Annals of Neonatology

OPEN ACCESS
ISSN:2636-3569

Original Article

The Efficiency of Breastfeeding Supportive Practices in Reducing Newborn Bilirubin Level During the First Week of Life. A Retrospective Comparative Study

Rania Mohamed Abdou[1]*, Bothayna Nader Sadek [2]

DOI: 10.21608/anj.2025.370879.1111

***Corresponding Author:** Pediatrics department, faculty of medicine, Ain shams university
E-mail: raniaabdou@med.asu.edu.eg
Full list of author information is available at the end of the article

Abstract

Background: Neonatal jaundice is a common condition that frequently leads to hospital readmission in the first week of life. Breastfeeding plays a critical role in the management of hyperbilirubinemia by enhancing hydration and promoting bilirubin elimination. However, the impact of breastfeeding counseling (BFC) on bilirubin levels and readmission rates remains underexplored. **Objectives:** This study aimed to evaluate the effectiveness of BFC programs in reducing hospital readmissions, hyperbilirubinemia severity, and neonatal intensive care unit (NICU) stay among neonates diagnosed with jaundice in their first week of life. **Methods:** A retrospective cross-sectional study was conducted using hospital records from the Breastfeeding Counseling Unit at Ain Shams Pediatric Hospital (2017–2022). Full-term jaundiced neonates were categorized into two groups: intervention (BFC received) and control (no BFC). The data analyzed included bilirubin levels, NICU duration, feeding practices, and readmission rates. **Results:** Neonates receiving BFC showed significantly lower bilirubin levels on the third day (5.1 ± 1.62 mg/dL vs. 6.9 ± 2.45 mg/dL, $p < 0.001$), shorter NICU stays (26.5 ± 2.87 vs. 60.3 ± 6.41 hours, $p < 0.001$), reduced weight loss at jaundice onset (5.6% vs. 7.3%, $p < 0.001$), and lower readmission rates compared to controls. **Conclusions:** breastfeeding counseling (BFC) significantly reduced neonatal hyperbilirubinemia severity, NICU stay length, and readmission rate. Expanding access to BFC, especially in low-resource settings, can improve neonatal outcomes.

Keywords: Breastfeeding counseling, Neonatal jaundice, Neonatal readmission, Infant feeding practices

……

Introduction

Indirect hyperbilirubinemia is one of the most common causes of hospital readmission within the first week of birth. According to previous studies, 28% of newborns are readmitted within the first 30 days of delivery [1]. Several factors, such as gestational age, delivery mode, ABO incompatibility, and ineffective breastfeeding, can cause hyperbilirubinemia in infants. Breastfeeding plays a crucial role in preventing hyperbilirubinemia. Previous research has warned that the incidence of hyperbilirubinemia with excessive breastfeeding is more often the result of breastfeeding problems than of breastfeeding itself. However, few studies have examined the effects of breastfeeding on neonatal jaundice [2]. Implementing lactation management strategies can help overcome breastfeeding challenges and increasing the frequency of breastfeeding can reduce the duration of phototherapy. Studies have shown that infants who are breastfed every 2 h exhibit an average decrease in bilirubin levels of 7.17 mg/dl, whereas those breastfed every 3 h show a decrease of 7.01 mg/dl. Therefore, breastfeeding every 2 h is an effective way of reducing bilirubin levels in infants with hyperbilirubinemia (p=0.000). [3]

Early breastfeeding is crucial for reducing jaundice in newborns by effectively controlling the bilirubin levels. It is strongly recommended that breastfeeding be initiated as early as possible to prevent the conversion of direct bilirubin to indirect bilirubin, which can lead to elevated bilirubin levels. Adequate breastfeeding can significantly increase intestinal motility and introduce necessary bacteria into the intestine, which effectively converts direct bilirubin into urobilin, leading to a decrease in bilirubin levels and a reduction in the degree of jaundice. [4]

