

KNOWLEDGE AND AWARENESS REGARDING BREAST FEEDING AND COVID-19 VACCINATION AMONG PREGNANT AND LACTATING MOTHERS ATTENDING OPD IN A SERVICE HOSPITAL DURING COVID-19 PANDEMIC

A. R. RAJAN¹, V. B. TRIPATHI², SHAFIQUE AHMED³,
ANUPAMA ARVIND BHAVE⁴

1. PROFESSOR, DEPT OF PEDIATRICS, MILITARY HOSPITAL KIRKEE, RANGE HILLS ROAD, KHADKI, PUNE, MAHARASHTRA, INDIA

2. ASSOCIATE PROFESSOR, DEPT OF OBST & GYNAE, MILITARY HOSPITAL KIRKEE, RANGE HILLS, KHADKI, PUNE, MAHARASHTRA, INDIA

3. ASSISTANT PROFESSOR PREVENTIVE & SOCIAL MEDICINE, STATION HEALTH OFFICER KIRKEE, RANGE HILLS, KHADKI, PUNE, MAHARASHTRA, INDIA

4. DEPT OF PEDIATRICS, MILITARY HOSPITAL KIRKEE, RANGE HILLS ROAD, KHADKI, PUNE, MAHARASHTRA, INDIA

Corresponding Author:

ANUPAMA ARVIND BHAVE, DEPT OF PEDIATRICS, MILITARY HOSPITAL KIRKEE, RANGE HILLS ROAD, KHADKI, PUNE, MAHARASHTRA, INDIA

ABSTRACT

Aim: To assess the Knowledge and Awareness regarding Breastfeeding and COVID-19 vaccination among Pregnant and Lactating Mothers attending OPD in a Service Hospital during COVID-19 Pandemic.

Material and Methods: Hospital based cross sectional study. Sample size of 380 Pregnant and Lactating Mothers attending OPD antenatally or postnatally were included in the study. Ethics committee approval was taken. A peer reviewed predesigned questionnaire was used to obtain information after taking consent. Demographic data and Knowledge of Mothers regarding Breastfeeding and COVID-19 Vaccination data was collected and analyzed.

Results: Our Study revealed knowledge and awareness regarding Breastfeeding and COVID-19 Vaccination in Pregnant and Lactating Mothers during COVID-19 Pandemic in a Service Hospital to be 53% and 57% respectively. Our Study also found a significant correlation between Age and Education of Mothers and their Knowledge regarding Breastfeeding in Pregnant and Lactating Mothers during COVID-19 Pandemic. A significant Correlation was found between Education of Mothers and their Knowledge regarding COVID-19 Vaccine in Pregnant and Lactating Mothers during COVID-19 Pandemic.

Conclusion: This study emphasizes the need to focus on promotion of breast feeding and COVID-19 Vaccination in Pregnant and Lactating during COVID-19 Pandemic. These

simple steps may contribute in lowering Neonatal and Infant Mortality rates. Breastfeeding must continue after Maternal COVID-19 vaccination.

Keywords: Breastfeeding, COVID-19 Vaccination, Pregnant and Lactating Mothers, Knowledge, WHO Guidance/FAQ Breastfeeding and Covid-19, Questions and answers COVID-19 vaccines and pregnancy, frequently asked questions COVID-19 vaccines and breastfeeding

Introduction

Breast feeding practice reaps rich health dividends for the mother and her Baby alike. The COVID-19 Pandemic created uncertainty in the minds of Pregnant and Lactating Mothers as to whether they would be putting their babies at risk of SARS COV2 infection by Breast feeding. These same doubts were addressed by the WHO Guidance/FAQ on Breastfeeding and COVID-19^[1]. Breastfeeding is essential to keep the neonatal and infant mortality low in India during COVID-19 Pandemic^[2].

Exclusive breast feeding for first 6 months of life followed by continuation of breast feeding beyond 2 years of age is recommended by WHO^[3].

SARS COV-2 causes pathogenesis by entry through respiratory tract in Pregnancy and in young children. There is a decrease in immunity by way of reduction in T and B Lymphocytes to adapt to changes during pregnancy. Pregnant women have increased chance of acquiring Respiratory infections because of Increase in Estrogen and Progesterone levels which cause swelling of the upper respiratory tract as also capacity of lungs to expand is reduced during Pregnancy^[4].

