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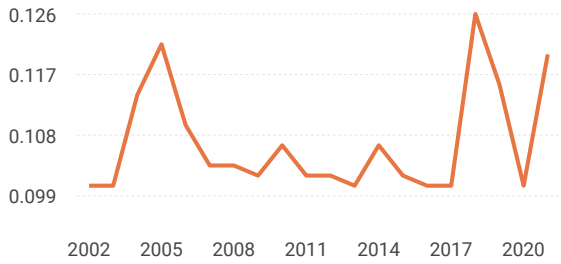
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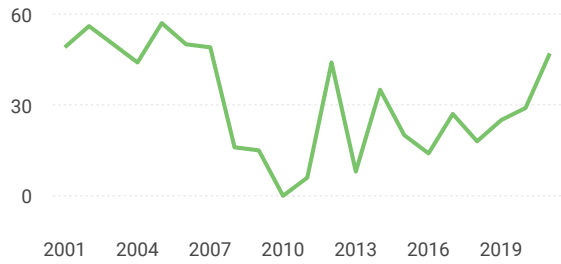
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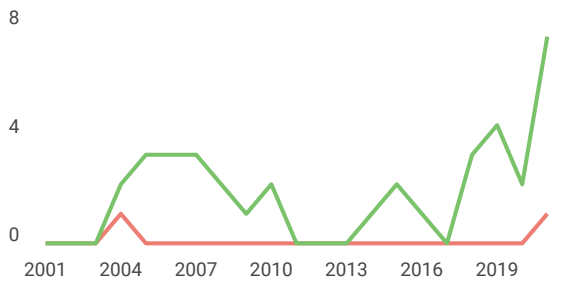
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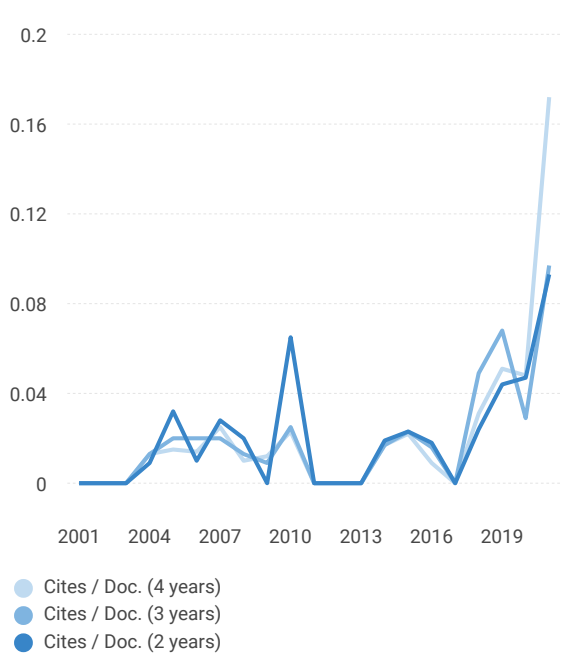
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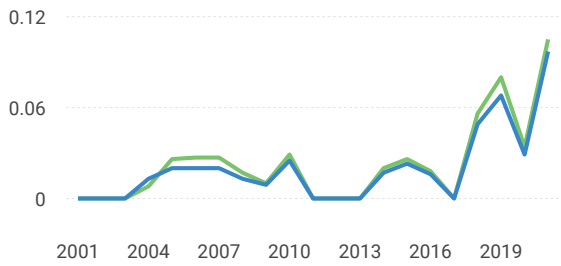
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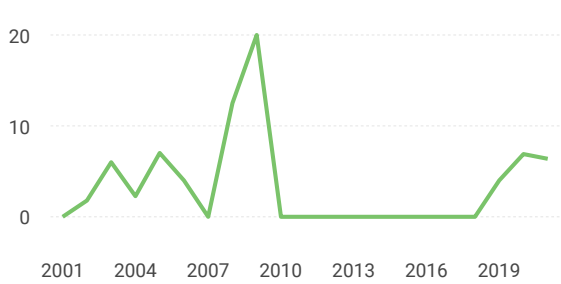
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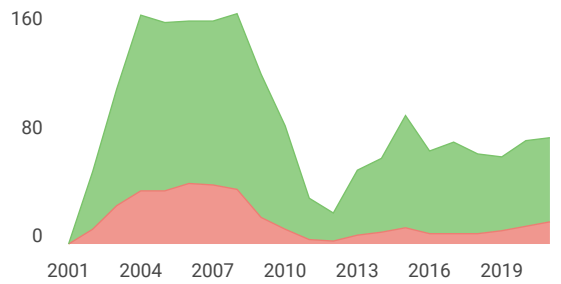
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Abstract

Background and Aim: Although breastfeeding is highly important and has numerous health benefits, COVID-19 makes it difficult for mothers with suspected or confirmed COVID-19 to breastfeed their neonates. Various breastfeeding guidelines can confuse mothers and harm both mothers and their neonates. This study aims to evaluate the SARS-CoV-2 transmission from mothers to neonates and to encourage mothers with suspected or confirmed COVID-19 to breastfeed.

