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Research Article

Factors Contributing Towards COVID-19 Vaccination among Pregnant Women Attending Antenatal Clinics in a Tertiary Care Center, Bhubaneswar, India

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Abstract

Background: Many vaccines were approved by the World Health Organization for emergency use in 2020, but pregnant women were excluded from these trials. When the COVID-19 vaccines were approved for use by pregnant women, they were left in a dilemma about whether to accept the vaccine during pregnancy or not. ***Objective***: To study the factors contributing to COVID-19 vaccine hesitancy among pregnant women attending antenatal tertiary care centers in India. ***Method***: A questionnaire was provided to pregnant women attending the antenatal tertiary care hospitals in Bhubaneswar, India. The questions included socio-demographic characteristics, obstetric parameters, knowledge of COVID-19 vaccines, and the reasons for hesitancy towards them. ***Results***: Vaccine hesitancy was 29.34% among pregnant women. The sources of information regarding the vaccine were the internet, and the causes of vaccine hesitancy were inadequate information and mistrust of the vaccine. Younger women were more inclined to accept the vaccine. Primigravida, the second trimester of pregnancy, belonging to rural areas, and being homemakers were factors associated with hesitancy. ***Conclusions***: Health care professionals need to actively participate in motivating pregnant women to accept the COVID-19 vaccines that should be integrated with the routine vaccination strategy in antenatal clinics.

Keywords: Antenatal women, COVID-19 vaccines, Pregnancy, Vaccine hesitancy.

العوامل المساهمة في التطعيم ضد COVID-19 بين النساء الحوامل اللاتي يترددن على عيادات ما قبل الولادة في مركز رعاية من الدرجة الثالثة، بوبانسوار، الهند

الخلاصة

الخلفية: وافقت منظمة الصحة العالمية على العديد من اللقاحات للاستخدام الطارئ في عام 2020، ولكن تم استبعاد النساء الحوامل من هذه التجارب. عندما تمت الموافقة على لقاحات COVID-19 للاستخدام من قبل النساء الحوامل، تركن في معضلة حول ما إذا كان يجب قبول اللقاح أثناء الحمل أم لا. **الهدف**: دراسة العوامل التي تساهم في تردد استخدام لقاح COVID-19 بين النساء الحوامل اللائي يحضرن مراكز الرعاية الثالثية السابقة للولادة في الهند. **الطريقة**: تم تقديم استبيان للنساء الحوامل اللائي يترددن على مستشفيات الرعاية الثالثية السابقة للولادة في بوبانسوار، الهند. تضمنت الأسئلة الخصائص الاجتماعية والديموغرافية، ومعايير التوليد، ومعرفة لقاحات COVID-19، وأسباب التردد تجاهها. **النتائج**: كان التردد في اللقاح 29.34٪ بين النساء الحوامل. كانت مصادر المعلومات المتعلقة باللقاح هي الإنترنت، وكانت أسباب التردد في اللقاح هي عدم كفاية المعلومات وعدم الثقة في اللقاح. كانت النساء الأصغر سنا أكثر ميلا لقبول اللقاح. كانت Primigravida ، الثلث الثاني من الحمل، التي تنتمي إلى المناطق الريفية، وربة منزل من العوامل المرتبطة بالتردد. **الاستنتاجات**: يحتاج أخصائيو الرعاية الصحية إلى المشاركة بنشاط في تحفيز النساء الحوامل على قبول لقاحات COVID-19 التي يجب دمجها مع استراتيجية التطعيم الروتينية في عيادات ما قبل الولادة.

