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ASSOCIATION BETWEEN EARLY INITIATION OF BREASTFEEDING AND NEONATAL MORBIDITY IN TERM NEWBORNS: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Despite the fact that early neonatal morbidity is still prevalent even in term infants, there may be some practices that can be modified during the first hour after birth that can impact short-term outcomes.

Materials and Methods: This is a prospective observational study which assessed the correlation between early breastfeeding (within 1 hour of birth) and neonatal morbidity in 320 term mother and newborn pairs admitted to a tertiary care teaching hospital.

Results: Breastfeeding initiation within 1 hour of birth had a significantly lower composite morbidity rate in the first 7 days of life than delayed initiation (24.8% vs 45.3%, p<0.001). Early initiation was associated with lower frequencies of hypothermia (8.9% vs 21.7%, p=0.002), hypoglycemia (4.7% vs 12.3%, p=0.014), feeding difficulty (7.5% vs 18.9%, p=0.003), neonatal intensive care admission (6.5% vs 15.1%, p=0.012), and a shorter hospital stay (2.3±0.8 vs 3.0±1.4 days, p<0.001); after adjustment, delayed initiation independently increased the odds of neonatal morbidity (adjusted odds ratio 2.18, 95% confidence interval 1.31-3.63, p=0.003).

Conclusions: Early breastfeeding initiation was thus linked to a clinically relevant decrease in early morbidity in term infants and is considered a time-sensitive aspect of standard delivery room practice.

Keywords: Breastfeeding, Early Initiation, Term Newborn, Neonatal Morbidity, Hypothermia, Hypoglycemia
Introduction.

INTRODUCTION

Breastfeeding is not just a nutrition event that starts after post natal stabilization, but is a biologically integrated process of neonatal adaptation. Breastfeeding offers immunologic, metabolic, developmental and microbiome benefits, and breastfeeding itself encourages maternal-newborn contact and coordinated physiologic transition. The overall health impacts of breastfeeding throughout the lifespan have been well documented, but there are significant gaps in implementation right after birth [1]. Supportive delivery room practices, skilled support and health system policies that reduce unneeded separation are all important to improving breastfeeding practices, in addition to maternal motivation [2].

The first hour of life is becoming known as a critical window.

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Early initiation allows the newborn to consume colostrum, helps with thermal protection (maternal contact), helps to maintain glucose homeostasis, and may decrease exposure to prelacteal feeds or contaminated substitutes. A systematic review showed that early initiation of breastfeeding was associated with reduced neonatal mortality and morbidity [3]. In a large cohort from Ghana, the timing of initiation was also a dose-response relationship with neonatal mortality, indicating that timing alone may have clinical significance [4]. Another metaanalysis also revealed associations between delayed and non-exclusive breastfeeding patterns with adverse neonatal outcomes [5].

Early initiation has also been shown to be associated with survival in other populations. A pooled analysis revealed increased neonatal mortality rates with initiation after the first hour, and increased mortality rates after 24 hours of initiation [6]. However, more recent observation data suggest that infants who start breastfeeding early may have a reduced risk of severe early neonatal illness, including suspected sepsis [7]. Beyond mortality, early initiation has been associated with reduced rates of respiratory illness,

suggesting that early feeding practices may impact early and later infectious morbidity [8].

Early breastfeeding is not an isolated event. Early skin-to-skin contact increases the chances of successful initiation and helps to maintain neonatal temperature and cardiorespiratory stability [9]. The best results from multicomponent breastfeeding interventions occur when counseling, facility practices and community support are provided together, not as isolated components [10]. But numerous studies have been conducted on mortality, breastfeeding rates, or populations of preterm babies. There are few prospective studies that have quantified the short-term morbidity specifically in clinically stable term newborns and considered delivery mode, skin-to-skin contact, birth weight, and antenatal counseling.

The current study was thus conducted to determine if early breastfeeding (within 1 hour of birth) was related to neonatal morbidity in the first 7 days of life in term newborns. The main goal was to compare the composite morbidity outcome between the early and delayed initiation groups. Specific morbidities, neonatal intensive care admission, readmission and length of stay were compared and independent predictors of neonatal morbidity were identified as secondary objectives.

MATERIALS AND METHODS

This is a prospective observational study which was carried out in the postnatal wards and newborn care areas of a tertiary care teaching hospital. No changes were made in feeding or care in the delivery room; all exposure classification was based on standard clinical practice.