COVID-19 vaccine offers protective immunity to mother as well as to their neonates as the antibodies have been found in the Umbilical Cord Blood of the newborns too^{[5],[6]}. The risk of delivering a preterm neonate is higher in Pregnancy with COVID-19 as also the likelihood of hospital admission of babies born to Pregnant COVID-19 Mothers is thrice more^[7].

Breastfeeding should be continued by mothers after COVID-19 Vaccination as per WHO Recommendation. The availability, use and acceptance of variety of effective COVID-19 Vaccines will enable reduction of COVID-19 Mortality and morbidity, across the world^[8].

These same doubts need to be addressed so that proper advice can be given to the mothers about breastfeeding and COVID-19 Vaccination during COVID-19 Pandemic as per the WHO Guidance/FAQ on Breastfeeding and COVID-19^[1] and WHO Questions and Answers on COVID-19 Vaccination and Pregnancy^[5]

Material and Methods

A Hospital based cross sectional study was conducted over a period of 3 months. This study included a Sample size of 380 Pregnant and Lactating Mothers attending OPD in a Service Hospital antenatally or postnatally during the COVID-19 Pandemic.

Ethics committee approval was taken. A peer reviewed predesigned questionnaire was used to obtain information after taking consent.

Scoring was done on the basis of WHO guidance/FAQ on breastfeeding and COVID-19. Also based on World Health Organization. (2022). Questions and answers: COVID- 19

vaccines and pregnancy, frequently asked questions: COVID-19 vaccines and breastfeeding based on WHO interim recommendations (12 August 2021), COVID-19 Vaccination during Pregnancy and Lactation Guidelines by Ministry of Health and Family Welfare, Government of India.

Inclusion criteria:

- Pregnant and Lactating Mothers attending OPD in a Service Hospital antenatally or postnatally during the COVID-19 Pandemic
- Willing for Survey

Exclusion Criteria:

- Mother's specifically advised against breastfeeding or COVID-19 Vaccination on medical grounds.
- Unwilling for Survey

Demographic Information and Information pertaining to Knowledge of mothers regarding Breastfeeding and COVID-19 Vaccination during COVID-19 Pandemic was collected using a predesigned peer reviewed questionnaire after obtaining the participant's consent. The data collected was tabulated in an MS Excel Sheet. Statistical Analysis was done using Statistical Package for the Social Sciences (SPSS) version 20 for calculation of Descriptive Analysis like frequency and percentages. Pearson's Correlation Coefficient for Age, Education, Parity and Mode of Delivery vis a vis Knowledge of Mothers regarding Breastfeeding and COVID-19 Vaccination was calculated. Correlation significant at the 0.01 level 2-tailed was noted.

Results

This Study included 380 Pregnant and Lactating Mothers attending OPD in a Service Hospital, antenatally or postnatally during the COVID-19 Pandemic and willing for participation. Socio-demographic Characteristics of the Study Participants was as shown in **TABLE 1**.

Their Overall Knowledge assessment for the various aspects of Breastfeeding and COVID-19 Vaccination during COVID-19 Pandemic was as follows:

Breastfeeding:

1. 47 % of mothers were aware that COVID-19 is not passed through Breast milk during Breastfeeding by suspected / confirmed COVID-19 Mothers.
2. In the same circumstances 28 % of mothers knew that Baby should be breastfed and placed skin to skin with mother.
3. 87% of all mothers knew that they should Wash hands, wear facemask, disinfect surfaces
4. Only 33% of Mothers had awareness to give Only Breast milk, No Formula milk
5. 32% of Mothers knew it was Safe to give expressed breast milk from COVID-19 mother
6. Awareness regarding Ability to restart breastfeed after recovery from other illness was seen in 72% of Mothers.
7. 57% of Mothers knew the Difference in breastfeeding and social distancing WHO recommendation in COVID-19
8. Only 22% of Mothers knew that Baby should not to be separated from COVID-19 mother.

9. 25% of Mothers knew to wash breast before breastfeed if COVID-19 mother has coughed /sneezed on chest

10. 38% of Mothers knew that the Best alternative is Mother's EBM if unable to breastfeed

COVID-19 Vaccination during Pregnancy and Lactation:

11. 58% Mothers knew that a Pregnant Woman can take COVID-19 Vaccine.

12. 48% of Mothers said that they had taken COVID-19 Vaccine on being Pregnant.

13. 62% of Mothers were aware that a mother can Breastfeed after taking COVID-19 Vaccine.

14. Awareness regarding COVID-19 Vaccine can be taken while Breastfeeding a New Born was seen in 39% Mothers.

15. 80% of Mothers were aware that Pregnancy is safe after taking COVID-19 Vaccine.

