%38.6)		17 (%32.1)	29 (%35.4)	
If the Ministry of Health of Turkey recommend that pregnant women be vaccinated, will you be vaccinated?	**Yes**	66 (%100)			34 (%65.4)	32 (%38.6)	**.002**	34 (%64.2)	32 (%39)	**.004**
	No		69 (%100)		18 (%34.6)	51 (%61.4)		19 (%35.8)	50 (%61)	

Sixty-six (48.9%) participants stated that they want to be vaccinated if the COVID-19 vaccine is recommended to pregnant women. We observed that active staff in COVID-19 units had more intention to be vaccinated than staff in non-COVID-19 units ($p<0.05$). Doctors stated that they were more interested in getting the COVID-19 vaccine than other healthcare professionals ($p<0.05$). In addition, when other HCWs and doctors were compared; the thought that the COVID-19 vaccine would harm to the baby was significantly higher in other HCWs group ($p <0.05$). We did not find a significant difference in the effect of pregnancy trimester on the decision of the COVID-19 vaccination ($p = 0.146$).

The reasons of COVID-19 vaccine refusal or hesitancy for pregnant HCWs are presented in Table 3.

Table 3: Reasons of COVID-19 vaccine refusal or hesitancy for healthcare worker pregnant women

Questions	**Answers**	**Do not want to vaccinate** n:69 (% 51.1)	**Work actively in COVID-19 units** n:18 (%26)	**Do not work actively in COVID-19 units** n:51 (%74)	**p value***	**Doctor** n:19 (%28)	**Other health-care professinal** n:50 (%72)	**p value***
Fear of injection	**Yes**	1 (%1.4)		1 (%2)	.999		1 (%2)	.999
	No	68 (%98.6)	18 (%100)	50 (%98)		19 (%100)	49 (%98)	
The vaccine is harmful to the my body	**Yes**	1 (%1.4)		1 (%2)	.999	1 (%5.3)		.275
	No	68 (%98.6)	18 (%100)	50 (%98)		18 (%94.7)	50 (%100)	
The vaccine will cause COVID-19 infection	**Yes**	1 (%1.4)		1 (%2)	.999	1 (%5.3)		.275
	No	68 (%98.6)	18 (%100)	50 (%98)		18 (%94.7)	50 (%100)	
The vaccine is harmful to my fetus/baby	**Yes**	41 (%59.4)	10 (%55.6)	31 (%60.8)	.698	7 (%36.8)	34 (%68)	**.018**
	No	28 (%40.6)	8 (%44.4)	20 (%39.2)		12 (%63.2)	16 (%32)	
COVID-19 is not a serious illness	**Yes**	6 (%8.7)		6 (%11.8)	.328	3 (%15.8)	3 (%6)	.336
	No	63 (%91.3)	18 (%100)	45 (%88.2)		16 (%84.2)	47 (%94)	

My risk of getting COVID-19 is low	**Yes**	2 (%2.9)		2 (%3.9)	.999	2 (%10.5)		.073
	No	67 (%97.1)	18 (%100)	49 (%96.1)		17 (%89.5)	50 (%100)	
I believe that even if I am sick, I and my baby will not encounter any adverse outcomes	**Yes**	5 (%7.2)	1 (%5.6)	4 (%7.8)	.999	2 (%10.5)	3 (%6)	.611
	No	64 (%92.8)	17 (%94.4)	47 (%92.2)		17 (%89.5)	47 (%94)	
I do not think the vaccine will work	**Yes**	15 (%21.7)	6 (%33.3)	9 (%17.6)	.192	5 (%26.3)	10 (%20)	.745
	No	54 (%78.3)	12 (%66.7)	42 (%82.4)		14 (%73.7)	40 (%80)	
My spouse/ other family members do not want me to vaccinate	**Yes**	1 (%1.4)		1 (%2)	.999		1 (%2)	.999
	No	68 (%98.6)	18 (%100)	50 (%98)		19 (%100)	49 (%98)	
There is not enough knowledge about COVID-19 vaccine safety in pregnant women	**Yes**	63 (%91.3)	17 (%94.4)	46 (%90.2)	.999	19 (%100)	44 (%88)	.177
	No	6 (%8.7)	1 (%5.6)	5 (%9.8)			6 (%12)	
I think the vaccine is not effective because of mutation of the virus	**Yes**	23 (%33.3)	9 (%50)	14 (%27.5)	.081	4 (%21.1)	19 (%38)	.182
	No	46 (%66.7)	9 (%50)	37 (%72.5)		15 (%78.9)	31 (%62)	

The three most important reasons for vaccine refusal or hesitancy are a lack of knowledge regarding the safety of the vaccine in pregnant women; the thought that the vaccine is harmful to the fetus/baby and the belief that the vaccine was ineffective due to the mutation of the virus respectively.

DISCUSSION

The present study evaluated the rate of acceptability of the COVID-19 vaccine and factors affecting vaccine refusal in pregnant HCWs. Knowing the vaccine acceptability rate is important in terms of improving a health policy and planning interventions to increase the vaccination rate.

Since the announcement of the vaccine studies, many studies have been performed on the perception and acceptance of the COVID-19 vaccine. Many of these studies have been conducted with the general population (9-11). However, the number of studies we can find in the literature on the vaccination attitude of pregnant women is very limited (12,13). And, we could not find any studies about pregnant HCWs. Revealing the vaccination acceptance of pregnant HCWs, who are among the highest risk groups in terms of exposure and infection to COVID-19, will shed light on the general vaccination acceptance of the society. In addition, when HCWs become infected, they will be a source for hospital-acquired spread and pose a risk to patients and other HCWs. In addition, vaccine hesitancy in this group will lead to loss of workforce during the pandemic when healthcare workforce is most needed.

