NurseLine Journal
Vol. 6 No. 2 November 2021 p-ISSN 2540-7937 e-ISSN 2541-464X

IMPROVING CARE FOR LOW BIRTH WEIGHT INFANTS IN THE ERA OF COVID-19 PANDEMIC: A SYSTEMATIC LITERATURE REVIEW

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Keywords:
care
COVID-19
low birth weight
premature
prevention

ABSTRACT

COVID-19 has spread rapidly throughout the world. COVID-19 can occur in all age including neonatal. Low birth weight (LBW) infants are a population that is vulnerable to contracting COVID-19. LBW is at risk of experiencing vertical and horizontal transmission due to COVID-19 and LBW care in the era of COVID-19 is still controversial. Therefore, evidence-based LBW care recommended in the pandemic era is needed to prevent the risk of LBW transmission due to COVID-19. This study aims to provide an understanding and summarize the evidence regarding the best-recommended treatment for controlling COVID-19 infection in LBW. Literature search according to the established theme using 5 databases, namely: Scopus, PubMed, Google Scholar, Science Direct, and ProQuest were searched to identify relevant articles. The strategy used in searching for literature that matches the topic in this literature review uses the PICO framework and then a review was carried out using the PRISMA method to gain insight into the care of LBW in the era of the COVID-19 pandemic. Of the 274 research articles produced, 14 articles met inclusion criteria and were included in the reviews. LBW care in the era of the COVID-19 pandemic such as breastfeeding, kangaroo method care, and living with the mother following infection control measures are important to increase scientific awareness about LBW care to prevent LBW from contracting Covid-19. The risk of LBW being infected at the time of birth is low when preventive measures to protect LBW from being infected with COVID-19 are carried out appropriately. The risk of short-term and long-term impacts of LBW care if mothers and infants are rooming in and breastfeeding using infection control measures appear to be smaller than physically separating infants and mothers who are not breastfeeding in this pandemic era.

BACKGROUND

COVID-19 was declared to be pandemic by the World Health Organization (WHO) in March 2020 (Gale et al., 2020; Tanner & Wahezi, 2020). COVID-19 can affect all age including infants because its very high infection rate (Cavicchiolo, Lolli, et al., 2020). Low birth weight (LBW) is a neonatal population at high risk of contracting COVID-19. LBW is a vulnerable population with an immature immune system. LBW is at greater risk of developing respiratory tract infections (Cavicchiolo, Trevisanuto, et al., 2020; Gale et al., 2020). In the past, human coronaviruses have been known to cause serious respiratory infections in immunocompromised infants and children (Gagneur et al., 2008). For this reason, COVID-19 is an important concern for health care providers concerning the care of LBW.

LBW is at risk of transmitting COVID-19 vertically and horizontally. Although vertical and horizontal transmission is rare, COVID-19 was associated with higher neonatal mortality and morbidity. Therefore, vertical transmission via intrauterine and transplacental cannot be completely ruled out (Trevisanuto et al., 2020). Detection of COVID-19 in amniotic fluid, and placenta from infected women, to breast milk provides the possibility for vertical transmission (Auriti et al., 2020; Gale et al., 2020; Sheikhahmadi et al., 2021). The presence of COVID-19 RNA in the syncytiotrophoblast can supports pos-