Knowledge and Awareness regarding Breast feeding and COVID-19 Vaccination among Pregnant and Lactating mothers as per Age, Education of Mother, Parity and Mode of Delivery was as depicted in **TABLE 2.** and **TABLE 3.** respectively.

TABLE 1: Socio-demographic Characteristics of the Study Participants

S.No.	Socio-demographic Characteristics	N (%)
1.	Age (inyears)	
	20-30	269 (71%)
	30-40	111(29 %)
2.	Education of Lady	
	≤ 12th Std	210 (55 %)
	>12 th Std	170 (45 %)
3.	Parity	
	Nullipara	74 (19 %)
	≥ Primipara	306 (81 %)
4.	Mode of Delivery	
	Not delivered	73 (19 %)
	SVD	201 (53 %)
	LSCS	106 (28 %)

TABLE 2: Knowledge and Awareness regarding Breast feeding among Pregnant and Lactating mothers during COVID-19 Pandemic

CORRECT ANSWERS									
Questions	Age (years)		Parity		Education		Mode of Delivery		
	20-30	30-40	NIL	≥1	Mother	Mother	ND	SVD	LSCS
	≤ 12 th	>12 th							
Total Number (n=380)	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %
Q1. COVID-19	129	49	32	146	87	91	32	98	48

is not passed through Breastfeeding?	(48%)	(44%)	(43%)	(48%)	(41%)	(54%)	(44%)	(49%)	(45%)
Q2.Baby should be breastfed and placed skin to skin with mother	70 (26%)	35 (32%)	21 (28%)	84 (28%)	50 (24%)	55 (32%)	20 (27%)	57 (28%)	28 (26%)
Q3.Wash hands, wear facemask, disinfect surfaces	244 (91%)	86 (78%)	67 (91%)	263 (86%)	174 (83%)	156 (92%)	66 (90%)	165 (82%)	99 (93%)
Q4.To give Only Breast milk, No Formula milk	83 (31%)	42 (38%)	25 (34%)	100 (33%)	62 (30%)	63 (37%)	25 (34%)	70 (35%)	30 (28%)
Q5. Safe to give expressed breast milk from COVID-19 mother?	83 (31%)	39 (35%)	24 (32%)	98 (32%)	54 (26%)	68 (40%)	24 (33%)	64 (32%)	34 (32%)
Q6. Ability to restart breastfeed after recovery from other illness	200 (74%)	73 (66%)	53 (72%)	220 (72%)	144 (69%)	129 (76%)	53 (73%)	143 (71%)	77 (73%)
Q7.Difference in breastfeeding and social distancing WHO recommendation	153 (57%)	63 (57%)	40 (54%)	176 (58%)	119 (57%)	97 (57%)	40 (55%)	116 (58%)	60 (57%)
Q8 No separation of COVID-19 Mother from her Baby	57 (21%)	25 (23%)	13 (18%)	69 (23%)	35 (17%)	47 (28%)	12 (16%)	44 (22%)	26 (25%)
Q9. Not to wash breast before every breastfeed	68 (25%)	27 (24%)	20 (27%)	75 (25%)	52 (25%)	43 (25%)	20 (27%)	49 (24%)	26 (25%)
Q10.EBM as	94	50	28	116	69	75	28	78	38

next Best alternative if unable to breastfeed	(35%)	(45%)	(38%)	(38%)	(33%)	(44%)	(38%)	(39%)	(36%)
------------------------------------------------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

TABLE 3: Knowledge and Awareness regarding COVID-19 vaccination among Pregnant and Lactating mothers

CORRECT ANSWERS										
Questions	Age (years)		Parity		Education		Mode of Delivery			
	20-30	30-40	NIL	≥1	Mother	≤ 12th	>12th	Std	ND	SVD
Total Number (n=380)	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %	Aware (n) %
Q11. Pregnant Lady can take COVID-19 Vaccine	166 (62%)	55 (50%)	40 (54%)	181 (59%)	116 (55%)	105 (62%)	39 (53%)	117 (58%)	65 (61%)	
Q12. Have you taken COVID-19 vaccine during Pregnancy	137 (51%)	46 (41%)	39 (53%)	144 (47%)	100 (48%)	83 (49%)	38 (52%)	82 (41%)	63 (59%)	
Q13. Breastfeeding can be done after Mother's COVID-19 vaccination	166 (62%)	68 (61%)	42 (57%)	192 (63%)	123 (59%)	111 (65%)	42 (58%)	122 (61%)	70 (66%)	
Q14. COVID-19 vaccine can be taken while Breastfeeding	115 (43%)	33 (30%)	33 (45%)	115 (38%)	65 (31%)	83 (49%)	33 (45%)	65 (32%)	50 (47%)	
Q15. Safe to conceive after COVID-19 vaccination	219 (81%)	85 (77%)	60 (81%)	244 (80%)	160 (76%)	144 (85%)	59 (81%)	156 (78%)	89 (84%)	

