Women, Midwives, and Midwifery
https://wmmjournal.org
Publisher: Asosiasi Pendidikan Kebidanan Indonesia (AIPKIND)
http://aipkind.org

Breastfeeding Experiences by Mothers with Covid-19: Lessons from the Pandemic for the Better Future

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ABSTRACT

Background: The spread of COVID-19 had affected disruption of health care system including maternal and neonatal health care, one of which was breastfeeding services. Breastfeeding mothers with COVID-19 needed more attention because they experienced separation, lack of skin-to-skin contact, and insufficient support.
Purpose: This scoping review aimed to map the literature, identify knowledge gap and conduct review of scientific evidence about breastfeeding by COVID-19 mothers.
Method: The scoping review method applied PRISMA-ScR guideline. Five databases were used to search relevant articles using PEOS framework.
Result: From this search, 723 articles were obtained and 11 articles that appropriate with the inclusion criteria. Six themes were found in this scoping review, namely breastfeeding for baby, safety of breastfeeding, the barriers to breastfeeding COVID-19, the motivation of COVID-19 mother in breastfeeding, condition of breastfeeding mothers with COVID-19 and social support.
Conclusion: The importance of breastfeeding by mothers with COVID-19 must be understood by families, health workers and health service providers as an effort to achieve breastfeeding by mothers with COVID-19.

Keywords: Breastfeeding; Breastfeeding mothers; COVID-19; Experiences

Corresponding email: intankusuma29@gmail.com
Submitted: 5 July 2024; Accepted: 16 September 2024; Published: 30 October 2024

ISSN: 2775-4448
DOI: https://doi.org/10.36749/wmm.4.3.41-62.2024

BACKGROUND

Breast milk is a complete source of nutrition for infants and contains various other substances that are very important for infants (Association of Women's Health 2021). At the age of 0-6 months, babies only need breast milk to meet their nutritional needs or referred to as exclusive breastfeeding, babies are given breast milk for the first 6 months without additional food or fluids except for drugs, vitamins or supplements that are needed on medical indications (Babic et al. 2020). *The World Health Organization* (WHO) recommends continued breastfeeding until the child gets 2 years old to obtain optimal benefits (WHO 2021). The fulfillment of nutritional needs of infants through breastfeeding is proven to provide benefits for infants. It also contains vital antibodies and other nutrients that can help the baby's immune system to fight infections. Breast milk contains IgA, IgG, and IgM antibodies, which function to protect the body from bacteria and viruses and prevent allergies (World Health Organization 2021).

Corona virus disease (COVID-19) is a virus caused by coronavirus 2 (SARS-CoV-2). The very fast spread of COVID-19 has resulted in a pandemic that has disrupted health care systems around the world. During the COVID-19 pandemic, there were restrictions on health services including maternal and infant health (Ministry of Health of the Republic of Indonesia 2018; National Population and Family Planning Board (BKKBN) et al. 2018). This restriction was one of the efforts to prevent the transmission of COVID-19. Restrictions on health services affect the policies in hospitals regarding the implementation of early initiation of breastfeeding, breastfeeding and *rooming-in* for newborns, moreover in handling cases of maternity and breastfeeding mothers who were confirmed positive for COVID-19. This situation was a complicated challenge for health workers, especially midwives, to be able to provide breastfeeding support.

The study of Pereira, et al (2020) showed several problems for breastfeeding mothers who were confirmed positive for COVID-19 in breastfeeding. Some of these problems include breastfeeding mothers who are confirmed positive for COVID-19 with pharmacological treatment can breastfeed their babies if given information about the possible minimal risk of very small drug secretion in breast milk. The second problem was that breastfeeding mothers who have confirmed COVID-19 with severe symptoms could increase the risk of transmitting the virus. The third problem is how to manage lactation with newborns being cared for in neonatal intensive care units (NICU) (Pereira et al. 2020).

Another study showed that out of 1,481 deliveries, 116 (8%) mothers tested positive for COVID-19. All infants of mothers who were confirmed positive tested at 24 hours were negative. As many as 68 babies out of 82 babies (83%) were given rooming-in care and mothers were allowed to breastfeed their babies. A total of 79 (96%) of the 82 infants underwent repeated PCR examination on days 5-7 showing negative results. A total of 72 (88%) infants also tested on day 14 also showed negative results and none of the infants had COVID-19 symptoms. Perinatal transmission of COVID-19 is very unlikely if health protocols are properly implemented (Salvatore et al. 2020).

In the early months of the pandemic, there was not enough information explaining the epidemiological characteristics of the COVID-19 pandemic, the clinical implications and the long-term impact of COVID-19, causing concern among health workers and the public. The results of the report by Pissara et al 2020 that conducted in Portugal, showed that out of ten maternity mothers who were confirmed positive for COVID-19, it was not proven to transmit COVID-19 to their babies. All newborns had no symptoms of COVID-19 and were negative for SARS CoV-2 at birth and at 48 hours of life. However, nine

mothers decided not to breastfeed their babies until they tested negative. Separation of mother and baby results in the absence of horizontal transmission of COVID-19 (Guo et al. 2021; Pissarra et al. 2020). This is in line with the research of Guo et al, 2020 which showed no vertical transmission from mothers with confirmed COVID-19 to their babies.

