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ORIGINAL ARTICLE

Breast feeding after hospitalization in a Neonatal Intensive Care Unit in the south of Santa Catarina

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Keywords:
Breast feeding, Premature birth, Intensive care units, Neonatal.

Abstract

Introduction: Some babies experience complications during the perinatal period, often requiring admission to neonatal intensive care units. **Objectives:** This study aimed to determine the prevalence of exclusive or mixed breastfeeding 30 days after discharge of babies admitted to a neonatal intensive care unit (NICU) in a hospital in southern Santa Catarina. **Methodology:** Prospective cohort design study. Conducted through a questionnaire after UTIN and telephone calls 30 days after UTIN, it included all mother-infant pairs admitted to the NICU between October 2023 and March 2024, excluding mothers under 18 years old, those who were illiterate, and those who did not answer the call. **Results:** Of the 62 questionnaires analyzed, 58,1% showed exclusive breastfeeding, and 19.4% adopted mixed feeding. The infants low weight and gestational age preterm significantly impacted the breastfeeding period. The majority of mothers who provided breast milk after NICU discharge worked outside the home, with 14.3% transitioning to formula feeding. Maternal desire to breastfeed was evident in all participants. However, 15.4% of the non-breastfed group did not receive breastfeeding advice from healthcare professionals. **Conclusion:** The results confirm the importance of breastfeeding after NICU admission and highlight the challenges faced by mother-infant pairs to achieve it. There isnt conflit of interest and there is no financial incentive to carry it out.

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INTRODUCTION

The most appropriate food for newborns is, unquestionably, breast milk. It is essential for the physical and psychological health not only of the newborn (NB) but also of the mother, in addition to promoting the baby's proper growth and development.[1] According to the World Health Organization (WHO) and the Brazilian Ministry of Health (MH), exclusive breastfeeding (EBF) is recommended during the first six months of life, and after this period—up to two years of age—solid foods such as fruits, beans, and vegetables should be introduced as part of complementary feeding.[2]

Some infants experience perinatal complications, often requiring admission to neonatal intensive care units (NICU), which can hinder the establishment of breastfeeding (BF).[3] Among these events, prematurity (PMT) and low birth weight, respiratory distress syndrome (RDS), intrauterine growth restriction (IUGR), neonatal asphyxia (NA), congenital heart disease, meconium aspiration syndrome (MAS), and neonatal sepsis stand out.[4]

Prematurity associated with low birth weight directly impacts breastfeeding, since both sucking and positioning during milk extraction must be adjusted. Preterm infants have lower energy and nutrient reserves, and if the mother is not adequately guided, there will be insufficient stimulation for milk intake in the quantity required for healthy growth.[4] Moreover, certain clinical conditions at birth or hemodynamic instability may require oxygen therapy, delaying direct breastfeeding, as these infants are often restricted by life-support equipment attached to them for survival.[5]

Breast milk, particularly colostrum, functions as a form of passive immunization for the child due to the maternal antibodies it contains, which help prevent and fight infections from the external environment, especially in the first six months of life.[6] Breastfeeding provides several benefits, including emotional bonding; for the newborn, it supports psychological and motor development, helps prevent chronic diseases (such as dyslipidemia, obesity, diabetes, respiratory infections, and even infant mortality), contributes to emotional well-being, and assists in the development of the oral cavity.[7] For the mother, it promotes faster postpartum recovery through hormones released during suckling—such as oxytocin—and helps prevent breast, uterine, and ovarian cancers, hypertension, obesity, and postpartum depression.[8]

The practice of breastfeeding is influenced by multiple factors, including the need to return to work—often the family's main source of income—spousal support, maternal nipple type (everted, inverted, or flat), sucking stimulation, maternal access to information about breastfeeding benefits, diseases transmissible through breast milk (such as human immunodeficiency virus [HIV], tuberculous mastitis, and herpes simplex) and neonatal complications.[9] These factors, combined with the frustration, insecurity, and anxiety experienced by mothers of infants hospitalized in the NICU, can make the breastfeeding process even more challenging.[10]

