

Paediatricians' perspectives regarding breastfeeding during the Covid-19 pandemic: A cross-sectional study

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Abstract

Introduction: Covid-19 pandemic has raised queries regarding implications for breastfeeding (BF). Data are limited and recommendations for initial days after birth differ. Parents count on paediatricians for optimal information about feeding their infants, especially when the mother is infected.

Objectives: To estimate knowledge of paediatricians about BF in suspected or confirmed maternal cases of Covid-19, its association with demographic variables, and participants' opinions about factors influencing their guidance to parents regarding infant nutrition in Covid-19 infected mothers.

Method: This was a prospective cross-sectional study based on an online questionnaire administered to paediatricians in Uttar Pradesh, India, from February to March 2021. A total of 389 paediatricians participated. Knowledge questions were based on the World Health Organization guidance on BF for Covid-19.

Results: Among the 389 participants, 44.5% had adequate knowledge, 38.3% had average knowledge, and 17.2% had inadequate knowledge; 96.4% paediatricians preferred mothers' milk for infants with Covid-19 infected mothers. Fear of transmission of infection to infant was the major restraint, while the low risk of transmission to the infant if infection prevention and control practices were followed was the most useful factor perceived while counselling an infected mother for BF.

Conclusions: Knowledge of paediatricians about BF in suspected or confirmed maternal cases of Covid-19 was adequate in 44.5%, average in 38.3% and inadequate in 17.2%. Majority (96.4%) of paediatricians favoured BF in maternal Covid-19 cases.

(Key words: Human milk, Breast milk, Mother-infant bonding, Infant and young child nutrition, Expressed breast milk, Skin-to-skin contact)

Introduction

Towards the end of 2019, cases of pneumonia due to a new infectious agent emerged in Wuhan, Hubei Province, China. World Health Organization (WHO) labelled the causative coronavirus as SARS-CoV-2¹. It rapidly spread globally and was acknowledged by the WHO as a pandemic on 11th March 2020².

The novel disease caused major uncertainties for pregnant mothers and infants on ways to prevent the newborn from acquiring the disease in cases where the mother was infected. Physical distancing, the norm of prevention, interferes with bonding of a mother-infant dyad. Whether breastfeeding (BF) can be a source of vertical transmission or direct BF can put the infant at a greater risk of acquiring the disease remains incompletely understood³. BF is the key foundation for infant and young child survival, nutrition, development, and maternal health⁴. However, fear of transmission of infection to their infant in the parents compounds the difficulty of healthcare professionals in guiding them to the best nutrition for their infant, often leading to separation of the infant from their mothers.


Covid-19 has infected more than 400 million people globally⁵. There have been more than 280 million births during this pandemic, and parents should be provided evidence-based recommendations for care of their infant⁶. Recommendations by various bodies differ in the approach towards the care of infants of Covid-19 infected mothers, creating confusion even in the minds of healthcare professionals⁷.

Objectives

To estimate paediatrician's knowledge about BF in suspected or confirmed maternal cases of Covid-19, its association with demographic variables, and

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participants' opinions about factors influencing their guidance to parents regarding infant nutrition in Covid-19 infected mothers.

Method

This prospective cross-sectional study was conducted among paediatricians of Uttar Pradesh (UP), India over two months through an online questionnaire. Online survey design was rational given the pandemic situation and the need to reach the maximum number of participants over a wide geographical area.

UP is the most populous Indian state with an approximate population of 20 billion where 59.7% infants received exclusive BF, compared to the national average of 63.7%, initiation of BF within the first hour of birth was 23.9%, compared to the national average of 41.8% and infant mortality rate was 50.4 per 1000 live births, compared to the national average of 35.2 per 1000 live births^{8,9}. Thus, in UP, paediatricians play a large role in advocating infant nutrition and it is important to assess their knowledge and opinions regarding BF during the Covid-19 pandemic.

Sample size was calculated using the formula z^2pq/d^2 . $z=1.96$ (for a confidence level of 95%), $p=50\%$ (unknown estimated proportion of the population), $q=1-p$, $d=5\%$ (tolerated margin of error). Calculated sample size was 384.