Term live-born singleton newborns with a gestational age of 37 weeks 0 days to 41 weeks 6 days were eligible. Newborns were included if they were clinically stable following a standard initial assessment and time of first breastfeeding was documented. Exclusion criteria included major congenital malformation, Apgar score < 7 at 5 minutes, prolonged resuscitation and immediate mechanical ventilation, maternal critical illness that precluded any attempt at breastfeeding, contraindications to breastfeeding, multiple gestation, transfer from another facility, and failure to complete 7-day follow-up.

A sample size was determined for comparing two proportions. With neonatal morbidity rates of 25% for the early group and 42% for the delayed group, 80% power, an anticipated early-to-delayed group ratio of approximately 2:1, and an alpha of 0.05 (two-sided), at least 300 dyads were needed. Allowing for incomplete follow-up, 326 dyads were enrolled. Seven-day outcome data were not available for six of these, leaving an analytic sample of 320 newborns.

The exposure was defined as the time from birth to the first successful breastfeeding attempt. Early initiation was classified as attachment to the breast with observed sucking or prolonged suckling within 60 minutes of birth. Delayed initiation was defined as any time after 60 minutes. The attending nurse documented time in the delivery room and checked with mother within 6 hours. Immediate skin-to-skin contact occurred when there was no interruption of contact within 10 minutes of birth and for at least 30 minutes, unless interrupted by medical intervention.

Maternal data consisted of age, parity, antenatal care attendance, breastfeeding counselling received, pregnancy complications and mode of delivery. Data recorded for newborns were sex, gestational age, birth weight, Apgar scores, skin-to-skin contact, time to first feeding, prelacteal feeding, and rooming-in status. A digital axillary thermometer was used to take standard newborn temperatures and blood glucose testing was done as clinically indicated or when symptoms indicated hypoglycemia.

The primary outcome was a composite of one or more morbid events from birth to day 7: hypothermia (axillary temperature < 36.5°C), documented hypoglycemia (blood glucose < 45 mg/dL), feeding difficulty (requiring clinical assessment or supplemental feeding support), suspected neonatal sepsis (requiring laboratory evaluation and antibiotic treatment), and clinically significant jaundice (requiring phototherapy). Neonatal intensive care unit admission, unplanned hospital readmission within 7 days, and length of the birth hospitalization were secondary outcomes.

Newborns were evaluated prior to discharge and then contacted by structured phone call on day 7. When a hospital record was available, any illness or readmission reported was confirmed. The data were recorded on a pre-designed case-record form and analyzed in SPSS version 29.0. The data of continuous variables were presented as mean ± standard deviation and the data of categorical variables were presented as frequency and percentage. Appropriate tests were used: independent-samples t test, chi-square test, or Fisher exact test. Univariable analysis was followed by multivariable logistic regression for the composite morbidity outcome, with variables with $p<0.20$ and clinically relevant covariates. Odds ratios adjusted for 95% confidence intervals are presented. The p value was calculated for both sides, and was considered statistically significant if it was less than 0.05.

RESULTS

Among 320 analyzed mother-newborn dyads, 214 (66.9%) initiated breastfeeding within 1 hour

and 106 (33.1%) initiated after 1 hour. The mean time to initiation was 32.6±14.8 minutes in the early group and 154.2±96.5 minutes in the delayed group. Maternal age, parity, newborn sex, birth weight, and 5-minute Apgar score were comparable between groups. Cesarean delivery was more frequent among delayed initiators (45.3% vs 26.6%, p=0.001), while antenatal breastfeeding counseling and immediate skin-to-skin contact were more frequent in the early-initiation group (Table 1).