Materials and Methods: We searched PubMed and Google Scholar for literature on guidelines on COVID-19 and breastfeeding. We included English, free, and full-text articles.

Results: SARS-CoV-2 is rarely transmitted via breast milk. The recommended strategy for breastfeeding is for parents and the health care team to make a joint decision. Mothers can breastfeed safely with strict infection prevention protocols. Breastfeeding mothers are advised to take the COVID-19 vaccination. It benefits both the mother and the neonate.

Conclusion: The knowledge on COVID-19 and breastfeeding is continuously evolving. Our suggestions may serve as brief and flexible

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Key Words: COVID-19, breastfeeding, breast milk, transmission, vaccine, SARS-CoV-2

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Introduction

COVID-19, which is caused by SARS-CoV-2, shows diverse clinical manifestations ranging from asymptomatic to severe signs and symptoms (eg, dyspnea, respiratory failure, and hypoxia), and even death.¹ On March 11, 2020, the WHO declared COVID-19 as a pandemic. Since then, disease transmission increased dramatically, worldwide. According to the WHO, as of August 12, 2022, there have been approximately 585.1 million confirmed COVID-19 cases and 6.4 million deaths, worldwide.²

As a result of this pandemic, the priorities in the health care system have changed. SARS-CoV-2 is highly contagious and can infect anyone. Pregnant women and newborns are considered a high-risk group, as their susceptibility to infection increases because of lower immunity during pregnancy and after birth.³

Breastfeeding is extremely important for both the mother and the newborn, as it benefits both.³ However, many mothers with suspected or confirmed COVID-19 have shown reluctance to breastfeed because of the fear of transmission. Besides, various breastfeeding recommendations for mothers with COVID-19 create confusion and avoidable harm.⁴

Aim

To evaluate SARS-CoV-2 transmission from mothers to neonates and to encourage mothers with suspected or confirmed COVID-19 to breastfeed

Materials and Methods

This review was conducted from February to September 2021. We searched PubMed and Google Scholar for literature and guidelines regarding COVID-19 and breastfeeding. We included English, free, and full-text articles published from 2019 onward and excluded the paid full-text articles. A total of 36 articles were included in this literature review.

The importance of breast milk

Breastfeeding has long been known to provide nutritional and immunologic advantages to neonates.⁵ Antibodies present in breast milk are known to play

various important roles, including infection prevention, commensal selection, and immune tolerance throughout infancy.⁶ The ideal nutrition for a neonate is breast milk.⁵ Breastfeeding, both exclusive and supplemented, is associated with lower respiratory and gastrointestinal infections in infancy.⁵ Breastfeeding is known to reduce the risk of childhood obesity, autoimmune disorders, allergies, pediatric malignancies, and sudden infant death syndrome.⁷ Breastfeeding is related to a decreased incidence of necrotizing enterocolitis and sepsis as well as better neurodevelopmental outcomes in preterm neonates.^{8,9}

COVID-19 transmission through breast milk

Viral intrauterine transmission and breast milk transmission (from mother to neonate) following delivery are quite unlikely.^{4,10} Breast milk from mothers with COVID-19 has been proven negative for the virus in most studies evaluated.³ In addition, according to several studies, SARS-CoV-2 RNA has not been detected in breast milk samples collected from all breastfeeding mothers.¹¹ However, 8 of 70 breast skin swabs were positive for SARS-CoV-2 RNA. The swab taken before breast washing was definitively positive (CT values for both targets N1 and N2 were < 40).¹¹ This might help clarify the findings of viral RNA in some breast milk samples from previous studies (ie, skin contamination and/or respiratory droplets in breast milk).¹²⁻¹⁴

Some case reports have detected the virus in breast milk, and the neonates were diagnosed with COVID-19. There is no clarity whether this virus gets transmitted via breast milk, direct/close contact, or during delivery.³ Despite the finding of viral RNA in breast milk samples, breast milk isolates should be evaluated to determine its infectious capability.¹⁵ It is also essential to know whether the risk of transmission via breast milk varies between maternal disease phases and asymptomatic instances.¹⁶⁻¹⁸ Although a higher maternal viremia is expected during the acute phase, penetration of SARS-CoV-2 through the alveolus or milk-secreting unit does not always occur, which could also be the case during the convalescent phase.¹⁵ Another possibility is that the viral antibodies might have passively moved through the

breast milk of mothers diagnosed with COVID-19 and provide immunity for the neonate. However, evidence about this is still scarce.^{3,19}

What should mothers with COVID-19 do while breastfeeding?