Our Study revealed knowledge and awareness regarding Breastfeeding in Pregnant and Lactating Mothers during COVID-19 Pandemic to be 53%. The Knowledge and awareness regarding COVID-19 Vaccine in Pregnant and Lactating Mothers was found to be 57% during COVID-19 Pandemic.

Our Study also found a significant correlation between Age and Education of Mothers and their Knowledge regarding Breastfeeding in Pregnant and Lactating Mothers during COVID-19 Pandemic. (Pearson's Correlation Coefficient for Age was 0.153** Correlation significant at the 0.01 level 2-tailed), (Pearson's Correlation Coefficient for Education was 0.142** Correlation significant at the 0.01 level 2-tailed).

A significant Correlation was found between Education of Mothers and their Knowledge regarding COVID-19 Vaccine in Pregnant and Lactating Mothers during COVID-19 Pandemic. (Pearson's Correlation Coefficient for Education was 0.130* Correlation significant at the 0.05 level 2-tailed).

Discussion

Only 10.7% women agreed that they would breastfeed if infected with COVID, in a study by Kunno J et al in Thailand^[9]. In our study 47 % of mothers were aware that COVID-19 is not passed through Breast milk during Breastfeeding by suspected / confirmed COVID-19 Mothers.

Knowledge about Breastfeeding was found in 21% of the total score in an Egyptian study by Abusaad and El-Gilany. They also found a significant positive correlation between Mother's knowledge about breastfeeding and her education^[10]. In our study 41% Mothers were aware about Breastfeeding with education level 12th Std and below whereas 54% Mothers were aware at education level above 12th Std. Our Study also found a significant correlation between Age and Education of Mothers and their Knowledge regarding Breastfeeding in Pregnant and Lactating Mothers during COVID-19 Pandemic. (Pearson's Correlation Coefficient for Age was 0.153** Correlation significant at the 0.01 level 2-tailed), (Pearson's Correlation Coefficient for Education was 0.142** Correlation significant at the 0.01 level 2-tailed).

14.8% of pregnant women enrolled in a study by Maharlouei et al in Shiraz, Iran was aware that COVID-19 would not negatively affect their newborn's exclusive breastfeeding duration^[11].

In a study by Kaur et al from an eminent tertiary care hospital, New Delhi, India, only 18% of the Participating Pregnant women knew that Breastfeeding is the best feeding option for baby born to covid-19 mother, while 91-98% of pregnant women were aware that they should wash hands, wear mask and disinfect surfaces in contact^[12]. In our study 87% of all Mothers knew that they should Wash hands, wear facemask, disinfect surfaces.

In a study by Adhikari et al from a Tertiary care centre, Kathmandu, Nepal, 97.5% Postpartum Women participants washed hands before and after breastfeeding while 79.3% wore face mask while breastfeeding^[13].

A study from Morocco by Laamiri FZ et al on Breastfeeding Women, 26.8% women knew that Breastfeeding was possible in case of COVID-19 Mother, 82.1% knew about Respiratory hygiene and 92% knew about personal hygiene while breastfeeding during COVID-19 Pandemic^[14]. In our study 47% Mothers were aware about Breastfeeding in COVID-19 Mothers.

87% of all mothers knew that they should Wash hands, wear facemask, disinfect surfaces.

In a study by Kamal D et al at a Defence Service Tertiary Care Hospital on Pregnant Women OPD Participants, 50.2% knew that women with COVID- 19 can breastfeed the baby with proper hygiene^[15]. In our study 47% Mothers were aware about Breastfeeding in COVID-19 Mothers.

Vaccination

13.8% of Non-vaccinated Pregnant Women agreed for COVID-19 Vaccination during Pregnancy, 39.4% non-vaccinated breastfeeding women agreed to get the vaccination, if they received an offer, in a study by Schaal N K et al in Germany^[16]. In our study 58% Mothers knew that a Pregnant Woman can take COVID-19 Vaccine.