Several clinical studies have confirmed that infants exclusively

breastfed during phototherapy require less hospitalization than those who are given formula milk. Breast milk contains beta-glucuronidase, which converts bilirubin into a fat-soluble form, leading to an initial increase in indirect bilirubin levels. However, bilirubin is reabsorbed by the intestines. [5]

Breastfeeding counseling (BFC) is crucial immediately after birth. Lactation counselors provide support and encouragement to new mothers regarding the benefits of breastfeeding. However, we lack information on BFC and their impact on bilirubin levels in newborns under seven days old. This study evaluated the BFC status and its effect on bilirubin levels and readmission for jaundice in newborns born in the first week of life and aimed to determine the impact of breastfeeding support programs on the admission rates of healthy term infants with hyperbilirubinemia in low-income setting

Methodology

This retrospective study of comparative cross-sectional hospital records was conducted at the Breastfeeding Counseling Unit of the Neonatology department of Ain Shams Pediatric Hospital. We collected data from infants younger than one week of age who were diagnosed with jaundice as outpatients or hospitalized between 2017 and 2022.

Intervention program: The Breastfeeding Counseling Unit (BFCU) was established in 2016 and offers free counseling services seven days a week. Women hospitalized due to childbirth are referred to the BFCU for free counseling. The clinic provides both individual and group counseling sessions to all mothers and is managed by a certified lactation consultant.

All hospitalized mothers received advice and breastfeeding training at the BFCU, except for the critically ill babies requiring NICU admission. Infants admitted to the NICU usually

receive counseling after their critical condition stabilizes and lactation is initiated.

In individual counseling sessions, mothers receive motivation and advice that explains the benefits of breastfeeding to themselves and their babies. The lactation consultant assesses the feeding skills of the mother-infant dyad and helps infants latch properly by correcting their positioning. Mothers are also taught how to check whether their babies are receiving enough milk, given the difficulty in knowing exactly how much the infant has consumed through direct nursing. The consultant also thought of the art of pumping and milk storage, ensuring that mothers were equipped with all the necessary knowledge and skills to care for their newborns.

In addition to individual sessions, group counseling sessions provided additional support and care to the mothers. Counselors monitor and support mothers to 2-3 times to ensure successful breastfeeding practices. Lactation consultants also collected data from the parents of infants at each visit and digitally complete forms.

The BFCU provides psychological support to help mothers become more confident in their breastfeeding practices and infant care.

Participants

We conducted a full-term study for ≥ 37 weeks and diagnosed the patient with hyperbilirubinemia. These newborns were referred to the neonatology clinic between January 2017 and December 2022 for readmission to the NICU or for follow-up in the neonatology clinic. The results were divided into two groups: case and control. The patients received interventional breastfeeding counseling in our unit, whereas the control group did not receive any counseling. We extracted medical records of the neonates, including demographic data and information about the blood groups of the mothers along with information about the

management of hyperbilirubinemia and risk factors. Five established risk factors for hyperbilirubinemia had been evaluated in the study: dehydration/inadequate breastfeeding and ABO blood group.

We collected the digitally formatted clinical report form that the breastfeeding counselor used to gather a thorough breastfeeding history to collect relevant data. The analyzed data included the mother's age, feeding status, and demographic data. The 24-hour recall technique was used to determine what constitutes liquids other than breastmilk consumed by the infant and what constitutes partial breastfeeding (i.e., infant breastmilk consumption in addition to formula or other liquid foods).

Ethical consideration

The study was approved by the research ethics committee of the Faculty of Medicine, Ain Shams University (FMASU R27/2024)

Statistical Analysis

Data were analyzed using independent t-tests and chi-square tests where appropriate. Statistical significance was set at $p < 0.05$.

