International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Kamath A et al. Int J Reprod Contracept Obstet Gynecol. 2023 Apr;12(4):1050-1055
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20230811

Original Research Article

Vaccine hesitancy: a major hurdle even among women healthcare workers

Anusha Kamath*, Anita Yadav, Jyoti Baghel, Shuchita Mundle

Department of Obstetrics and Gynecology, All India Institute of Medical Sciences, Nagpur, Maharashtra, India

Received: 11 February 2023
Accepted: 04 March 2023

***Correspondence:**
Dr. Anusha Kamath,
E-mail: anusha.kamath@aiimsnagpur.edu.in

ABSTRACT

Background: One of the major threats to the COVID-19 vaccines rollout and successful mitigation of the pandemic is vaccine hesitancy. Vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services. The COVID-19 vaccine trials generated very limited data on safety and efficacy for pregnant women and children, since pregnant women were not included in any of the phase I/II or III trials. Hence the authors made an attempt to understand vaccine hesitancy among women healthcare and frontline workers with a focus on vaccination during pregnancy and lactation.
Methods: The recruitment of participants was done by purposive snowballing technique over a period of 15 days. The data collection was done through an online questionnaire generated with the help of Google forms. After excluding women who exceeded the age criteria and incompletely filled questionnaires, 101 responses were considered for analysis. Data analysis was done using SPSS software version 22.
Results: From a total of 101 responses for analysis, 26% had comorbidities. Of the 9 women who were pregnant, majority was in the second trimester (55.6%). Majority of the women, 63.6% had been feeding for more than six months. Of the respondents who had refused vaccination, most wanted to wait longer for further research on safety and efficacy (47.8%).
Conclusions: The reasons for pregnant women to decline COVID-19 vaccination during pregnancy even if the vaccine were safe and free were that they did not want to expose their developing baby to any possible harmful side effects, would like to see more safety data among pregnant women and unclear recommendations from the healthcare provider. As HCWs are envoys for evidence based medical interventions, and they are critical in promoting vaccine acceptance amongst the general population, it is important to design effective strategies to improve vaccine acceptance amongst this population.

Keywords: COVID vaccine, Healthcare workers, Lactation, Pregnancy, Vaccine hesitancy

INTRODUCTION

Since the WHO declared COVID-19 infection as a pandemic on 11th March 2020, scientists the world over began a race to produce a vaccine for this deadly disease. Several vaccines have since been developed and brought into the market at unparalleled speed.[1] This has been possible due to years of research and technological advances, running multiple trials in parallel, crucial financial assistance and help from regulatory institutions and their experts working at a breakneck speed.[2-4] In the European Union, the first vaccine, BNT162b2 by BioNTech/Pfizer, was authorized on 21 December 2020, followed by mRNA-1273 by Moderna and AZD1222 by Oxford/AstraZeneca approved on 7 and 29 January 2021, respectively.[5-7] COVAXIN®, India's indigenous COVID-19 vaccine by Bharat Biotech was developed in collaboration with the Indian Council of Medical Research (ICMR)- National Institute of Virology (NIV).[8,9]

Two vaccines that have been granted emergency use authorization by the Central Drugs Standard Control

Organization (CDSCO) in India are Covishield® (AstraZeneca's vaccine manufactured by Serum Institute of India) and Covaxin® (manufactured by Bharat Biotech Limited). Covishield® vaccine, manufactured by the Serum Institute of India, is a viral vector-based technology which is also used to manufacture ebola vaccine. Covaxin® vaccine is a whole-virion inactivated coronavirus vaccine which is also used to manufacture vaccines like influenza, rabies and hepatitis-A. The COVID-19 vaccine was launched on 16th January 2021 and it was administered to different groups of individuals in a phased manner. The first group included healthcare and frontline workers. The second group to receive COVID-19 vaccine was persons over 60 years of age and persons between 45 and 59 years with comorbid conditions. Recently the government of India has approved COVID vaccination for pregnant and lactating women; although at the time of conception of the study the scenario was contrary.[9]

