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THE EFFECT OF PLANNED BREASTFEEDING MANAGEMENT EDUCATION ON BREASTFEEDING OR FORMULA FEEDING, AND BREASTFEEDING SELF-EFFICACY IN NEONATAL INTENSIVE CARE UNIT: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

This quasi-experimental study aimed to assess the effect of planned breastfeeding management education on feeding practices and breastfeeding self-efficacy among mothers of newborns in the neonatal intensive care unit (NICU). The study included 130 mothers whose infants were admitted to the NICU for at least 3 days. The control group received standard breastfeeding education, while the experimental group received individualized planned education. Data on feeding practices and breastfeeding self-efficacy were collected through telephone interviews at the 3rd and 6th months after discharge. Descriptive statistics were used to summarize demographic characteristics and study variables. Group comparisons were conducted using the chi-square test for categorical variables and the independent samples t-test for continuous variables. No significant differences were found between groups in maternal or newborn characteristics ($p > 0.05$). Similarly, breastfeeding self-efficacy scores did not differ significantly between groups ($p > 0.05$). However, significant differences were observed in exclusive breastfeeding and formula feeding at the 3rd and 6th months ($p = 0.008$; $p = 0.001$). The findings indicate that breastfeeding education may support breastfeeding practices. Strengthening nurses' knowledge of breastfeeding self-efficacy and providing continued follow-up after discharge may help sustain breastfeeding.

Keywords: Breastfeeding, Formula Feeding, Self-Efficacy, Education.

YENİDOĞAN YOĞUN BAKIMDA İZLENEN BEBEKLERİN ANNELERİNE VERİLEN PLANLI ANNE SÜTÜ YÖNETİMİ EĞİTİMİNİN ANNE SÜTÜ/FORMUL MAMA KULLANIMINA VE ANNELERİN EMZİRME ÖZ-YETERLİLİĞİNE ETKİSİ

ÖZ

Bu yarı deneysel çalışma, yenidoğan yoğun bakım ünitesinde (YYBÜ) yatan bebeklerin annelerine verilen planlı emzirme yönetimi eğitiminin beslenme uygulamaları ve emzirme öz yeterliliği üzerindeki etkisini değerlendirmek amacıyla yapılmıştır. Çalışmaya, bebekleri YYBÜ'de en az 3 gün yatan 130 anne dahil edilmiştir. Kontrol grubuna standart emzirme eğitimi verilirken, deney grubuna bireyselleştirilmiş planlı emzirme eğitimi uygulanmıştır. Beslenme uygulamaları ve emzirme öz yeterliliğine ilişkin veriler, taburculuk sonrası 3. ve 6. aylarda telefon görüşmeleri ile toplanmıştır. Tanımlayıcı istatistikler, demografik özellikleri ve çalışma değişkenlerini özetlemek amacıyla kullanılmıştır. Gruplar arası karşılaştırmalarda kategorik değişkenler için ki-kare testi, sürekli değişkenler için bağımsız örneklem t-testi kullanılmıştır. Anne ve yenidoğana ait özellikler açısından gruplar arasında anlamlı fark bulunmamıştır ($p > 0.05$). Benzer şekilde, emzirme öz yeterliliği puanları açısından da gruplar arasında anlamlı fark saptanmamıştır ($p > 0.05$). Ancak, 3. ve 6. aylarda yalnızca anne sütü ile beslenme ve mama ile beslenme açısından gruplar arasında anlamlı fark bulunmuştur ($p = 0.008$; $p = 0.001$). Çalışmamızın bulguları, annelere verilen eğitimlerin, annelerin emzirme öz yeterliliğini ve emzirme oranlarını artırmadaki etkinliğini doğrulamıştır. Hemşirelerin emzirme öz yeterliliği konusundaki bilgi düzeylerinin güçlendirilmesi ve taburculuk sonrası sürdürülen danışmanlık ve izlem, emzirmenin devamlılığını destekleyebilir.

