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REVIEW PAPER

Breastfeeding during the COVID-19 pandemic

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ABSTRACT

The SARS-CoV-2 coronavirus pandemic significantly influenced aspects of children's nutrition, in particular breastfeeding and the percentage of breastfeeding mothers. During the pandemic, changes in postnatal care have occurred and may result in a global decline of the breastfeeding initiation rate and problems with long-term maintenance of lactation. Mother's milk is not a source of viral infection for a child; on the contrary, due to the presence of antibodies specific to the SARS-CoV-2 virus, it gives the possibility of acquiring passive immune protection. Currently, breastfeeding requires special care and protection. Emphasizing the benefits of human milk should become a priority in obstetric, neonatal and pediatric departments.

KEY WORDS:

breastfeeding, COVID-19, SARS-CoV-2.

INTRODUCTION

Breastfeeding is the ideal form of providing the right balance of nutrients and bioactive factors for newborn infants. Provision of human milk has a positive and significant influence on the child's health and its proper growth and development. Benefits of breastfeeding are widely known for both mother and infants [1, 2]. Although the World Health Organization (WHO) recommends exclusively breastfeeding during the first 6 months of life with continuation up to 2 years of age [3], it is a great challenge for the mother to breastfeed successfully and for healthcare workers to ensure proper lactation support. Multiple factors affect the decision of initiation and continuation of breastfeeding. As previous studies have shown, factors that have an impact on breastfeeding are sociocultural, economic, environmental and personal such as physical and psychological status. Success of breastfeeding also depends on the level of health service support and social support [4, 5].

The ongoing pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has turned the world upside down and affected all those factors negatively. Furthermore, the COVID-19 pandemic has raised the concerns for pregnant women and their newborns as both groups are susceptible and considered as a high risk population due to their lowered immunity at that time [6]. Concerns have also been raised about breastfeeding and its safety for fear of possible transmission of the SARS-CoV-2 virus through breast milk. Recommendations regarding breastfeeding and management of suspected or confirmed cases of COVID-19 in pregnant women were changing over time and differ between health agencies. The lack of a common consensus led to misinformation and diversity in clinical practices more than once causing stress and anxiety not only among women but also clinicians [7]. At the beginning of the pandemic, strict measures were taken to prevent perinatal and postnatal virus transmission [8]. Elective cesarean delivery, no skin-to-skin contact, and mother-newborn isolation policies were all common clinical practices. For mothers with suspected or confirmed COVID-19 infection temporary suspension of breastfeeding was recommended and

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the return was possible when the mother and her breast milk samples tested negative [9, 10]. Although the WHO approved breastfeeding and skin-to-skin contact from the beginning of the pandemic, a consistent consensus with other national and professional organizations appeared in April 2020 when the mechanism of virus transmission had been better studied [11].

CURRENT GLOBAL RECOMMENDATIONS

Recommendations and guidelines from the WHO subsequently the Centers for Disease Control and Prevention (CDC), the Royal College of Obstetricians and Gynecologists and others indicated that COVID-19 infection should not have an impact on the mode of delivery except worsening of COVID-19 symptoms. The decision regarding delivery, whether vaginal or cesarean, should always be individualized and adjusted to obstetric and fetal conditions. The presence of a labor support partner is known to improve birth outcomes and should not be contraindicated during the COVID-19 pandemic [11–13]. In the postpartum period breastfeeding became a global recommendation for women with COVID-19 as well as skin-to-skin contact and rooming-in. However, the procedures after birth may be changed and depend on factors such as clinical condition of the mother and her infant, the mother's decision to breastfeed and the availability of protective measures. Although perinatal SARS-CoV-2 infection is rare (2.2–9.1%), due to lowered infant's immunity viral transmission through the droplet route after delivery and during breastfeeding is possible [6, 14, 15]. Therefore, mothers with COVID-19 infection are obligated to follow certain preventive measures such as hand hygiene rules and wearing a face mask in order to minimize any risk of virus transmission [16]. Mothers should be encouraged to initiate breastfeeding and should be supported in further continuation. If a mother has COVID-19 and direct breastfeeding is impossible, she should be suggested to collect milk by hand expression or using a breast pump [17]. Another alternative may be pasteurized donor human milk (DHM), which is considered the best option of nutrition when the mother's own milk is not available [18]. The pandemic of coronavirus did not affect the safety of DHM. Even when the active virus was added to human milk samples, Holder pasteurization led to its inactivation [19–21]. The last alternative is milk formula if neither of the above is available.