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INTRODUCTION

The COVID-19 pandemic has been devastating for the whole world ever since March 2020 [1]. Many studies and trials were undertaken to produce the vaccines we have today to combat the deadly virus [2]. Many drugs were suggested as being the miracle bullet for the disease, but eventually, it was realized that prevention and breaking the chain of infection were the only ways to halt the virus. Many candidate vaccines were developed, and many trials were conducted to select the most appropriate vaccine for COVID-19. The World Health Organization validated the Pfizer/Bio NTech m-RNA vaccine as the first COVID-19 vaccine for immediate emergency usage on December 31, 2020 [3]. India rolled out its COVID-19 vaccination program on January 16, 2021, after conducting different phases of trials on healthy volunteers [4]. Unfortunately, the recommendation for COVID-19 vaccination in pregnant women came quite late on July 2, 2021 [5]. This delay was due to the fact that pregnant women were excluded from previous trials of COVID-19 vaccines worldwide due to obvious ethical issues [6]. This factor stood as a hindrance to vaccine acceptance by pregnant women and their family members. The current study was carried out to determine the factors that negatively influence COVID-19 vaccine acceptance among antenatal pregnant women and to suggest measures to increase vaccine acceptance.

METHODS

Study design

A cross-sectional quantitative study was conducted through printed questionnaire forms.

Questionnaire and data collection

Our questionnaire-based study was conducted over a span of six months, from August 1, 2021, to January 31, 2022, through printed questionnaire forms. The questionnaire was adopted from previous pre-validated questionnaires on vaccine hesitancy in previous studies [7,8]. The recommendation and guidelines for administering the COVID-19 vaccine to pregnant women were recently issued by the Government of India on July 2, 2021. Pregnant women attending the outpatient Department of Obstetrics and Gynecology at the Institute of Medical Sciences and SUM Hospital, Bhubaneswar, India, for antenatal checkups were given the questionnaire form and asked to fill it out during that time. The questionnaire incorporated socio-demographic characteristics (age, education level, employment status, place of residence, etc.) and obstetric parameters like gravidity status, trimester of pregnancy, knowledge of COVID-19 vaccines, and the causes of hesitancy toward the COVID-19 vaccine, if any. Written consent was obtained before filling out the questionnaire. The willing participants were informed about the aims and objectives of the study, the privacy policy, and provided with the principal investigator's email address and phone number at the start of the questionnaire form.

Data analysis

The responses to the individual questions in the questionnaire were tabulated in an Excel spreadsheet. The information was summarized using descriptive statistics such as mean, standard deviation, frequency, and percentage. All the parameters were analyzed using the SPSS version 25 software. The Chi-square test was used to check variations between the subcategories of the variables. Regression analysis was done by taking the factors contributing to vaccine hesitancy, such as age, parity, trimester of pregnancy, education level, employment status, prior infection with COVID-19, and prior administration of the COVID-19 vaccine, as independent variables and vaccine hesitancy as the dependent variable. A p-value < 0.05 was deemed statistically significant for the analyses, with a margin of error of 5% at a 95% confidence level.

RESULTS

A total of 450 response forms were collected. Out of them, 133 were rejected due to being incomplete in some aspects. A total of 317 valid response forms were collected. Out of the 317 pregnant women, 224 (70.66%) were willing to take the COVID-19 vaccine, whereas 93 (29.34%) participants declined to take the COVID-19 vaccine during their pregnancy. Table 1 shows the demographic characteristics and other parameters responsible for COVID-19 vaccine acceptance or hesitancy among pregnant women. Out of 224 pregnant women willing to take the vaccine, the majority of 90 (40.2%) belonged to the age group of 26–30 years. This was followed by 84 (37.5%) in the age group of >30 years and 50 (22.3%) in the age group of 18–25 years. Of the 93 pregnant women who declined to take the COVID-19 vaccine, 45 (48.4%), belonged to the age group of 26–30 years, followed by 36 (38.7%) in the age group of >30 years and 12 (12.9%) in the age group of 18–25 years. On analyzing the education levels and employment status of the study participants, it was found that out of the women who agreed to take the vaccine during pregnancy, 178 (79.5%) were educated beyond high school and 135 (60.3%) were employed, whereas 46 (20.5%) were educated below high school and 89 (39.7%) were homemakers. Out of the women who declined vaccination, 58 (62.4%) were educated beyond high school and only 33 (35.5%) were employed, whereas 35 (37.6%) were educated below high school and 60 (64.5%) were homemakers. Thus, there were significantly lower employment levels among respondents who declined the vaccine (p=0.001). Moreover, 184 (82.1%) pregnant women accepting the vaccine belonged to urban areas, 140 (62.5%) belonged to nuclear families, 40 (17.9%) belonged to rural areas, and 84 (37.5%) belonged to joint families. On the other hand, 58 (62.4%) pregnant women declining vaccination belonged to rural areas, and 62 (66.7%) hailed from joint