sibility vertical transmission from mother to infants. Nevertheless, no data were reported on the results of COVID-19 RT-PCR in newborn blood samples although viral RNA was detected in umbilical cord blood, placental samples, and breast milk (Auriti et al., 2020; Cavicchiolo, Trevisanuto, et al., 2020; Yuanyuan Dong et al., 2020). So far, the data suggest that the risk of vertical transmission through the placenta or breastfeeding is low. At the same time, horizontal transmission of COVID-19 in the neonatal period can occur from family contact or nosocomial transmission in the health care environment, such as when the LBW is in the neonatal unit (Gale et al., 2020). Scientific literature states that COVID-19 can transmit the virus to other people in close contact (within <2 m), through droplets produced by coughing, sneezing, or talking or can also be infected by touching a contaminated surface and then touching the eyes, nose, or nose. mouth (the virus can survive on surfaces for up to 72 hours) (Cavicchiolo, Trevisanuto, et al., 2020). One of the most common hypotheses of this infection mechanism considers that the angiotensin-2 converting-enzyme (ACE-2-R) receptor, targeting of COVID-19, will attach itself via a structural protein, the receptor-binding domain. ACE-2-R is expressed on the membranes of many host cells, particularly the respiratory tract. This is because of the transmission of COVID-19 transmission through the respiratory tract (Auriti et al., 2020). In this regard, efforts to prevent horizontal transmission of COVID-19 need to be carried out. One of them is by implementing social distancing restrictions. The social distancing measures adopted during the COVID-19 pandemic have had a major impact on human relations. This can pose challenges for parents, especially mothers, in caring for LBW. Therefore, mothers with LBW need clear information about LBW health care. Knowledge of breastfeeding-related LBW care, Kangaroo Mother Care (KMC), and outpatient care is limited and controversial, more data are needed to establish evidence-based LBW care. Therefore, needed guidelines for the care of LBW in the era of the COVID-19 pandemic to prevent the risk of transmission of LBW due to COVID-19.

METHOD

The literature search in this literature review uses 5 data based on Scopus, PubMed, Google Scholar, Science Direct, and ProQuest. The data used in the literature search is from April 2020 to August 2021. The data used is secondary data obtained not from direct observation but obtained from the results of research that has been carried out by previous researchers. The sources used as a whole are international journals with predetermined research topics. This study began with a systematic review using the PRISMA diagram. The strategy to carried out in this systematic review uses keywords and Boolean Operators (AND, OR, AND NOT) to determine the search, making it easier to find journals that match the research topic. The keywords used in searching for journals that are following the literature review using Medical Subject Heading (MeSH) are neonatal management, LBW care, premature care, LBW management, breastfeeding in the era of COVID-19 pandemic, kangaroo method care in the era of the COVID-19 pandemic. References from review articles were rechecked to avoid studies with overlapping results. Inclusion criteria were articles consisting of: 1) mothers with confirmed COVID-19 infection by polymerase-chain-reaction (qRT-PCR); 2) data on mothers with premature births/low birth weight babies, 3) written in English, 4) articles explaining the care of low birth weight/premature babies in the era of COVID-19 pandemic; 5) Case-control studies, cohort studies, observational studies, and brief reports were eligible for inclusion. Exclusion criteria were articles with: 1) unconfirmed cases of COVID-19 and no maternal or infant outcomes, and 2) studies with unpublished reports.

RESULTS

The Selection and Search Study produced 274 articles; After the elimination of duplicate articles and exclusion of studies by title and abstract, 60 relevant studies were identified for a complete test review. Of these, 40 studies were excluded due to a lack of information on whether COVID-19 was diagnosed during pregnancy or a lack of information regarding LBW care. Therefore, 14 articles were eventually included in the systematic review (Figure 1). Most of the papers included in this review are research conducted in China, Iran, France, Korea, America, and Turkey. All studies are published in English. The journal consists of: various medical specialties, not limited to gynecology and obstetrics, showing the importance of the various fields that cover this topic.

The most reported neonatus born to mothers with confirmed COVID-19 were asymptomatic (Tscherning, Sizun, & Kuhn, 2020). At the time of writing, there have been no case reports of adverse infant outcomes when the mother develops COVID-