However, one of the major threats to the COVID-19 vaccines rollout and successful mitigation of the pandemic is vaccine hesitancy. Vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services.[11] Vaccine hesitancy is complex and context specific, varying across time, place and vaccines. There are several general factors influencing the reluctance to vaccination, including lack of confidence in recommended vaccines and providers, the perception of how conveniently can be obtained, risk perception and trust, perceived importance of vaccination, past experience with vaccines, level of education and knowledge and religious and moral convictions.[12-14] In the case of COVID-19 vaccines, additional factors may also play a role. Firstly, the unprecendented speed at which the vaccines have been developed and approved within less than one year has people worried about their safety.[15] Secondly, the effectiveness of the vaccines to limit the asymptomatic spread remained unanswered in the clinical trials.[16,17] Thirdly, role of online social media in potentially deteriorating the willingness to vaccinate among various groups of individuals cannot be underestimated.[18,19] For this reason, the level of trust in COVID-19 vaccines must be monitored prior to and after their introduction in different world regions.

The COVID-19 vaccine trials generated very limited data on safety and efficacy for pregnant women and children, since pregnant women were not included in any of the phase I/II or III trials.[2,20-27] Yet, pregnant women with symptomatic COVID-19 might be at an increased risk for severe illness than non-pregnant peers.[28] Some studies also indicated the vaccine refusal within the healthcare workers, which is particularly problematic as it may impact the general public's decision.[29] The vaccines cannot defeat the pandemic without widespread acceptance. Hence the authors made an attempt to understand vaccine hesitancy among women healthcare and frontline workers with a focus on vaccination during pregnancy and lactation.

METHODS

The current study was a cross sectional observational study conducted among women healthcare and frontline workers as defined by the Government of India. The objectives of the study were to study the prevalence of COVID-19 vaccine hesitancy among women healthcare and frontline workers and to explore the factors associated with vaccine hesitancy

Inclusion criteria

The inclusion criteria was as follows: women who were >18 -40 years age, willing to provide consent, healthcare as defined by the Government of India: health care providers and workers in health care settings (public and private), including ICDS workers.[10] Frontline workers (FLWs) as defined by the Government of India: personnel from state and central police organisation, armed forces, home guards, prison staff, disaster management volunteers, civil defence organisation, municipal workers and revenue officials engaged in surveillance and containment activities or frontline workers.[10]

Institutional ethical committee (Pro-cert no-EC/NEW/INST/2020/548) approval was obtained (IEC/Pharmac/2021/251). The recruitment of participants will be done by purposive snowballing technique over a period of 15 days. The residence was divided into regions-south India (Karnataka, Andhra Pradesh, Telangana, Tamil Nadu, Kerala), Central India (Madhya Pradesh, Chhattisgarh, Vidarbha), western India (Gujarat, Rajasthan, Maharashtra), north India, east India, north-east India and Andaman and Nicobar Islands. The data collection was done through an online questionnaire generated with the help of Google forms. A questionnaire was sent to experts on the subject to establish validity and relevance of the questions and was then pilot tested on a subset of our intended population. The questionnaire was then sent via WhatsApp and email to individuals requesting them to complete the questionnaire and forward it further. A written consent was displayed at the beginning of participant record form. Only after giving consent, the participant record form was made accessible to participants. In case of nonresponse, a reminder was sent twice at weekly intervals. Incompletely filled responses were not included in the analysis. Part 1 of the questionnaire collected the socio-demographic data of the individual with regards to the age, education and residence. The second part focused on the health and reproductive history. Part three of the questionnaire documented their experience with the COVID infection and attitude towards COVID-19 vaccine.

The data collected was entered in a spread-sheet, categorical data and continuous data was recorded into numerical variables and expressed as mean and median and frequency, respectively. Data analysis was done using SPSS software version 22.

RESULTS

During the period of data collection, a total of 128 women answered the questionnaire. After excluding women who exceeded the age criteria and incompletely filled questionnaires, 101 responses were considered for analysis.