Results

This study compared jaundiced newborns who received breastfeeding counseling with those who did not. The results revealed significant differences between several parameters. Infants who received breastfeeding counseling experienced slower bilirubin increase on day 3, shorter NICU stays, and a greater rate of bilirubin decrease during follow-up. The percentage of weight loss at the onset of jaundice was higher in the group that did not receive counseling (Table 1).

Table (1): Comparison of Outcomes in Infants with and Without Breastfeeding Counseling During the First Week of Life

Item		Breastfeeding counseling no. = 200	Without breastfeeding counseling no. = 200	Test value	P-value	Sig.
Age in hours of readmission	Mean ± SD	117.2 ± 12.32	108.4 ± 10.25	-7.765•	0.000	HS
	Range	87.4 - 164.6	80.8 – 151.4			
Weight	Mean ± SD	2.8 ± 1.62	2.92 ± 1.32	0.812•	0.417	NS
	Range	1.77 - 4.02	1.6 – 3.9			
Bilirubin level on day 3 of Billicheck	Mean ± SD	5.1 ± 1.62	6.9 ± 2.45	8.667•	0.000	HS
	Range	1.4 -7.6	3–9.5			
Weight loss percentage at the appearance of jaundice	Mean ± SD	5.6 ± 1.27	7.3 ± 2.37	8.941•	0.000	HS
	Range	2.4 – 7.7	2.12 – 11.1			
Length of stay after delivery in hours	Mean ± SD	45.5 ± 10.28	21.84 ± 2.04	-31.926•	0.000	HS
	Range	38.1- 61.3	18.2- 29.42			
Length of stay in the NICU (hours)	Mean ± SD	26.5 ± 2.87	60.3 ± 6.41	68.061•	0.000	HS
	Range	21.9- 35.2	49.2 – 79.9			
Bilirubin level decreases in mg/dl/hour during follow-up	Mean ± SD Range	0.5 ± 0.11 0.45- 0.7	0.3 ± 0.07 0.4 – 0.6	-21.693•	0.000	HS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
•: Independent t-test

Table 2: Comparison of Clinical and Feeding Characteristics Between Readmitted and Non-Readmitted Infants with Hyperbilirubinemia at Discharge after delivery

Item		Not readmitted	Readmitted	Test value	P-value	Sig.
		No. = 200	No. = 200			
Gestational age	Mean ± SD Range	38.36 ± 0.87 37–40	38.21 ± 0.95 37–39	-1.647•	0.100	NS
Birth weight in g	Mean ± SD Range	3277 ± 331.5 2850–3780	3350 ± 421 2654 ± 3863	1.927•	0.054	NS
Gender	Male Female	90 (45.0%) 110 (55.0%)	120 (60.0%) 80 (40.0%)	9.023*	0.002	HS
Type of feeding	Exclusive breastfeeding Mixed Breastmilk + formula Mixed breastmilk + herbs Formula milk	120 (60.0%) 60 (30.0%) 8 (4.0%) 12 (6.0%)	80 (40.0%) 60 (30.0%) 5 (2.5%) 55 (27.5%)	36.289*	0.000	HS
Number of feeds per 24 hours	Mean ± SD Range	10.56 ± 2.3 6–13	6.74 ± 2.51 3-11	-15.868•	0.000	HS
Bilirubin level at 1st discharge mg/dl	Mean ± SD Range	5.34 ± 1.25 3–9	6.83 ± 2.10 2–10	8.622•	0.000	HS
Risk factors	ABO incompatibility	110 (55.0%)	115 (57.5%)	3.365*	0.066	NS
	Cephalhematoma	5 (2.5%)	4 (2.0%)	0.009*	0.924	NS
	RH incompatibility	20 (10.0%)	23 (11.5%)	1.021*	0.312	NS
	Cesarean section	110 (55.0%)	115 (57.5%)	3.365*	0.066	NS
	Mother receiving Breastfeeding counseling sessions at delivery	150 (75.0%)	80 (40.0%)	17.103*	0.000	HS
Number of follow-up visit at clinic	Mean ± SD Range	4.5 ± 1.3 2-6	4.41 ± 0.95 1-5	-0.790•	0.429	NS
Obstacles of breastfeeding	Formula preference	65 (32.5%)	110 (55.0%)	2.232*	0.135	NS
	Maternal perception of not enough milk	50 (25.0%)	90 (45.0%)	0.727*	0.393	NS
	Bad latch	40 (20.0%)	80 (40.0%)	0.019*	0.890	NS
	Nipple confusion	126.0%)	60 (30.0%)	9.889*	0.001	HS
	Others	4 (2.0%)	10 (5.0%)	0.118*	0.731	NS