At the start of the pandemic, the evidence of transmission of COVID-19 through breast milk was so weak that health workers must provide adequate breastfeeding counselling and optimize preventive measures. The efforts to prevent the transmission of COVID-19 are carried out through hand hygiene and the use of appropriate masks for all breastfeeding mothers to minimize the risk of transmission. The separation of mother and baby is attempted to be avoided (Peng et al. 2020; Salvatore et al. 2020). WHO provides recommendations for breastfeeding mothers who are confirmed positive for COVID-19 to continue breastfeeding their babies by paying attention to health protocols and the mother's ability to breastfeed through established guidelines. Information from health workers and full support from both health workers, and families are needed so that mothers can continue to breastfeed their babies even though they are infected with COVID-19 (World Health Organization. 2021a, 2021b).

OBJECTIVE

Even though we are no longer in the COVID-19 pandemic, it can be used as a lesson for the next life so that we can get the most appropriate and useful recommendations for the conditions we are facing, especially to continue optimizing breastfeeding support and continue preventing transmission of existing viruses.
Based on these conditions, the authors have purposes to identify how breastfeeding is given to breastfeeding mothers who are confirmed positive for COVID-19. Therefore, the authors took this theme for a scoping review.

METHODS

Scoping review also known as a mapping review or scoping study, it is defined as the process of mapping existing literature or evidence (Armstrong et al. 2011; Peters et al. 2020). Scoping review is used to identify knowledge gaps, set the research agenda, map available evidence and identify implications for decision making (Munn et al. 2018; Sargeant and O'Connor 2020). Compilation and reporting of this scoping review using the guide Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Tricco et al. 2018).

The author uses the PEOS (Population, Exposure, Outcome, and Study) framework in preparing the scoping review questions. The framework is used to assist in identifying the main concepts in the focus of the question, developing appropriate search terms to describe the problem. PEOS was used to identify the elements of qualitative research (Semiawan 2020).

Table 1
Framework Research Question

Based on the framework, the researcher determined that the scoping review question to be taken was "How is the breastfeeding experience by mothers with COVID-19?" .

Eligibility criteria

The characteristics of the sources used as eligibility criteria through inclusion and exclusion criteria. The author identifies the relevant articles by determining the inclusion and exclusion criteria that will be used as a source of scoping reviews.

P (*Population*)	E (*Exposure*)	O (*Outcomes*)/ T (Themes)	*S (Study)*
Breastfeeding mothers with COVID-19	*COVID-19*	*Breastfeeding/* Pemberian ASI	*Original Research qualitative and quantitative*

Table 2
Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1. *Original research*, case report, case study, guidelines from WHO and articles from Google Scholar 2. Articles published in English published in 2020-2021 3. Articles discussing breastfeeding by mothers with COVID-19 4. Articles that discuss the experiences of mothers with COVID-19 in breastfeeding 5. Articles that discuss the physical, psychological and social conditions of mothers with breastfeeding with COVID-19	1. *Review / Comment article* 2. *Opinion papers*

Information Sources

Researchers used relevant databases, namely PubMed, Wiley Online Library, Ebsco, ScienceDirect, ClinicalKey for Nursing and gray literature (google scholar as search engine, guidelines from WHO and UNICEF).

Search Strategy

The search strategy and specific keywords used in the search process. The keywords used are "Breastfeeding mothers OR breastfeeding women AND COVID-19 OR Coronavirus Disease OR SarsCov-2 AND Breastfeeding". The literature search was carried out from December 2021 to February 2022. The author conducted an article search by accessing the PubMed database, Wiley Online Library, Science Direct, EBSCO, ClinicalKey for Nursing and grey literature through Google Scholar. In making it easier to find articles, keywords are written using advanced search by adding a boolean by adding "OR", "AND". After entering these keywords, the next author adds a year filter, namely the range of 2020-2021 and the type of original research article including quantitative, qualitative, mixed method. We also included case report and case study. Next, the articles from the search results were downloaded and stored in the reference manager.

RESULTS

Selection of Sources of Evidence

The results of the article search through 4 databases and 1 online library obtained as many as 723 articles, namely from PubMed 63 articles, Wiley online library 130 articles, EBSCO 30 articles, ScienceDirect 211 articles, ClinicalKey for Nursing 244 articles, *gray literature* with Google Scholar 45 articles. All articles obtained were *screened* based on the title. As many as 553 irrelevant articles were found 553 articles were declared irrelevant because they did not discuss the topics in this study or did not meet the inclusion

criteria and 121 duplicate articles were found. A total of 49 articles were screened for full text and 38 articles were *excluded*. Based on the screening carried out, the articles used in the scoping review were 11 articles. The following is Prisma *Flowchart* in this *scoping review*:

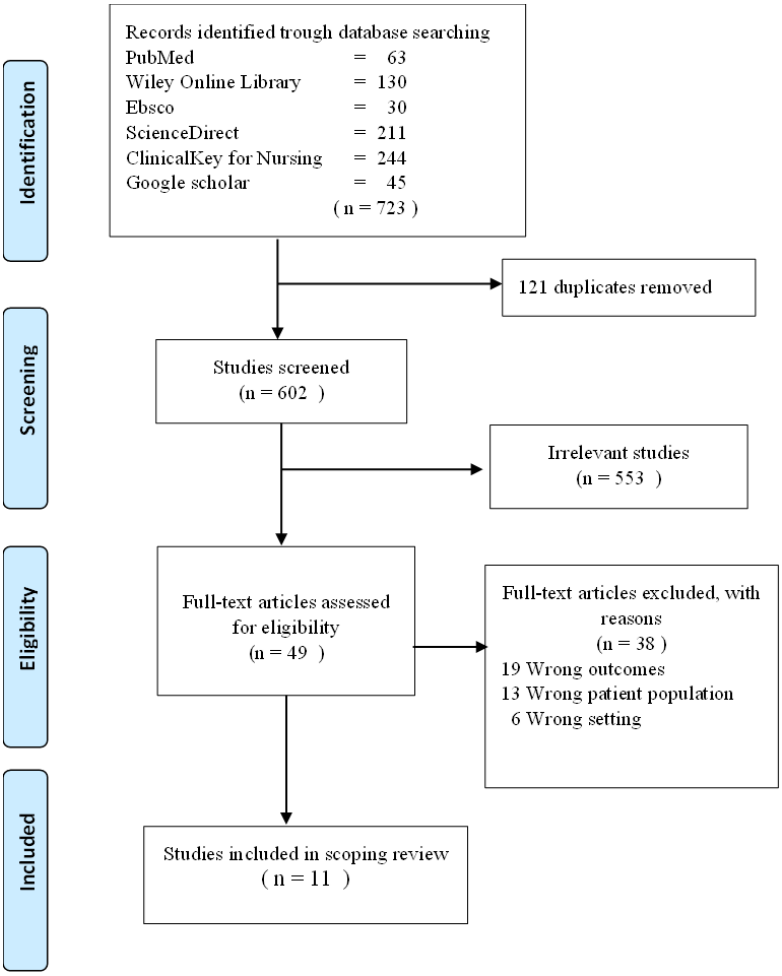

Figure 1. PRISMA Flowchat

Charting data

Table 3. Charting data

Code	*Title/Author/ year*	*Countr y*	*Aim*	*Type of Research*	*Data Collection*	*Participants/ Sample Size*	*Result*
A1	*The breastfeeding experiences of COVID-19-positive women: A qualitative study in Turkey* / (Aşcı, Demirgöz, and Ergin 2021)	Turkey	The purpose of the study was to determine the experience of breastfeeding mothers positive for COVID-19	Qualitative Studies	Data collection is done through telephone to each informant by recording telephone conversations.	14 mothers who had been diagnosed with COVID-19 while breastfeeding.	Obtained three themes in this study, among others: Theme 1 "increased emotional burden," describes the emotional effects of illness experienced by mothers, such as anxiety and fear, feelings of sadness and inadequacy. Theme 2 is "Breastfeeding during illness," which describes the effect of the treatment process on the mother, symptoms associated with the disease, its effect on breastfeeding attitudes and behavior, and the influence of social media and television. Theme 3 “perceived social support and need,”

Code	*Title/Author/ year*	*Countr y*	*Aim*	*Type of Research*	*Data Collection*	*Participants/ Sample Size*	*Result*
							defines the social support that is felt and expected by the mother during isolation.
A2	*Breastfed 13 month-old infant of a mother with COVID-19 pneumonia: a case report* / (Yu et al. 2020)	China	The purpose of this study is to analyze the case of a mother breastfeeding her 13 month when both were diagnosed with COVID-19 pneumonia.	*case report*	Clinical presentation, diagnosis, treatment, and outcome.	Breastfeeding mother who is confirmed positive for COVID-19 and her child is 13 months old	SARS-CoV-2 was not detected in breast milk, whereas antibodies to SARS-CoV-2 were detected in serum and breast milk. This case confirms that the possibility of transmission of SARS CoV-2 from mother to child through breast milk is very small and breastfeeding directly to children is safe to do.
A3	*Breastfeeding mothers with COVID-19 infection: a case series* / (Pereira et al. 2020)	Spanis h	This study aims to describe the type of lactation in COVID-19 mothers, identify any additional difficulties, and assess the risk of infection in pregnant women newborn baby.	*Retrospective case series*	Data collection was obtained from medical records and surveys by telephone	A total of 22 mother with COVID-19 after giving birth from March 14th to April 14th 2020.	A total of 20 (90.9%) of the 22 mothers chose to breastfeed their babies during hospitalization. IMD and skin-to-skin contact in the delivery room were performed in 54.5 and 59.1%, respectively. Eighty-two percent of newborns to mothers with COVID-19 were breastfed after 1 month, down to 77% at 1.8 months. Six out of 22 (37.5%) mothers with COVID-19 needed complementary

Code	*Title/Author/ year*	*Countr y*	*Aim*	*Type of Research*	*Data Collection*	*Participants/ Sample Size*	*Result*
							foods temporarily until exclusive breastfeeding was achieved. During the follow-up period, there were no complications, and no neonates were infected during breastfeeding.
A4	*The experiences of childbearing women who tested positive to COVID-19 during the pandemic in northern Italy* / (Fumagalli et al. 2021)	Italy	Research objectives for explore the birth experience of COVID-19 positive mothers who gave birth in March and April 2020 in Northern Italy maternity hospital.	Qualitative/p henomenolo gical studies	Data collection was carried out through structured interviews via telephone/ *video call* (n = 21) or face-to-face advance (n = 1) depending on the choice of the mother.	A total of 22 mothers tested positive for COVID-19 during the pandemic in Italy and gave birth during March and April 2020	The research results are covers four main themes: 1) overcoming unmet expectations; 2) react and adapt to 'new habits'; 3) 'pandemic relationship'; 4) share a traumatic experience with a strong emotional impact long-lasting. The most traumatic conditions the mother experiences are sudden family separation, isolation, transfer to a referral center, partner not being allowed to attend the delivery and limited physical contact with the new baby born, the women were concerned about holding their baby for more thanwhat was absolutely necessary (e.g.