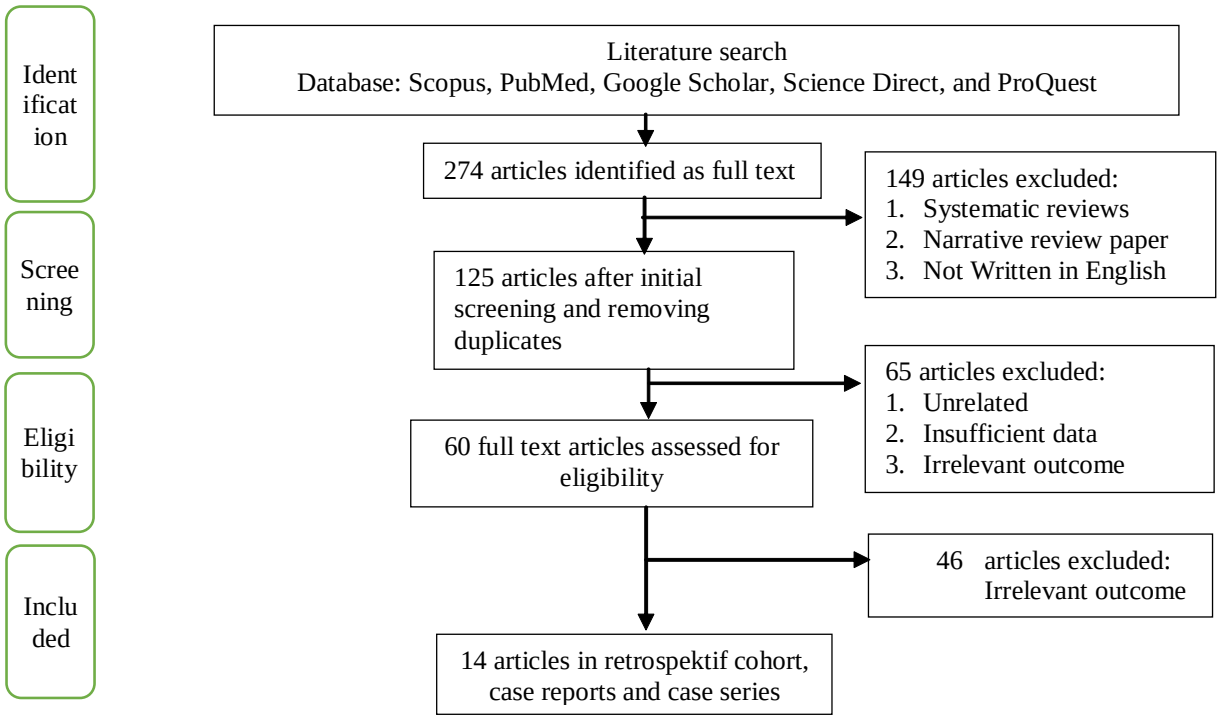

Figure 1. PRISMA Flow Diagram

19 during pregnancy. All stable newborns with confirmed COVID-19 mothers are cared for by implementing universal contact precautions and against COVID-19 infection (Anand et al., 2020). There are several reasons neonates are relatively protected from infection. Preliminary data suggest that infants born to COVID-19 positive mothers may benefit from some level of passive immune protection at birth, with transplacental IgG acting as a natural form of convalescent plasma transfusion (Zeng, Hua, & Chen Xu, 2020). However, LBW is at risk of developing perinatal COVID-19 infection. This may occur because the passive transfer of maternal protective immunoglobulin does not reach its maximum until term, with neonates 28-30 weeks having approximately 50% maternal IgG levels (Blauvelt et al., 2020). Research conducted by Hu et al., (2020) stated that all newborn did not develop severe complications due to prematurity and were negative for the acute respiratory syndrome SARS-CoV-2 nucleic acid test. In line with previous studies, the study conducted by Zeng et al., (2020) showed that the clinical symptoms of 4 premature infants and 2 low birth weight infants at risk of mild COVID-19 with good results. There were no clinical or investigative findings demonstrating COVID-19 in neonates born to affected mothers, and all samples, including amniotic fluid, umbilical-cord blood, and breastmilk were negative for COVID-19. Therefore, the recommended LBW care in the era of the COVID-19 pandemic based on literature studies include:

Breastfeeding

Breast milk is the best nutrition for all newborns, including LBW. Breast milk has many positive benefits, including direct transfer of antibodies and immunological factors, weight gain, preventing low blood sugar, and supporting brain development (Tran et al., 2020). This is supported by research conducted by Eidelman A., because mothers infected with the coronavirus may have the potential to transmit maternal protective antibodies to their babies through breast milk (Calil, Krebs, and De Carvalho, 2020). In addition, there was no scientific evidence on COVID-19 transmission from breastmilk (Yunzhu Dong et al., 2020). Therefore, breastfeeding is continued by the mother following the COVID-19 infection control procedures as developed by World Health Organization, (2020):

a. Wash your hands with soap and water or an alcohol-based hand sanitizer before touching the baby.
b. Respiratory hygiene: sneeze or cough into a tissue and dispose of the tissue immediately and then wash hands immediately with soap and water or an alcohol-based hand sanitizer.
c. Wear a medical mask, avoid talking or coughing during breastfeeding.
d. Change the mask immediately if coughing or sneezing occurs, and every time you eat.
e. Associated with the inability of infants to take milk

from the breast has been described as a major challenge by both parents and caregivers (Koenraads et al., 2017). Mothers who are positive for COVID-19 need special support to initiate and maintain lactation if LBW is unable to breastfeed. Mothers who agree to stimulate lactation by pump extraction require infection control measures. Strict control measures for milk extraction with special breast pumps are implemented by mothers and are reviewed daily (Pissarra et al., 2020).

f. If an infected mother chooses not to breastfeed her baby, she can express breast milk using a pump after proper hand hygiene (Shah & Saugstad, 2021).

g. Consider the possibility of enlisting the help of a healthy person to feed the newborn with breast milk using a cup or spoon.

As explained above, mothers on confirmed COVID-19 can choose to breastfeed or not breastfeed or extract breast milk, after receiving all the necessary information with the decision made according to the mother's preference. Considering that breastfeeding has been recommended by World Health Organization, (2020), mothers with mild to moderate confirmed COVID-19 need to be supported to breastfeed LBW related to specific immunological benefits for LBW.

Kangaroo Method Care

Kangaroo Mother Care (KMC) is one of the interventions for the management of Low Birth Weight Babies (LBW). The COVID-19 pandemic is the most challenging hurdle for kangaroo-method care practices, due to concerns about the transmission of SARS-CoV-2 (Davanzo, Merewood, and Manzoni, 2020). The standard kangaroo method of care in all institutions begins with skin-to-skin contact of the newborn with its mother in the first hours of life if medically appropriate. Skin-to-skin contact in the first hours of life is associated with a reduced risk of postpartum hemorrhage, decreased levels of postpartum depression and anxiety, and increased chances of successful breastfeeding (Boscia, 2020). World Health Organization, (2020) recommends that mothers and babies stay together throughout the day and night, practicing skin-to-skin contact including the kangaroo method of care, especially immediately after birth, regardless of suspected or confirmed COVID-19.

Rooming-in

American Academy of Pediatrics (AAP) states that the management of LBW is based on their clinical condition (eg admission to a specific neonatal ward or neonatal intensive care unit (NICU). Mothers can choose to share a room with their babies (Genoni et al., 2020). This is in line with research conducted by Salvatore et al., (2020) showing that 83% can live with the mother and 4% are separated from the mother after 24 hours according to clinical indications or maternal preferences. WHO also recommends that LBW can live with mothers who have confirmed SARS-CoV-2 for hospitalization. The decision to separate or not to separate mother and baby depends on the clinical condition of the mother and/or newborn (severe maternal symptoms, newborn requiring NICU care). For mothers who live along with the baby, the American Academy of Pediatrics (AAP) recommends using appropriate infection prevention measures to minimize the risk of transmission from mothers on confirmed COVID-19 to their babies where LBW should be bathed after birth to remove the virus that could potentially be present on the skin surface.