Table 1 represents the socio-demographic data of the study population.

Table 1: Socio-demographic data (N=101).

Characteristics	Number (%)
Education	
Secondary	2 (2)
Higher Secondary	11 (10.9)
Graduate	37 (36.6)
Postgraduate and above	51 (50.4)
Residence	
South India	13 (12.9)
Central India	28 (27.7)
Western India	37 (36.6)
North India	15 (14.9)
North East India	1 (1)
East India	5 (5)
Andaman and Nicobar Islands	2 (2)
Parity	
Nulliparous	48 (47.5)
One	31 (30.7)
Two	20 (19.8)
More than two	2 (2)
Not pregnant	74 (73.3)
Planning pregnancy	6 (5.9)
Currently pregnant	9 (8.9)
Breastfeeding	12 (11.9)

Twenty six percent women had comorbidities of which 11.9% had hypothyroidism, 5.9% had asthma, 3% had hypertension and diabetes each and 1% had systemic lupus erythematosus, autoimmune disease and physical handicap each. Of the 9 women who were pregnant, majority was in the second trimester (55.6%). Majority of the women, 63.6% had been feeding for more than six months.

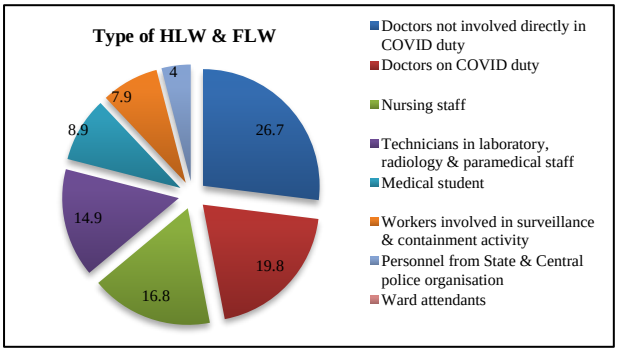

Figure 1: Types of healthcare and frontline workers.

The types of healthcare and frontline workers included in the study are depicted in the Figure 1.

Only 39.6% respondents had ever been ever been infected with the virus. Of these majority had been infected before the vaccination (71.4%) and had mild disease (90%).

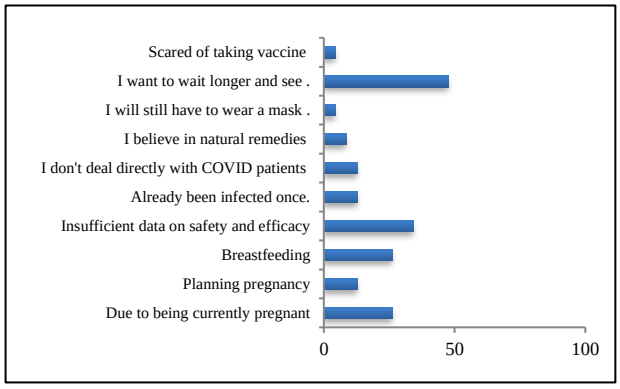

Figure 2: Reasons for refusal of vaccine.

Of the respondents who had refused vaccination, most wanted to wait longer for further research on safety and efficacy (47.8%) whereas 26.4% gave the reason as pregnancy or planning pregnancy (13%). The details are given in the Figure 2.

Eighty seven percent of the vaccinated had taken Covishield vaccine whereas the rest (12.5%) had been vaccinated with Covaxin. At the time of conducting the survey, 78.2% of the respondents had taken both doses of the vaccine. Only nine ladies had refused the second dose either due to getting pregnant (2), planning pregnancy (1), adverse reaction with first dose (2) and eventration of diaphragm (1). Six women were waiting for the second dose as the guidelines for interval between two doses increased from 28 days to 84 days in May 2021.

