Original Article

COVID-19 Vaccine Acceptance among Pregnant Women Attending Antenatal Clinic in a Tertiary Care Hospital of India

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Abstract

Background: Despite opinions regarding safety and efficacy of COVID-19 vaccines in pregnancy, they are approved for pregnant women. However, little is known about attitudes and perception of pregnant women toward COVID-19 vaccination. **Objective:** To find out COVID-19 vaccine acceptance, its predictors, and perceptions, among pregnant women attending antenatal clinic in a tertiary care hospital of India. **Methodology:** A descriptive cross-sectional study was conducted among 180 pregnant women during 2021 using a predesigned, pretested questionnaire consisting of vaccination, obstetric history, and perception about COVID-19 vaccination. Those who took at least one dose of vaccine was considered vaccine acceptor. Chi-square test was performed to check association with independent variables for vaccine-acceptors and nonacceptors. **Results:** About 126 (70%) women were vaccine-acceptors and 54 (30%) were nonacceptors. Higher proportion of vaccine-acceptors were noted among those aged >20 years ($P = 0.003$), with previous pregnancy loss (83.3%) and problem in conceiving (71.4%), working mothers (72.7%), lower socioeconomic status (71.1%), and lower literacy (71.2%). Favorable attitudes toward COVID vaccine were present in most of the participants (72.8%). 74.6% of vaccine acceptors and 61.1% nonacceptors agreed to take vaccine on recommendation of health-care provider ($P = 0.009$). Significantly higher proportion of acceptors (43.7%) agreed to recommend another mother to take vaccine than nonacceptors (24.1%) (P=- 0.044). Significantly higher proportion of acceptors (84.9%) agreed to get vaccinated with precautionary dose if vaccination camp is organized ($P = 0.039$). **Conclusion:** A high level of vaccine acceptance was seen mostly because of the trust on health-care providers. Targeted efforts are required for health-care workers and public regarding vaccine literacy.

Keywords: COVID-19, India, perception, pregnancy, vaccination

Introduction

SARS-CoV-2 pandemic has imposed devastating impacts on people globally posing enormous burden to the society.[1] It was seen that consequences of COVID-19 infection may get very severe among pregnant women because of physiological and immunological changes during pregnancy.[2] Recently Centre for Disease Control and Prevention reported that pregnant women infected with COVID-19 are more likely to be hospitalised, required the intensive care unit facilities and mechanical ventilation support compared to nonpregnant women. Literature also reported that COVID-19 infected pregnancy were associated with unfavorable pregnancy outcomes like preeclampsia/eclampsia, maternal mortality, and poorer neonatal outcome such as preterm birth, severe perinatal morbidity, and mortality.[3]

Thus, with the availability of effective vaccines against COVID-19, vaccination of priority groups like pregnant women was one of the most important strategies for controlling the pandemic. Though there were many arguments for the safety and efficacy of COVID-19 vaccines in pregnant women, Government of India approved COVID-19 vaccine for pregnant women at any time during the pregnancy taking into consideration risks and benefits involved.[4] However, little is known about attitudes and perception of pregnant women toward COVID-19 vaccination. A survey conducted in 16 countries found that only acceptance rate of COVID-19 vaccine was 2% among pregnant women. Interestingly vaccine acceptance was found lowest in Russia, the United States

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and Australia, and highest in India, Mexico.[5] In India the acceptance rate varied from state to state, in Kerala it was 80%, whereas in Manipur 22.1%.[6] An assessment of the prevalence and determinants of vaccine hesitancy will aid in the acceleration of vaccine administration among pregnant women.

There is dearth of literature in West Bengal state of India regarding level of acceptance of COVID-19 vaccine among pregnant women. Thus, the current study was carried out to find out acceptance rate, perceptions, and attributing factors for their vaccine acceptance among the pregnant women attending antenatal clinic of a tertiary care hospital which might help the ongoing COVID-19 vaccination program.

Methodology

Study type, area, and participants

A hospital based descriptive type of study with a cross-sectional design was carried out in the antenatal clinic of North Bengal Medical College and Hospital (NBMCH), Darjeeling district, situated in sub-Himalayan region of West Bengal, India during November, and December 2021. NBMCH is the oldest tertiary care hospital in the region, which caters to patients from the entire Darjeeling district as well as from the neighboring districts of Jalpaiguri, Uttar and Dakshin Dinajpur, the states of Bihar and Assam, and the neighboring country of Nepal. The pregnant women of any gestational age attending antenatal clinic for routine check-up during the study period, were included in the study. Exclusion criteria were those who were unwilling to participate or came to the clinic with any obstetric emergency.