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
*: Chi-square test; •: Independent t-test

Table 3: Comparison of Clinical Outcomes Between Breastfed and Artificially Fed Infants During NICU Admission

Item		Breast fed during admission No. = 200	Artificially fed during admission No. = 200	Test value	P-value	Sig.
Length of stay hours	Mean ± SD Range	40.15 ± 2.67 36- 84	46.87 ± 3.25 30- 92	22.595•	0.000	HS
Number of fed	Mean ± SD Range	8.64 ± 1.65 10–12	9.54 ± 1.09 11- 13	6.436•	0.000	HS
Bilirubin level upon admission	Mean ± SD Range	20.84 ± 0.67 19.5 – 21	20.51 ± 0.87 19–22	-4.250•	0.000	HS
Bilirubin level at discharge	Mean ± SD Range	12.19 ± 0.85 10–15	11.57 ± 1.01 9- 14	-6.642•	0.000	HS

P-value > 0.05: nonsignificant; P-value < 0.05: Significant; P-value < 0.01: Highly significant
•: Independent t-test

Table 2 shows no significant differences in gestational age and birth weight; however, male infants were more susceptible to readmission. Feed type also affects readmission rates, with counseled exclusively breastfed infants having lower readmission rates. Readmitted infants had higher bilirubin levels at discharge. Risk factors such as ABO incompatibility, cephalohematoma, RH incompatibility, and cesarean section did not show significant differences. Breastfeeding counseling at delivery significantly reduced the readmission rates.

Breastfed infants had a shorter length of stay and fewer feeds per day than artificially fed ones. Breastfed infants also had slightly higher bilirubin levels on admission, possibly because of initial breastfeeding challenges. However, at discharge, bilirubin levels were lower in the breastfed infants.

Discussion

This study provides valuable insights into the impact of breastfeeding counseling on the management of neonatal hyperbilirubinemia. The

intervention program offered at the Breastfeeding Counseling Unit (BFCU) at Ain Shams Pediatric Hospital is an essential component in the management of hyperbilirubinemia. The BFCU provides comprehensive counseling services that emphasize the role of breastfeeding in reducing the risk of jaundice by addressing factors such as inadequate breastfeeding and dehydration. Similar findings have been reported in previous studies, which emphasized the protective role of exclusive breastfeeding in preventing and managing hyperbilirubinemia in neonates [6]. Studies have shown that proper breastfeeding practices are vital in ensuring that infants receive sufficient nutrition and hydration, which can reduce jaundice severity (4,6). The BFCU's individualized counseling sessions also focus on improving maternal-infant bonding, breastfeeding techniques, and lactation management, such as teaching proper latching and milk storage, and boosting maternal confidence. These interventions help mothers overcome the potential barriers to successful breastfeeding. This finding aligns with research suggesting that tailored breastfeeding support programs enhance maternal confidence and breastfeeding success and reduce the risk of jaundice [7]. Furthermore, group counseling sessions provided additional support, demonstrating the importance of peer-to-peer interactions in reinforcing good breastfeeding practices [8]

One of the most notable findings was the age at readmission. Infants who received counseling were readmitted to the neonatal intensive care unit at a later age, which may be attributed to more effective breastfeeding practices and the early management of hyperbilirubinemia. This result is consistent with previous studies suggesting that breastfeeding reduces jaundice severity by promoting hydration and enhancing bilirubin

excretion. Breastfeeding counseling helps mothers better manage feeding techniques and lactation, which may delay readmission by preventing complications that lead to readmission [9].