Table 1. Maternal and neonatal characteristics according to timing of breastfeeding initiation

Characteristic	Early ≤1 h (n=214)	Delayed >1 h (n=106)	p value
Maternal age, years	26.9±4.3	27.4±4.7	0.340
Primiparous, n (%)	98 (45.8)	56 (52.8)	0.238
Cesarean delivery, n (%)	57 (26.6)	48 (45.3)	0.001
Antenatal breastfeeding counseling, n (%)	154 (72.0)	57 (53.8)	0.001
Immediate skin-to-skin contact, n (%)	186 (86.9)	50 (47.2)	<0.001
Male newborn, n (%)	113 (52.8)	54 (50.9)	0.752
Birth weight, kg	3.02±0.38	2.96±0.42	0.198
5-minute Apgar score	9.1±0.6	9.0±0.7	0.181

The primary composite morbidity outcome occurred in 53 of 214 newborns (24.8%) in the early-initiation group and 48 of 106 (45.3%) in the delayed-initiation group (p<0.001). Delayed initiation was associated with significantly higher rates of hypothermia, hypoglycemia, feeding difficulty, neonatal intensive care admission, and 7-day readmission. Suspected sepsis was numerically more frequent after delayed initiation and approached statistical significance. The mean birth-hospital stay was 0.7 days longer among delayed initiators (Table 2).

Table 2. Neonatal morbidity and short-term outcomes by breastfeeding initiation group

Outcome	Early ≤1 h (n=214)	Delayed >1 h (n=106)	p value
Any neonatal morbidity, n (%)	53 (24.8)	48 (45.3)	<0.001
Hypothermia, n (%)	19 (8.9)	23 (21.7)	0.002
Hypoglycemia, n (%)	10 (4.7)	13 (12.3)	0.014
Feeding difficulty, n (%)	16 (7.5)	20 (18.9)	0.003
Suspected sepsis, n (%)	11 (5.1)	12 (11.3)	0.050
Phototherapy-treated jaundice, n (%)	26 (12.1)	19 (17.9)	0.157
NICU admission, n (%)	14 (6.5)	16 (15.1)	0.012
Readmission within 7 days, n (%)	5 (2.3)	8 (7.5)	0.026
Hospital stay, days	2.3±0.8	3.0±1.4	<0.001

In multivariable logistic regression, delayed initiation of breastfeeding remained independently associated with neonatal morbidity after adjustment for delivery mode, immediate skin-to-skin contact, birth weight, antenatal counseling, and parity (adjusted odds ratio 2.18, 95% confidence interval 1.31-3.63, p=0.003). Lack of immediate skin-to-skin contact and birth weight below 2.5 kg were also independent predictors, while antenatal breastfeeding counseling was associated with lower adjusted risk. The final model demonstrated acceptable calibration and no important multicollinearity (Table 3).

Table 3. Multivariable predictors of composite neonatal morbidity

Predictor	Adjusted OR	95% CI	p value
Breastfeeding initiation >1 h	2.18	1.31-3.63	0.003
Cesarean delivery	1.62	1.00-2.64	0.049
No immediate skin-to-skin contact	1.91	1.12-3.27	0.018
Birth weight <2.5 kg	2.36	1.14-4.89	0.021
No antenatal breastfeeding counseling	1.69	1.02-2.81	0.043
Primiparity	1.29	0.80-2.08	0.294

DISCUSSION

This prospective study showed that early initiation of breastfeeding (within 1 hour of birth) was associated with significantly reduced short-term morbidity in term newborns. The difference in the composite morbidity outcome was 20.5 percentage points and delayed initiation was independently associated with over twice the odds of morbidity after adjusting for important maternal and delivery-related factors. The results are clinically important because the study population comprised term infants who were sufficiently stable to stay with their mothers following the routine initial care, and therefore the differences seen in the results cannot be attributed to severe prematurity or significant illness at birth.

It is biologically plausible that the lower morbidity seen with early initiation is the result of this. Prompt feeding offers colostrum with high immunologic content and can help minimise exposure to prelacteal substances. Previous observations associated early feeding habits with lower infant mortality due to infections, indicating that protection against infectious processes might play a partial role in infant survival [11]. The direction and magnitude of the difference in the present study was in the direction of this pathway, though it did not meet conventional statistical significance.

This decrease in feeding difficulties may be a physiologic and/or behavioral benefit. Newborns are likely to be alert and receptive to feeding in the early postnatal period and repeated practice can be achieved before they become fatigued, separated, or supplemented. Infant illness has been linked to suboptimal breastfeeding practices in Vietnam [12]. Delayed initiators were over two times more likely to have feeding difficulty and this was probably a factor in the extra observation, supplementation and hospitalization.

