

A Case Study Supporting Lack of SARS-CoV-2 Spread to a 3-Month Old Infant Through Exclusive Breastfeeding

Journal of Human Lactation
2021, Vol. 37(2) 269–272
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DOI: 10.1177/0890334421991072
journals.sagepub.com/home/jhl



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Abstract

Introduction: During the Coronavirus Disease 2019 global pandemic, maternal and newborn wellbeing has received much attention. Detailed reports of infected women breastfeeding their infants are uncommon. Due to incomplete information available, full data about those infants' outcomes are lacking, and evidence of infectivity through breastfeeding has not been documented.

Main Issue: Here, we report about a mother who breastfed her infant until she was confirmed with the SARS-Cov-2 infection. After follow-up, we have confirmed that the infant, who was breastfed by the infected mother, was not infected.

Methods: A 33-year-old woman gave birth to a full-term male infant on November 8, 2019. Since birth, she had been exclusively breastfeeding the baby until she was confirmed with the SARS-Cov-2 infection on February 8, 2020. She was hospitalized, isolated from her baby, and stopped breastfeeding. Even though she remained asymptomatic, her milk was expressed using a breast pump and discarded. The mother's milk sample was collected on February 9, 2020, and the result of the nucleic acid test for COVID-19 was negative. Her infant was asymptomatic and remained virus negative. Her laboratory findings and chest Computed Tomography imaging was normal. She was treated according to the national protocol with aerosolized interferon $\alpha 2 \beta$, lopinavir/ritonavir and ribavirin. Her serum SARS-CoV-2 specific antibodies (IgG and IgM) tested positive when discharged. She returned to breastfeeding after discharge.

Conclusion: Our findings suggest that breastfeeding may be less of a risk than anticipated. Additional research is needed to explore this possibility.

Keywords

anatomy, breastfeeding, breast biostatistics, case study, COVID-19, insufficient milk, milk supply, SARS-CoV-2

Background

During the Coronavirus disease 2019 (COVID-19) global pandemic, the care of infected mothers and their babies has been a significant concern worldwide, and breastfeeding safety has been one of the hottest issues (Davanzo, 2020; Marinelli & Lawrence, 2020; Marinelli, 2020). SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2) spreads mainly from person to person through close contact (0–2 meters). It is transmitted through respiratory secretions (droplets) when an infected individual sneezes or coughs (United States Centers for Disease Control and Prevention [CDC], 2020). Most researchers have focused on intrauterine, intrapartum, and peripartum transmission regarding maternal and child health (de Souza Silva et al., 2020). Current case reports about COVID-19 infected infants have mainly been acquired by horizontal respiratory transmission (Canarutto et al., 2020; Le et al., 2020). Information about

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Date submitted: July 14, 2020; Date accepted: January 08, 2021.

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infants who were breastfed by an infected mother has been scarce. It is unknown what the infant's risk of infection is when exposed to different modes of transmission. Therefore, whether infected mothers need to stop breastfeeding remains controversial (Salvatori et al., 2020; World Health Organization [WHO], 2020a).

Most previous researchers have investigated pregnant women with COVID-19 and found that viral RNA was undetectable in these women's first milk (Chen et al., 2020; Yan et al., 2020). However, these women did not breastfeed their newborns, so the infectivity through breastfeeding remained unknown. Furthermore, detection of SARS-CoV-2 RNA in human milk does not equate with infectivity (Auriti et al., 2020; de Souza Silva et al., 2020). So far, the clinical practice of breastfeeding during the epidemic has not been uniformly practiced, due to a lack of evidence. Moreover, guidance varies by country (e.g., China's guidance separates mothers and babies and does not support expressing and feeding that milk to babies). Here, we report a case of exclusive breastfeeding by an asymptomatic carrier of SARS-CoV-2.

This study was approved by the Institutional Board of the First Affiliated Hospital of University of Science and Technology of China (No. 2020-XG(H)-009). The investigated individuals all agreed to participate in the study and provided written informed consent. The patient and her family approved the Chinese version of this case study.