Sample size and sampling technique

The sample size was calculated based on the anticipated prevalence of vaccine acceptance for COVID-19 among pregnant women as 77.9%, confidence interval of 95%, and absolute precision of 10%.[7] Furthermore, a design effect of 1.5 to compensate for systematic random sampling and adding 10% nonresponse rate to get the final sample size of 179.5 rounded off to 180. After record analysis of previous 1 year data of patients visiting in ANC clinic, it was seen that average patient visit is 100 per day. Weekly 2 days (Monday and Thursday) were selected for data collection based on feasibility. Thus, on each day approximate 23 patients were interviewed. Systematic random sampling was applied to recruit 23 patients per day. Sampling interval was calculated as 800/180 = 4.4–5. A random number selection was made between 1 and 5 and the first patient to be interviewed on that day corresponded to the random number selected from the queue. Thereafter, every 4th eligible patient was selected and interviewed.

Data collection and analysis

A pretested, semi-structured interview schedule consisting of three parts were used for data collection. Pretesting of the interview schedule was done on a convenience sample of 20 pregnant women attending antenatal clinic of Dabgram Matrisadan which is the urban field practice area of NBMCH. Data regarding sociodemographic characteristics such as age, literacy status, residential area, socioeconomic status of the family,[8] working status and obstetric history such as period of gestation, parity, history of any abortion, problem to conceive were taken. Regarding the COVID vaccination, those at least took one dose of COVID-19 vaccine was considered as vaccine-acceptor: if no dose taken, vaccine nonacceptor. Perception of the mothers about COVID-19 vaccination were assessed by 10 items which were measured by 3-point Likert scale i.e., agree, neutral, and disagree. Each item had a score ranging from 1 to 3; negative statements were scored in reverse. A minimum score of 10 and a maximum score of 30 were obtained. A score of ≤20 was considered unfavorable attitude and 21–30 favorable attitude. A subject once interviewed was not interviewed again on his/her subsequent visits to the clinic.

Chi-square test was performed to check association with independent variables for vaccine acceptors and nonacceptors. A $P < 0.05$, was taken as statistically significant. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY, USA: IBM Corp was used for analysis.

Ethical consideration

Ethical permission for the study was obtained from the Institutional Ethics Committee of the NBMCH (IEC/NBMC/2020-21/15). The study participants were explained about the study and informed consent was taken. Anonymity and confidentiality were maintained.

Results

Among the participants, 24.4% were ≤20 years old. The average age of the participants was 23.5 ± 3.8 years (range 15 years to 36 years). 91.7% resided in rural area and majority (63.3%) completed their education above middle school. But 3.9% were illiterate or had nonformal education. Only 12.2% pregnant women were working otherwise rests were homemaker. Mostly they belonged to lower socioeconomic status (class IV and V) according to Modified B.G Prasad scale considering All India Consumer Price Index for June 2022.[8]

83 (46.1%) participants were primigravida, 18 (10%) had history of pregnancy loss before. 35 (19.4%) had comorbidities, and 99.4% took tetanus vaccine in current pregnancy. Regarding infection of COVID-19, 2.8% said their family member diagnosed with the infection and only 1.7% agreed that they previously had COVID. Newspaper (68.3%), TV (60%), radio (20.6%), hospital (54.4%), pamphlets (17.2%), campaigns (15%), and neighbors (54.4%) were the sources of information about COVID-19. When they were enquired if they heard about availability of COVID-19 vaccine for pregnant women, 174 (96.7%) responded positively. Among the 180 participants, 54 (30%) did not take any dose, while 56 (31.1%) took first dose, 70 (38.9%) took second dose of COVID-19 vaccine. 147 (81.7%) participants said that all eligible family members took at least one dose of COVID-19 vaccine.