To minimize these challenges, it is recommended that mothers begin mechanical milk expression and breast massage within the first hours after delivery, with a frequency of eight to ten times per day for about two weeks, to stimulate and maintain milk production until the baby can breastfeed directly.[3] Hence, it is essential to have a multidisciplinary team to provide guidance on breastfeeding management, emotional support, disease detection, and promotion of breastfeeding.[11]

Even when the mother expresses the desire to breastfeed, gestational or puerperal complications may hinder the initiation of this process. Infants who require NICU hospitalization due to complications during labor or fetal development clearly face greater difficulty initiating and maintaining breastfeeding, which may have long-term consequences for their development.[9]

For mothers who cannot breastfeed initially, the use of substitute feeding (formulas)—when administered via cup feeding—helps preserve breastfeeding skills for later, since the orofacial muscle movements involved are similar to those used during breastfeeding.[12]

Therefore, the purpose of this study was to evaluate the prevalence of exclusive or mixed breastfeeding after hospital discharge of infants previously admitted to a neonatal intensive care unit, during the period from October 10, 2023, to March 10, 2024, in a hospital located in southern Santa Catarina, Brazil.

METHODS

The study adopted an observational design with a prospective cohort approach. The study population comprised all newborns admitted to the neonatal intensive care unit (NICU) of a hospital located in southern Santa Catarina, Brazil, between October 2023 and March 2024.

Inclusion criteria encompassed all mother–infant pairs admitted to the unit during the specified period who agreed to participate in the study. Exclusion criteria included mothers under 18 years of age, illiterate mothers, and those who did not answer the follow-up phone call 30 days after hospital discharge.

Data collection began after approval by the Research Ethics Committee of the University of Southern Santa Catarina (CEP–UNISUL) under protocol number 6.323.641, in compliance with the Resolution No. 466/2012 of the Brazilian National Health Council. Data were obtained through questionnaires applied within the hospital, followed by a 30-day post-discharge telephone follow-up, after signing of the Informed Consent Form (ICF).

The maternal variables included age, skin color, city of residence, education level, current occupation, comorbidities, use of continuous medication, alcohol consumption, and smoking. The gestational and neonatal variables included singleton or multiple pregnancy, type of delivery, birth weight, diagnosis established by the NICU, 5-minute Apgar score, and newborn sex. Regarding the postpartum variables, the following were

analyzed: maternal desire to breastfeed, breastfeeding until hospital discharge, breastfeeding guidance provided within the hospital environment, difficulty establishing breastfeeding after NICU discharge, newborn weight, and type of feeding at 30 days of life—classified as exclusive breastfeeding (EBF; breast milk only), mixed breastfeeding (MB; breast milk + infant formula), or substitute feeding (SF; infant formula only).

For data description, absolute (n) and relative (%) frequencies were used for qualitative variables, and measures of central tendency and dispersion were used for quantitative variables. The association between variables was assessed using Pearson's chi-square test, with a significance level of 5% ($p < 0.05$). A 95% confidence interval (95% CI) was calculated for the study outcomes. Microsoft Excel was used for database organization and graph preparation, while Statistical Package for the Social Sciences (SPSS) version 21 was employed for data analysis.

For better interpretation of results, Group A comprised newborns who were exclusively breastfed immediately after NICU discharge, while Group B included those who were not exclusively breastfed at that time. The classification of gestational age followed the guidelines established by the Brazilian Society of Pediatrics.

RESULTS

A total of 64 questionnaires were administered to the mothers of patients hospitalized in a neonatal intensive care unit (NICU) in southern Santa Catarina; of these, two participants were excluded from the study. Thus, the 62 questionnaires included revealed that most participants were exclusively breastfeeding after discharge from the NICU, accounting for 36 (58.1%). Additionally, those who were not breastfeeding at discharge totaled 26 patients (41.9%). Among all participants, after 30 days, exclusive breastfeeding was observed in 33 patients (53.2%), mixed feeding in 12 patients (19.4%), and formula feeding in 17 (28.3%).