Anahtar kelimeler: Emzirme, Mama ile besleme, Öz yeterlilik, Eğitim.

1. INTRODUCTION

Breast milk (BM) is the ideal nutrition for infants. It is safe, clean, and contains antibodies that protect against many common childhood diseases. Breast milk provides all the energy and nutrients required by the infant during the first months of life (1). Considered the best source of nutrition for infants, breast milk is a complex biological fluid that should be given at least until the sixth month of life. It contains proteins, lipids, sugars, immune cells, and many bioactive substances, supporting the formation of the immune system and being crucial for healthy organ development in infants (2). The benefits of breast milk extend beyond the mother and child, positively impacting the family, society, and the national economy (3,4).

Breastfeeding is one of the most effective ways to ensure the child's health and survival (1). It has numerous health benefits for both mother and infant. Breast milk contains all the nutrients the infant needs during the first six months. Initiating breastfeeding early, within the first hour after birth, and ensuring the infant receives colostrum or "first milk," which is rich in protective factors, is essential (5). In a report prepared by the WHO and UNICEF Global Breastfeeding Collective, breastfeeding rates in 194 countries were evaluated. Only 44% of infants were exclusively breastfed during the first six months, 68% were breastfed until the age of one, and 44% were breastfed until the age of two. WHO and UNICEF aim to increase the global exclusive breastfeeding rate to over 70% by 2030 (6).

Despite numerous studies encouraging breastfeeding in both our country and globally, the duration of breastfeeding remains below desired levels. In Turkey, while the initiation rate for breastfeeding is high, the continuation rate is insufficient. According to the 2018 TNSA, the percentage of children exclusively breastfed decreases with age: 59% for infants aged 0-1 month, 45% for infants aged 2-3 months, and 14% for infants aged 4-5 months. Contrary to recommendations for exclusive breastfeeding for infants under six months, 23% of infants are fed with non-breast milk, and 12% receive additional foods alongside breast milk (7).

The success of exclusive breastfeeding is influenced by the mother's beliefs and attitudes toward breastfeeding, the health status of both the infant and the mother, the prenatal and postpartum interventions by the birth nurses to support lactation, and the mother's nutrition during the lactation period (8). Every mother has an instinct to breastfeed her baby and strives to do so. However, various issues related to the mother and the baby can demotivate her, causing difficulties in breastfeeding. Nurses must be vigilant observers and provide breastfeeding counseling by addressing the mother's concerns and anxieties (9).

It is essential to understand the factors that influence breastfeeding to ensure effective and adequate sucking. These factors can be classified as those related to the infant, mother, and environmental/social factors (10). Among these, maternal factors are the most significant. A mother’s perception of breastfeeding self-efficacy plays a crucial role. Numerous studies have been conducted to identify effective approaches for increasing breastfeeding rates and durations, and breastfeeding self-efficacy has been identified as one of the most important factors (11,12).

The concept of self-efficacy was first introduced by psychologist Albert Bandura in 1977 under the "Cognitive Behavioral Change Framework." He indicated that personal competence is closely related to better health, higher achievements, and social integration. This concept is used in various fields, including mental and physical health, academic success, emotional disorders, socio-political change, and career choices (13). Cindy-Lee Dennis, influenced by this definition, examined the concept of ‘Breastfeeding Self-Efficacy’ and developed the “Breastfeeding Self-Efficacy Theory” by explaining the sources and influencing factors of self-efficacy perception. Studies have shown that mothers with high breastfeeding self-efficacy experience fewer problems when initiating and

continuing breastfeeding. In contrast, mothers with low self-efficacy tend to stop breastfeeding much earlier than recommended (14).

