

Association between early initiation of breastfeeding and reduced risk of respiratory infection: Implications for nonseparation of infant and mother in the COVID-19 context

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Abstract

Early initiation of breastfeeding, within 1 h of birth, is vital for the health of newborns and reduces morbidity and mortality. Secondary analysis of the 2016 Nepal Demographic and Health Survey (DHS) showed that early initiation of breastfeeding significantly reduced the risk of acute respiratory infection (ARI) in children under 2 years. Early initiation of breastfeeding requires maternal proximity. Separation of infant and mother inhibits early initiation of breastfeeding and increases the risk that infants will suffer from ARIs. However, during the COVID-19 pandemic, guidance varied, with some recommending that infants and mothers with SARS-CoV-2 be isolated from one another. Nepal's Ministry of Health and Population recommended nonseparation, but the adherence to this guidance was inconsistent. Maternal proximity, nonseparation and early initiation of breastfeeding should be promoted in all birthing facilities.

KEYWORDS

acute respiratory infection (ARI), COVID-19 pandemic, early initiation of breastfeeding, maternal proximity, nonseparation of mother and baby, SARS-CoV-2

1 | BACKGROUND

Initiation of breastfeeding within one hour of birth is vital for the health of newborns. It has been consistently shown that infants who do not breastfeed within the first hour of life are at elevated risk of neonatal mortality (Khan et al., 2015; Smith et al., 2017). Apart from the immunological and nutritional value of breastfeeding for the infant, early breastfeeding initiation is also important for mothers, particularly in reducing the risk of excessive postpartum haemorrhage (Sobhy & Mohame, 2004).

Early initiation of breastfeeding is especially critical in low- and middle-income countries, and forms part of the World Health Organization's Essential Newborn Care Practices (World Health Organization, 2002). In Nepal, the Ministry of Health and Population has strongly supported the early initiation of breastfeeding for at least two decades. The 2004 National Neonatal Health Strategy (Ministry of Health and Population, 2004), 2016 Every Newborn Action Plan (Ministry of Health and Population, 2016) and the 2019 Safe Motherhood and Newborn Health Road Map 2030 (Family Welfare Division, 2019) all state that breastfeeding should be initiated within an hour of birth. Yet up to half of all infants are not facilitated to breastfeed immediately and the

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rate of early initiation of breastfeeding is actually decreasing (Central Bureau of Statistics (CBS), 2019; Ministry of Health and Population, Nepal; New ERA; and ICF, 2017).

Early initiation of breastfeeding requires uninterrupted contact, preferably skin-to-skin, between infants and their mothers (Bystrova et al., 2009). However, during the COVID-19 pandemic, some government and nongovernment health authorities have recommended separation at birth of infants from mothers who were SARS-CoV-2 positive or suspected to be so (Vu Hoang et al., 2020). These recommendations prevented early initiation of breastfeeding. Moreover, they were in opposition to a precautionary approach that would have prioritised maternal-infant proximity until such time as it was demonstrated that SARS-CoV-2 posed a greater risk than maternal separation (Gribble et al., 2020).

Given the level of concern about the nature of SARS-CoV-2 respiratory virus and the potential risk posed to infant health, we conducted a secondary analysis of the Nepal Demographic and Health Survey 2016 (DHS¹) data set to determine the impact of breastfeeding practices on the risk of acute respiratory infection (ARI) in children. Our analysis demonstrated that delayed initiation of breastfeeding was associated with an increased risk of ARI in Nepali children under 2 years of age. This suggests that in the current pandemic, ensuring that infants and mothers are kept together to facilitate the early initiation of breastfeeding is even more critical to protect infants and young children from SARS-CoV-2.

2 | SECONDARY ANALYSIS METHOD

We conducted a secondary analysis of the Nepal DHS 2016 data. An initial comparison between the prevalence of ARI in children aged 0–23 months with whom breastfeeding had or had not been initiated early was performed using a χ^2 test. Then a mixed-effects logistic regression was performed to explore the relationship further. Analysis was conducted in Stata 13.

3 | RESULTS

Our analysis demonstrated a robust relationship between initiation of breastfeeding within the first hour of birth (early initiation) and reduced risk of ARI in the previous 2 weeks in children under 2 years. The χ^2 test revealed that the prevalence of ARI was lower in children with whom breastfeeding had been initiated early (2.5%) compared to children with whom breastfeeding had not been initiated early (4.1%).