families, compared to 35 (37.6%) women belonging to urban areas and 31 (33.3%) women belonging to nuclear families. Thus, there was significantly higher vaccine hesitancy among women who belonged to joint families or rural areas (p=0.001). Table 1 shows that out of the 224 pregnant women willing to take the vaccine, 104 (46.4%) were primigravida, and 120 (53.6%) were multigravida.

Table 1: Demographic characteristics and other parameters of the respondents (Vaccine acceptance n = 224, Vaccine non-acceptance n = 93)

Factors	Accepting n=224 n(%)	Not Accepting n=93 n(%)	p-value
Age (year)			
18-25	50(22.3)	12(12.9)	
26-30	90(40.2)	45(48.4)	0.13
>30	84(37.5)	36(38.7)	
Gravida			
G1	104(46.4)	64(68.8)	
G2	92(41.1)	24(25.8)	0.001
G3	28(12.5)	5(5.4)	
Trimester			
1st	44(19.6)	5(5.4)	
2nd	90(40.2)	47(50.5)	0.005
3rd	90(40.2)	41(44.1)	
Educational Level			
Below High School	46(20.5)	35(37.6)	0.001
Above High School	178(79.5)	58(62.4)	
Employment Status			
Employed	135(60.3)	33(35.5)	<0.001
Home maker	89(39.7)	60(64.5)	
Location			
Rural	40(17.9)	58(62.4)	<0.001
Urban	184(82.1)	35(37.6)	
Family type			
Joint	84(37.5)	62(66.7)	<0.001
Nuclear	140(62.5)	31(33.3)	

Chi-square test was used to determine if there was a significant association between the variables. p-value <0.05 was considered statistically significant.

64 (68.8%) of women who declined vaccination were primigravida, and 29 (31.2%) were multigravida. There was a significantly higher level of vaccine hesitancy among primigravida women as compared to multigravida women (p=0.001). Out of the 93 women declining vaccination, 5 (5.4%) belonged to the first trimester, 47 (50.5%) belonged to the second trimester, and 41 (44.1%) belonged to the third trimester of their pregnancies. Out of the 224 women accepting the vaccine, 44 (19.6%) belonged to the first trimester, 90 (40.2%) belonged to the second trimester, and 90 (40.2%) belonged to the third trimester. The p-value was found to be significant (p=0.005). Table 2 shows the main sources of information regarding the COVID-19 vaccines among pregnant women. Social media and the internet were the leading sources of information regarding COVID-19 vaccines for 121 (38.17%) of our study participants. This was followed by sources such as television and radio by 82 (25.87%) participants, newspapers by 54 (17.03%) participants, and friends and relatives by 21 (6.62%) participants.

Table 2: Sources of information regarding COVID-19 Vaccines

Source	n(%)
Social media and internet	121(38.17)
TV (Television) / Radio	82(25.87)
Newspapers	54(17.03)
Health care providers	34(10.73)
Friends and relatives	21(6.62)
Others	5(1.58)
Total	317(100)

Information from healthcare providers was sought by 34 (10.73%) participants. Table 3 shows the causes of hesitancy among the 93 pregnant women who declined to take the COVID-19 vaccine during their pregnancy. The most common cause of vaccine hesitancy was inadequate information about the vaccine in 48 (51.61%) participants, followed by the reason that pregnant women do not require the vaccine since they mostly stay at home by 11 (11.81%) participants.