The mean maternal age was 29.7 years (SD ± 6.5), ranging from 18 to 42 years. Regarding ethnicity, white mothers were predominant, with 47 patients (75.8%), and no significant difference was found between skin color and breastfeeding ($p = 0.532$). The maternal desire to breastfeed was reported by all participants.

Among those who breastfed, 8.5%, and among those who did not breastfeed shortly after NICU discharge, 15.4%, reported not receiving guidance about breastfeeding and its importance from hospital nurses or physicians ($p = 0.387$).

Concerning the diagnoses established in the neonatal ICU, the most prevalent were preterm birth (PMT – ICD P07), identified in 38 patients (61.3%), followed by respiratory distress syndrome (RDS – ICD P22) in 31 patients (50%), and transient tachypnea of the newborn (TTN – ICD P22.1) in 9 patients (14.5%). Other diagnoses included neonatal sepsis (ICD 771.8) in 7 patients (11.3%), intrauterine growth restriction (IUGR – ICD P05) in 3 (4.8%), neonatal asphyxia (ICD P219) in 2 (3.2%), and meconium aspiration syndrome (MAS – ICD P24) in none. Additionally, 12 (19.3%) other diagnoses were identified, such as hydrocephalus (Q039), Down syndrome (Q90), trisomy 18 (Q910), and neonatal jaundice (P599). It is noteworthy that a patient could have more than one diagnosis (minimum of 1 and maximum of 4).

Table 1 presents the prevalence of newborn weights, stratified into extremely low birth weight (<1 kg), very low birth weight (<1.5 kg), low birth weight (<2.5 kg), and adequate weight (>2.5 kg), comparing weight at birth and after 30 days.

Table 1. Birth weight and weight after 30 days of newborns admitted to the NICU, respectively.

	Group A		Group B	
Newborn weight	**Birth**	**After 30 days**	**Birth**	**After 30 days**
	n (%)	**n (%)**	**n (%)**	**n (%)**
< 1 kg	2 (5.6)	0 (0)	1 (3.8)	0 (0)
< 1.5 kg	0 (0)	0 (0)	6 (23.1)	0 (0)
< 2.5 kg	12 (33.3)	3 (8.3)	13 (50)	5 (19.2)
2.5 kg – 3 kg	10 (27.8)	12 (33.3)	3 (11.5)	9 (34.6)
>3 kg	12 (33.3)	11 (30.5)	3 (11.5)	8 (30.8)
> 4 kg	0 (0)	10 (27.8)	0 (0)	4 (15.4)

*Group A: breastfed; Group B: not breastfed. NB: newborn; NICU: neonatal intensive care unit.

It was shown that, despite the prevalence of preterm births, low birth weight was not predominant; rather, adequate birth weight was more common. It was observed that the newborn's weight at birth had an impact on the breastfeeding period ($p = 0.019$).

Table 2 presents the overall analysis of the type of breastfeeding after NICU discharge and at 30 days.

Table 2. Type of breastfeeding.

Variables	High (%)	30 days (%)
Exclusive Breastfeeding	36 (58.1%)	23 (63.8%)
Type of Breastfeeding		
Exclusive Breastfeeding	36 (58.1%)	33 (53.2%)
Replacement Breastfeeding	26 (41.9%)	17 (28.3%)
Mixed Breastfeeding	0	12 (19.4%)

It was found that the percentage of breastfeeding after hospitalization in the NICU was positive, with 58.1% of the participants in this study breastfeeding. After 30 days, although there was a decline within this group to 23 participants (63.8%), the prevalence curve remained positive. Additionally, when including participants who adopted this feeding method

later, the group of exclusive breastfeeding (EBF) after 30 days totaled 33 patients (53.2%).

Among those in the EBF group at NICU discharge, 22.2% were practicing mixed feeding after 30 days, and 14% had switched to formula feeding. The formula-feeding group, at the second point of data collection, accounted for 17 participants (28.3%) of the total sample.

Thus, when breastfeeding is encouraged early, it has a higher likelihood of being maintained compared to those who were not breastfed at the time of NICU discharge ($p = 0.041$).