UP Chapter of the Indian Academy of Paediatrics (IAP) was contacted to obtain the names, phone numbers, and emails of all enrolled paediatricians. Paediatricians actively practising in UP were included in the study. Paediatricians working in a super-specialty not involved in care of newborns and infants were excluded. Study team contacted 1120 paediatricians. After applying exclusion criteria, 993 paediatricians were shortlisted, and we obtained informed consent from 521 to whom the questionnaire was forwarded; 389 responded within the stipulated time and were included in the study. This was considered adequate according to the calculated sample size.

Questionnaire was developed by the investigators based on available evidence and pilot interviews with a few senior paediatricians to develop questions on the opinions regarding BF. It was pilot-tested on seven paediatricians, who were excluded from the final assessment. Their feedback was recorded and relevant editing was performed. It contained questions on demographic parameters including sex, highest medical qualification, professional experience (in years), work set-up, designation, additional training on BF and number of infant milk formulae (IMF) prescribed per month by

participants. Knowledge instrument was based on 'Frequently asked questions: BF and Covid-19 for healthcare workers'¹⁰.

There were 16 questions with one correct answer for each except questions 2 and 8 which had two and four correct options respectively (for multiple answer questions participants could choose more than one option). Each correct response was given a score of 1 and an incorrect response a score of 0. A maximum score of 20 and a minimum score of 0 could be obtained. A score of more than 14 was considered adequate, 11-14 as average and below 11 as inadequate knowledge.

Paediatricians' opinions of the optimal method of infant feeding when the mother has Covid-19, what factors help and hinder them in counselling a Covid-19 infected mother for BF, and which guidelines they follow in their practice were asked. Questionnaire was completed during February and March 2021. After obtaining informed consent, the questionnaires on Google Forms were emailed to the participants who were reminded thrice at intervals of 7-10 days to complete it. Anonymity was maintained as no personal details were asked and the raw data were securely password protected by the principal investigator. Responses collected were analysed.

Ethical issues: The study was approved by the Institutional Ethics Committee (IEC) of Hind Institute of Medical Sciences UP (IEC/IRB No: HIMS/IRB/2020-21/1124) on 18.07.2020. Informed consent was obtained from the paediatricians participating in study.

Statistical analysis: Raw data were downloaded from Google Forms in Microsoft Excel and exported to SPSS version 25. Frequency tables were generated for all demographic variables. Knowledge score was calculated based on responses. Mean (SD) and frequency (%) were used. For categorical variables Chi-squared test was used. Level of significance was set as <0.05 , and values shown were two-tailed.

Results

Table 1 shows the demographic characteristics of the participants.

Mean (SD) knowledge score was 13.7 (3.1). Knowledge was adequate in 173 (44.5%), average in 149 (38.3%) and inadequate in 67 (17.2%) participants. Knowledge score was associated with whether the paediatricians were at a teaching faculty post in a medical college or not ($p=0.03$) and the number of IMF prescribed by them ($p=0.01$) (Table 2).

Table 1: Demographic characteristics of the participants (n=389)

Demographic variable	n (%)
<i>Gender</i>	
Female	100 (25.7)
Male	289 (74.3)
<i>Highest qualification</i>	
Post-Graduation (MD/DNB/Diploma)	367 (94.3)
Super Specialization in Neonatology (DM/Fellowship)	22 (05.7)
<i>Experience (years)</i>	
≤ 10	150 (38.6)
>10	239 (61.4)
<i>Work profile</i>	
Private Practitioner	238 (61.2)
Government Doctor	49 (12.6)
Government Medical College	49 (12.6)
Private Medical College	53 (13.6)
<i>Designation</i>	
Private Practitioner	238 (61.2)
Specialist at Government Hospital	49 (12.6)
Teaching Faculty	102 (26.2)
<i>Received additional training for breastfeeding</i>	
Yes	226 (58.1)
No	163 (41.9)
<i>Infant milk formula prescribed per month</i>	
<1	230 (59.1)
1-10	136 (35.0)
>10	23 (05.9)

MD = Doctor of Medicine, DNB = Diplomate of National Board, DM = Doctorate of Medicine

Table 2: Knowledge scores associated with demographic variables of the participants (n=389)