The breastfeeding counseling group had significantly reduced bilirubin levels in infants on the 3rd day and at discharge, confirming its beneficial effects on lowering hyperbilirubinemia. Research has shown that early and frequent breastfeeding promotes the elimination of bilirubin by initiating regular bowel movements and preventing jaundice by facilitating the elimination of bilirubin [10]. This suggests that effective breastfeeding practices may improve hyperbilirubinemia management.

Weight loss upon jaundice appearance was significantly lower in the breastfeeding counseling group, indicating that effective breastfeeding counseling potentially reduced the risk of dehydration. This suggests that breastfeeding counseling not only promotes nutritional intake but also ensures proper hydration, preventing excessive weight loss and severe jaundice development [9].

The lengths of stay after delivery and in the NICU were notably different between the two groups. Infants who received breastfeeding counseling had a longer length of stay after delivery, but a shorter stay in the neonatal intensive care unit. This result indicates that extended postnatal care and counseling improve the monitoring and management of breastfeeding, reducing the need for prolonged NICU stays. This finding is supported by evidence that breastfeeding support programs lead to more efficient care and less intensive treatment [8].

The study found no significant differences in gestational age or birth weight between readmitted and non-readmitted patients with hyperbilirubinemia. Instead, other modifiable factors such as feeding

practices and bilirubin management may play a more prominent role in preventing readmission [10]. Infants who were readmitted had fewer feeds per day (Mean ± SD: 6.74 ± 2.51) than those who were not readmitted (Mean ± SD: 10.56 ± 2.3) indicating that Frequent feeding is crucial for managing bilirubin levels and preventing readmission in infants, as it promotes regular stooling and hydration, preventing complications and readmissions [3]. This study found that infants with elevated bilirubin levels at discharge were at a higher risk of readmission due to severe jaundice. However, common risk factors, such as ABO incompatibility and cesarean section, were not significant predictors. Breastfeeding counseling significantly reduced readmission rates among the infants. Our results emphasize the critical role of feeding practices in preventing readmission for hyperbilirubinemia [3]. Male sex, higher bilirubin levels at discharge, and lack of breastfeeding counseling have emerged as important predictors of readmission. To reduce the incidence of readmission for hyperbilirubinemia, healthcare providers should focus on supporting exclusive breastfeeding, addressing breastfeeding challenges, and closely monitoring bilirubin levels before discharge [10].

Breastfed infants have shorter stays than artificially fed infants, although they have fewer feeds than artificial feeds. This can be explained by the nutritional and immunological benefits of breast milk, which provides essential antibodies that promote faster recovery from illnesses and higher nutrient density, resulting in more efficient feeding and longer satiation periods [11]

Breastfed infants have slightly higher bilirubin levels on admission than artificially fed infants, possibly due to initial challenges with breastfeeding, which should be interpreted cautiously, as it may reflect transient issues that improve with proper

breastfeeding support. However, these levels are generally lower at discharge, indicating that breastfeeding facilitates the elimination of excess bilirubin through frequent bowel movements and improved hydration [3].

This study has several limitations. First, it was conducted in a single hospital, and the findings may not be generalizable to other populations or healthcare settings. Additionally, although this study focused on neonates diagnosed with jaundice, further research is needed to explore the broader effects of breastfeeding counseling on neonatal outcomes in a more diverse population. Further studies are needed to explore the long-term benefits of breastfeeding counseling beyond the neonatal period.

Conclusions

Breastfeeding counseling (BFC) significantly reduced neonatal hyperbilirubinemia severity, NICU stay length, and readmission rate. Expanding access to BFC, especially in low-resource settings, can improve neonatal outcomes.