The group difference was most apparent for hypothermia. Early breastfeeding typically happens when the mother is close and skin to skin contact, which minimizes evaporative and conductive heat loss. Evidence for the link between newborn care and thermal stability includes the fact that delayed bathing can help to promote breastfeeding and decrease hypothermia and hypoglycemia [13]. Similarly, early ENC packages have been shown to be linked to better breastfeeding practices and reduced negative neonatal outcomes [14]. The present results corroborate this evidence, as delayed breastfeeding was still independently associated with morbidity, even after controlling for the presence of immediate skin-to-skin contact.

Delayed feeding was one of several modifiable factors identified in previous neonatal studies to be associated with hypothermia. Delayed initiation of breastfeeding was significantly associated with increased risk of hypothermia in an intensive care unit population, but was not associated with increased risk of hypothermia in a population with more limited clinical risk [15]. The same finding of association between lack of breastfeeding and early neonatal hypothermia was observed in Nigeria [16]. The prevalence of this term-only cohort was lower than that of these higher risk settings, but the direction of association was similar.

This association with hypoglycemia should be taken with a grain of salt as universal screening for glucose was not done. Testing was clinically targeted, which may underestimate asymptomatic episodes. However, there was significantly less hypoglycemia when it was present, or reported, among early initiators. This is likely due to early milk transfer, less cold stress and avoiding long fasts. This is significant because the mild neonatal symptoms can lead to investigations, supplementation or transfer to higher level care even if the underlying instability is transient.

Cesarean delivery was a significant contextual challenge for timely initiation. Almost half of the delayed initiators were cesarean delivered. This is in line with the fact that early-term and delivery-related factors have been shown to have a negative impact on breastfeeding initiation and duration [17]. The first feed can be delayed due to operating room procedure, maternal discomfort after surgery, delayed transfer and/or observation of the newborn. These findings indicate that the cesarean associated delay is not inevitable and that coordinated support in the recovery room, early skin-to-skin contact and

lactation assistance at the bedside can help minimize the delay.

The size of benefit found in this study is comparable to the overall mortality evidence. A meta-analysis carried out in sub-Saharan Africa found a significant mortality risk difference with delayed initiation and non-exclusive breastfeeding [18]. We were not powered to look at mortality, and did not find any neonatal deaths, but the decrease in common morbidities is a possible pathway by which early initiation might lead to survival. Even in low mortality settings, outcomes of lower rates of hypothermia, feeding difficulty, and intensive care use are meaningful.

The early-initiation prevalence of 66.9% was above the national average but still one-third of term newborns were not initiated within the first hour. Research in China has reported extremely low rates of initiation within 1 hour and barriers to breastfeeding in the health system, although the overall level of breastfeeding acceptance was high [19]. This suggests that late start-up is not necessarily a maternal choice, but may be a reflection of the care system. The high correlation between antenatal counselling and the early initiation in our cohort also indicates that preparation prior to birth might positively influence the behaviour in the delivery room.

Several strengths of the study include prospective exposure documentation, a well-defined term population, a 7-day window of morbidity, comparison of multiple clinically relevant outcomes, and multivariable adjustment for delivery mode and skin-to-skin contact. But there are restrictions to be recognized. Observational design does not allow for causal inference and there may be residual confounding due to unmeasured clinical or social factors. Other outcomes, such as hypoglycemia and suspected sepsis, were based on clinical testing and not universal screening. The findings may be limited to the single center setting and the quality of breastfeeding after the first feed was not quantified. There are several care practices that affect neonatal hypothermia and previous studies in other hospital settings have shown that factors other than feeding time influence hypothermia [20].

With these caveats, the uniformity of outcomes suggests a pragmatic take-home message: the first hour should be considered as a window of activity. To enhance early initiation, delivery teams can prevent routine separation, promote skin-to-skin contact, be ready to address barriers to cesarean, and offer prompt skilled assistance. Standardized biochemical screening, repeated assessments of breastfeeding effectiveness and longer follow-up should be incorporated into future multicenter studies to assess the long-term neonatal morbidity benefit.

CONCLUSION

Term infants who were breastfed within 1 hour of birth had fewer feeding problems, less hypothermia, less hypoglycemia, fewer neonatal morbidity, fewer intensive care admissions and shorter hospital stays than those who were not breastfed within an hour of birth. After adjusting for delivery and newborn-care factors, delayed initiation was an independent predictor of morbidity. Early breastfeeding should thus be considered as a measurable, time-sensitive quality indicator of routine care of stable term newborns.

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