Table 3: Causes of hesitancy towards COVID-19 vaccines

Causes	n (%)
Inadequate information about the vaccine	48 (51.61)
Pregnant women do not need the vaccine because they stay at home	11 (11.81)
Fear of side effects of the vaccine during pregnancy	9 (9.68)
Have heard of people becoming positive after vaccine	9 (9.68)
COVID-19 is not dangerous	5 (5.38)
Fear of injection	5 (5.38)
Vaccine not safe	3 (3.23)
Fake or faulty vaccine	3 (3.23)
Total	93 (100)

Other reasons were fear of possible adverse effects on the fetus by 9 (9.68%) participants and rumors of people becoming COVID-19-positive due to the vaccine by 9 (9.68%) participants. Other reasons like COVID-19 not being dangerous were cited by 5 (5.38%) participants, fear of injection by 5 (5.38%) participants, vaccines not being safe by 3 (3.23%) participants, and vaccines being fake or faulty by 3 (3.23%) participants. Table 4 shows the association between acceptance of the COVID-19 vaccine during pregnancy and being previously infected with COVID-19. Out of the 278 women who were not infected with COVID-19 previously, 203 (73%) women accepted the vaccine, and 75 (27%) were hesitant to take the vaccine. Out of the 39 women who were previously infected with COVID-19, 21 (53.8%) participants accepted the vaccine, whereas 18 (46.2%) were hesitant to take the vaccine during pregnancy. This shows higher levels of vaccine acceptance in comparison to vaccine hesitancy among antenatal women who had been previously infected with COVID-19 (p=0.014).

Table 4: Effect of prior infection with COVID-19 / taking a prior dose of COVID-19 vaccine on Vaccine acceptance

Types	Vaccine acceptance (*n*=224) *n*(%)	Hesitant (*n*=93) *n*(%)	Total	*p*-value
Prior infection with COVID-19	21(53.8)	18(46.2)	39	0.014
Not infected	203(73)	75(27)	278	
Taken a prior dose of COVID-19 vaccine	62(82.7)	13(17.3)	75	
Not taken prior dose of COVID-19 vaccine	162(66.9)	80(33.1)	242	0.009
Total	224	93		

Chi-square test was used to determine if there was a significant association between the variables. *p*-value <0.05 was considered statistically significant.

Table 4 shows the relationship between prior vaccination with COVID-19 vaccines and their further acceptance during pregnancy. Of the total 317 study participants, 75 (23.7%) had previously taken a single dose of the COVID-19 vaccine. Out of them, 62 (82.7%) were willing to take the second dose during pregnancy, and 13 (17.3%) were hesitant to take the second dose of the vaccine. Out of the 242 participants who had not taken a previous dose of the COVID-19 vaccine, 162 (66.9%) accepted the vaccine and 80 (33.1%) declined the vaccine. This association between prior vaccination with COVID-19 vaccines and the readiness to repeat the same was found to be statistically significant ($p<0.05$). Table 5 shows the regression analysis results of the different factors contributing to vaccine hesitancy. The age of the pregnant women, parity, employment status, and acceptance of a prior dose of the COVID-19 vaccine significantly affected vaccine hesitancy.