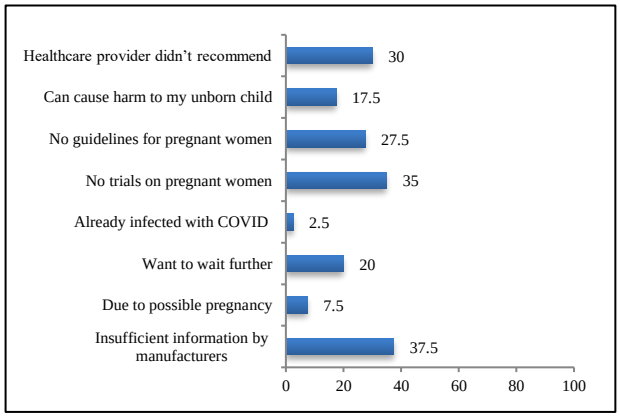

Figure 3: Concerns related to vaccination in pregnancy.

When asked about the concerns related to vaccination in pregnancy, the women gave the following responses (Figure 3).

Fifty percent of the respondents listed their healthcare provider or their knowledge as a doctor as their source of information. This was followed by the internet (40.6%), social media (37.6%), family and friends (37.6%) and newspapers (20.8%) as the sources influencing their decision to get vaccinated

DISCUSSION

The World Health Organization (WHO) defined the vaccine hesitancy as a behavior, influenced by a number of factors including issues of confidence (do not trust vaccine or provider), complacency (do not perceive a need for a vaccine, do not value the vaccine), and convenience (access).[30] A systematic review of 31 studies COVID-19 vaccine hesitancy worldwide found that vaccine acceptance rates ranged from 27.7% in the Democratic Republic of the Congo to 78.1% in Israel.[31,32] In the present study, the prevalence of vaccine hesitancy was 22.7%. The most common reason for refusal of vaccination was insufficient data about the safety and efficacy of the vaccine and that the vaccines were produced in haste and the participants wanted to wait longer for more data. This was corroborated by Manning et al, Taylor et al, Jain et al and Troiano et al in various parts of the world.[9,30,33,34] Similar findings were reported in a study by Rosso et al; wherein women expressed concerns about the safety of the vaccine and the quality and impartiality of information provided by healthcare professionals and pharmaceutical companies.[35] A common worry about vaccine effectiveness was often about how, for whom and for how long vaccines work. These concerns were also seen to damper the acceptance of the COVID-19 vaccine.

Alabbad et al instead, reported that the most common reason for vaccine refusal was believing that it had no positive effect and that it was unnecessary.[36] In a study conducted by Pugliese-Garcia et al in Zambia, some participants preferred informal, traditional and religious approaches to prevention and cure.[37] Krishnamoorthy et al reported that the major reason for the hesitancy was the unverified and potentially misleading information spread regarding the safety of the vaccine through social media among health workers and parents.[38] Jain et al also reported this among medical students in India.[9] Hence it is essential to promote reliable sources of information such as official websites and through trained professionals.

The healthcare workers play a pivotal role in addressing vaccine hesitancy and promoting vaccine uptake. Studies have shown that HCWs who are vaccinated are more likely to recommend vaccines to friends, family, and their patients.[31,39] The devastating second wave highlights the importance of rapid vaccine coverage to reach the level of herd immunity in the community and HCW play a pivotal role in this.

In the present study, 15 of 27 women refused vaccination due to being either pregnant, planning to conceive or breastfeeding. The reasons for pregnant women to decline COVID-19 vaccination during pregnancy even if the vaccine were safe and free were that they did not want to expose their developing baby to any possible harmful side effects, would like to see more safety data among pregnant women and unclear recommendations from the healthcare provider. Sketje et al also demonstrated similar findings in a study conducted among pregnant women of 16 countries.[2] Pregnant and lactating women are usually not included in the vaccine research, primarily because of safety concerns for mother and fetus.[27] Hence pregnant women have been excluded from all the ongoing trials for COVID-19 vaccine leading to paucity of data. However, Pfizer (23 pregnancies) and Moderna (12 pregnancies) reported that a few participants inadvertently became pregnant during the trials. Pfizer has announced a global Phase 2/3 trial to evaluate the safety, tolerability, and immunogenicity of the COVID-19 vaccine in 4000 healthy women vaccinated between 24 and 34 weeks of gestation pregnant women.[27] Moderna and the United Kingdom have each created a registry to document obstetric, neonatal, and infant outcomes among vaccinated pregnant women. Johnson and Johnson subsidiary Janssen is also planning a phase 2 placebo-controlled trial among pregnant women. The Center for Disease Control (CDC) has created a voluntary smartphone-based app called "v-safe," which includes pregnant women, to register voluntary reporting of adverse events following Covid vaccination.[23] Thus with these initiatives, more data should be available very soon. The CDC, ACOG, and SMFM have recommended supporting the offer of COVID-19 vaccines to pregnant persons.[20,21]