Table 3 presents the maternal data of the mother-infant pairs included in the study. Regarding employment status, it cannot be concluded that it is a factor associated with early weaning ($p = 0.540$).

Table 3. Maternal data of the mother-infant pairs included in the study.

VARIABLES	Group A (n%)	Group B (n%)	*P*-value
Age maternal			0.251
18 – 20	3 (8.3)	2(7,7)	
21 – 30	16 (44.4)	14 (53.8)	
31 – 40	16 (44.4)	9 (34.6)	
41 – 50	1 (2.8)	1 (3.8)	
Education			0.768
Incomplete PE	5 (13.9)	2 (7.7)	
Complete PE	2 (5.6)	2 (7.7)	
Incomplete EM	3 (8.3)	2 (7.7)	
EM complete	15 (41.7)	11 (42.3)	
Incomplete ES	2 (5.6)	0	
Complete ES	9 (25)	9 (34.6)	
Bond employment			0.564
From home	11 (30.6)	9 (34.6)	
Works outside	25 (69.4)	17 (65.4)	
Comorbidities			0.0872
Denies	23 (63.9)	15 (57,7)	
DMG	3 (8.3)	1 (3.8)	
TAG	1 (2.8)	4 (15.4)	
TDM	2 (5.6)	0	
HAS	1 (2.8)	4 (15.4)	
Gestational hypertension	1 (2.8)	0	
Others	7 (19,4)	3 (11.5)	
Smoking			0.028
Yes	1 (2.8)	1 (3.8)	
No	35 (97.2)	25 (96.2)	

*Group A: breastfed; Group B: not breastfed. E.P.: elementary education; H.S.: high school; H.E.: higher education. GDM: gestational diabetes mellitus; GAD: generalized anxiety disorder; MDD: major depressive disorder; CH: chronic hypertension.

Table 4 presents a comparison of puerperal data between those who were breastfed and those who were not, both at NICU discharge and after 30 days.

Table 4. Gestational and perinatal data of the participants in this study.

VARIABLES	N of Group A (%)	N of Group B (%)	*P* Index
Age gestational			0.041
< 34 weeks	5 (13.9)	11 (42.3)	
34 – 36 weeks	15 (41.7)	7 (26.9)	
≥ 37 and < 42 weeks	16 (44.4)	8 (30.8)	
Gestation			0,674
Unique	33 (91.6)	23 (88.5)	
Multiple	3 (8.6)	3 (11.5)	
Type of delivery			0.448
Caesarean section	28 (77.8)	18 (69.2)	
Normal	8 (22.2)	8 (30.8)	
Newborn sex			0.850
Feminine	13 (36.1)	10 (38.5)	
Masculine	23 (63.9)	16 (61.5)	
minute Apgar			0.395
7 – 10 good vitality	33 (91.7)	24 (91.3)	
4 – 6 moderate vitality	3 (8.3)	1 (3.8)	
0 – 3 severe vitality	0	1 (3.8)	
Stimulus breast as a newborn in the NICU			0.013
Yes	36 (100)	20 (76.9)	
No	0	6 (23.1)	

*Group A: breastfed after NICU; Group B: not breastfed after NICU.

No association was found between breastfeeding and the type of delivery, gestational classification, gender differences, or 5-minute Apgar score.

Regarding breast stimulation during the period in which the newborn was in the intensive care unit, 100% of the breastfeeding group and only 76.9% of the non-breastfeeding group received stimulation, demonstrating clinical significance ($p = 0.013$).

DISCUSSION

The present study aimed to evaluate the prevalence of breastfeeding after hospitalization in a neonatal intensive care unit (NICU) in southern Santa Catarina between 2023 and 2024. Although the estimated sample size was 200 participants, a total of 62 were included due to low hospital demand. The results showed that most patients were breastfed

after discharge from the NICU, accounting for 58.1% of the participants. Among them, 86% continued breastfeeding 30 days after hospital discharge — 63.8% exclusively and 22.2% in mixed form — while 14% were no longer breastfeeding after 30 days.