History and Observational Assessment

In January 2020, we identified a family cluster with COVID-19. Four family members were admitted to local medical centers. Among these four patients, there was a breastfeeding mother (Patient A). Their SARS-CoV-2 infections were confirmed according to the Chinese national protocol (Zhao et al., 2020). During hospitalization, data concerning the epidemiological investigation, symptoms and signs, findings, outcomes, and serum samples were collected.

Patient A, a 33-year-old woman, had a vaginal birth of a 39-week gestational aged male infant on November 8, 2019 in a local hospital. She had been exclusively breastfeeding the baby since birth. She lived with her baby, her husband (Patient B), and her father- and mother-in-law (Patients C and D) in the same household. Their relative (Patient E) was resident in Wuhan, traveled back to their hometown, and stayed with the family from January 21–26, 2020.

Management

Patient E developed a fever on January 22, 2020, and was confirmed COVID-19 after returning to Wuhan on January 26. Patient B had fever and fatigue on January 24, was hospitalized and isolated on January 29, and confirmed COVID-19 on January 30. Patients C and D were confirmed

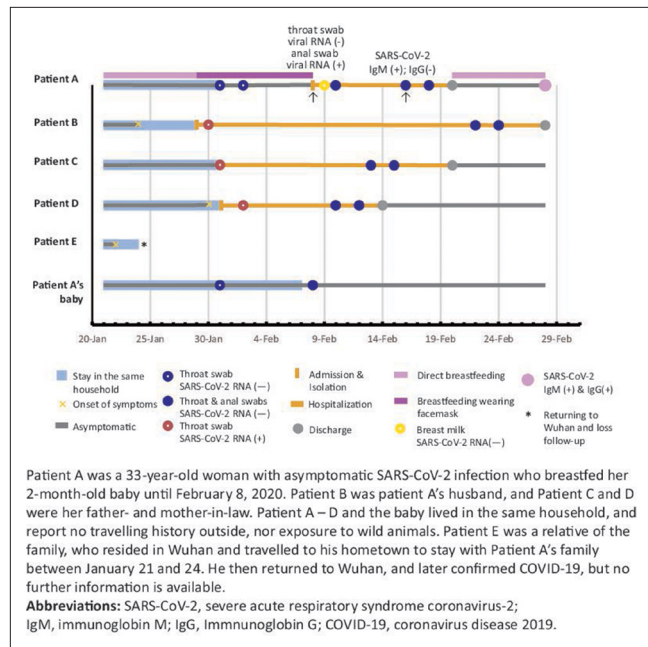


Figure 1. Epidemiological Information of Patient A, a Breastfeeding Mother With Asymptomatic SARS-CoV-2 Infection, and her Cluster Event.

COVID-19 on January 31 and February 2, respectively (Figure 1). They were all admitted to the hospital as routine clinical care at that time. (Persons who had close contact with suspected cases without symptoms need to be isolated at home.)

As a close contact, Patient A was still asymptomatic and stayed at home, isolating with her baby, beginning on January 29. She kept breastfeeding her baby while wearing a face mask. Her throat swab samples were collected on January 31, February 2, and February 8, and all were reported SARS-CoV-2 RNA negative. However, her anal swab sample, collected on February 8, was positive. She was then hospitalized, isolated from her infant, and required to stop breastfeeding. The infant was taken care of by relatives and nourished using artificial infant formula.

During hospitalization, Patient A remained asymptomatic. Her laboratory findings and chest Computed Tomography imaging was normal. Her milk was expressed using a breast pump to prevent mastitis, and this milk was discarded. The mother's milk sample collected on February 9 was viral RNA negative. She repeated viral RNA tests on February 10 (throat swabs), February 16 (throat and anal swabs), and February 18 (throat and anal swabs), and all were negative. Following the National Recommendations for Diagnosis and Treatment of COVID-19 (5th Edition), she was treated with aerosolized interferon $\alpha 2\beta$, lopinavir/ritonavir and ribavirin.