The vaccination status (vaccine acceptors and nonacceptors) of the pregnant women were checked for any association with predictors variables like age, level of education, occupation, socioeconomic status, any history of pregnancy loss, problem in conceiving, and gravida [Table 1]. It was seen that the those who were more than 20 years old, took at least one dose of COVID vaccine (75.7%) than those who were 20 years old or less (52.3%) and it was found to be statistically significant ($P = 0.003$). Higher proportions among the vaccine acceptors were noted with history of pregnancy loss (83.3%) and problem in conceiving (71.4%). However, these differences were not statistically significant [Table 1]. Vaccine acceptance was more among those who were working (72.7%), from lower socioeconomic status (71.1%), had literacy status up to middle school (71.2%). However, these were not found to be significant.

Majority of the vaccine acceptors took the vaccine because the health-care provider counseled them about the vaccine [Figure 1]. Few took because they thought it will protect them and their baby, family member told them to take it. Only four women said that they were unaware about pregnancy, thus took first dose but will not take second dose. When the nonacceptors were enquired about reason behind refusal, most of them told due to fear of adverse effect in pregnancy and harm to baby, followed by lack of information and advice from health-care provider to wait till delivery [Figure 2]. Few did not take because of unavailability of vaccines, denial from husband, and sickness.

Favorable attitudes toward COVID vaccine were present in most of the participants (72.8%). It was more among the vaccine acceptors (75.6%) than the nonacceptors (24.4%) and statistically significant ($P = 0.008$) [Figure 3]. There was difference in perceptions regarding COVID-19 vaccine, among the acceptors and nonacceptors. Among the nonacceptors, 38.9% agreed that COVID-19 vaccine is safe in pregnancy, 35.2% thought it may harm their baby, 57.4% agreed about problem in breastfeeding as a side effect, 27.8% thought it can lead to pregnancy loss. These proportions were not significantly different than the vaccine acceptors [Table 2]. 74.6% of vaccine acceptors and 61.1% nonacceptors agreed to take the vaccine on recommendation of health-care provider. The difference was statistically significant ($P = 0.009$).

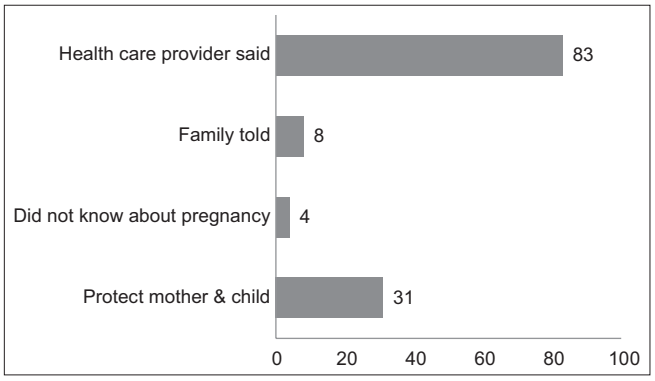

Figure 1: Reasons for acceptance of COVID-19 vaccine ($n = 126$)

Table 1: Association of sociodemographic and obstetric variables with vaccination status of pregnant women (n=180)

Variables	Total, n (%)	Vaccine acceptor, n (%)	Vaccine nonacceptor, n (%)	χ^2	P
Age					
Up to 20	44 (100)	23 (52.3)	21 (47.7)	8.715	0.003*
>20 years	136 (100)	103 (75.7)	33 (24.3)		
Literacy status					
Up to middle school	66 (100)	47 (71.2)	19 (28.8)	0.073	0.787
Above middle school	114 (100)	79 (69.3)	35 (30.7)		
Occupation					
Working	22 (100)	16 (72.7)	6 (27.3)	0.089	0.766
Homemaker	158 (100)	110 (69.6)	48 (30.4)		
Socioeconomic status**					
Lower (class IV, V)	142 (100)	101 (71.1)	41 (28.9)	0.407	0.524
Higher (class I, II, III)	38 (100)	25 (65.8)	13 (34.2)		
Gravida					
Primi-gravida	83 (100)	54 (65.1)	29 (34.9)	1.790	0.181
Multi-gravida	97 (100)	72 (74.2)	25 (25.8)		
History of pregnancy loss					
Yes	18 (100)	15 (83.3)	3 (16.7)	1.693	0.193
No	162 (100)	111 (68.5)	51 (31.5)		
History of any problem in conceiving					
Yes	7 (100)	5 (71.4)	2 (28.6)	0.007	0.933
No	173 (100)	121 (69.9)	52 (30.1)		
Total	180 (100)	126 (70)	54 (30)		