Global and national stakeholders are consistently advocated breastfeeding during the pandemic despite the concern of transmission of the infection from mothers to neonates.²⁰ The WHO,²¹ the United Nations International Children's Emergency Fund,²² the Union of European Neonatal & Perinatal Societies,²³ and the United States Centers for Disease Control and Prevention²⁴ emphasize immunologic and psychosomatic advantages of breastfeeding for both the mother and the neonate and current COVID-19 infant care recommendations (which include separating the mother with COVID-19 from the neonate, delaying breastfeeding, expressing breast milk, and providing infant care through a caregiver, for early initiation of direct breastfeeding and skin-to-skin contact).¹⁰

In general, mothers with airborne diseases (eg, tuberculosis, varicella, and measles) should avoid close contact with their neonate, while they may feed their neonates by expressing breast milk.⁵ As per the available limited data, mothers with COVID-19 must continue to breastfeed their neonates.⁵ Direct breastfeeding or feeding expressed breast milk should always be promoted if the mother's and the neonate conditions are stable, based on careful consideration of the risks of vertical transmission. Mothers with COVID-19 should take precautions to prevent droplet transmission to their neonates during breastfeeding.³

COVID-19 transmission from mother to neonate is rare during rooming-in, if strict infection prevention protocols are implemented.²⁵ Mothers who meet the following criteria are suitable for rooming-in: those who do not require respiratory support or supplementary oxygen, whose vital signs are within normal range, whose body temperature is < 100°F, and those who were capable of nursing their neonates.²⁵ For the neonates, rooming-in is considered if they appear well with a gestational age \geq 34 weeks, those with a birth weight of \geq 2000 g, those whose physical examination and vital signs are within normal range, and those

who are skilled in feeding.²⁵ Clinically stable mothers with COVID-19 who are willing to nurse their neonates need to be advocated for rooming-in and breastfeeding. Before rooming in and starting breastfeeding, the mothers should be thoroughly instructed on proper precautions.²⁵ The mothers and neonates should be admitted to COVID-19 isolation wards. Ad interim indications from the Italian Society of Neonatology²³ recommend the provision of formal notes containing rooming-in instructions for mothers. The notes should emphasize handwashing, wearing a surgical face mask during breastfeeding or when providing care to the neonate, and otherwise maintaining physical distance (2 m) from the neonate. During the hospital stay, no visitations should be allowed, including paternal visits.

If mother and neonate are eligible for rooming-in, but the health care center does not have that facility (eg, the mother hospitalized at the COVID-19 ward or no room for rooming-in practice), they should be discharged from the hospital and advised to continue to breastfeed with remote lactation support with the help of telecommunication (eg, texting, telelactation, or mobile apps).²⁶ Some studies mention that providing telephonic support to vulnerable mothers has helped them to continue to breastfeed.^{27,28} In "proactive" telephonic support, a peer counselor or a lactation consultant contacts mothers to provide encouragement and to troubleshoot maternal concerns or to identify impediments. In addition, mothers also can call support personnel when they experience difficulties with breastfeeding. Telemedicine is an efficient method for educating the mother and her family.²⁹ Neonatal care professionals should use a secure cloud-based video messaging service to brief about newborn care assistance to family members.³⁰ According to qualitative statements from families of neonates and level 2 and level 3 UK neonatal staff, during COVID-19 pandemic, there was greater emotional closeness and more engagement between the family members while caring for the neonate, which in turn benefitted breast milk expression.³⁰

The American Academy of Pediatrics guidelines for postpartum care recommend a safer way by having a caregiver feeding the neonate with the expressed breast

milk to lower the transmission risk.³¹ If there is no other healthy substitute caregiver, mothers must always wear face masks and maintain breast and hand hygiene with or without fresh hand gloves.^{3,11,32,33} While expressing, a clean-catch sample from the nipple that drips or squirts should be collected in a sterile container.³³ Between pumping sessions, breast pumps and their components should be properly sterilized.^{5,33} This method ensures the neonate continues to receive the benefits of breast milk and maternal antibodies against SARS-CoV-2.⁵

COVID-19 vaccine for breastfeeding mother

Professional societies have supported providing COVID-19 vaccinations to breastfeeding mothers, as the benefits of maternal vaccination during breastfeeding exceed possible concerns.^{34,35} Nonlive vaccines (eg, mRNA vaccines) that are available in the United States are predicted not to be excreted into breast milk or absorbed by the neonate in significant amounts. There are no reports on nonlive vaccinations causing adverse effects in neonates through breastfeeding.³⁴ There was a similarity between the humoral immune response to the mRNA COVID-19 vaccines and that of COVID-19 natural infection. Breast milk of mothers with COVID-19 contains immunoglobulins specific to SARS-CoV-2.³⁴

In a study conducted by Perl et al,³⁶ 84 breastfeeding mothers received 2 doses of COVID-19 vaccine, and after 6 weeks of vaccination, these mothers had a high level of IgA and IgG antibodies specific to SARS-CoV-2 in their breast milk. IgA antibodies were detected as early as 2 weeks after vaccination, while IgG antibodies were detected in 4 weeks (a week after the second dose).³⁶ Several additional investigations have shown comparable results in mothers with COVID-19.¹¹ Antibodies present in breast milk exhibit significant neutralization effects, providing protection against infections in neonates.¹¹

Conclusion

The research on COVID-19 and breastfeeding is ongoing. Our suggestions may serve as brief and

flexible recommendations that can be customized to local requirements.

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