The government of India approved COVID-19 vaccination for pregnant women on 29th June 2021. This recommendation was not in place at the time of conducting the survey. Hence that may be a reason for vaccine hesitancy among pregnant and breastfeeding women. Since the launch of the COVID-19 vaccination on 16th January 2021, India has achieved the admirable feat of administering100 crore vaccine doses as of 22nd October 2021 despite vaccine shortages and initial reluctance among the general population. This indicates that the disastrous second wave had a positive effect on vaccine hesitancy and it has been largely overcome. It will remain critical to sustain and scale up these efforts as the vaccination campaign advances in order to successfully keep the third wave at bay.

A major drawback of the study is that the data was collected during the peak of the second wave when most of the healthcare workers were involved in handling the tremendous load of patients and hence response rate may have been low. Moreover, the current study was conducted after COVID-19 vaccination had been completed for healthcare workers. Therefore, it may have underestimated the initial vaccine hesitancy of those who subsequently converted to the vaccine acceptance group and were ultimately vaccinated. Also, this was a cross-sectional survey administered at a single time-point when the Government of India had still not recommended

vaccination for pregnant and lactating women. This recommendation came into effect from June 29, 2021. Willingness to get vaccinated may have changed over time and be influenced by factors such as newer knowledge.

CONCLUSION

As HCWs are envoys for evidence based medical interventions, and they are critical in promoting vaccine acceptance amongst the general population, it is important to design effective strategies to improve vaccine acceptance amongst this population. Health education programs must be tailored to increase awareness regarding vaccine efficacy and safety to counter apprehension.

Policy makers must address denial and doubt of the disease, public fears and misconception using effective communication to promote including face mask-wearing and mass vaccination to end this pandemic crisis. Although vaccine hesitancy showed a diminishing trend over time, every effort should be made to expand vaccine coverage and encourage pregnant and lactating women to take the shot.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee Pro-cert no-EC/NEW/INST/2020/548) (IEC/Pharmac/2021/251)