A study by Skirrow H et al in UK, COVID-19 vaccine acceptance was 62.1% during pregnancy^[17]. In our study 48% of Mothers said that they had taken COVID-19 Vaccine on being Pregnant.

29.5% of the Pregnant Women participants indicated they would agree to be vaccinated against COVID-19, in a study by Egloff C et al from France. Some of the Factors influencing acceptance of vaccination were being slightly older and multiparity^[18]. In our study 58% Mothers knew that a Pregnant Woman can take COVID-19 Vaccine. 62% vaccination awareness in 30 years age or below, whereas 50% in above 30 years age. Awareness about safety of COVID-19 Vaccination during Pregnancy was 54% in Nullipara whereas 59% in Multipara.

In a study from Ethiopia by Mose A., 51.9% of participant Lactating Mothers had good knowledge about COVID-19 vaccine. The finding of this study showed that 61% of lactating mothers had willingness to receive COVID-19 vaccination if it is available^[19]. Awareness regarding COVID-19 Vaccine can be taken while Breastfeeding a New Born was seen in 39% Mothers in our study.

In a study by Simmons L.A. et al, 43% of Pregnant participants from California, USA, reported planning to get the vaccine as soon as possible. The remaining 57% were hesitant: 27% responded that they would not receive the vaccine. Younger age of participant was one of the factors that predicted more COVID-19 vaccine hesitancy^[20]. 58% Mothers knew that a Pregnant Woman can take COVID-19 Vaccine. 48% of Mothers said that they had taken COVID-19 Vaccine on being Pregnant.

Conclusion

This study emphasizes the need to focus on promotion of breast feeding and COVID-19 Vaccination in Pregnant and Lactating during COVID-19 Pandemic. These simple steps may contribute in lowering Neonatal and Infant Mortality rates and breastfeeding and vaccination will also improve maternal postnatal health. COVID-19 general precautions are now known to all. COVID-19 Precautions while Breastfeeding, during COVID-19 pandemic is of great importance for the mother and baby's health. This study also creates awareness about COVID-19 Vaccination in Pregnancy and lactating Mothers. Breastfeeding must continue after Maternal COVID-19 vaccination.

References

1. World Health Organization. (2020). Frequently asked questions: breastfeeding and COVID-19: for health care workers, 12 May 2020. World Health Organization. Available from: <https://apps.who.int/iris/handle/10665/332719>. License: CC BY-NC-SA 3.0 IGO
2. Chawla D, Chirla D, Dalwai S, Deorari AK, Ganatra A, Gandhi A, et al. Perinatal-Neonatal Management of COVID-19 Infection – Guidelines of the Federation of Obstetric and Gynaecological Societies of India (FOGSI), National Neonatology Forum of India (NNF), and Indian Academy of Pediatrics (IAP). *Indian Pediatr.* 2020 June; 57:538-549.
3. Fact sheet: Infant and young child feeding [Internet]. World Health Organisation (Geneva); 24 Aug 2020; [cited 2020 Sept 15]. [about 7 screens]. Available from: <https://www.who.int/news-room/fact-sheets/detail/infant-and-young-child-feeding>
4. Liu, X., Chen, H., An, M. *et al.* Recommendations for breastfeeding during Coronavirus Disease 2019 (COVID-19) pandemic. *Int Breastfeed J* **17**, 28 (2022).
5. WHO Questions and Answers: COVID-19 vaccines and pregnancy WHO REFERENCE NUMBER: WHO/2019-nCoV/FAQ/Pregnancy/Vaccines/2022.1 World Health Organization. (2022). **Questions and answers: COVID-19 vaccines and pregnancy ,15 February 2022. World Health Organization.** <https://apps.who.int/iris/handle/10665/351855>. License: CC BY-NC-SA 3.0 IGO
6. IFE-Core Group, UNICEF, WHO, COVID-19 Infant Feeding Working Group. Frequently asked questions: COVID-19 vaccines and breastfeeding based on WHO interim recommendations (12 August 2021). Geneva: World Health Organization; 2021 (WHO/2019-nCoV/FAQ/Breast_feeding/Vaccines/2021.1).
7. Woodworth KR, Olsen EO, Neelam V, et al. Birth and Infant Outcomes Following Laboratory-Confirmed SARS-CoV-2 Infection in Pregnancy-SET-NET, 16 Jurisdictions, March 29–October 14, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:1635–1640.
8. Scientific Brief: Breastfeeding and COVID-19 [Internet]. World Health Organisation (Geneva); 23 Jun 2020; [cited 2020 Sept 15]. [about 7 screens]. WHO reference number: WHO/2019-nCoV/Sci_Brief/Breastfeeding/2020.1 Available from: <https://www.who.int/news-room/commentaries/detail/breastfeeding-and-covid-19> and <https://www.who.int/publications/i/item/10665332639> License: CC BY-NC-SA 3.0 IGO licence.
9. Kunno, J., Yubonpant, P., Supawattanabodee, B. *et al.* Knowledge, attitudes, and practices related to the COVID-19 pandemic among pregnant women in Bangkok, Thailand. *BMC Pregnancy Childbirth* **22**, 357 (2022).
10. Abusaad, F., Al-Gilany, A. Predictors of Breastfed Mother's knowledge, Attitude and Practice during COVID-19 Pandemic. *International Egyptian Journal of Nursing Sciences and Research*, 2022; 2(2): 27-35.