*Statistically significant, **Modified B.G.Prasad scale-is based on per capita monthly income and all India average consumer price index of June 2022 (adjusting for inflation; base year 2016). It is used extensively for classifying socioeconomic status of both rural and urban Indian population

Table 2: Perception about COVID vaccination in pregnancy among study participants (*n*=180)

Statements	Total agreed (among total), *n* (%)	Vaccine acceptor, *n* (%)	Vaccine nonacceptor, *n* (%)	*P*
COVID vaccination is safe in pregnancy	78 (43.3)	57 (45.2)	21 (38.9)	0.478
COVID-19 disease can be severe in pregnancy	115 (63.9)	81 (64.3)	34 (63.0)	0.575
COVID vaccination can harm baby	73 (40.6)	54 (42.9)	19 (35.2)	0.440
COVID-19 vaccine can cause problems in breastfeeding	84 (46.7)	53 (42.1)	31 (57.4)	0.164
COVID-19 vaccine can lead to pregnancy loss	47 (26.1)	32 (25.4)	15 (27.8)	0.911
Willing to take vaccine if only health-care workers tell	127 (70.6)	94 (74.6)	33 (61.1)	0.009*
Have adequate information about COVID-19 vaccine	16 (8.9)	13 (10.3)	3 (5.6)	0.402
Willing to advice another mother for taking COVID-19 vaccine	68 (37.8)	55 (43.7)	13 (24.1)	0.044*
Willing to get vaccinated if COVID-19 vaccination camp will be organized near you	144 (80.0)	107 (84.9)	37 (68.5)	0.039*
Public health campaigns lessened fear of COVID-19 vaccine in pregnancy	123 (68.3)	84 (66.7)	39 (72.2)	0.084

*Statistically significant

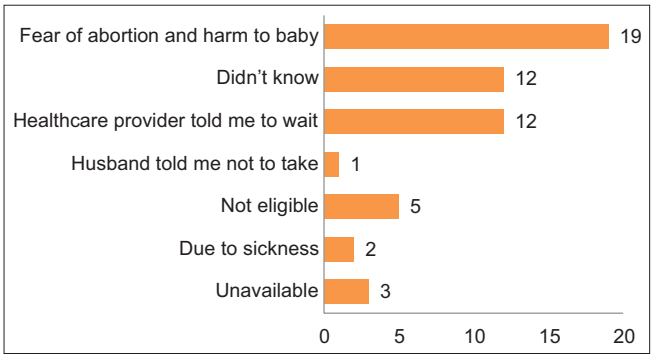

Figure 2: Reasons for not taking any doses of COVID-19 vaccine (*n* = 54)

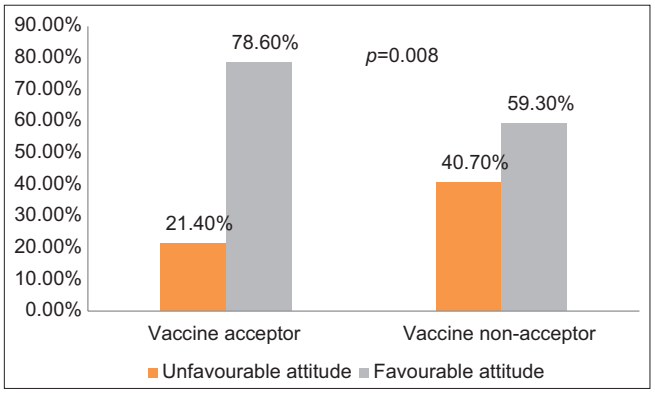

Figure 3: Difference in perception regarding COVID-19 vaccination in pregnancy among vaccine-acceptors and nonacceptor (*n* = 180)

Furthermore, majority among acceptors (43.7%) agreed that if a mother comes to them for advice regarding vaccine, they will advise her to take it (P = 0.044). Significantly higher proportion of acceptors (84.9%) agreed to get vaccinated with precautionary dose if vaccination camp is organized than only 68.5% among the nonacceptors agreeing (P = 0.039).