Demographic variable	Knowledge score			X ²	p
	Adequate (>14) n=173	Average (11-14) n=149	Inadequate (<11) n=67		
<i>Gender</i>					
Female	41	38	21	1.483	0.48
Male	132	111	46		
<i>Highest qualification</i>					
Post-Graduation	161	141	65	1.45	0.48
Super Specialization	12	08	02		
<i>Experience (years)</i>					
≤ 10	69	54	27	0.552	0.76
>10	104	95	40		
<i>Work profile</i>					
Private Sector	128	115	48	0.863	0.65
Government Sector	45	34	19		
<i>Designation</i>					
Teaching Faculty	57	34	12	7.271	0.03
Non-Teaching	116	115	55		
<i>Additional training for breastfeeding</i>					
Yes	104	90	32	3.555	0.17
No	69	59	35		
<i>Infant milk formula prescribed per month</i>					
<1	112	78	40	12.788	0.01
1-10	58	58	20		
>10	03	13	07		

Knowledge Score – Maximum possible = 20, Minimum possible = 0

Most (376, 96.4%) paediatricians believed that mother's milk should be given to the infant, 176 (45.2%) said that mother-infant should be kept together and breastfed with precautions, 127 (32.6%) said that mother-infant should be kept separate and breastfed with precautions and 72 (18.5%) favoured feeding with expressed mother's milk (Figure 1).

While counselling for BF in COVID-19 infected mothers, the commonest factor that hindered

paediatricians was the fear of transmitting the infection to the infant (254, 65.3%) (Figure 2) and the most common factor that helped them was the low risk of transmission to the infant if infection prevention and control practices were followed (204, 52.4%) (Figure 3).

Most paediatricians followed IAP and National Neonatology Forum (NNF) recommendations for BF in COVID-19 cases (185, 47.6%) (Figure 4).

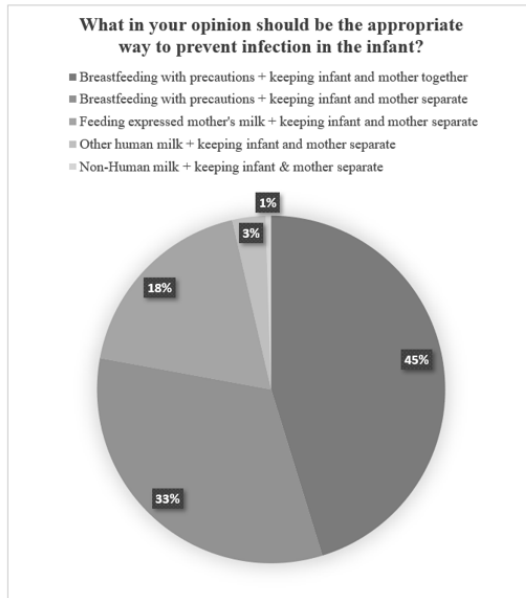


Figure 1: Opinion of paediatricians regarding appropriate way to prevent infection in infant if Mother is COVID-19 Infected

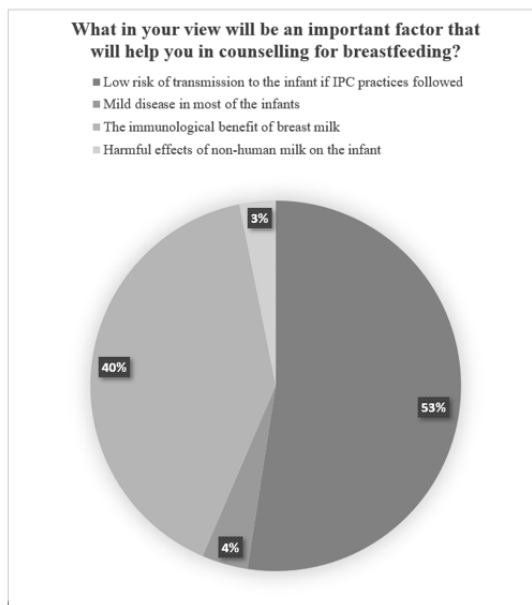


Figure 2: Opinion of paediatricians regarding the important factor that helps in counselling for breastfeeding in Covid-19 infected mothers
IPC practices = Infection Prevention and Control practices

