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Literature Review of Mothers Diagnosed With COVID-19 and the Impact on Breastfeeding Their Newborns

Stacey A. Warner & Jessica L. Arevalo

ABSTRACT: In early 2020, newborns were separated from their mothers who were diagnosed with COVID-19 infection. The purpose of this literature review is to examine the current evidence to determine if the transmission of COVID-19 infection to the neonate increases if newborns are directly breastfed by mothers who are positive for COVID-19 infection. There were 28 studies conducted in seven countries, with 10 of those studies conducted in the United States. In total, 5,123 neonates were born to mothers diagnosed with COVID-19, with 3,872 neonates determined to have been breastfed or provided mixed feeding including breast milk. Overall, 2.35% (91/3,872) of the newborns tested positive, and all recovered from COVID-19 infection. As frontline health care providers, nurses are instrumental in offering support and education on the risks and benefits of breastfeeding for individuals diagnosed with COVID-19.

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The Centers for Disease Control and Prevention (CDC) reported the first case of novel coronavirus (SARS-CoV-2) infection in the United States in Washington state (CDC, 2020a). In March 2020, a pandemic was declared by the World Health Organization (WHO; 2020a) for COVID-19. Recommendations from the American Academy of Pediatrics and the CDC at the beginning of the pandemic were for hospitals to separate mothers diagnosed with COVID-19 infection from their newborns because of the possible risk of neonatal infection and to feed expressed breast milk, donor
s milk, or infant formula to the neonate by a healthy caregiver with mask and gloves worn (Amatya et al., 2020; Puopolo et al., 2020; Wu et al., 2020). At the time of this writing, the American College of Obstetricians and Gynecologists (ACOG; 2022) encourages individuals diagnosed with COVID-19 infection to feed their newborns breast milk and to continue active discussions with their health care providers if they are planning to breastfeed their newborns.

Background

Breast milk provides numerous benefits for neonates, including intake of colostrum rich in immunoglobulin (lg) A, which provides immune support for the newborn for up to 2 years (Costa et al., 2020; Czosnykowska-Lukacka et al., 2020). Decreases in upper and lower respiratory tract infections and obesity in children have also been associated with breastfeeding in infancy (Anderson et al., 2020; Tromp et al., 2017). Researchers investigating COVID-19 at the beginning of the pandemic reported that the expressed breast milk transmission from mothers with COVID-19 to their neonates was 4.7% (7/148; Deniz & Tezer, 2020; Walker et al., 2020).

The purpose of this literature review is to examine the current evidence to determine if the transmission of COVID-19 infection to neonates increases if newborns are directly breastfed by their mothers diagnosed with COVID-19 infection.

Literature Review

Search Methods and Sources

The search included peer-reviewed research published between December 2019 and January 31, 2022 and found in the MEDLINE, CINAHL, and PubMed databases for different variations of the Medical Subject Heading keywords “COVID-19 positive mothers,” “breastfeeding,” and “newborns,” as well as the inclusion criteria of newborns tested by real-time reverse transcriptase polymerase chain reaction (RT-PCR) nasopharyngeal swab. After further review, exclusion criteria consisted of reviews, guidelines, duplicates, a study in a foreign language, studies not related to breastfeeding or mother diagnosed with COVID-19, case reports with fewer than four neonates, studies that separated the mother and newborn during their hospital stay and neonatal period; studies where it could not be determined that neonates were tested for COVID-19 or breastfed, and survey studies collected outside of the hospital. The reference sections for all inclusion articles were reviewed and cross-referenced for further inclusion studies, with four inclusion studies found and discussed as follows.

Study Selection and Data Collection

The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA; Page et al., 2021) flowchart displays the search of 272 articles (see Figure 1). There were 248 study articles excluded with descriptions in the flowchart. After screening the articles, 24 studies met the inclusion criteria, and an additional four studies were included through cross-references, for a total of 28 studies for mothers diagnosed with COVID-19 infection who breastfed their newborns. The 28 articles were analyzed for mother and infant COVID-19 infection status, neonatal feeding, direct breastfeeding, and infection protocol (see Supplementary Table S1). Studies were ranked based on their level of evidence and quality rating in accordance with the Johns Hopkins Nursing Evidence-Based Practice: Levels of Evidence, with all 28 articles ranked as Level III: low quality, descriptive, observational studies, or case series articles (Dang et al., 2022).