This association was confirmed by the mixed-effects logistic regression. In unadjusted analysis, the odds of children with whom

Key points

- Early initiation of breastfeeding requires maternal proximity, whereas separation of infant and mother delays breastfeeding initiation.
- Delayed initiation of breastfeeding increases the risk of acute respiratory infection in children under 2 years in Nepal.
- During the COVID-19 pandemic, ensuring proximity of infants and mothers with SARS-CoV-2 was inconsistent, thus risking delayed breastfeeding initiation and increasing the risk of acute respiratory infections in infants.
- Maternal proximity, nonseparation and early initiation of breastfeeding should be consistently promoted including in the COVID-19 context.

breastfeeding had been initiated early having had an ARI in the past 2 weeks were lower and approaching significance, as shown in Table 1. When the analysis was adjusted for child, child and maternal, and child, maternal and household covariates, respectively, the odds were significantly reduced (odds ratio [OR] = 0.53, confidence interval [CI] = 0.31–0.94, $p = 0.028$; OR = 0.45, CI = 0.23–0.90, $p = 0.023$; OR = 0.46, CI = 0.23–0.92, $p = 0.028$, respectively). The relationship remained robust at all levels of the model, which suggests a true association.

4 | DISCUSSION

4.1 | Early initiation of breastfeeding and reduced risk of morbidity and mortality

Our analysis shows a clear association between delayed initiation of breastfeeding and increased risk of ARI in Nepali children under 2 years of age. This concurs broadly with the existing literature on breastfeeding initiation, morbidity and mortality.

TABLE 1 Odds ratios of children with whom breastfeeding had been initiated early having had an ARI in the past 2 weeks ($n = 1968$)

	OR (95% CI, p value)
Unadjusted	0.61 (0.37–1.01, 0.053)
<i>Adjusted for covariates related to</i>	
Child (sex, age, birth weight)	0.53 (0.31–0.94, 0.028)
Child and mother (sex, age, birth weight, mother's education, mother's work)	0.45 (0.23–0.90, 0.023)
Child, mother and household (sex, age, birth weight, mother's education, mother's work, caste, residence, wealth)	0.46 (0.23–0.92, 0.028)

¹Since 1984, more than 400 Demographic and Health Surveys (DHS) have been conducted in over 90 countries. DHSs are nationally representative household surveys with large sample sizes (5000–30,000 households) that collect data on standard demographic, health and nutrition indicators. They are conducted every 5 years, allowing comparisons over time and between countries. Datasets are freely available for secondary analysis to explore associations in greater depth. See <https://dhsprogram.com/>.

The literature on early initiation of breastfeeding has tended to focus on delayed breastfeeding initiation and increased risk of all-cause mortality. One systematic review and meta-analysis showed that delaying breastfeeding initiation beyond the first hour after birth doubled the risk of all-cause neonatal mortality (Khan et al., 2015). Another systematic review and meta-analysis including 136,047 subjects from birth to 12 months found that infants who initiate breastfeeding between 2 and 23 h after birth are at a 33% greater risk of all-cause mortality, compared to infants who initiate breastfeeding within an hour (Smith et al., 2017). Initiation of breastfeeding more than 24 h after birth is associated with a two-fold risk of all-cause neonatal mortality (Debes et al., 2013; Smith et al., 2017). Early initiation of breastfeeding is especially important for preterm and low birthweight infants (Lutter, 2010).

In Nepal, neonatal mortality (from 0 to 28 days) is currently 16 deaths per 1000 live births and accounts for 57% under-five mortality in Nepal (Ministry of Health and Population, 2016). The 2030 SDG target for Nepal is 12 deaths per 1000 live births and Nepal's Every Newborn Action Plan target is 11 deaths per 1000 live births by 2035 (Family Welfare Division, 2019). A study in southern Nepal showed that 19% of all neonatal deaths could be averted with early initiation of breastfeeding and that if breastfeeding was delayed for 24 h or more, neonatal mortality increased 1.4 times (Mullany et al., 2008).