Nurses play a critical role in promoting, protecting, and supporting breastfeeding, particularly in neonatal intensive care units where mothers may experience increased stress and uncertainty. Through individualized education, counselling, and continuous support, nurses can enhance mothers' confidence, improve breastfeeding skills, and facilitate the establishment and continuation of breastfeeding. Effective breastfeeding education provided by nurses not only benefits infants by supporting optimal nutrition, growth, and immune protection but also contributes to maternal well-being by strengthening maternal–infant bonding and reducing anxiety.

Nurse-led breastfeeding interventions represent an important component of evidence-based practice and contribute to improving the quality of neonatal care. By increasing breastfeeding self-efficacy and supporting exclusive breastfeeding rates, such interventions may have long-term positive effects on public health outcomes. In many baby-friendly hospitals, mothers are provided with breastfeeding education through prenatal courses. After delivery, mothers continue to receive education and are supported by healthcare professionals throughout their hospital stay. However, studies and reports indicate that these policies are insufficient to ensure the effective continuation of breastfeeding after discharge. Exclusive breastfeeding rates during the first six months remain below desired levels. This situation may negatively affect the infant's physical and psychosocial development. One of the primary reasons for this is the lack of adequate support provided to mothers after discharge.

Mothers need to have confidence in their ability to translate breastfeeding knowledge into practice. Mothers with high self-efficacy are more likely to cope with challenges, encourage themselves, and adopt positive problem-solving approaches. Nurses have a crucial role in supporting and sustaining breastfeeding. Regardless of the reason for admission to healthcare institutions, the infant's feeding status should be assessed, breastfeeding mothers should receive counselling, breastfeeding practices should be observed, and parents should be encouraged to continue breastfeeding. Nurses play a key role in fostering positive attitudes toward breastfeeding among new mothers at different stages of care.

Therefore, this study is expected to contribute to the literature by providing evidence on the effectiveness of planned breastfeeding management education in the NICU setting.

2. METHODS

2.1. Aim and Study Design

This study was designed as a quasi-experimental study to examine the effect of planned breastfeeding management education provided to mothers of infants admitted to the neonatal intensive care unit (NICU) on breastfeeding/formula feeding practices and breastfeeding self-efficacy.

2.1.1. Hypotheses

H1: Mothers who receive planned breastfeeding management education will have higher breastfeeding self-efficacy than those who do not receive education.

H2: Infants of mothers who receive planned breastfeeding management education will have higher rates of breast milk intake than those whose mothers do not receive education.

H3: Infants of mothers who receive planned breastfeeding management education will have lower rates of formula feeding than those whose mothers do not receive education.

H4: Mothers with higher breastfeeding self-efficacy scores will have higher rates of exclusive breastfeeding at the 3rd and 6th months.

2.2. Setting and Sample

The study was conducted in the Neonatal Intensive Care Unit (NICU) of Atatürk Training and Research Hospital. The sample consisted of mothers of neonates admitted to the NICU who met the inclusion criteria. The NICU has seven incubators, one isolation room, and a Level 3 care unit. However, due to the lack of sub-specialties in neonatology and pediatrics, the unit predominantly follows neonates diagnosed with hyperbilirubinemia, transient tachypnea of the neonate (TTN), and feeding intolerance.

In this study, randomization was not applied. Group allocation was performed based on the time period of admission. Mothers and their infants who were followed in the NICU between October 2022 and March 2023 were assigned to the control group, while those admitted between April 2023 and October 2023 were assigned to the experimental group.

The control group was formed by neonates and mothers who were followed in the NICU between October 2022 and March 2023, and the experimental group consisted of neonates and mothers admitted to the NICU between April 2023 and October 2023. On average, 15 neonates are discharged each month from the NICU where the study was conducted. Data from both the control and experimental groups were collected at 3 and 6 months. According to the known sample size calculation for the population (average of 180 neonates over 12 months), a sample size of 123 was determined with a 95% confidence interval and 5% margin of error. To account for sample loss, 65 mothers and neonates from the control group and 65 from the experimental group were included.