Outcomes

Patient A's serum SARS-CoV-2 specific antibodies were tested on February 16 and showed positive IgM and negative IgG. On February 28, both IgG and IgM were positive. Patient A was discharged and returned to breastfeeding on February 20. Her baby was still asymptomatic. His throat swab sample collected on January 31, and repeated on February 8, with an anal swab sample, were all negative.

Discussion

With limited evidence about breastfeeding with COVID-19, recommendations were varying: the World Health Organization (2020a) suggests that infected mothers can keep breastfeeding when asymptomatic or paucisymptomatic; United States Centers for Disease Control and Prevention (2020) recommends that an infected mother's milk can be used to feed infants by a third person who is uninfected; in China, babies can only be breastfed after their mothers are no longer infected. Moreover, donor milk or infant formula should be considered an alternative for safety reasons. (Wang, Shi, et al., 2020; Wang, Hu, et al., 2020).

A research team from Germany reported that SARS-CoV-2 RNA could be detected in infected mother's milk during the perinatal period (Groß et al., 2020). Whether infants can be infected through breastfeeding remains unclear. The precautionary indication for COVID-19 infected mothers not to breastfeed has been proposed by some authors without sound evidence and ignoring the importance of breastfeeding (Favre et al., 2020; De Rose et al., 2020). Thus, the World Health Organization (2020b) recommends skin to skin contact, rooming-in, and exclusive breastfeeding, instead of removing infants from their mothers. All suggested that mothers who room-in or breastfeed should follow strict hand washing protocols and use masks. Mother–infant contact and holding enhance thermoregulation, and other physiological outcomes significantly reduce mortality and morbidity. Recently, researchers reported that human milk contained SARS-Cov-2 IgG and IgA, which may have potential benefit for the neonates (Dong et al., 2020). Given that there is currently no evidence supporting an increased risk for infants from breastfeeding, there may be more potential benefits for keeping mothers and children together.

In our case, the mother was an asymptomatic carrier, and no viral RNA was detected in her milk at the time of diagnosis. She breastfed her infant wearing a face mask, washed hands before each feeding, and did not spread the infection to her baby. Even if there was no evidence supporting that SARS-CoV-2 could be vertically transmit through breastfeeding, some health care providers would be more likely to recommend that infected mothers give up breastfeeding (Wang, Shi, et al., 2020, Wang, Hu, et al., 2020). In this report, Patient A had to stop breastfeeding as did other infected mothers. Thankfully, her infant only had to switch

to artificial baby formula for 2 weeks and was able to successfully restart breastfeeding after his mother's discharge.

Patient A did not infect her 3-month-old infant before the dyad separation occurred 12 days after COVID-19 diagnosis in their relative (Patient E). This case study supports the hypothesis that mothers with mild illness using protective measures may directly breastfeed their infants, with a low transmission risk. Of course, a case study provides limited evidence; therefore, further investigations are needed.

Conclusion

We suggest that, overall, an infected mother should be encouraging to keep breastfeeding. If the mother is too sick to breastfeed herself, helping her maintain lactation is also important. Our findings suggest that breastfeeding may be less of a risk than anticipated. Additional research is needed to explore this possibility.

Acknowledgments

We would like to thank Shufang Jia MD for her assistance in data collection. We would like to thank the administrative staffs for their support in data coordination.

Author Contributions

WL contributed in data and sample collection, data interpretation and wrote the first draft. YL contributed to data interpretation. ZL contributed in data and sample collection, data interpretation and discussion of the manuscript. CH and JL provided administrative support, contributed in discussion of the manuscript. SL contributed in data analysis and interpretation, and critical review of the manuscript. XZ contributed in data analysis and interpretation, and critical editing and review of the manuscript.

Disclosures and conflicts of interest


The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author). There are no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; and no other relationships or activities that could appear to have influenced the submitted work.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was funded by the Fundamental Research Funds for the Central Universities (Grant number. YD9110004001 and YD9110002002), China. The funder had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

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