Code	*Title/Author/ year*	*Countr y*	*Aim*	*Type of Research*	*Data Collection*	*Participants/ Sample Size*	*Result*
							breastfeeding time).
A5	*Breastfeeding in Mothers with COVID-19:Insights from Laboratory Tests and Follow-Upfrom Early Outbreak of the Pandemic in China* / (Zhong, Luo, Li, et al. 2020)	China	The aim of the study was to provide an overview of the safety of breastfeeding and postpartum follow-up, including physical condition and psychology in pregnant women with SARS-CoV-2 during the stage the beginning of the pandemic, to provide *evidence* related to strategy best health care.	Quantitative/ cohort studies	Initial data was obtained from the medical records of patients/mothe rs who were suspected and confirmed positive for COVID-19.	A total of 23 pregnant and postpartum women with a positive confirmed diagnosis of COVID-19 or suspected COVID-19.	No SARS-CoV- was found in neonates and all breast milk samples were negative for SARS-CoV-2. IgG detection results for SARS-CoV-2 were negative in all breast milk samples. All infants were healthy at two follow-ups, and antibody tests for SARS-CoV-2 were negative. Breastfeeding rates increased during the second follow-up. The results from this study showed that half of the women receiving a second follow-up suffered from stress, anxiety, or depression.
A6	*Report on a lactating patient with COVID-19* / (Oncel et al. 2021)	China	This study aims to increase understanding of COVID-19 with particular emphasis on breastfeeding patients.	*case report*	The data was obtained from the first confirmed case of the corona virus (COVID-19) in a breastfeeding patient in Chizhou, Anhui Province, China.	Breastfeeding mother who is confirmed positive for COVID-19	SARS-CoV-2 is transmitted primarily through respiratory droplets and patient contact, making up the population are generally at high risk of infection. Management of mother-child interaction and breastfeeding in women with COVID-19 is difficult, further studies are needed to obtain strong evidence

Code	*Title/Author/ year*	*Countr y*	*Aim*	*Type of Research*	*Data Collection*	*Participants/ Sample Size*	*Result*
							regarding the safety of breastfeeding.
A7	*A multicenter study on epidemiological and clinical characteristics of 125 newborns born to women infected with COVID-19 by Turkish Neonatal Society* / (Salvatore et al. 2020)	Turkey	The aim of the study was to evaluate the epidemiological and clinical characteristics of 125 newborns born to mothers infected with COVID-19.	Quantitative/ cohort studies	Data obtained from electronic case report forms (eCRF) through the online registration system at 34 NICU	Pregnant women (n = 125) who had a positive RT-PCR test and the baby was born to that patient.	Eight of the 125 mothers (6.4%) were admitted to the intensive care unit for mechanical ventilation, six of whom died (4.8%). The majority of newborns (86.4%) were followed in the isolation room in the NICU. Four of the 120 newborns (3.3%) had a positive RT-PCR test result. The preference of parents to give formula and expressed breast milk was more common than following the recommendation to continue breastfeeding. This is due to anxiety and lack of information.
A8	*Neonatal management and outcomes during the COVID-19 pandemic: an observation cohort study* (Salvatore et al. 2020)	United States of Americ a	The purpose of this research is to followed up on neonates born to mothers who were positive for SARS-CoV-2 at the time of delivery and described best practices regarding mother-infant infection control, and identified potential risk factors	Quantitative/ observationa l cohort study	Data were collected from inpatient medical records at birth and neonatal outpatient medical records at clinic visits on days 5-7 and 14 and by telemedicine for visits at 1 month of age.	Neonates born between March 22 and May 17, 2020, at three hospitals in New York to mothers who tested positive for SARS-CoV-2 during delivery	Of the 1,481 deliveries, 116 (8%) mothers tested positive for SARS-CoV-2; 120 neonates were identified. All neonates were examined in the first 24 hours and there were no positive results for SARS-CoV-2. A total of 82 (68%) neonates completed follow-up on days 5-7 of life.