Inclusion and exclusion criteria for the study were: neonates with a gestational age of 32 weeks or more, admitted to the NICU for at least 3 days (with the planned education lasting for 3 days), no congenital anomalies or genetic disorders in the neonates, mothers with no conditions that would prevent breastfeeding postpartum, initiation of lactation and milk expression by the mothers, and written informed consent obtained from the parents, with mothers aged between 18 and 45 years.

2.3. Data Collection Tools

Data were collected using the following instruments.

2.3.1. Descriptive Information Form

The information form collected sociodemographic data about mothers (e.g., age, education level) and neonates (e.g., type of delivery, gestational age, reasons for NICU admission). It also gathered information on maternal breastfeeding experience (e.g., whether the mother received breastfeeding education before delivery, intentions to use formula, plans for pacifier or bottle use).

The form included questions on breastfeeding practices at 3 and 6 months, including the use of breast milk/formula, and the classification of breastfeeding (exclusive breastfeeding, predominantly breastfeeding, partial breastfeeding).

2.3.2. Postnatal Breastfeeding Self-Efficacy Scale – Short Form

The Breastfeeding Self-Efficacy Scale (BSES) was developed by Dennis and Faux in 1999 with 33 items. It evaluates how confident mothers feel about breastfeeding. A pilot study found a Cronbach's alpha value of 0.96. The short form of the BSES, comprising 14 items, was derived by removing items with low item-total correlations (below 0.60). The reliability of the short form was confirmed with a Cronbach's alpha of 0.94. The Turkish adaptation of the scale was conducted by Aluş-Tokat and Okumuş (2010), and it was found to have a Cronbach’s alpha of 0.86, indicating high reliability. Permission for scale use was obtained. In this study, the Cronbach’s alpha coefficient of the scale was found to be 0.88, indicating high reliability.

2.4. Variables of the Study

The independent variable was individualized planned breastfeeding management education. The dependent variables were the mean scores on the Breastfeeding Self-Efficacy Scale, exclusive breastfeeding and formula feeding status, and breastfeeding level at 3 and 6 months.

2.5 Data Collection Method

The control group received standard breastfeeding education, while the experimental group received individualized, planned breastfeeding management education. Data was collected by conducting telephone interviews with both groups in the 3rd and 6th months, focusing on breastfeeding/self-efficacy and breastfeeding or formula feeding.

2.5.1. Standard Breastfeeding Education for the Control Group

Every parent of a neonate admitted to the NICU received standard breastfeeding education, with an emphasis on the timing of milk expression, the benefits of breastfeeding for the infant, and the proper procedure for milk delivery to the NICU. Informational brochures were provided, containing details on breast milk production, breastfeeding positions, ways to increase milk supply, and safe storage conditions for expressed milk. Follow-up education was provided on subsequent visits by the mother to the NICU.

2.5.2. Planned Breastfeeding Management Education for the Experimental Group

Mothers in the experimental group, who agreed to participate and provided written informed consent, received individualized face-to-face training by a NICU nurse and researcher. The education was planned to be delivered on the first day of the neonate's NICU admission and continued for 3 additional days, totaling 4 days of training (Table 1).

On the first day of admission: Since parents are often anxious and overwhelmed, basic information was provided regarding the importance of breastfeeding, how often to express milk, and proper milk storage conditions. The families were informed that they could contact the researcher for further questions outside of the unit's regular hours.

On the second day: The importance of breastfeeding was reiterated, and mothers were encouraged to breastfeed at each feeding session, provided there were no contraindications from either the mother or infant. The mothers received additional support for milk expression, including tips to enhance milk production (e.g., warm showers before expressing, creating a relaxing environment, listening to calming music, and using clothing that carried the infant's scent).

On the third day: Feedback was gathered from the mothers regarding their experiences with milk expression at home. Guidance was given on increasing milk quantity and quality through appropriate maternal nutrition and emotional support.

On the fourth day: Education on infant discharge and postpartum care was provided, including potential challenges and guidance for continued breastfeeding at home. The mothers were observed while breastfeeding, and further assistance was provided.