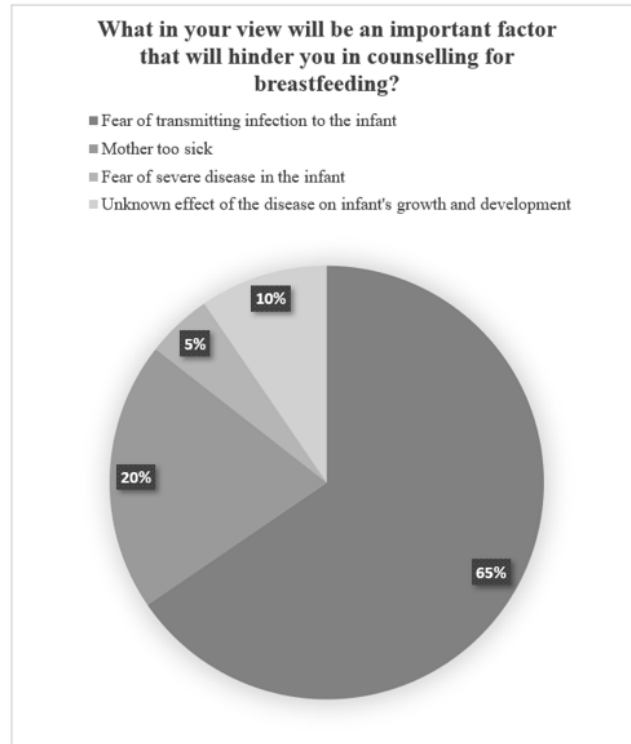


Figure 3: Opinion of paediatricians regarding the important factor that hinders in counselling for breastfeeding in Covid-19 infected mothers

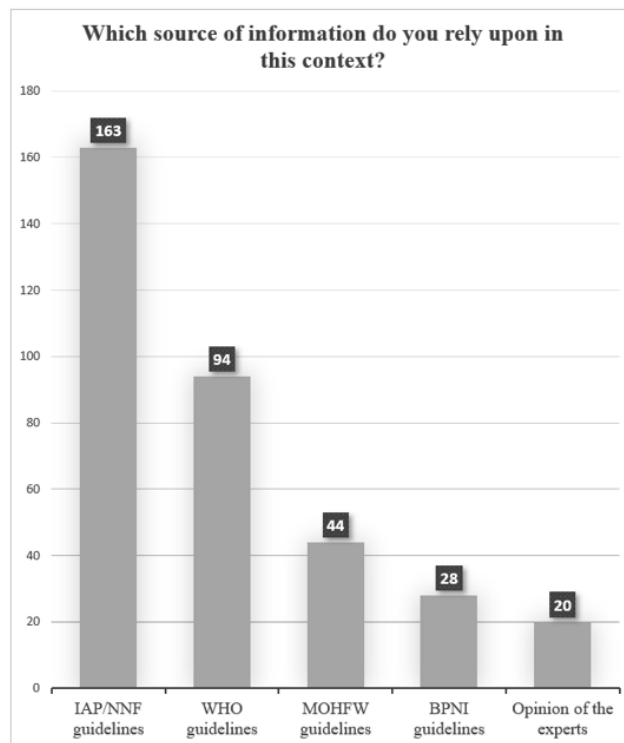


Figure 4: Guidelines followed by the paediatricians regarding breastfeeding in Covid-19

LAP = Indian Academy of Paediatrics; NNF = National Neonatology Forum; WHO = World Health Organization; MOHFW = Ministry of Health and Family Welfare; BPNI = Breastfeeding Promotion Network of India

Discussion

There are diverse queries regarding feeding implications when the mother is Covid-19 infected, as evidence is scanty and recommendations from various bodies differed⁷. In the present study, knowledge about BF recommendations in maternal Covid-19 cases was adequate in 44.5% of paediatricians. Other studies have found adequate knowledge in 33% of medical officers and 57% of paediatricians^{11,12}. In our study there was a significant difference in the knowledge of medical college teaching faculties compared to general paediatricians, which may be attributed to the regular training and guidelines they are exposed to regarding Covid-19. Paediatricians prescribing fewer IMF usually gave more importance to benefits of BF even in the Covid-19 setting and a significant difference was found in their knowledge compared to those who prescribed more IMF¹³.