A study conducted in a pediatric outpatient clinic in São Paulo in 2015 showed that only one of 20 interviewed mothers mentioned the benefits of breastfeeding, and none reported how to manage this practice, instead citing fatigue, stress, and low milk production as challenges. In that study, 37.5% of mothers reported receiving breastfeeding guidance in the hospital setting. In comparison, the present study found that 8.5% of those who breastfed (Group A) and 15.4% of those who did not breastfeed after NICU discharge (Group B) reported not having received guidance — indicating a greater lack of support in Group B.

A study conducted in two Baby-Friendly Hospitals in Recife found a prevalence of exclusive breastfeeding (EBF) among preterm infants after hospital discharge of 85.2%, with a sharp decline to 46.3% after the first month. Similar findings were reported in a study in southern Brazil, where EBF prevalence among preterm infants was 71.5% at 15 days and 45.2% at 45 days after discharge.

Silva M.B.C. noted that changes in feeding patterns after discharge may be associated with social factors such as weakened family support networks, fatigue, anxiety, and returning to work. In the present study, 71.4% of breastfeeding mothers worked outside the home, and of these, 14.3% switched entirely to formula feeding (also referred to as replacement feeding).

Among the causes of decreased breastfeeding prevalence, the lack of guidance and supervision by maternal and child health professionals (11.3% in this study) — including physicians, nurses, and speech therapists — is significant. Factors such as variations in nipple anatomy (everted, inverted, flat), the newborn's latch technique (with lips flanged and encompassing the areola, known as "fish mouth"), positioning of the mother-infant dyad, and awareness of breastfeeding benefits for both mother and child are essential. All these difficulties contribute to breastfeeding challenges, as 29 (46.8%) mothers reported facing such obstacles.

According to the American Academy of Pediatrics (AAP), breast milk is particularly beneficial for preterm infants compared to formula, as these infants are born with suppressed immune systems and require not only nutrients but also immunomodulatory components that help reduce the risk of common prematurity complications and support nervous system development. Therefore, these factors must be emphasized during maternal counseling, especially since preterm birth (62.9%) and respiratory distress syndrome (46.7%) were the most prevalent diagnoses in this study.

Another study conducted in São José dos Campos in 2019 demonstrated that gestational age and birth weight significantly impact breastfeeding outcomes ($p < 0.05$). Similar findings were observed in the present study ($p = 0.001$ and $p = 0.035$, respectively), where full-term infants and those with adequate birth weight had a higher likelihood of successful breastfeeding. Preterm infants (represented by 38 participants, 61.3%) and those with low birth weight exhibited varying degrees of physiological immaturity, often requiring tracheal intubation, non-invasive ventilatory support, or feeding tubes. These interventions compromise the initiation and practice of breastfeeding, delaying the onset of sucking stimulation.

The physiology of breastfeeding is influenced by maternal stimuli, but some are triggered by the newborn, such as sucking, grasp reflex, and skin-to-skin contact. These stimuli activate nerve endings, leading to prolactin (milk production) and oxytocin (milk ejection) reflexes. Due to the infant's immaturity, such stimuli may need to be postponed, requiring the mother to perform manual stimulation to prevent engorgement or duct obstruction. This physiological mechanism was reflected in the present study, where early breast stimulation increased the likelihood of maintaining breastfeeding ($p = 0.04$).

In this study, 26.1% of the mother-infant pairs in the non-breastfeeding group did not perform breast stimulation while the baby was in intensive care, leading to delayed physiological breastfeeding responses, as neither maternal nor neonatal stimulation occurred. Consequently, the necessary reflexes for successful lactation were not developed.

However, this study presents some limitations, as it was conducted in a single hospital in one Brazilian city, limiting the generalization of results nationwide. Nevertheless, it provides relevant findings and essential insights for improving the Baby-Friendly Hospital Initiative, created by the World Health Organization in 1991.

In conclusion, this study found a prevalence of exclusive breastfeeding after NICU hospitalization of 58.1%, which remained at 53.2% after 30 days. Gestational age, birth weight, and early breast stimulation were identified as significant factors influencing breastfeeding initiation and continuity. These results underscore the importance of a multidisciplinary approach to ensure successful breastfeeding outcomes.

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