Post-discharge, the researcher continued to provide weekly follow-up telephone consultations for 3 months to offer ongoing support and ensure continuity of education (Table 1).

Expert opinions were obtained from professionals in pediatric nursing (n=4), obstetrics and gynecology nursing (n=4), a gynecologist (n=1), and a pediatrician (n=1) to finalize the education content. The content of the education was reviewed and revised in line with their recommendations.

Table 1. Content of Planned Breastfeeding Management Education

Day / Period	Content of Education	Method	Purpose
Day 1	Importance of breastfeeding, frequency of milk expression, breast milk storage	Verbal explanation	Increase awareness and reduce maternal anxiety
Day 2	Encouraging breastfeeding, techniques to increase milk supply (warm shower, relaxation, music, infant scent)	Face-to-face training	Improve milk production and maternal confidence
Day 3	Evaluation of milk expression experiences, maternal nutrition and emotional support	Feedback and counseling	Support continuation of breastfeeding
Day 4	Discharge education, breastfeeding techniques, problem-solving strategies	Observation and guidance	Prepare mothers for breastfeeding at home
Post-discharge (0–3 months)	Weekly telephone follow-up	Telephone counseling	Ensure continuity of breastfeeding support
Post-discharge (3–6 months)	Monthly follow-up and support	Telephone counseling	Maintain breastfeeding and provide long-term support

2.5.3. Planned Breastfeeding Management Education Content Topics

- The benefits of breastfeeding for infants
- The benefits of breastfeeding for mothers
- Milk expression techniques
- Step-by-step guidance for manual milk expression (demonstrated practically)
- Frequency of milk expression
- Proper storage of expressed breast milk
- Handling milk from a deep freezer
- Strategies for increasing and maintaining milk supply
- Factors that promote milk production
- Expected milk yield over time

2.6. Ethical Aspects of Research

Before the study was initiated, permission to use the scale was obtained from the original authors via email. Institutional permission was obtained from the hospital where the study was conducted (Date/No: 13.06.2022). Ethical approval for the study was granted by the Ethics Committee of a University Hospital (Date/No: 30.03.2022 / 12-08). The responsible researcher explained the purpose of the study to the participants, and both written and verbal informed consent were obtained from all parents of the neonates. Participants were informed that they could withdraw from the study at any time without providing any reason.

2.7. Data Analysis

The obtained data were analyzed using SPSS 25.0 software. Descriptive statistics (frequencies, percentages, means) were used to analyze demographic data. The demographic characteristics of the experimental and control groups were compared using Chi-square and t-tests. The Shapiro-Wilk test was applied to check the normality of the scale data. Mean scores from the scale were compared using a one-way analysis of variance (ANOVA). Inter-group differences in scale scores were assessed with t-tests. The significance level was set at $p<0.05$.

3. RESULTS

3.1. Demographic Characteristic

The descriptive characteristics of the research groups are presented in Table 1. The mean maternal age was 26.43 ± 6.06 years in the experimental group and 26.76 ± 6.04 years in the control group. The mean gestational age of the neonates was 38.23 ± 1.20 weeks in the experimental group and 38.27 ± 1.13 weeks in the control group. The mean length of hospital stay was 6.56 ± 3.24 days in the experimental group and 6.12 ± 3.41 days in the control group.

When comparing the groups, no statistically significant differences were found in terms of maternal and neonatal characteristics ($p > 0.05$), indicating that the groups were homogeneous (Table 2).