DISCUSSION

The practice of LBW care is more challenging because LBW problems are often associated with breastfeeding, Kangaroo Mother Care (KMC), and inpatient care (Prabhakaran & Arulappan, 2020). Although current evidence identification that the risk of LBW contracting SARS-CoV-2 from a mother is low, all LBW born to mothers who are positive for COVID-19 should receive early neonatal monitoring and care. This should be the main focus of care provided after birth Mascarenhas et al., (2020). This study aims to provide the latest and evidence-based guidelines for LBW care practices in the COVID-19 pandemic era that are appropriate for local conditions. Research conducted by Auriti et al.,(2020) stated that so far there is no evidence that breastfeeding by mothers who are positive for COVID-19 can cause true infection in breastfed neonates. Mothers need to be encouraged to breastfeed their babies. World Health Organization, (2020), recommends that the benefits of breastfeeding substantially outweigh the potential risks of COVID-19. The Italian Society of Neonatology recommends starting breastfeeding in all mothers on confirmed SARS-CoV-2 infection if they are in a good clinical condition in which case this option should be discussed with the family about the benefits, risks, and appropriate hygiene rules, implemented as an obligation (Auriti et al., 2020). This is in line with the WHO recommendation which states that mothers infected with COVID-19 can continue to have close contact with their babies because the risk of COVID-19 infection in infants is low, this is

because COVID-19 infection in neonates is usually mild or asymptomatic, while the consequences of not breastfeeding or breastfeeding are low. the separation between mother and baby can be significant (Choi, 2020). There are several precautions during breastfeeding that should be followed to minimize the risk of transmission including practicing respiratory hygiene by wearing a medical face mask, washing hands with soap and water, or an alcohol-based hand sanitizer before and after contact with the baby, regularly cleaning and disinfecting touched surfaces. , and avoid falling asleep with the infant (Pereira et al., 2020; Renfrew et al., 2020). If a mother decides to breastfeed by expressing breast milk, it is necessary to strictly implement infection prevention and control. These include washing and disinfecting hands, breasts, and breast pumps, frequent cleaning and disinfection of surfaces, and the use of medical face masks for mothers when expressing breast milk. LBW is recommended to be cared for together with the mother. The decision to separate mother and baby depends on the clinical condition of the mother and/or baby. The decision to separate mother and baby should be made on a case-by-case basis and in consultation with doctors (Abdollahpour & Khadivzadeh, 2020; Shah & Saugstad, 2021). This is supported by the World Health Organization, (2020a) recommending that mothers with confirmed COVID-19 stay together during hospitalization throughout the day and carry out skin-to-skin contact, including kangaroo care, especially immediately after birth. Separation may be necessary for a mother who is too sick to care for her baby or who requires a higher level of care. Separation may be necessary for neonates who are at higher risk for severe disease (eg, infants with underlying medical conditions, infants requiring higher levels of care).

CONCLUSION

Based on the available evidence so far, attention regarding LBW care (breastfeeding, kangaroo method care, and mother-infant attachment/rooming-in) with mothers on confirmed COVID-19 was focused on avoiding transmission of COVID-19 to LBW by implementing prevention and control COVID-19 infection. This practice has not changed during the pandemic. Mothers who are positive for SARS-CoV-2 can stay with their babies all day long and have kangaroo mother care and breastfeeding with slight modifications to the usual process: the mother wears a medic mask when approaching babies and practices proper hand hygiene before touching infant, and breastfeeding. The management of LBW care needs to be carried out according to the mother's preferences and decide on separation or hospitalization on a case-by-case basis depending on the clinical condition of the mother and/or LBW by taking into account the principle of greater benefit compared to the bad consequences of using breast milk substitutes and separation of mother and baby.

ACKNOWLEDGMENT

The authors would like thank to the Faculty of Health Sciences, Universitas Muhammadiyah Jember for facilitating this research and in particular would like thank to the translators who contribute to the writing of this article.

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