REFERENCES

1. Schwarzinger M, Watson V, Arwidson P, Alla F, Luchini S. COVID-19 vaccine hesitancy in a representative working-age population in France: a survey experiment based on vaccine characteristics. Lancet Public Health. 2021;6:e210-21
2. Skjefte M, Ngirbabul M, Akeju O, Escudero D, Hernandez-Diaz S, Wyszynski DF, et al. COVID-19 vaccine acceptance among pregnant women and mothers of young children: results of a survey in 16 countries. Eur J Epidemiol. 2021;36(2):197-211.
3. Defendi HG, da Silva Madeira L, Borschiver S. Analysis of the COVID-19 vaccine development process: An exploratory study of accelerating factors and innovative environments. J Pharm Innov. 2021:1-7.
4. Burgos RM, Badowski ME, Drwiega E, Ghassemi S, Griffith N, Herald F, et al. The race to a COVID-19 vaccine: Opportunities and challenges in development and distribution. Drugs Context. 2021;10.
5. Rzymski P, Zeyland J, Poniedziałek B, Małecka I, Wysocki J. The perception and attitudes toward COVID-19 vaccines: a cross-sectional study in Poland. Vaccines. 2021;9(4):382.
6. Polack FP, Thomas SJ, Kitchin N, Absalon J, Gurtman A, Lockhart S, et al. Safety and efficacy of the BNT162b2 mRNA Covid-19 vaccine. N Engl J Med. 2020;383(27):2603-15.
7. Baden LR, El Sahly HM, Essink B, Kotloff K, Frey S, Novak R, et al. Efficacy and safety of the mRNA-1273 SARS-CoV-2 vaccine. N Engl J Med. 2021;384(5):403-16.
8. Voysey M, Clemens SA, Madhi SA, Weckx LY, Folegatti PM, Aley PK, et al. Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. Lancet. 2021;397(10269):99-111.
9. Jain J, Saurabh S, Kumar P, Verma MK, Goel AD, Gupta MK, et al. COVID-19 vaccine hesitancy among medical students in India. Epidemiol Infect. 2021;149:e132.
10. MoHFW. COVID-19 vaccination- operational guidelines (updated 20 December 2020). New Delhi: Ministry of Health and Family Welfare, Government of India. 2021. Available from: https://www.mohfw.gov.in/pdf/COVID19VaccineOG111Chapter16.pdf. Accessed on 2 May 2021.
11. MacDonald NE. Vaccine hesitancy: Definition, scope and determinants. Vaccine. 2015;33(34):4161-4.
12. MacDonald NE. The SAGE Working Group on Vaccine Hesitancy Vaccine hesitancy: definition, scope and determinants. Vaccine. 2015;33:4161-4.
13. Murphy J, Vallières F, Bentall RP, Shevlin M, McBride O, Hartman TK, et al. Psychological characteristics associated with COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom. Nature Commun. 2021;12(1):29.
14. Dubé E, Laberge C, Guay M, Bramadat P, Roy R, Bettinger JA. Vaccine hesitancy: an overview. Hum Vaccines Immunotherap. 2013;9(8):1763-73.
15. Baldo V, Reno C, Cocchio S, Fantini MP. SARS-CoV-2/COVID-19 vaccines: the promises and the challenges ahead. Vaccines. 2021;9(1):21.
16. Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. Nat Hum Behav. 2021;5(3):337-48.
17. Schiavo R. Vaccine communication in the age of COVID-19: Getting ready for an information war. J Commun Healthcare. 2020;13:73-5.
18. Johnson NF, Velásquez N, Restrepo NJ, Leahy R, Gabriel N, El Oud S, et al. The online competition between pro-and anti-vaccination views. Nature. 2020;582(7811):230-3.
19. Rzymski P, Zeyland J, Poniedziałek B, Małecka I, Wysocki J. The perception and attitudes toward COVID-19 vaccines: A cross-sectional study in Poland. Vaccines. 2021;9(4):382.
20. American College of Obstetricians and Gynecologists. Vaccinating pregnant and lactating patients against COVID-19. 2020. Available from: http://www.aofog.net/pdf/Vaccinating%20Pregnant%20and%20Lactating%20Patients%20Against%20COVID-19%20_%20ACOG.pdf. Accessed on 31 August 2021.
21. Society for Maternal Fetal Medicine. SARS-Co-V-2 Vaccination in Pregnancy. Available from:

https://s3.amazonaws.com/cdn.smfm.org/media/2591/SMFM_Vaccine_Statement_12-1-20. Accessed on 12 July 2021.
22. Academy of Breastfeeding Medicine Considerations for COVID-19 Vaccination in Lactation. Available from: https://www.bfmed.org/abm-statement-considerations-for-covid-19-vaccination-in-lactation. Accessed on 5 June 2021.
23. Centers for Disease Control and Prevention. COVID-19 (Coronavirus Disease): People with Certain Medical Conditions. Available from: https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html. Accessed on 5 November 2021.
24. Royal College of Obstetricians and Gynaecologists. Updated Advice on COVID-19 Vaccination in Pregnancy and Women Who Are Breastfeeding. Available from: https://www.rcog.org.uk/en/news/updated-advice-on-covid-19-vaccination-in-pregnancyand women-whoare-breastfeeding/. Accessed on 31 August 2021.
25. Advisory Committee on Immunization Practices. ACIP Recommendations. Available from: https://www.cdc.gov/vaccines/acip/recommendations.html. Accessed on 5 June 2021.
26. Dooling K, Marin M, Wallace M, McClung N, Chamberland M, Lee GM, et al. The advisory committee on immunization practices' updated interim recommendation for allocation of COVID-19 Vaccine- United States, December 2020. Morb Mortal Week Rep. 2021;69(5152):1657-60.
27. Rasmussen SA, Kelley CF, Horton JP, Jamieson DJ. Coronavirus Disease 2019 (COVID-19) Vaccines and Pregnancy: What Obstetricians Need to Know. Obstet Gynecol. 2021;137(3):408-14.
28. Allotey J, Stallings E, Bonet M, Yap M, Chatterjee S, Kew T, et al. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: Living systematic review and meta-analysis. BMJ. 2020;370:m3320.
29. Agyekum MW, Afrifa-Anane GF, Kyei-Arthur F, Addo B. Acceptability of COVID-19 vaccination among health care workers in Ghana. Adv Public Health. 2021;2021:1-8.
30. Troiano G, Nardi A. Vaccine hesitancy in the era of COVID-19. Public Health. 2021;194;245-51.
31. Mehta K, Dhaliwal BK, Zodpey S, Loisate S, Banerjee P, Sengupta P, et al. COVID-19 vaccine acceptance among healthcare workers in India: Results from a cross-sectional survey. PLOS Glob Public Health. 2022;2(7):e0000661.
32. Sallam M. COVID-19 Vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates. Vaccines. 2021;9(2).
33. Manning ML, Gerolamo AM, Marino MA, Hanson-Zalot ME, Pogorzelska-Maziarz M. COVID-19 vaccination readiness among nurse faculty and student nurses. Nurs Outlook. 2021;69(4):565-73.
34. Taylor S, Landry CA, Paluszek MM, Groenewoud R, Rachor GS, Asmundson GJ. A proactive approach for managing COVID-19: the importance of understanding the motivational roots of vaccination hesitancy for SARS-CoV2. Front Psychol. 2020;11:575950.
35. Rosso A, Massimi A, Pitini E, Nardi A, Baccolini V, Marzuillo C, et al. Factors affecting the vaccination choices of pregnant women for their children: a systematic review of the literature. Hum Vaccines Immunother. 2020;16(8):1969-80.
36. Alabbad AA, Alsaad AK, Al Shaalan MA, Alola S, Albanyan EA. Prevalence of influenza vaccine hesitancy at a tertiary care hospital in Riyadh, Saudi Arabia. J Infect Public Health. 2018;11(4):491-9.
37. Pugliese-Garcia M, Heyerdahl LW, Mwamba C, Nkwemu S, Chilengi R, Demolis R, et al. Factors influencing vaccine acceptance and hesitancy in three informal settlements in Lusaka, Zambia. Vaccine. 2018;36(37):5617-24.
38. Krishnamoorthy Y, Kannusamy S, Sarveswaran G, Majella MG, Sarkar S, Narayanan V. Factors related to vaccine hesitancy during the implementation of Measles-Rubella campaign 2017 in rural Puducherry-a mixed-method study. J Fam Med Prim Care. 2019;8(12):3962.
39. Kabamba Nzaji M, Kabamba Ngombe L, Ngoie Mwamba G, Banza Ndala DB, Mbidi Miema J, Luhata Lungoyo C, et al. Acceptability of vaccination against COVID-19 among healthcare workers in the Democratic Republic of the Congo. Pragmat Observat Res. 2020;11:103-9.

Cite this article as: Kamath A, Yadav A, Baghel J, Mundle S. Vaccine hesitancy: a major hurdle even among women healthcare workers. Int J Reprod Contracept Obstet Gynecol 2023;12:1050-5.