There are four schools of thought regarding BF recommendations by international and national bodies:

1. *BF with precautions and keeping mother and infant together*: WHO recommends immediate skin-to-skin contact, kangaroo mother care, and exclusive BF in mothers with confirmed or suspected Covid-19¹⁰. They advise precautions like hand-washing with soap and water or using alcohol-based hand rubs, wearing medical masks, following respiratory hygiene, and keeping surfaces clean and disinfected. A similar view was shared by 176 (45.2%) study participants. IAP, NNF, and Federation of Obstetric & Gynaecological Societies of India (FOGSI) recommend this approach if community transmission is evident, medical facilities are overburdened without services to isolate normal, suspected, and infected mothers¹⁴. This approach was favoured by the United Nations Children's Fund¹⁵, Royal College of Obstetricians and Gynaecologists¹⁶, Ministry of Family Health and Welfare India¹⁷ and Breastfeeding Promotion Network of India¹⁸.
2. *BF with precautions and keeping mother and infant separate at a distance of six feet after feeding*: This approach was recommended by the Centres for Disease Control and Prevention (CDC) in cases where parents wished to continue BF with precautions¹⁹. This was the opinion of 127 (32.7%) study participants. Mother needs to follow all precautions as above and directly breastfeed, following which the infant is placed in a crib at least six feet away. This cautious approach was also suggested by Italian Society of Neonatology²⁰, Academy of Breastfeeding²¹ and Union of European Neonatal & Perinatal Societies²⁰.
3. *Separating mother and newborn immediately after birth and using mother's expressed milk for feeding*: CDC recommends an approach where parents decide to avoid direct BF and exposure of the newborn to the mother¹⁹. This was suggested by 72 (18.5%) paediatricians in the study group. This recommendation is also applicable when the mother is too sick to take care of the newborn or the newborn requires nursery admission. Mothers should be encouraged to express their milk manually or by using a breast pump. The expressed milk can be fed to the infant without pasteurization. The outer surfaces of the containers of expressed milk may be contaminated with SARS-CoV-2 from respiratory droplets which may persist. Therefore, the mother expressing milk should follow strict respiratory hygiene and disinfect the containers with virucidal agents before storage²². IAP, NNF, and FOGSI recommended the approach if community transmission is non-evident and services to isolate normal, suspected and infected mothers are present¹⁴.
4. *Separating mother and newborn immediately after birth and not using mother's expressed milk for feeding*: In this situation, newborn has to be fed by other human or non-human milk. This was recommended by the Chinese expert group who supported a possibility of vertical transmission and transmission through mother's milk²³. This approach was endorsed by only 14 (3.6%) paediatricians in the study group. This approach can deprive newborns of health benefits provided by human milk. It can be especially devastating in lower-middle-income countries where newborn survival is strongly linked to BF. BF is an important determinant of infant survival, intellect, and the national economy²⁴. Benefits of BF outweigh the risk of possible transmission of the human immunodeficiency virus infection by infected mothers; thus, recommendations have changed for infant feeding in these parts of the world²⁵. The only practical indication of the recommendation can be when mother is too sick to breastfeed directly or even express her milk. In this situation, WHO suggests the use of donor human milk¹⁰. SARS-CoV-2 can be inactivated by pasteurization of human milk using the Holder method (62.5°C for 30 min)²⁶. If a human milk

bank is not available, it might be preferable to breastfeed from another woman (wet-nursing) rather than giving IMF, depending on cultural and family acceptability¹⁰.

The Spanish case series on outcome of newborns breastfed with respiratory precautions by Covid-19 positive mothers showed encouraging results, none of the newborns turning positive²⁷. Of paediatricians in our study 53% found the low risk of transmission to infant if IPC practices were followed a helpful factor in counselling for BF.