11. Maharlouei, N., Asadi, N., Bazrafshan, K., Roozmeh, S., Rezaianzadeh, A., Zahed-roozegar, M., Shaygani, F., Kharmandar, A., Honarvar, B., Hemyari, C., Omidifar, N., Zare, M., and Lankarani, K. B. (2020). Knowledge and Attitude regarding COVID-19 among Pregnant Women in Southwestern Iran in the Early Period of its Outbreak: A Cross-Sectional Study. *The American Journal of Tropical Medicine and Hygiene* 103, 6, 2368-2375, available from: <<https://doi.org/10.4269/ajtmh.20-0608>>[Accessed 20 June 2022]
12. Kaur TP, Rana A, Perumal V, Sharma A, Dadhwal V, Kulshrestha V, Singhal S, Meena J, Kumar S, Bhatla N. A Cross-Sectional Analysis to Evaluate Knowledge, Attitude And Practices Among Pregnant Women During COVID-19 Pandemic. *J Obstet Gynaecol India*. 2021 Aug;71(Suppl 1):18-27.
13. Adhikari SP, Pariyar J, Sapkota K, Gurung TK, Adhikari SR. Evaluation of Knowledge, Attitude, Practice and Hospital Experience Regarding COVID-19 Among Post-Partum Mothers at a Tertiary Care Center: A Cross-sectional Study. *Kathmandu Univ Med J*. 2020;COVID-19 Special Issue 70(2):10-4.
14. Laamiri F Z Barich F, Slaoui A, Hasswane N, ElgotA, KharbachA, Hassan A and Barkat A. Impact of covid 19 pandemic on knowledge, practice and mental health of breastfeeding women: experience of souissi maternity hospital of Rabat, Morocco. *E3S Web of Conferences* 319, 010 (2021)
15. Kamal D, Thakur VD, Swain SK, Vikneshram CR. Knowledge, attitude, and practice toward COVID-19 among pregnant women in a tertiary care hospital during the COVID-19 outbreak. *J Mar Med Soc* 2020;22:S66-71.
16. Schaal NK, Zöllkau J, Hepp P, Fehm T, Hagenbeck C. Pregnant and breastfeeding women's attitudes and fears regarding the COVID-19 vaccination. *Arch Gynecol Obstet*. 2021 Oct 27:1–8.
17. Skirrow H, Barnett S, Bell S, Riaposova L, Mounier-Jack S, Kampmann B, Holder B. Women's views on accepting COVID-19 vaccination during and after pregnancy, and for their babies: a multi-methods study in the UK. *BMC Pregnancy Childbirth*. 2022 Jan 14;22(1):33.
18. Egloff C, Couffignal C, Cordier AG, Deruelle P, Sibiude J, Anselem O, et al. (2022) Pregnant women's perceptions of the COVID-19 vaccine: A French survey. *PLoS ONE* 17(2): e0263512.
19. Mose A. Willingness to Receive COVID-19 Vaccine and Its Determinant Factors Among Lactating Mothers in Ethiopia: A Cross-Sectional Study. *Infect Drug Resist*. 2021;14:4249-4259.
20. Leigh Ann Simmons, Mackenzie D.M. Whipps, Jennifer E. Phipps, Nikita S. Satish, Geeta K. Swamy, Understanding COVID-19 vaccine uptake during pregnancy: 'Hesitance', knowledge, and evidence-based decision-making, *Vaccine*, Volume 40, Issue 19, 2022, Pages 2755-2760, ISSN 0264-410X,