Code	*Title/Author/ year*	*Countr y*	*Aim*	*Type of Research*	*Data Collection*	*Participants/ Sample Size*	*Result*
			associated with transmission.				Of the 82 neonates, 68 (83%) were admitted to the mother. All mothers were allowed to breastfeed; at 5-7 days of life, 64 (78%) were still breastfeeding. None of the neonates had any symptoms of COVID-19. This suggests that COVID-19 transmission is less likely to occur in the perinatal period if proper precautions are taken, and that allowing the neonate to be hospitalized with the mother and to breastfeed directly is a safe procedure when carried out with effective parental education on infant protection strategies.
A9	*Detection of SARS-CoV-2 in Milk From COVID-19 Positive Mothers and Follow-Up of Their Infants* / (Bertino et al. 2020)	Italy	The main objective of this study was to investigate the presence of SARS-CoV-2 RNA in breast milk in mothers infected with SARS-CoV- 2. The secondary objective of this study was to evaluate clinical outcomes during the first month of life in infants who were exclusively	Quantitative/ observationa l cohort study	Data were collected through examination of breast milk samples from mothers who were confirmed positive. Follow-up of newborns was carried out during the first month of life or until two consecutive negative	14 nursing mothers diagnosed with COVID-19.	In 13 cases the search for SARS-CoV-2 RNA in breast milk samples was negative and one case was positive. Thirteen of the 14 newborns were exclusively breastfed and monitored closely in the first month of life. Four newborns tested positive for SARS-CoV-2

Code	*Title/Author/ year*	*Countr y*	*Aim*	*Type of Research*	*Data Collection*	*Participants/ Sample Size*	*Result*
			breastfed by their positive mothers. .		swabs were found.		and all were detected within the first 48 hours of life, after the onset of maternal symptoms. Also the clinical course of these 4 babies, including those who received SARS-CoV-2 positive breast milk, went smoothly, and all of them became SARS-CoV-2 negative within 6 weeks.
A10	*Investigation of SARS-CoV-2 RNA in milk produced by women with COVID-19 and follow-up of their infants: A preliminary study* / (Kilic et al. 2021)	Turkey	The main objective of this study was to detect the presence of SARS-CoV-2 RNA in breast milk samples from 15 mothers with coronavirus 19 (COVID-19) and in throat swab samples of delivered infants.	Quantitative/ observational cohort study	Data was collected through examination of breast milk samples from 15 mothers with COVID-19. All infants underwent clinical follow-up for 14 days of isolation and their throat swab samples were tested for SARS-CoV-2 RNA.	Amount 15 mothers with COVID-19	The results showed that from 15 mothers with COVID-19, SARS-CoV-2 RNA was detected in breast milk samples from 4 mothers. A throat swab sample from this mother's baby was found to be positive for SARS-CoV-2 RNA. Three out of four mothers are breastfeeding. In addition, during the 14-day isolation, all mothers (except three mothers) breastfed their babies. The clinical outcome of all mothers and infants was good. Based on these results it can be concluded that the benefits of breastfeeding may outweigh

Code	*Title/Author/ year*	*Countr y*	*Aim*	*Type of Research*	*Data Collection*	*Participants/ Sample Size*	*Result*
							the risk of SARS-CoV-2 infection in infants.
A11	*Clinical profile, viral load, management and outcome of neonates born to COVID 19 positive mothers: a tertiary care center experience from India* / (Anand et al. 2021)	India	This study was conducted to describe the clinical profile of neonates born to mothers who were tested positive for COVID-19 infection and to determine the relationship between the status and viral load of the neonate's COVID-19 with the mother's clinical status and viral load.	Quantitative/ cohort study	Data collection was carried out through the medical records of all mothers who gave birth in COVID facilities from April 1, 2020 to July 10, 2020, which were reviewed independently.	Amount 69 mothers confirmed positive for COVID 19	Of the 69 mothers who were positive for COVID 19 (2.3%), with 1 abortion, 2 maceration stillbirths and 2 new stillbirths as a result of pregnancy. Of the 65 neonates tested, 10.7% (7) were confirmed positive for COVID 19 by RT-PCR. Viral load in neonates is comparable to Ct reported from adults but neonates have milder clinical manifestations. The viral load of mothers with COVID-19 positive neonates compared with mothers with COVID-19 negative neonates for gene E and RdRp was also not statistically significant. The majority (93%) of neonates tested later than 48 h (roomed in with mother and breastfed) tested negative.

Study Characteristics

The characteristics of the study were identified based on several categories, including the year the article was published, the research method and design and the country of origin of the research. Based on the year published, the articles used in this *scoping review* consist of 5 articles from 2020 and 6 articles from 2021. The two articles in this scoping review use a qualitative method with a phenomenological approach. A total of 9 other studies used quantitative methods with 2 studies with case report designs, 1 study with case series and 6 studies with cohort designs.

Characteristics of the article based on the country where the research was conducted, it was found that the study was conducted in Turkey, China, Spain, Italy, the United States and India. This shows that 4 studies were conducted in developed countries and 7 studies in developing countries. Based on the assessment carried out, all articles are included in the good category/Grade A. The studies assessed almost meet all the elements in the JBI Critical Appraisal Checklist. This shows that the article deserves to be used as a reference basis in providing health services.

Data Analysis

The authors carried out theme mapping using thematic analysis so that we could identify themes that emerged from the data obtained. The authors determined 6 themes, namely breastfeeding for infants, safety of breastfeeding and breastfeeding for infants by mothers with COVID-19, barriers to COVID-19 mothers in breastfeeding, drivers of COVID-19 mothers in breastfeeding, conditions of mothers with COVID-19 in breastfeeding and support in breastfeeding during COVID-19 mothers. The mapping of the themes in this scoping review:

Table 4
Theme Mapping
After charting the data, the author identified emerging themes based on analysis of the results found in the articles included in this review. We analyzed each article and then grouped the results obtained with articles that discussed the same theme.