In a systematic review to evaluate possibility of vertical transmission, of the 86 neonates tested by RT-PCR, only four were positive²⁸. A meta-analysis of studies to detect SARS-CoV-2 genome in milk of mothers with confirmed Covid-19 yielded positive results in 12 out of 183 cases. Of the twelve mothers, six had newborns who tested Covid-19 positive. In addition, of 89 mothers with confirmed Covid-19, the milk of 69 had anti-SARS-CoV-2 antibody²⁹. Fear of transmission of the disease was an important factor (65%) perceived by the study participants, which hindered them in counselling for BF. However, according to available evidence, risk of transmission of infection by the milk of an infected BF mother is extremely low while the protection offered is high.

Human milk lactoferrin blocks interaction between SARS-CoV-2 and ACE2 receptors³⁰. Human milk oligosaccharides act as a direct barrier to pathogens and promote healthy microbiota by their probiotic action³¹. Direct immunological benefits occur by transfer of macrophages, lymphocytes and neutrophils through human milk and also by secretory IgG and IgA³². Mucosa of gastrointestinal and respiratory tracts gets coated with IgA, thereby effectively blocking viruses³³.

A New York study to assess impact of separation of mother-infant dyad due to maternal Covid-19 infection on final BF outcome revealed significantly higher rates of BF in dyads, both in hospital and home, who remained unseparated compared to those who were separated. There was no evidence of transmission of infection from asymptomatic mothers to their infants in both groups³⁴. Thus, it is essential to avoid separation of the mother-infant dyad³⁵.

As most Indian paediatricians rely on the IAP and NNF guidelines for their clinical practice, they should provide timely, evidence-based, updated recommendations for clinical practice. The information must percolate to general paediatricians who are not in teaching institutes and thus less exposed to Covid-19 related training sessions¹³. This study identifies factors that paediatricians perceive

as strengths and weaknesses in recommending BF to a Covid-19 infected mother. These factors may be utilized in the formation of training material and in updating the understanding of paediatricians. It also exposes gaps in the current awareness of paediatricians which can be bridged by regular training by competent bodies.

This study has limitations due to the rapidly evolving evidence about Covid-19, which is frequently modifying recommendations. The study was based on a self-reported questionnaire and therefore was subject to the Hawthorne effect. It looked into the knowledge part only and not the practice component. Many paediatricians may be knowledgeable but the fear of transmission of this virus to the infants may have lingered in their minds, which would have been evident in the practical scenario. The study was limited to one state of India and a multicentre study can provide more valuable information.

Conclusions

Knowledge of paediatricians about BF in suspected or confirmed maternal cases of Covid-19 was adequate in 44.5%, average in 38.3% and inadequate in 17.2%. The majority (96.4%) of paediatricians favoured breastfeeding in maternal Covid-19 cases.

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References

1. World Health Organization. Naming the coronavirus disease and the virus that causes it. 2020. [cited 2020 Dec 19]. Available from: [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-\(covid-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it)
2. World Health Organization. WHO Director-General's opening remarks at the media briefing on Covid-19 - 11 March 2020. [cited 2020 Dec 19]. Available from: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
3. Karimi-Zarchi M, Neamatzadeh H, Dastgheib SA, Abbasi H, Mirjalili SR, Behforouz A, *et al*. Vertical transmission of coronavirus disease 19 from infected pregnant mothers to neonates: A review.