BREASTFEEDING BARRIERS DURING THE PANDEMIC

Despite the appearance of consistent international recommendations, their implementation in clinical practice among countries and hospitals has not been homogeneous [22]. The Infant Microbiome COVID-19 Project conducted among 378 health providers in 47 countries reported that 93.5% of hospitals have changed their birthing practices [23]. Fear of infection and its transmission to infants, conflicting initial recommendations, reorganization of hospital activity, limitation of available space, lack or relocation of medical staff to COVID-19 wards, constant pressure and exhaustion of healthcare workers led to overshadowing and de-prioritization of breastfeeding and breastfeeding friendly practices globally [24]. Although mothers' initial and post-delivery willingness to breastfeed has not changed during the pandemic and the recommendations regarding continuation of breastfeeding remain unchanged for the majority of healthcare professionals, the COVID-19 pandemic has had a negative impact on maternal and breastfeeding services [25]. Moreover, a negative impact of the pandemic on breastfeeding behaviors was noticeable. The survey of mothers from several European countries and the USA revealed that despite women's initial willingness to breastfeed, many women decided not to breastfeed, breastfeed less after starting, or stop breastfeeding or pumping specifically because of COVID-19. The proportion ranged from 8% in Germany to 21% in France [26].

As a consequence of the COVID-19 pandemic mothers were mostly forced to go through labor alone without any companion. 47% of respondents in the Infant Microbiome COVID-19 Project reported that mothers were alone during hospital admission [23]. Presence of a birth support person improves maternal and fetal outcomes during the active labor and influences the maternal emotional state. The presence of a birth support person, especially at the beginning of pandemic – when personal protective equipment and diagnostic tests were limited and exposure to birth partners posed a risk of infecting health care workers – was not allowed [22, 27]. Currently, the presence of a support person in the delivery room often depends on the decision made by the head of the hospital or regulations across countries.

The WHO recommends early and uninterrupted skin-to-skin contact, kangaroo mother care (KCM) and rooming-in regardless of suspected or confirmed SARS-CoV-2 infection [28]. Despite the existing recommendations, many hospitals practiced separation of mother-infant dyads immediately after birth, which increased the risk of breastfeeding establishment failure. It is known that immediate skin-to-skin contact after birth is essential for breastfeeding success, as it helps early initiation of suckling at the breast. Moreover, it increases the proportion of infants exclusively breastfed at the time of hospital discharge and also over time [29]. The Centers for Disease Control and Prevention in the USA conducted a COVID-19 survey among 1,344 hospitals taking care of mothers with confirmed or suspected COVID-19. The study reported that 14.0% of hospitals discouraged skin-to-skin contact and 6.5% prohibited skin-to-skin contact [30].

Kangaroo mother care is known for its improvement of exclusive breastfeeding rates compared to convention-

al method care, at the time of hospital discharge. Rooming-in, meanwhile, helps to achieve more satisfying and lasting breastfeeding, encourages maternal-infant bonding and leads to better outcomes for both mother and infant [31]. In addition, infants who do not room-in with their mothers are more likely to receive more breastmilk substitutes. Although most evidence showed that rooming-in with infected mothers does not significantly increase viral transmission (on the condition that preventive measures are followed) and adverse outcomes for infants [16, 32], the adaptation of this post-delivery practice was variable in different medical centers across countries [22, 33]. Many hospitals discouraged or prohibited rooming-in. Perrine *et al.* reported that of 1,344 hospitals, 37.8% discouraged rooming-in and 5.3% prohibited rooming-in [30].

Providing prompt lactation support especially during the first days postpartum is crucial to initiation and continuation of breastfeeding [34]. The coronavirus pandemic caused difficulties in accessing lactation advices and negatively influenced breastfeeding support services both during the hospital stay and after discharge. Lack of face-to-face contact with breastfeeding mothers when lactation problems arise has resulted in earlier weaning and formula feeding [35]. The CDC in COVID-19 survey recorded that decreased in-person lactation support was observed in 17.9% of hospitals in the USA [30]. In addition, many hospitals left parents with the decision whether to breastfeed their children without showing the current evidence and recommendations. Postpartum hospitalization is a critical window for healthcare providers to ensure proper lactation support, which helps mothers to establish lactation and breastfeeding [36]. During the pandemic the trend towards discharging mothers and newborns early was remarkable, especially in less than 48 hours after cesarean birth and less than 24 hours after vaginal delivery. That increased the breastfeeding problems at home as mothers do not receive expert lactation post-discharge care [37].