THEME	SUB THEME	ARTICLE CODE
Breastfeeding for babies	- Breastfeeding when mother is COVID-19	A1, A2, A3, A4, A5, A7, A8, A9, A10
	- Not giving breast milk (giving formula milk/supplementary food)	A1, A3, A5, A6, A7, A8, A9, A10
Safety of breast milk and breastfeeding in babies by mothers with COVID-19	- Very low risk of transmitting COVID-19 through breast milk and breastfeeding	A2, A5, A8, A9, A11
	- Safe breastfeeding is carried out by following health protocols	A2, A3, A5, A8, A9
Barriers to breastfeeding mothers with COVID-19	- Difficulty breastfeeding due to physical symptoms	A1, A3
	- Infant conditions requiring intensive care (NICU etc.)	A3, A8, A11
	- Worry and anxiety of transmitting COVID-19 to baby	A4, A5, A6, A7
	- Lack of information	A1, A4

THEME	SUB THEME	ARTICLE CODE
Motivation of COVID-19 mothers in breastfeeding	- Mother's desire to prioritize breastfeeding her baby	A1, A3
The condition of the mother of COVID-19 in breastfeeding	- Mother's physical condition	A1, A2, A3, A5, A6, A9, A10
	- Mother's psychological condition	A1, A4, A5
	- Mother's social condition	A1, A4
Social support in breastfeeding to mothers with COVID-19	- Husband and family support	A1, A4
	- Health worker support	A1, A3, A4
	- Support from health care providers and government	A1, A3, A4, A8

DISCUSSION

Breastfeeding for babies

Close and early contact and exclusive breastfeeding help the baby's development and help the baby's immune system to fight infections (United Nations Children's 2020). However, mothers with COVID-19 have challenges in breastfeeding. Several studies have shown that mothers who have tested positive for COVID-19 continue to breastfeed their babies either directly or through expressed breast milk (Anand et al. 2021; Aşcı, Demirgöz, and Ergin 2021; Bertino et al. 2020; Fumagalli et al. 2021; Oncel et al. 2021; Pereira et al. 2020; Salvatore et al. 2020; Yu et al. 2020; Zhong, Luo, Zhang, et al. 2020). Aşcı et al's study, 2021 stated that almost all mothers (93%) after confirmation of COVID-19 decided to continue breastfeeding. During isolation, mothers stated that they had followed health protocols for hygiene rules, used masks, and tried to reduce close contact other than while breastfeeding.

In line with several studies conducted that breastfeeding was recommended for mothers with COVID-19, but proper precautions need to be met in an effort to reduce the risk of transmission to the baby. Measures taken to minimize the risk of transmission during breastfeeding include wearing masks, washing hands, routine cleaning and disinfecting all touched surfaces (Cui et al. 2020; Peng et al. 2020; Vassilopoulou et al. 2021). Transmission of COVID-19 from mother and baby through breastfeeding is unlikely to occur if prevention is carried out properly. Apart from direct breastfeeding, mothers with COVID-19 can also provide breast milk to their babies through expressed breast milk. A longitudinal study by Peng et al 2020, conducted in China, showed that ten out of 14 mothers who had confirmed COVID-19 during delivery gave breast milk via expressed breast milk in the early days after delivery, then the mother breast-fed directly on the 22nd postpartum day.

Research also shows that there are mothers with COVID-19 who do not breastfeed their babies (Aşcı, Demirgöz, and Ergin 2021; Bertino et al. 2020; Kilic et al. 2021; Liu, Zhou, and Zhu 2021; Oncel et al. 2021; Zhong, He, Chen, et al. 2020). The study of Oncel et al (2021) showed that the rate of using formula milk (56.8%) was higher than the use of exclusive breastfeeding. The high use of formula milk can be caused by the health conditions of the mother (severe symptoms or mothers with complications such as mothers are unwell, with fever, in need of oxygen therapy and are even admitted to the intensive care unit, expressing milk might be a real challenge for them.) and the baby (the need for NICU care), lack of information related to breastfeeding by mothers with COVID-19, separation of mother and baby, anxiety from both parents and health workers.

on possible breast milk contamination. The results of the research by Pissara et al (2020) also showed that mothers decided to separate themselves from their babies in an effort to prevent the transmission of COVID-19 to their babies. Nine out of ten mothers continue to stimulate lactation by pumping breast milk and choose to discard expressed breast milk until the SARS CoV-2 RT PCR is negative (Pissarra et al. 2020).

Safety of breast milk and breastfeeding for babies by mothers with COVID- 19

Results of studies on breast milk samples from mothers breastfeeding with COVID indicates the absence of SARS-CoV-2 in breast milk or negative for SARS-CoV-2. In another study, SARS CoV-2 RNA was found in 1 breast milk sample from a total of 14 breast milk samples from mothers with COVID-19. The results of the Kilic et al, 2021 study also showed that from 15 mothers with COVID-19, as many as 4 breast milk samples detected SARS-2 RNA (Kilic et al. 2021).