Results

The 28 studies were conducted in seven countries, including the United States, Italy, India, Israel, Portugal, Spain, and Sweden. In total, 5,123 neonates were born to mothers diagnosed with COVID-19, with 70% (n = 3,872) of the newborns determined to have been breastfed. Overall, 2.35% (91/3,872) of the breastfed newborns tested positive for COVID-19 infection confirmed by RT-PCR nasopharyngeal swab. The majority of the 91 newborns were asymptomatic, with one admitted for a short duration in the NICU for acute respiratory distress, two with gastrointestinal symptoms, two requiring ventilation because of prematurity, nine for unrelated diagnoses, and two who had mild noted desaturations. All of the newborns recovered and were discharged home from the hospital.

In the 10 studies conducted in the United States, 886 newborns were born to mothers diagnosed with COVID-19. Overall, 59% (516/877) of mothers chose to breastfeed while diagnosed with COVID-19 infection. Seventeen breastfed newborns who tested positive for COVID-19 by RT-PCR swab after birth. Of the 3.29% (17/516) who tested positive, 11 were asymptomatic; one newborn was sent to the NICU for prematurity, not because of COVID-19 infection; two had mild gastrointestinal symptoms or fever; two had mild desaturation episodes early after birth; and one newborn had severe

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Researchers in the United States reported that mothers diagnosed with COVID-19 infection who implemented face mask use, handwashing, and washing of the breasts before breastfeeding did not transmit the virus to their neonates.

COVID-19 signs and symptoms requiring respiratory support and isolation (see Supplementary Table S1). Overall, no neonatal deaths were reported in this group, and all infants were reported to have recovered.

There were eight studies conducted in Italy, with 81.4% (659/810) of the mothers choosing to breastfeed their newborns. Of the breastfed newborns, 4.86% (32/659) tested positive, with the majority having mild to no symptoms, two with gastrointestinal signs and symptoms, and one newborn needing brief intensive care support for respiratory distress, but all recovered. Four studies conducted in India reported that 87.7% of the participant mothers breastfed (391/446). The overall percentage of neonates who tested positive for COVID-19 was 4.86% ($n=19/391$). Specifically, Kalamdani et al. (2020) found that 12 neonates were exclusively breastfed and tested positive for COVID-19, although they were asymptomatic or had mild symptoms, and all 12 infants were reported healthy by 2 months of age. Anand and colleagues (2021) reported that 13% (7/51) of neonates tested positive and were asymptomatic, with one requiring brief respiratory support for distress due to prematurity, and all recovered.

The studies conducted in Spain were limited to three studies conducted with different percentages of infection. In Spain, there was a 64% (314/489) rate of breastfeeding among participants, with 0.6% (2/314) of newborns testing positive for COVID-19. Solis-Garcia and colleagues (2021) reported that newborns breastfed by mothers diagnosed with COVID-19 infection did not contract the virus when tested after 14 days; however, one newborn tested positive and was asymptomatic 2 weeks later. There were single studies from Israel, Portugal, and Sweden during the search period, with researchers from Israel and Portugal reporting no coinfection to newborns with breastfeeding, and those from Sweden reporting that 1.1% (21/1,888) of newborns tested positive for COVID-19 infection after breastfeeding.

When the data are considered as a whole (see Supplementary Table S1), 93% (26/28) of the articles in this review provided information on the infection protocol implemented during the study, including infection control and education to parents. Researchers in the United States reported that mothers diagnosed with COVID-19 infection who implemented face mask use, handwashing, and washing of the breasts before breastfeeding did not transmit the virus to their neonates (Breslin et al., 2020; Dumitriu et al., 2021; Popofsky et al., 2020; Salvatore et al., 2020). Bertino et al. stated that the risks and benefits were addressed with the mother and that ultimately the mother would make the decision to breastfeed. Specifically, Dumitriu and colleagues reported that one newborn tested positive because of an unmasked symptomatic mother. Malhotra et al. (2021) and Pace et al. (2021) found that of the newborns diagnosed with COVID-19, only one newborn in each study was symptomatic briefly and fully recovered.