In the present study, the vaccine acceptance rate was 48.9% among HCWs. Goncu Ayhan et al. found the vaccine acceptance rate was %37 in pregnant women who were not HCWs (13). Compared to this study, the expected rise in vaccine acceptance in HCWs could be due to the higher knowledge of HCWs about COVID-19 vaccines. We think that it makes the main difference that healthcare professionals, who are the occupational group with the highest exposure to the virus, search for information about the efficacy and safety of vaccines in order to protect themselves and to give advice to the general public.

In another study conducted with pregnant women from 16 countries, the vaccine acceptance rate was found 52%. However, in this study expressions such as "If the vaccine has an efficacy of 90%, if the COVID-19 vaccine is safe for you and your baby" were used in the question format (12). We can conclude that the vaccine acceptance rates will automatically increase when the pregnant woman is reassured about the efficacy and safety of the vaccine in the pregnancy.

In the group of those who do not want to be vaccinated, the three most important reasons for vaccine refusal were: 1) a lack of information that the vaccine is safe in pregnant women (91.3%), 2) the thought that it could be harmful to the baby (59.4%), 3) the belief that the vaccine is not effective because the virus is mutated (33.3%). These reasons are consistent with the vaccine hesitation reasons in the study by Goncu Ayhan et al. (13). Even though in the present study pregnant women are HCWs, their concerns about vaccination are similar to pregnant women who are not HCWs, probably due to their maternal instinct (14). Our study population is more experienced and educated about both the disease and the COVID-19 vaccine. However, the similarity of vaccine refusal reasons in the two studies may suggest that maternal emotional status is quite important in vaccine acceptance.

In the vaccine acceptance group, women declared that 1) they wanted to be vaccinated even if medicine would be found to treat COVID-19, 2) they believe that effective vaccination would end the pandemic. This result shows that the group that wants to vaccinate has more information about immunization with the vaccine. Passive immunization is more effective, healthier and more cost-effective than active immunization. [15] The most needed professional group during the pandemic period is HCWs. Passive immunization of HCWs is also important not to cause loss of workforce (15).

In the vaccine refusal group, while the rate of pregnant women who thought that the vaccine would be harmful to themselves was 1.4%, the rate of those who thought that the vaccine would be harmful to their baby is 59.4%. This reveals that the main source of concern and priority of pregnant women about vaccine hesitation is the health of their babies. The only way to overcome this hesitation seems to be including pregnant women in vaccination studies. Preliminary findings on mRNA COVID-19 vaccine safety in pregnant women have been published very recently (16). This study reported that all of the adverse pregnancy and neonatal outcomes including congenital anomaly were consistent with the normal frequency seen in the literature (16) . Although this study facilitates pregnant women and their health care providers to decide about the COVID-19 vaccination, these are the preliminary findings of the study. There is still a need for the final results of the study and an increase in the sample size of pregnant women.

The opinion that the vaccine is harmful to the baby was significantly lower in doctors compared to other healthcare professionals ($p<0.05$). Doctors had a higher intention than other HCWs to be vaccinated if health authorities recommend vaccination to pregnant women ($p<0.05$). The doctors stated that they have enough knowledge about the vaccine significantly more than other pregnant HCWs ($p<0.05$). The study of Dror et al. supports our results, showing that the acceptability of the COVID-19 vaccine is significantly higher for doctors than for nurses (17). The reason may be that doctors use literature more often than other HCWs in their daily practice. Therefore, doctors may have more accurate and up-to-date knowledge about the COVID-19 vaccine.

The staff in COVID-19 units had significantly more intent to be vaccinated compared to those in non-COVID-19 department ($p<0.05$). They showed a higher rate of feeling the physical symptoms of anxiety when they think they are infected with SARS-CoV-2 than the staff in non-COVID-19 department ($p<0.05$). The healthcare staff working in the COVID-19 unit are more likely to understand the severity of the disease, as they see more intubation, end-stage patients and deaths from COVID-19. Therefore, it was an expected result that vaccine acceptance was higher than those working in departments not related to COVID-19.

In responce to the question of "if influenza vaccine was recommended in present pregnancy, would you get vaccinated?", the rate of having it done in the vaccine acceptance group also was significantly higher than the vaccine refusal group ($p<0.05$). However, when tetanus toxoid administration was compared between the two groups, no significant difference was observed between them. In addition, when the pregnant women were asked whether they would have the routine vaccinations of the baby, it was observed that everyone except 2 patients (%2.9) in the vaccine rejection group would. The reason for such a high rate (100% in vaccine acceptance group, 97.1 in vaccine rejection group) was probably that the routine vaccination of the baby and administration of tetanus toxoid is supported by the government health policy and patients can access these vaccines from health centers and family physicians without going to the hospital. This result showed that the vaccination strategy

is enormously successful when they are approved as a health policy and supported by national health authorities.

The strengths of our study are its novelty, shedding light on a current issue, being conducted with a group that has not been studied before with understandable questions, and its prospective design.

CONCLUSION

In conclusion, although the rate of vaccine acceptance among HCWs pregnant women was higher than non-HCWs pregnant women, it remained below the rate required for "herd immunity" for COVID-19 disease. To date, it is the first study evaluating the perception and attitudes of pregnant women who are healthcare workers to the COVID-19 vaccine. Lack of data on the safety of the vaccine in pregnant women and the thought that it will harm to the baby appear to be the two most important obstacles to vaccination acceptance even if they are health care providers. We can overcome these obstacles only by including pregnant women in phase 3 studies of vaccines as soon as possible. In the next stage, all pregnant women, including healthcare professionals, should be educated to ensure confidence in the safety and efficacy of the vaccine and developed vaccine strategies should be made a health policy.

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CONFLICT OF INTEREST

The authors have no conflicts of interest.

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