- Fetal Pediatric Pathology* 2020; **39**(3): 246–50.
<https://doi.org/10.1080/15513815.2020.1747120>
4. World Health Organization. Protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services. 2017. [cited 2021 Mar 19]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/259386/9789241550086-eng.pdf>
 5. Worldometer. Covid Live - Coronavirus Statistics - Worldometer. 2022 [cited 2022 Feb 22]. Available from: <https://www.worldometers.info/coronavirus/>
 6. Worldometer. World Population Clock: 7.9 Billion People (2022) - Worldometer. 2022 [cited 2022 Feb 19]. Available from: <https://www.worldometers.info/world-population>
 7. Yeo KT, Oei JL, De Luca D, Schmölder GM, Guaran R, Palasanthiran P, *et al.* Review of guidelines and recommendations from 17 countries highlights the challenges that clinicians face caring for neonates born to mothers with Covid-19. *Acta Paediatrica* 2020; **109**(11): 2192–207.
<https://doi.org/10.1111/apa.15495>
 8. Ministry of Family Health and Welfare India. National Family Health Survey (NFHS-5). 2019 [cited 2021 Sep 25]. Available from: http://rchiips.org/nfhs/factsheet_NFHS-5.shtml
 9. Ministry of Family Health and Welfare India. NFHS-5. State Fact Sheet Uttar Pradesh. 2019 [cited 2021 Sep 25]. Available from: http://rchiips.org/nfhs/NFHS5_FCTS/Uttar_Pradesh.pdf
 10. World Health Organization. Frequently asked questions : Breastfeeding and Covid-19 For health care workers. 2020. [cited 2020 Nov 25]. Available from: https://cdn.who.int/media/docs/default-source/maternal-health/faqs-breastfeeding-and-covid-19_805d4ce8-2329-4227-9261-695afa68b32c.pdf?sfvrsn=d839e6c0_5&download=true
 11. Rajan AR, Vishal AK. Assessment of knowledge of healthcare workers in a service hospital regarding breastfeeding practices in mothers confirmed or suspected to have Covid-19. *Indian Journal of Child Health* 2020; **7**(11): 437–40.
<https://doi.org/10.32677/ijch.2020.v07.i11.002>
 12. Malik S, Joshi P, Gupta P, Sharma S. Assessment of knowledge and opinion regarding breastfeeding practices during Covid-19 pandemic among paediatricians and obstetricians in India: an online survey. *Sudan Journal of Paediatrics* 2021; **21**(1):30–5.
<https://doi.org/10.24911/sjp.106-1598349125>
 13. Handa D, Schanler RJ. Role of the paediatrician in breastfeeding management. *Pediatric Clinics of North America* 2013; **60**(1): 1–10. <https://doi.org/10.1016/J.PCL.2012.10.004>
 14. Federation of Obstetric & Gynaecological Societies of India National Neonatology Forum Indian Academy of Pediatrics. Clinical Practice Guideline Perinatal-Neonatal management of Covid-19 infection. 2020. [cited 2021 Apr 11]. Available from: http://www.nnfi.org/assests/upload/cpg-pdf/FOGSI_NNF_IAP_COVID19_perinatal_neonatal_guideline_ver_1_01_March_26-2020.pdf
 15. United Nations Children's Fund. COVID-19: Frequently asked questions. 2020. [cited 2021 Mar 10]. Available from: <https://www.unicef.org/stories/novel-coronavirus-outbreak-frequently-asked-questions>
 16. Royal College of Obstetricians and Gynaecologists. Coronavirus infection and pregnancy. 2020 [cited 2021 Feb 27]. Available from: <https://www.rcog.org.uk/en/guidelines-research-services/guidelines/coronavirus-pregnancy/covid-19-virus-infection-and-pregnancy/>
 17. Breastfeeding Promotion Network of India. Response to concern on separation of baby from mother and bottle-feeding. 2020. [cited 2020 Nov 25]. Available from: <https://www.bpni.org/wp-content/uploads/2020/04/MoHFW-response-Concerning-Separation-of->