Most studies on breast milk samples from COVID-19 mothers did not include information on maternal viraemia. Breast milk samples were only tested by RT-PCR test so it was possible that the detection of viral RNA in breast milk was influenced by the components of breast milk tested. It was important to note that the detection of viral RNA in breast milk does not necessarily indicate viral infectivity, and other tests were needed to determine whether there were viral particles in breast milk that could be transmitted after ingestion by the infant (Bertino et al. 2020; Centeno-Tablante et al. 2021).

To date, there is no strong evidence to suggest that SARS CoV-2 can be transmitted through breast milk. Breast milk contains anti-SARS CoV-2 antibodies and its concentration correlates with the ability of breast milk to effectively neutralize SARS-CoV-2 infectivity. The risk of transmission that actually needs to be watched out for is through droplets and breast skin contaminated with droplets from the mother's cough (Pace et al. 2021).

The currently available data are not sufficient to conclude the transmission of COVID-19 through breastfeeding. Several studies have shown that the risk of transmitting COVID-19 to their babies is very low if they apply health procedures. The risk of COVID-19 infection in infants is relatively low. Infections that occur are usually mild or asymptomatic, while the consequences of not breastfeeding and separation between mother and baby can have significant repercussions. The benefits obtained from breastfeeding for both mother and baby are greater than stopping the breastfeeding process. Adherence to infection prevention and control measures is very important as an effort to prevent contact transmission between mothers with suspected or confirmed COVID-19 to newborns (World Health Organization 2020).

Safe procedures during breastfeeding for mothers with COVID-19 include practicing good hygiene during breastfeeding such as wearing a mask, washing hands with soap before and after touching the baby, cleaning and disinfecting surfaces regularly. The main risk for the baby is contracting the virus from close contact with the mother or other infected family members, so the application of hygiene procedures must be carried out. For mothers who choose to express breast milk and feed their babies using a clean cup or spoon, it is also important to pay attention to the cleanliness of the tools used. If the mother is unable to breastfeed or express breast milk, the provision of *Pasteurized Donor Human Milk* (PDHM) should be considered (Spatz et al. 2021).

Barriers to breastfeeding mothers with COVID-19

Most mothers experience symptoms such as fever, shortness of breath, myalgia, and decreased appetite due to COVID-19. These symptoms result in difficulty in breastfeeding and the perception of inadequate milk production. This condition becomes an obstacle for the mother so that she cannot give breast milk to the baby. Nutrition for infants with formula milk needs to be given appropriately by paying attention to the instructions on the packaging. Extra care is also needed in maintaining the cleanliness of the equipment used by washing bottles, teats, and other equipment used thoroughly .

Apart from the mother's physical condition, breastfeeding barriers also come from the condition of the baby who requires care in the *Neonatal Intensive Care Unit* (NICU). The study of Pereira et al (2020) demonstrated the presence of 2 newborns from preterm labor requiring NICU care, one due to respiratory distress syndrome and the other due to hemolytic anemia. Provision of nutrition in case 1 through pasteurized breast milk donors and expressed breast milk until the 17th day and after that the mother is able to breastfeed. In case 2, feeding was carried out with pasteurized donor breast milk until day 18, followed by a three-week period of formula feeding before achieving mother-only breastfeeding.

Mother's concern about transmitting COVID-19 to her baby through breastfeeding is an obstacle in breastfeeding. This concern made the mother decide not to breastfeed the baby, separate herself from the baby and throw away her expressed breast milk until the mother was declared negative for SARS CoV-2 as an effort to prevent the transmission of COVID-19. Fear of transmitting COVID-19 to babies also causes parents to prefer to give formula milk compared to breastfeeding and expressing breast milk.

Another obstacle experienced by mothers with COVID-19 is the lack of information obtained regarding the safety of breastfeeding while the mother is suffering from COVID-19. Information related to the safety of breastfeeding has not been fully obtained by mothers, so there are concerns that they will transmit COVID-19 to babies. Providing comprehensive information to mothers is needed so as to minimize the worries/doubts felt by mothers.

Motivation of COVID-19 mothers in breastfeeding

Mothers with COVID-19 still have the desire to breastfeed their babies/children. Mothers have understood the importance of breastfeeding for the health of babies/children. In addition, mothers also have the assumption that the content of breast milk will protect babies/children from COVID-19. This assumption has increased the motivation of mothers to breastfeed and made mothers prioritize breastfeeding even though the mother is in a COVID-19 condition.

The condition of the mother of COVID-19 in breastfeeding

Several studies have shown that breastfeeding mothers with COVID-19 are found to be asymptomatic and with clinical symptoms. Most women experience symptoms such as fever, shortness of breath, myalgia, and decreased appetite due to COVID-19. Clinical symptoms in mothers with COVID-19 include fever 10 (71.4%), cough 9 (64.3%), myalgia 3 (21.4%), dyspnea 4 (28.6%) diarrhea 1 (7.1%) and asymptomatic 2 (14.3%). Other studies have shown clinical symptoms that appear in mothers with COVID-19, including cough 29 (50%), anosmia or ageusia 27 (47%), fever 24 (41%), rhinorrhea 11

(19%), myalgia 11 (19%), shortness of breath or respiratory distress 8 (14%), headaches 7 (12%), gastrointestinal 5 (9%), and other 9 (15%) (Aşcı, Demirgöz, and Ergin 2021; Salvatore et al. 2020).