A decrease in breastfeeding rate at the time of hospital discharge was observed especially among infants born to COVID-19 positive mothers [38]. Also a decrease in the exclusively breastfeeding rate in non-infected mothers was observed. Such occurrence was reported in the study by Latorre *et al.*, where 69.4% of infants during lockdown vs. 97.7% of infants in the control group were exclusively breastfed at the time of discharge. In a follow-up period from 30 to 90 days postpartum the proportion of breastfeeding remaining exclusive was lower in the lockdown group than in the control group (58.5% vs. 92.4%) [39]. In an Italian case-control study research focused on breastfeeding initiation practices. The study included 152 breastfeeding mothers during the pandemic and 147 breastfeeding mothers who delivered before the pandemic as a control group. The results of the study showed significantly lower exclusively breastfeeding initiation rates in the study group compared to pre-pandemic controls [40].

However, during the pandemic some unexpected positive effects associated with pandemic restrictions were highlighted. Hospital visitor restrictions favorably decreased distraction during breastfeeding, helped facilitate the establishment of lactation and also increased support for pumping and maternal-infant bonding [41].

COVID-19 affected not only infected and non-infected mothers who had just delivered a child in hospital but also lactating mothers who stayed at home and breastfed their babies for a longer time. Mothers and all families had to face the rapidly changing situation and deal with conflicting information about safety of breastfeeding. Lockdown situation and home confinement had an impact on the mother's physical condition and led to problems with obtaining expert lactation education, care and technical assistance. Vazquez-Vazquez *et al.* surveyed women in the UK who delivered before lockdown (n = 1049) and during lockdown (n = 316). As a result, 13% (39/316) of mothers who delivered during lockdown reported a change in the mode of infant feeding. Of mothers who were breastfeeding, 10% reported a decrease in breastfeeding frequency and 15% a decrease in breastfeed duration [42]. In an online survey of breastfeeding mothers (n = 1219) by Brown and Shenker, earlier cessation of breastfeeding than originally planned was also observed [43]. A slight decrease in breastfeeding (4.32%) was reported also in Thailand [44]. The main reason to stop breastfeeding or change feeding was insufficient healthcare professional support and lack of face-to-face technical support [42, 43]. In a study gathering data of 3823 breastfeeding women during the pandemic in Belgium, 91% of women reported that they did not change feeding practices and 82% of them reported an increase in breastfeeding frequency (due to the lockdown time at home and the potential protective role of antibodies against COVID-19 in human milk). Regarding breastfeeding frequency, 18% of women stated that they reduced breastfeeding frequency. The reduction was caused by worries due to the global pandemic and increased childcare responsibilities at home, which led to a reduction in the quantity of breast milk [45].

PSYCHOLOGICAL IMPACT

Several studies have shown that the COVID-19 pandemic and the consequent lockdown have a psychological impact on pregnant and breastfeeding women as this population is vulnerable to mental health problems [46, 47]. According to the World Health Organization, about 10% of pregnant women and 13% of new mothers experience a mental disorder, primarily depression [48]. The COVID-19 pandemic caused significant emotional distress for pregnant women and breastfeeding mothers [47]. As previous studies reported, prenatal and perinatal stress and anxiety may result in inhibition of the let-down reflex and thus lead to disruption of milk flow and re-

duced milk volume. Moreover, stress has a negative impact on breastfeeding duration [49].