Evidence on delayed breastfeeding initiation and morbidity is limited, and very few studies have explored the association between early initiation of breastfeeding and ARI risk. Hajeebhoy et al. found that prelacteal feeding and delayed breastfeeding initiation were associated with higher risk of ARI (Hajeebhoy et al., 2014), which concurs with our finding that children who initiated breastfeeding more than an hour after birth doubled their risk of ARI. Another study showed that delayed initiation resulted in a significantly increased risk in several respiratory symptoms including (cough and difficulty breathing) in infants up to 12 months (Smith et al., 2017). To our knowledge, ours is one of the first studies to explore the relationship between delayed breastfeeding initiation and ARI morbidity, and the first such study in Nepal.

4.2 | Biological basis

There are biologically plausible mechanisms that may explain the relationship between early initiation of breastfeeding and reduced morbidity and mortality related to ARI. Early breastfeeding initiation ensures that the infant receives colostrum, which is rich in immune factors and promotes resistance to and recovery from infection (Ballard & Morrow, 2013). It also tends to reduce the risk of hypothermia, which has been shown to contribute to neonatal morbidity and mortality (Smith et al., 2017), including in Nepal (Mullany et al., 2010). Furthermore, recent studies have demonstrated that breastmilk from mothers who have been infected with or vaccinated against SARS-CoV-2 contains antibodies against the virus which suggests that breastfeeding could protect infants from SARS-CoV-2 (Juncker et al., 2021; Perl et al., 2021). This concurs with studies showing that vaccinating

mothers against influenza confers protection to their breastfeeding infants (Schlaudecker et al., 2013).

Other pathways are yet to be explored. For example, the priming effect of early initiation of breastfeeding on the digestive system is well known (van den Elsen et al., 2019), and there is some evidence that breastfeeding may have a similar protective effect on the microbiome of the upper respiratory tract (Biesbroek et al., 2014; Castanys-Muñoz et al., 2016; Gensollen et al., 2016). This possible relationship between the respiratory microbiome and early initiation of breastfeeding might explain the reduced risk of ARI and may have implications for protecting infants and young children from SARS-CoV-2. Another explanation may be the impact of bioactive components on mucosa. It is well known that secretory immunoglobulin A and macroglobulins along with other bioactive factors such as oligosaccharides and lactoferrin in breastmilk protect intestinal mucosa and inhibit attachment of pathogens (Ballard & Morrow, 2013; Hajeebhoy et al., 2014; Thai & Gregory, 2020). It is conceivable that breastmilk also coats the nasopharyngeal mucosa, thereby protecting against the transmission of SARS-CoV-2 and other bacteria and viruses responsible for respiratory illness (Kilpatrick & Meissner, 2020; Schlaudecker et al., 2013).

Early initiation of breastfeeding also increases the probability of exclusive breastfeeding, reduces the risk that infants will be given other foods and liquids from birth to 6 months and increases the likelihood of continued breastfeeding. Thus, early initiation of breastfeeding could contribute to protection from infection in the longer term (Moore et al., 2016; Permatasari & Syafruddin, 2016), all of which reduce the risk of ARI infection (Hajeebhoy et al., 2014; Lamberti et al., 2013).

4.3 | Breastfeeding initiation requires maternal proximity

The most effective way to facilitate early initiation of breastfeeding is through placing infants prone, skin-to-skin on their mother's chest immediately after birth. Healthy infants placed skin-to-skin are able to orient themselves towards the breast, crawl to the breast, self-attach and suckle (Widström et al., 2019). The process of working towards and achieving breastfeeding after being placed skin-to-skin can take some time so it is critical that skin-to-skin contact is not terminated before this occurs (Bystrova et al., 2009; Widström et al., 2011). Infants placed skin-to-skin have more effective first breastfeeds (Moore et al., 2016). These breastfeeds occur during a time when infants have high levels of catecholamines (adrenaline and noradrenaline) in their system which may enhance learning (Bystrova et al., 2009). Breastfeeds during skin-to-skin in the first hour of life form a foundation for continued effective feeding (Bystrova et al., 2009). Infants placed skin-to-skin after birth are less likely to be exposed to infant formula in hospital and to breastfeed for longer than infants not placed skin-to-skin (Moore et al., 2016). Skin-to-skin contact thus facilitates early initiation of breastfeeding, exclusivity of breastfeeding and duration of breastfeeding. The converse is true where skin-to-skin contact and early initiation of breastfeeding are eschewed.

Separating infants and mothers make early initiation of breastfeeding more difficult.