Physical symptoms of breastfeeding mothers while experiencing COVID-19 make it difficult for mothers to breastfeed. However, mothers can be given information to continue breastfeeding their babies through expressed breast milk if the mother cannot breastfeed directly. If the mother's condition does not allow breastfeeding by direct breastfeeding or expressed breast milk, then the fulfillment of infant nutrition can be provided by giving donor breast milk. The research of Pereira et al 2020 showed that there were cases of giving formula milk to babies until the 4th week after birth and then the mother was able to breastfeed directly and fully.

The psychological condition of breastfeeding mothers with COVID-19 also needs to be considered. Mothers experience anxiety and fear of transmitting COVID-19 to their babies, spouses and families when confirmed COVID-19. Most mothers with COVID-19 experienced decreased physical contact with their babies because of COVID-19 resulting in mothers feeling sad and incapacitated. Another study showed a mother with COVID-19 who wanted to breastfeed her baby but had to be separated from her baby caused the mother to feel unable to carry out her maternal duties. Mother expressing breast milk and then throwing it away makes the mother feel guilty. The mother also feels worried and anxious for fear of transmitting the disease to her baby. The cumulative impact of this fear causes anxiety and the mother cannot sleep for days (Kumar et al. 2020; Suryavanshi et al. 2020).

The results of research by Luo et al (2021) show that the psychological condition of mothers with COVID-19 who breastfeed their babies experience higher stress, anxiety and depression than the group of mothers with suspected COVID-19. This happened because of concerns about transmitting COVID-19 to her baby. This situation can be overcome by providing parents with adequate information or health education about safe infection control practices, such as wearing masks at all times and maintaining hand hygiene.

The social condition of mothers with COVID-19 is also experiencing restrictions. Mother feels alone and lonely when she has to do isolation. The COVID-19 condition in the mother makes the mother isolated and far from the baby and his family. Strict isolation and quarantine measures have resulted in delaying the initiation of early breastfeeding as well as expressing expressed breast milk for babies until three weeks after delivery. Social restrictions don't just happen in the hospital. However, mothers are worried that there will be discrimination or stigma that will be received from the community after the mother returns from the hospital.

Support in breastfeeding mothers with COVID-19

Research by Aşcı et al (2021) showed that most mothers received support from their spouse, mother, and mother-in-law, who accompanied or called on them during isolation at home. Support received from these sources included caring for the baby, positioning the baby while breastfeeding, and providing motivation through positive statements about breastfeeding and recovery. Emotional support from family and partners is obtained by mothers remotely through *video calls* when physical contact with family is not allowed.

However, some mothers do not get the support they expect from their closest family. Mother feels that there is no positive expression from her partner or mother-in-law. This is in line with the research of Sanjeev Kumar et al (2020) which states that mothers do not get support from their families. The family is worried about the mother's COVID-19 status, which in turn increases the fear of the mother. This makes the mother avoid talking to the family.

Mothers also need social support from health workers health workers including doctors, nurses and midwives. Informational support in the form of providing information related to treatment options and their effects on breastfeeding, safe breastfeeding methods for babies, obstacles that occur in breastfeeding such as insufficient breast milk, milk production and breastfeeding support systems for mothers with COVID-19. This is needed so that mothers do not feel confused and worried about giving breast milk. Emotional support from health workers is needed by mothers to be able to provide a sense of empathy, security, comfort and reduce worries about the condition of themselves and their babies (Brown and Shenker 2021; Fumagalli et al. 2021).

World Health Organization / WHO has provided recommendations for breastfeeding mothers with COVID-19 to continue to breastfeed their babies either through breastfeeding or expressed breast milk by establishing health protocols. This is also the basis for the policy of the Ministry of Health of the Republic of Indonesia to provide support for breastfeeding mothers with COVID-19 to continue to breastfeed their babies by complying with health protocols to prevent transmission through droplets.

Research shows that there are health services that separate mothers and babies on the grounds of preventing horizontal transmission of COVID-19. The study of Yu et al (2020) stated that in China all infants were isolated from their mothers who were infected with COVID-19 immediately after birth, and these infants were given complete formula milk without breastfeeding the mother. In line with the research of Sanjeev Kumar et al (2020) which states that a positive mother for COVID-19 in a tertiary health facility in India cannot give breast milk to her baby, the mother expresses the milk and then throws it away. This makes the mother feel sad and feel unable to carry out her duties as a mother. Several studies have also shown that health care providers allow COVID-19 positive mothers to breastfeed either directly or through expressed breast milk.

CONCLUSION

Breastfeeding by mothers with COVID-19 was a challenge. The findings in this review indicate that breastfeeding mothers with COVID-19 are faced with various conditions related to breastfeeding. Several studies have shown that breastfeeding mothers with COVID-19 continue to breastfeed but also several other studies have shown that mothers do not breastfeed while they are suffering from COVID-19 because the difficulty breastfeeding due to physical symptoms, worry and anxiety of transmitting COVID-19 to baby and lack of information. This is influenced by several existing factors, including understanding regarding the safety of breastfeeding and breastfeeding when the mother is confirmed to have COVID-19, barriers to breastfeeding, the condition of COVID-19 mothers in breastfeeding, social support in breastfeeding when the mother is COVID-19. A support system is needed from families, health workers and health service providers to support the success of breastfeeding by mothers with COVID-19.

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