**Limitations**

There are limitations to this review. The 28 studies needed a thorough review and discussion between the authors of this review for the count of neonates who were breastfed and the neonates who were reported diagnosed with COVID-19 infection. Overall, there was a low number of participants in the studies, the level of measurement of the studies was exploratory and descriptive in analysis, and the low-quality ranking of these studies does not provide evidence of causation. Another limitation is the limited diversity in the samples. The participants in the United States were predominantly reported as White or unknown/other races, with the exception of one study in which 40% of the participants identified as Latino/Hispanic and 22% as Black/non-Hispanic (Malhotra et al., 2021). COVID-19 information and protocols were evolving, which may have affected the identification of infants who were at risk for COVID-19.

**Discussion**

Early in 2020, reports of COVID-19 infection severity in pregnant women was a concern, especially because there was a reported 4.7% ($n=7/148$) chance of horizontal transmission of the infection from the mother diagnosed with COVID-19 to the newborn; however, no neonatal deaths were reported (Deniz & Tezer, 2020; Walker et al., 2020). At the start of the pandemic, mothers were separated from their newborns, and formula was often the choice for feedings (Brown & Shenker, 2020). Researchers in the United States reported that mothers diagnosed with COVID-19 infection who implemented face mask use, handwashing, and washing of the breasts before breastfeeding did not transmit the virus to their neonates.
Providing ongoing education to childbearing families on the benefits and risks of vaccination for COVID-19 is recommended

There were unintended vaccinations in those pregnant occurring in the Moderna and Pfizer trials; because the pregnancies and births are not yet complete, the results and discussion are not available at this time (Rasmussen et al., 2021). Currently, BioNTech is sponsoring a Phase 2/3 randomized trial that started in February 2021 for a SARS-CoV-2 RNA vaccine for women who are pregnant with results pending for August 2022 (BioNTech, 2021).

**Implications for Nursing Practice**

The Academy of Breastfeeding Medicine (2020) does support breastfeeding with safety measures to limit the spread of COVID-19 as a choice for parents and their newborns. The current recommendations from the CDC and WHO promote rooming-in, the initiation of breastfeeding within the first hour of life, and implementing infection control practices (CDC, 2021b; WH0, 2020a). To minimize the transmission of COVID-19 infection from the mother to the neonate, mothers who actively breastfeed should use infection control measures of (a) handwashing, (b) breast washing, and (c) mask wearing while caring for their newborns (Sullivan and Thompson, 2020).

ACOG and other major national organizations support the use of vaccination for COVID-19 in pregnancy (ACOG, 2021; AWHONN, 2021). The CDC also recommends vaccination for anyone pregnant, lactating, or attempting pregnancy (CDC, 2021a). According to Rottenstreich et al. (2022), there was a decreased risk for adverse outcomes for neonates born to mothers who were vaccinated. Therefore, nurses and other health care providers need to be aware of the need for support, education, and safety for neonates and breastfeeding individuals who are diagnosed with COVID-19 infection. Providing ongoing education to childbearing families on the benefits and risks of vaccination for COVID-19 is recommended.

**Implications for Future Research**

Future research with longitudinal and randomized case–cohort studies is recommended to document and analyze risk factors in relation to health status for newborns. To learn more about the extent to which COVID-19 infection affects neonates in the United States, studies using repeat serologic testing, larger sample sizes in diverse populations, consistent neonatal testing mode and time, and statistical analyses for significance need to be conducted.

**Conclusion**

At the start of the pandemic, mothers diagnosed with COVID-19 infection were separated from their newborns,
and breastfeeding was not encouraged because of the potential risk of transmission (Amatya et al., 2020; Puopolo et al., 2020; Wu et al., 2020). As information regarding COVID-19 has evolved, these practices have changed, and less rigid protocols are in place. Women should be encouraged to discuss the risks of a COVID-19 infection during pregnancy and lactation with their health care providers. Because vaccination is widely available in the United States and recommended by all major health care organizations, all individuals of reproductive age should be encouraged to complete vaccination and participate in COVID-19 safety measures as appropriate. Nurses need to be aware of rapidly changing information and provide current evidenced-based information to childbearing families.

**Supplementary Materials**

Note: To access the supplementary material that accompanies this article, visit the online version of *Nursing for Women’s Health* at http://nwhjournal.org and at https://doi.org/10.1016/j.nwh.2022.03.010.

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