In a recent online survey from Belgium, maternal mental status during lockdown was investigated. Almost half of the surveyed women (a total of 2421 pregnant and 3445 breastfeeding) experienced symptoms of depression and anxiety and their prevalence was higher when compared to estimates obtained before the pandemic [45]. A subsequent study by Hull *et al*. showed that lactating mothers experienced isolation, stress/anxiety and need of reassurance [50]. Similarly, mothers in a study by Vazquez-Vazquez mentioned that they experienced anxiety, depression, loneliness and isolation. Worse mental health outcomes result in negative breastfeeding experiences. Positive breastfeeding experiences and hence better mental health outcomes have been observed when mothers spend more time at home, having more time for motherhood, fewer home visitors and less social pressure [42, 43]. Breastfeeding support, as the study of Chaput *et al*. reported, is essential for maternal mental health. This prospective study on Canadian women showed that women who experienced negative breastfeeding support were at increased risk of postpartum depression[51]. During the COVID-19 pandemic the quality of breastfeeding support has rapidly decreased, as mentioned previously; therefore emphasizing wider and easier access to breastfeeding help is urgently needed.

The coronavirus pandemic modified dietary habits of adolescents globally and might also have altered positively or negatively maternal nutrition. Unfavorable changes in dietary habits such as an increased number of snacks or comfort food consumption might have led to negative changes in milk's microbiome and thus altered infant development [52].

SAFETY OF BREASTFEEDING

Early in the COVID-19 pandemic, the biggest fear of breastfeeding newborns was due to the limited data regarding the risk of SARS-CoV-2 transmission through breast milk. In a study by Brown and Shenker, 13.2% of mothers reported that they had concerns about the safety of breastfeeding. Moreover, mothers received information that breastfeeding might not be safe during COVID-19. 4.3% of mothers reported that they got that information from health providers, 9.9% from family and friends and 21.9% saw it on social media [43]. Current evidence shows that detection of viral DNA in human milk from a COVID-19 positive mother and transmission of the virus through breast milk is uncommon. The living systematic review performed by Centeno-Tablante *et al*. showed that 43 of 46 breastmilk samples obtained from COVID-19 positive mothers tested negative for SARS-CoV-2, and the three other samples were positive [53]. Another meta-analysis including 48 studies, performed by Zhu *et al*., led to the conclusion that presence of the SARS-CoV-2 genome in breastmilk is generally not found and is associated with mild symptoms in newborns. Data were collected on 183 women and showed that only twelve tested positive for the SARS--CoV-2 genome in their breastmilk samples. Six infants of these twelve mothers had a positive SARS-CoV-2 test result [54]. Furthermore, in another study breast milk samples did not show any active or replication-competent virus [19].

ANTIBODIES IN HUMAN MILK

Human milk is a source of maternal SARS-CoV-2 antibodies, which contribute to the acquisition of newborns' passive immunity and provide protection against the virus [17]. Previous studies have shown that breastmilk contains anti-SARS-CoV-2 IgG and IgA (mostly in secretory form – sIgA) [55, 56]. In a systematic review conducted by Low *et al*. 69 out of 86 breast milk samples (80.2%) contained SARS-CoV-2-specific IgA [57]. Fox *et al*. in a preliminary study on a group of women following recovery from COVID-19 found the presence of anti-SARS-CoV-2 sIgA in 80% of human milk samples [55]. Furthermore, human milk showed neutralizing capacity on SARS-CoV-2 in vitro. Data collected in a systematic review by Low *et al*. showed that 20 out of 48 milk samples (41.7%) had the ability to neutralize a SARS-CoV-2 clinical isolate strain [57]. Neutralizing function was also evaluated after Holder and high-pressure pasteurization. Levels of SARS-CoV-2 IgA after Holder pasteurization remained unchanged but the neutralizing function was reduced or lost. Neutralizing capacity of antibodies after high-pressure pasteurization remained effective [58]. Interestingly though, the persistence of antibodies in human milk was found after 195 days after onset of infection in a single individual [59]. A recent study performed by Juncker *et al*. reported anti-SARS-CoV-2 IgA in human milk that persisted at least 10 months after PCR confirmed infection [60]. In an online survey conducted in Belgium, 82% of mothers reported an increase in breastfeeding frequency, inter alia due to protective properties of human milk and willingness to immunize their infants [45].

CONCLUSIONS

Breastfeeding during the ongoing COVID-19 pandemic presents even greater challenges for lactating mothers, their families, and health care workers than before the pandemic. The importance and safety of breastfeeding should be continuously emphasized to prevent the consequences of separation and non-breastfeeding for mother and infant. Currently, there is no evidence of SARS-CoV-2 transmission through breast milk. A growing number of studies indicate the presence of antibodies in mother's own milk that protect against severe and even morbid COVID-19.

DISCLOSURE

The authors declare no conflict of interest.

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