- Mothers-from-Babies-during-COVID19-mergency.pdf
18. Breastfeeding Promotion Network of India. Breastfeeding and Covid-19. 2020. [cited 2020 Dec 08]. Available from: <https://www.bpni.org/wp-content/uploads/2020/05/Update-on-COVID-19-and-Breastfeeding.pdf>
 19. Centers for Disease Control and Prevention. Evaluation and management considerations for neonates at risk for Covid-19. 2020. [cited 2020 Dec 25]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/caring-for-newborns.html>
 20. Davanzo R, Moro G, Sandri F, Agosti M, Moretti C, Mosca F. Breastfeeding and coronavirus disease-2019: Ad interim indications of the Italian Society of Neonatology endorsed by the Union of European Neonatal & Perinatal Societies. *Maternal and Child Nutrition* 2020; **16**(3): 1–8. <https://doi.org/10.1111/mcn.13010>
 21. Academy of Breastfeeding Medicine. ABM Statement on coronavirus 2019. 2020. [cited 2021 Sep 17]. Available from: <https://www.bfmed.org/abm-statement-coronavirus>
 22. Marinelli KA, Lawrence RM. Safe handling of containers of expressed human milk in all settings during the SARS-CoV-2 Pandemic. *Journal of Human Lactation* 2020; **36**(3): 498–501. <https://doi.org/10.1177/0890334420919083>
 23. Wang L, Shi Y, Xiao T, Fu J, Feng X, Mu D, *et al.* Chinese expert consensus on the perinatal and neonatal management for the prevention and control of the 2019 novel coronavirus infection. *Annals of Translational Medicine* 2020; **8**(3): 1–8. <https://doi.org/10.21037/atm.2020.02.20>
 24. The Lancet. Breastfeeding: achieving the new normal. *Lancet*. 2016 Jan 30; **387**(10017):404. [https://doi.org/10.1016/S01406736\(16\)00210-5](https://doi.org/10.1016/S01406736(16)00210-5)
 25. Young SL, Mbuya MNN, Chantry CJ, Geubbels EP, Israel-Ballard K, Cohan D, *et al.* Current knowledge and future research on infant feeding in the context of HIV: Basic, clinical, behavioral, and programmatic perspectives. *Advances in Nutrition* 2011; **3**(2): 225–43. <https://doi.org/10.3945/an.110.000224>
 26. Unger S, Christie-Holmes N, Guvenc F, Budyłowski P, Mubareka S, Gray-Owen SD, *et al.* Holder pasteurization of donated human milk is effective in inactivating SARS-CoV-2. *CMAJ* 2020; **192**(31): E871–4. <https://doi.org/10.1503/CMAJ.201309>
 27. Pereira A, Cruz-Melguizo S, Adrien M, Fuentes L, Marin E, Forti A, *et al.* Breastfeeding mothers with Covid-19 infection: A case series. *International Breastfeeding Journal* 2020; **15**(69): 1–8. <https://doi.org/10.1186/s13006-020-00314-8>
 28. Ashraf MA, Keshavarz P, Hosseinpour P, Erfani A, Roshanshad A, Pourdast A, *et al.* Coronavirus Disease 2019: A systematic review of pregnancy and the possibility of vertical transmission. *Journal of Reproduction and Infertility* 2020; **21**(3):157–68. PMID: 32685412
 29. Zhu F, Zozaya C, Zhou Q, De Castro C, Shah PS. SARS-CoV-2 genome and antibodies in breastmilk: A systematic review and meta-analysis. *Archives of Disease in Childhood Fetal and Neonatal Edition* 2021; **106**(5): 514–21. <https://doi.org/10.1136/archdischild-2020-321074>
 30. Lang J, Yang N, Deng J, Liu K, Yang P, Zhang G, *et al.* Inhibition of SARS pseudovirus cell entry by lactoferrin binding to heparan sulfate proteoglycans. *PLoS One* 2011; **6**(8). <https://doi.org/10.1371/journal.pone.0023710>
 31. Newburg DS, Walker WA. Protection of the neonate by the innate immune system of developing gut and of human milk. *Pediatr Research* 2007; **61**(1): 2–8. <https://doi.org/10.1203/01.pdr.0000250274.68571.18>
 32. Bode L, McGuire M, Rodriguez JM, Geddes DT, Hassiotou F, Hartmann PE, *et al.* It's alive: Microbes and cells in human milk and their potential benefits to mother and infant. *Advances in Nutrition* 2014; **5**(5): 571–3. <https://doi.org/10.3945/an.114.006643>

33. Van de Perre P. Transfer of antibody via mother's milk. *Vaccine* 2003; **21**(24): 3374–6.
[https://doi.org/10.1016/S0264-410X\(03\)00336-0](https://doi.org/10.1016/S0264-410X(03)00336-0)
34. Popofsky S, Noor A, Leavens-maurer J, Quintos-alagheband ML, Mock A, Vinci A, *et al.* Impact of maternal severe acute respiratory syndrome coronavirus 2 detection on breastfeeding due to infant separation at birth. *Journal of Pediatrics* 2020; **226**: 64–70.
<https://doi.org/10.1016/j.jpeds.2020.08.004>
35. Stuebe A. Should infants be separated from mothers with Covid-19? First, Do No Harm. *Breastfeeding Medicine* 2020; **15**(5): 351–2.
<https://doi.org/10.12968/bjcn.2019.24.6.302>