4.4 | The impact of the pandemic on uninterrupted contact, skin-to-skin and early initiation of breastfeeding

An analysis of COVID-19 maternal and newborn care guidance from 33 countries found that only 21% recommended that infants of mothers with SARS-CoV-2 initiate breastfeeding within an hour of birth and only 27% recommended that infants of mothers with confirmed SARS-CoV-2 be placed skin-to-skin with their mothers after birth. Further, 27% of guidance documents actually recommended that infants of mothers with SARS-CoV-2 be isolated from one another (Vu Hoang et al., 2020). Interrupting contact, especially skin-to-skin, between the infant and mother inhibits early initiation of breastfeeding and increases the risk that infants will suffer from ARIs.

4.5 | The Nepal context before the COVID-19 pandemic

The 2016 DHS reported that 55% of children under 2 years had initiated breastfeeding within an hour of birth (Ministry of Health and Population, Nepal; New ERA; and ICF, 2017). Just 3 years later, the Nepal Multiple Indicator Cluster Survey (MICS) reported that early initiation of breastfeeding had decreased to 42% (Central Bureau of Statistics (CBS), 2019). Granted, the early initiation of breastfeeding indicator is based on historical recall of what happened up to 2 years before the survey interview, and the surveys are different. However, the sampling and indicator are sufficiently comparable to demonstrate that early initiation of breastfeeding in Nepal, which was already inadequate, is not improving.

Unpublished data from Nepal's Health Information Management System (HMIS) (Health Services Department, Management Division, Ministry of Health and Population, [n.d.]). reports an even lower rate of early initiation of breastfeeding. This may be more accurate than the DHS or MICS data since there is no recall bias. Over the past five years, early initiation of breastfeeding has declined from approximately 30% in 2017–2019, to 17% in 2020 and to 15% in 2021.

Even before the COVID-19 pandemic, there were missed opportunities for early initiation of breastfeeding. Although 78% of births took place in health facilities in 2019, only 42% of infants breastfed within an hour of birth (Central Bureau of Statistics (CBS), 2019). Anecdotally, health workers say that they are so busy that they are not able to support breastfeeding, including early initiation. The largest maternity hospital in Kathmandu has acknowledged this deficit and aims to address it through a lactation support initiative that educates staff, mothers,

fathers and extended family on the importance of breastfeeding. UNICEF is supporting this initiative and is also working to invigorate the Baby Friendly Hospital Initiative by improving policy implementation and monitoring.

4.6 | The guidance on infant–mother nonseparation in Nepal in the COVID-19 context

Nepal's Ministry of Health and Population recommended infants born to women with SARS-CoV-2 infection or symptoms should not be separated but should have skin-to-skin contact, early initiation of breastfeeding, rooming-in and direct breastfeeding (Ministry of Health and Population, 2020). However, a director of a maternity hospital in Kathmandu stated that the isolation of infants from mothers with SARS-CoV-2 symptoms was hospital policy (Shrestha & Heaton, 2020). A study of nine hospitals found that during lockdown (March to May 2020), early initiation of breastfeeding decreased by 3.5% (Ashish et al., 2020), although there were significant differences between hospitals (Ashish et al., 2021).

5 | CONCLUSION AND RECOMMENDATIONS

This study contributes to the body of evidence that shows that early initiation of breastfeeding and uninterrupted, preferably skin-to-skin, contact between newborns and their mothers is an essential first step for future health. Pertaining, as it does, to early initiation of breastfeeding and protection from ARI, it is particularly relevant in the COVID-19 era. In the face of SARS-CoV-2, a respiratory disease, it is more important than ever to ensure that mothers and babies stay together and establish breastfeeding within the first hour of life. This underscores the vital importance of nonseparation of infants and mothers, even where mothers are SARS-CoV-2 positive or suspected.

This analysis should be repeated elsewhere, particularly in the South Asia region, to reinforce the implementation of guidance of nonseparation after birth and early initiation of breastfeeding, irrespective of the mother's SARS-CoV-2 status. In Nepal, early initiation of breastfeeding and uninterrupted, preferably skin-to-skin, contact should continue to be promoted in all birthing facilities.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS

SM and BB conceptualised the study. BB conducted the statistical analysis with support from SM. BB drafted the initial version of the manuscript. SM and KG provided significant additional input. KC-H and KRP provided input and comments. All authors and approved the final manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available from the Demographic and Health Survey (DHS) Program site at <https://dhsprogram.com/data/>.

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