Table 5: Multiple regression analysis of factors influencing COVID-19 vaccine hesitancy

Variable	Coefficient	SE	*p*-value	Odds Ratio	95% CI
Age	-0.0894	0.0359	0.0127	0.9145	(0.8524-0.9811)
Parity	0.8825	0.2313	0.0001	2.4170	(1.5360-3.8033)
Trimester of Pregnancy	-0.3446	0.1993	0.0838	0.7085	(0.4794-1.0470)
Previously affected with COVID-19	0.6083	0.3859	0.1150	1.8372	(0.8623-3.9144)
Taken prior dose of COVID-19 vaccine	-0.7375	0.3647	0.0432	0.4783	(0.2340-0.9776)
Education level	-0.3758	0.3204	0.2408	0.6867	(0.3665-1.2868)
Employment status	-0.7449	0.2934	0.0111	0.4748	(0.2672-0.8438)
Constant	4.7631	1.5857	0.0027		
Chi-square = 48.6631	*Df = 7*		*p-value = 0.0000*		

Table 6 shows the knowledge about the adverse effects of the vaccine among the study participants. 193 (60.88%) participants agreed that fever after vaccination was the most known side effect of the COVID-19 vaccines. 55 (17.35%) participants knew body aches were a side effect of the COVID-19 vaccines. This was followed by knowledge of other side effects such as injection site swelling by 27 (8.52%) participants, injection site redness by 12 (3.79%) participants, and belief in the rumor of becoming COVID-19 positive after vaccination by 30 (9.46%) participants.

Table 6: Knowledge on the adverse effects of COVID-19 Vaccines

Side Effects	*n*(%)
Fever	193(60.88)
Body aches	55(17.35)
Becoming COVID-19 Positive	30(9.46)
Swelling at injection site	27(8.52)
Redness at injection site	12(3.79)
Total	317(100)

73 (23%) women encountered difficulties in getting access to the COVID-19 vaccine. Table 7 shows the different factors responsible for the difficulties encountered in getting easy access to the COVID-19 vaccine by our study participants. An excessive crowd at the vaccination center was the most common hindering factor encountered by 30 (41.09%) participants.

Table 7: Reasons for difficulty in getting access to COVID-19 vaccines

Causes	*n* (%)
Excessive crowd at the vaccination centers	30(41.09)
Difficulty to book an appointment in software application	24(32.88)
Vaccination center was in faraway place	7(9.59)
Absence of a partner to reach a vaccination center	6(8.22)
Inappropriate schedule of the vaccination centers	2(2.74)
Medical grounds to avoid vaccine	2(2.74)
No knowledge about location of vaccination centers	2(2.74)
Total	73(100)

This was followed by reasons such as difficulty in booking a vaccine appointment via the COWIN software app by 24 (32.88%) participants, vaccination centers being located in faraway locations by 7 (9.59%) participants, absence of a partner to reach a vaccination center by 6 (8.22%) participants, inappropriate schedule of the vaccination centers by 2 (2.74%) participants, medical grounds to avoid the vaccine such as allergy to any of the vaccine components or to any other previous vaccine or currently suffering from acute febrile illness, etc. by 2 (2.74%) participants, and no knowledge about the location of the vaccination centers by 2 (2.74%) participants.

DISCUSSION

The present study, which included 317 pregnant women in different trimesters, shows vaccine