Discussion

Vaccination drives for the entire population within a short time are resource intensive. To make these programs effective high level of acceptance and coverage are needed. In the present study, vaccine acceptance rate among pregnant women was 70%. A multicentric study done in 16 countries found it was more than 80% in India and Mexico among pregnant mothers whereas lowest rate was seen in US, Russia, and Australia (45%).[5] Another study also reported relatively higher rate of vaccine acceptance in Brazil, India, and South Africa.[9] These higher acceptance among the middle-income countries might be due to the higher prevalence of other infectious diseases which triggered severity of COVID-19 and positive vaccine attitude.[5] While the acceptance rate is much higher in India compared to global scenario, within India, there was much higher hesitancy of COVID-19 vaccine (77.9%) from Manipur.[7] Lower rate of vaccine acceptance among pregnant women (44.3%) was reported by Sutton D *et al*. compared to nonpregnant women (76.2%).[10] The observed differences might be due variable access to health-care services, different level of knowledge and perception about COVID-19, and variation in methodology and time context.

It was evident from the current study that most of the pregnant women took at least one dose of vaccine because of their faith toward health-care provider. Naqvi S *et al*. found in their study that most of the pregnant women turn to family members and health professionals for advice regarding COVID-19 vaccination.[11] A Jordanian survey also found the same.[12] On the other hand, nonacceptance was mostly due to fear of adverse effects and unavailability of information. Some of them did not get vaccinate as health care workers asked them to wait. This could be due to less information regarding safety and efficacy of vaccine among pregnant women to the health-care provider. As the vaccine was introduced in a very short period, efficacy trials were still going on; pregnancy is a sensitive issue in the society. These could be the factors behind telling the pregnant mothers to wait by the health-care provider. Thus, it is important to engage and educate the health-care workers also.

In this study the vaccine acceptance was associated with age. Those who were more than 20 years old had higher level of acceptance. A multicentric study from 7 countries found that

the Indian pregnant mothers had lower odds of accepting COVID-19 vaccine in <20 years age-group (OR - 0.94 [95% CI: 0.83–1.06]) than the 20–35 years age-group.[11] In Saudi Arab older pregnant women had greater acceptance rate of COVID-19 vaccine (AOR-1.005 [95% CI: 0.983–1.028]).[13] This finding might be due to the fact that the pregnant women with advanced maternal age are more concerned about the disease. Educational status, occupation, and socioeconomic status were not found to be significant predictors of vaccine acceptance in the current study. However, these were significantly associated with vaccine acceptance in many literature.[13,14] Interestingly, those with previous history of any pregnancy loss, or problem in conceiving in cuurent pregnancy were more inclined to receive COVID-19 vaccine. This might be due to safeguarding the current pregnancy from hazards of COVID-19 infection. To support the fact, a study from China based on health belief model found pregnant women with history of adverse pregnancy outcome, 1.11 times more likely to get the COVID-19 vaccine than who does not.[14]

In this study 6 out of 10 pregnant women agreed about severity of COVID-19 in pregnancy while only 4 out of 10 agreed about safety of vaccine in pregnancy. In a study from Manipur 31.9% agreed about vaccine safety, 50.9% about effectiveness of the vaccine.[7] Near about half of the study participants in the current study, were concerned about pregnancy loss and harmful effect to foetus as an adverse effect of the vaccine. In many countries (UK, turkey etc.) high vaccine hesitancy was due to lack of COVID-19 vaccine safety data in pregnant women and foetus.[15,16] Majority agreed that public health campaigns lessened their fear regarding the vaccine. Those who took at least one dose, agreed that they will also motivate another pregnant mother to take it and if any other precautionary dose available near their residence through vaccination camp, they will take it. It is evident from these findings that health-care workers were the most trusted source of information about the COVID-19 vaccine. Trust and confidence in the health-care system have shown to play an important role in vaccine acceptance in world-wide.[17,18]

Smaller sample size and single hospital-based study were the limitations of the current study. Moreover, those who visited the hospital, they might be more inclined to accept the vaccine because they generally seek for services. Large scale community-based study would have provided the exact prevalence of vaccine acceptance.

Conclusion

A high level of acceptance was seen in this study. Most of them took because of their trust to on health-care providers. Lack of information, fear of harmful effect to the foetus, and faith toward health-care provider asking to wait, are major factors behind nonacceptance of COVID-19 vaccine. This suggests that targeted efforts are required for the health-care worker as well as public regarding vaccine literacy. Along with these, educational programs, awareness campaigns about the safety of the COVID-19 vaccine for pregnant women, also required to gain trust. Awareness can be increased during antenatal check-ups at the facility as well as during household visits by community health workers.

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Conflicts of interest

There are no conflicts of interest.

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