Acknowledgements

We would like to thank all medical staff at Breastfeeding Counseling Unit of the Neonatology department, Ain Shams Pediatric Hospital

Author's contributions

All authors shred equally in this scientific work

Funding

We had not received financial support for the study

Conflict of interest

We declared no conflict of interest concerning the study.

Author's details

[1]Pediatric department, Faculty of Medicine, Ain Shams University, Egypt

[2]Pediatric department, Faculty of Nursing, Ain Shams University, Egypt

Date: received 29th January 2025, accepted 26th March 2025

References

1. Saleem S, Nair RS, Chandran Nair PM. Early hospital discharge and readmission jaundice in term babies. International Journal of Contemporary Pediatrics. 2020; 7

(2): 351-354. doi: 10.18203/ 2349- 32 91. Ijcp 2020010

2. Firdaus F, Hasina SN, Windarti Y, Wulandari DD. Breast Milk Management in the Efforts to Reduce Bilirubin Levels in Neonatal Jaundice. Macedonian Journal of Medical Sciences. 2021 Dec 16;9(G):300-305. doi: 10.3889/oamjms.2021.7776
3. Kankew S, Daramas T, Patoomwan A. Frequency of Breastfeeding, Bilirubin Levels, and Re-admission for Jaundice in Neonates. The Bangkok Medical Journal. 2019; 15(2). doi: 10.31524/ bkkmedj. 2019.09.010
4. Bratton, S., Cantu, R. M., & Stern, M. Breast milk jaundice. In StatPearls. Treasure Island, FL: StatPearls 2021. Publishing. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK537334
5. Akagawa, S., Akagawa, Y., Yamanouchi, S., Teramoto, Y., Yasuda, M., Fujishiro, S., & others. (2021). Association of neonatal jaundice with gut dysbiosis characterized by decreased Bifidobacteriales. Metabolites, 11(12), 887. https://doi.org/ 10.3390/metabo 11120887
6. Bhutani VK, Maisels ML, Stark AR, Buonocore G. Management of Jaundice and Prevention of Severe Neonatal Hyperbilirubinemia in Infants ≥35 Weeks Gestation. Neonatology. 2008;94(1): 63-67. https://doi.org/10. 1159/000113463
7. Willis SK, Hannon P, Scrimshawm S. The impact of the maternal experience with a jaundiced newborn on the breastfeeding relationship. J Fam Pract. 2002 May;51(5):465.
8. Rodríguez-Gallego I, Leon-Larios F, Corrales-Gutierrez I, González-Sanz JD. Impact and effectiveness of group strategies for supporting breastfeeding after birth: a systematic review. Int J Environ Res Public Health. 2021 Mar 4;18(5):2550. doi: 10.3390/ijerph180 52550.

9. Hassan B, Zakerihamidi M. The correlation between frequency and duration of breastfeeding and the severity of neonatal hyperbilirubinemia. J Matern Fetal Neonatal Med.2018 Feb;31(4):457-463. doi: 10.1080/14767 058. 2017. 1287897

10. Xavier R, Manoj VC, Cherian VJ. Breastfeeding jaundice: how big is the problem? Int J Contemp Pediatr. 2016 May;3(2):498-503. doi: 10.18203/2349-3291.ijcp20160948.

11. Nuzzi G, Trambusti I, Di Cicco ME, Peroni DG. Breast milk: more than just nutrition! Minerva Pediatr. 2021 Apr;73(2):111-114. doi:10.2373 6/ S2724-5276.21. 06223-X

Citation: Rania Mohamed Abdou; Bothayna Nader Sadek. "The Efficiency of Breastfeeding Supportive Practices in Reducing Newborn Bilirubin Level During the First Week of Life. A Retrospective Comparative Study", *Annals of Neonatology* 2025, 7(2):38-50. doi: 10.21608/anj.2025.370879.1111