acceptance in 224 (70.66%) of the participating women. Similar rates of COVID-19 vaccine acceptance were found among antenatal women in Mexico, as documented in a survey conducted by Skjefte *et al*. [9]. Pregnancy is a vulnerable condition, and studies have shown that pregnant women have a higher risk of developing serious complications from the COVID-19 infection [10–13]. Therefore, a good level of vaccine acceptance among pregnant women is a positive sign to curb COVID-19 as effectively as other viral diseases in the past [14,15]. On analysis of the main sources of information regarding the COVID-19 vaccines among pregnant women, it was found that the majority of the participants got their first-hand information from the media and the internet [7]. Internet and media sources can be misleading and can play a negative role in promoting the vaccine [16–18]. Information from healthcare providers was only sought by 34 participants (10.72%). The minimal impact of healthcare providers on pregnant women's decision to take the vaccine was also highlighted in a survey by Skjefte *et al*., conducted in 16 countries including the United States, India, Brazil, Russia, Spain, Italy, etc. [9]. This shows the need to step up our efforts toward promoting information on vaccines among the pregnant population, which is also endorsed by the American College of Obstetricians and Gynecologists Immunization, Infectious Disease, and Public Health Preparedness Expert Work Group as well as the Society for Maternal-Fetal Medicine [19,20]. The most common cause of vaccine hesitancy in our study, similar to other studies, was inadequate information available on the safety of the vaccines in pregnancy [7,21]. The sheer coincidence of asymptomatic infected people becoming symptomatic with COVID-19 infection after getting the COVID-19 vaccine has further added to the confusion [22]. The notion that pregnant women staying at home all the time are protective against COVID-19 infection, even if other members venture outside, has added to vaccine hesitancy. The most common age group that readily accepted the vaccine was between 26 and 30 years of age, followed by the age group of >30 years. This shows the younger age group of pregnant women in our study were more inclined to accept the COVID-19 vaccines in comparison to older pregnant women. This stands in contrast to the findings of Skjefte *et al*., who suggested that women in the younger age group had more vaccine hesitancy [9]. The reason for this difference might be due to the fact that Skjefte *et al*. conducted their study in 16 different countries, mostly the United States, Brazil, Russia, Spain, Argentina, Colombia, the UK, Mexico, Peru, South Africa, Italy, Chile, the Philippines, etc., apart from India. In those western countries, especially the United States, there was a massive anti-vaccine campaign in place, which was mostly spearheaded by their young population [9]. The education levels of an individual reflect well on their perception of different issues in society. Thus, it was seen that vaccine acceptance was far greater in women who were educated beyond high school, which was similar to the findings of Skjefte *et al*., and Robertson *et al*. [9,23]. Another demographic feature that assumed a significant role in COVID-19 vaccine hesitancy was the type of families they come from, i.e., whether from small nuclear families consisting of the couple in question and their children, if any, or from relatively larger joint families [7]. It was observed in our study that women who came from joint families and rural areas had a lower level of acceptance of COVID-19 vaccines. Pregnant women who were employed had better acceptance of the vaccine than homemakers. This could be due to the lack of decision-making authority among Indian homemakers and their subjugation to the decisions and perceptions of the dominant male member or elderly woman in the household. The reason for the increased acceptance of COVID-19 vaccines among employed pregnant women might be the company policies, incentives, and perks offered by employers to get their employees vaccinated [24]. These findings were supported by the study of Riad et al., who found that employment status had a significant role in vaccine acceptance among pregnant women in South Africa, whereas it did not play much role among Chinese pregnant women [8,25,26]. Vaccine hesitancy was seen mainly in primigravida, who are expected to be more anxious and worried about their first experience of pregnancy events. But Kiefer *et al*., differed in their view and stated that multiparous women had a higher vaccine hesitancy [27]. This might be due to the fact that multiparous women already have children with them, for whom vaccination is still not in place. They probably assume that COVID-19 is not dangerous for children and perceive a sense of COVID-19 denial for their unborn children too. This is also reinforced by the study of Danchin *et al*., who stated that parental decisions about the vaccination of their children begin in pregnancy itself [28]. Women in their second trimester were at the forefront of a decline in vaccination as compared to women in either the first or third trimesters, similar to the findings of Blakeway *et al*., who found higher levels of COVID-19 vaccine hesitancy among women belonging to the second trimester of pregnancy [29]. Goncu Ayhan *et al*., and Riad *et al*. had similar findings [7,8]. Prior infection with COVID-19 weakly influenced the levels of vaccine acceptance or hesitancy. 53.8% of the pregnant women, previously infected with COVID-19, accepted the vaccine, and a comparable 46.2% of pregnant women, previously infected with COVID-19, rejected the vaccine. The reason for rejecting the vaccine even after going through the pain of being infected previously can be attributed to the fact that prior infections instill a false sense of being "naturally protected" against repeat infections. In addition, the risk of trying something new, like the COVID-19 vaccines during pregnancy, seemed too much. This is similar to the findings of Anderson et

al., who found that antenatal women in England perceived the risk of side effects of COVID-19 vaccines as greater than the risk of contracting COVID-19 infection itself [30]. As seen in previous studies, prior vaccination with any sort of vaccine increases the acceptability of being further vaccinated during pregnancy [31]. Similarly, in our study, 82.7% of the women who had been vaccinated with the COVID-19 vaccine before pregnancy further accepted the second dose of the vaccine. But 66.9% of pregnant women who had not taken a prior dose of the COVID-19 vaccine refused to do so during their pregnancy. This might be due to the apprehension of the adverse effects of the vaccine and their possible amplification during pregnancy. On assessing the knowledge of the side effects of the vaccine, we found that fever was the most common side effect known to the participants. This was followed by body aches, swelling, and redness at the site of the injection, among other known side effects. The most peculiar side effect of COVID-19 vaccines known to them was stated as turning COVID-19 positive after being vaccinated. This reflects the impact of rumors and the propagation of misinformation by word of mouth and social media on the general public. Moreover, 23% of our participants seeking COVID-19 vaccination faced problems in getting easy access to vaccine and vaccination centers [7]. In the analysis of the factors causing hindrance in getting easy access to vaccines, excessive crowding at the vaccination centers was stated as the most common reason. Crowding at the vaccination centers is a great inconvenience to pregnant women who might have problems standing in long lines and waiting to get vaccinated. There is also a looming fear of contracting the COVID-19 infection from the crowd itself at the vaccination centers. The next most common issue reported was the inability to book a slot for vaccination through the mobile application or website. This might be due to the lack of technical knowledge on the part of the women or their family members to do the same, or due to being unable to cope with the speed with which the slots get filled up once they are opened for booking. Even after the successful booking of the slot, the assigned vaccination center might be located far away from the residential area of the participant, thus further adding to the inconvenience. This has been stated as the third most common reason for the difficulty in getting easy access to the vaccine. On regression analysis, age, parity, employment status of the pregnant women, and recipients of a prior dose of the COVID-19 vaccine were found to be significant determinants of vaccine hesitancy. In our study, younger pregnant women were more likely to accept the vaccine than older women. Kristin *et al*. also had similar results from their study [32]. The increased acceptance of the COVID-19 vaccine among the younger age group of pregnant women might be due to the fact that they are more connected to social media and the internet than the older age group of women, which serves as the predominant source of information regarding the vaccine in our study.

Study limitations

This is a single-center study, and the responses received might be specific to a particular population from a certain geographical area and might not be applicable on a large scale to the general population. The level of vaccine acceptance is an ever-evolving scenario, and it may increase in the future with increased health education. Thus, the results obtained are only a capture of a particular time frame.

Conclusion

The COVID-19 vaccine acceptance among pregnant women attending our institution was almost on par with other countries. The most common cause cited for vaccine hesitancy was inadequate information on the safety of COVID-19 vaccines. Increased age, rural background, and belonging to larger joint families were associated with vaccine hesitancy. On the other hand, higher educational levels and being employed were associated with higher vaccine acceptance. The purpose of our study was to highlight the underlying interplaying factors responsible for vaccine hesitancy. This might help in providing important leads for formulating appropriate policies for new vaccine rollouts in the future.

Recommendations

Pregnant women, along with their family members, should be informed about the benefits of the vaccine during their antenatal visits. This might reduce resistance from family members and increase vaccine acceptance. A community-based approach should be adopted to mitigate the anxiety and fear of the new vaccine. People should be made aware of the minor side effects of the COVID-19 vaccine to minimize panic and stop negative rumors. Vaccines should be made easily available at the antenatal clinics to minimize the hassle of procuring the vaccine through online slot booking.

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Conflicts of interest

There are no conflicts of interest.

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Data sharing statement

Supplementary data can be shared with the corresponding author upon reasonable request.

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