Table 2: Descriptive Characteristics of Mothers and Neonates (n=130)

Characteristics	Experimental Group (n=65)	Control Group (n=65)	t / X^2	p-value
Maternal Characteristics	**Mean ± SD**	**Mean ± SD**		
Age (years)	26.43 ± 6.06	26.76 ± 6.04	0.319	0.798
Education status	**n (%)**	**n (%)**		
Illiterate	3 (37.5)	5 (62.5)	2.139	0.544
Primary school	27 (49.1)	28 (50.9)		
High school	32 (55.2)	26 (44.8)		
University	3 (33.3)	6 (66.7)		
Working status				
Working	26 (45.6)	31 (54.4)	0.781	0.377
Not working	39 (53.4)	34 (46.6)		
Neonatal Characteristics				
Delivery method				
NVD	26 (52.0)	24 (48.0)	0.130	0.718
C/S	39 (48.2)	41 (51.2)		
Reason for hospitalization (n, %)				
TTN	14 (56.2)	18 (43.8)	2.054	0.842
Hyperbilirubinemia	22 (48.9)	23 (51.1)		
Infection	16 (51.6)	15 (48.4)		
Feeding intolerance	5 (50.0)	5 (50.0)		
Prematurity	5 (62.5)	3 (37.5)		
Other	3 (75.0)	1 (25.0)		
	Mean ± SD	**Mean ± SD**		
Gestational age (weeks)	38.23 ± 1.20	38.27 ± 1.13	0.224	0.921
Postnatal age (days)	1.70 ± 1.31	1.50 ± 1.22	0.895	0.813
Parity	2.00 ± 0.90	2.24 ± 0.82	5.195	0.959
Length of hospital stay (days)	6.56 ± 3.24	6.12 ± 3.41	-0.763	0.986

Values are presented as mean ± standard deviation or number (percentage).

NVD: Normal vaginal delivery; C/S: Cesarean section; TTN: Transient tachypnea of the newborn.

3.2. Breastfeeding – Related Characteristics

Regarding breastfeeding-related characteristics, 51.9% of mothers in the experimental group and 48.1% in the control group received prenatal breastfeeding education. Similarly, 44.4% of mothers in the experimental group and 55.6% in the control group had previous breastfeeding experience.

No statistically significant differences were found between the groups in terms of prenatal education, formula feeding intention, pacifier/bottle use, and breastfeeding initiation within the first 24 hours ($p > 0.05$). However, a significant difference was observed in breastfeeding experience between the groups ($p = 0.024$) (Table 3).

Table 3. Distribution of Mothers' Breastfeeding – Related Knowledge (n=130)

Characteristics	Experimental Group (n=65)	Control Group (n=65)	X^2	p-value
Prenatal breastfeeding education	**n (%)**	**n (%)**	0.047	
Yes	14 (51.9)	13 (48.1)		0.829
No	51 (49.5)	52 (50.5)		
Breastfeeding experience			5,125	
Yes	44 (44.4)	55 (55.6)		0.024
No	21 (67.7)	10 (32.3)		
Formula feeding intention			0.284	
Yes	26 (47.3)	29 (52.7)		0.723
No	39 (52.0)	36 (48.0)		
Pacifier/bottle use intention			0.513	
Yes	28 (53.8)	24 (46.2)		0.474
No	37 (47.4)	41 (52.6)		
Breastfeeding initiation within the first 24 hours			3.718	
Immediately after birth	0 (0.0)	1 (100.0)		0.294
Within 60 minutes	9 (36.0)	16 (64.0)		
60 min–24 h	37 (55.2)	30 (44.8)		
After 24 h	19 (51.4)	18 (48.6)		

Values are presented as a number (percentage). Chi-square test was used for categorical variables.

3.3. Breastfeeding Self-Efficacy Levels

When examining breastfeeding self-efficacy scores, the experimental group had a mean score of 51.58 ± 5.18 at the 3rd month and 55.32 ± 6.27 at the 6th month, whereas the control group had a mean score of 45.60 ± 5.61 at the 3rd month and 47.23 ± 5.35 at the 6th month. Although the experimental group showed higher self-efficacy scores at both time points, the differences between the groups were not statistically significant at the 3rd month ($p = 0.477$) or the 6th month ($p = 0.433$) (Table 4).

These findings suggest that although planned breastfeeding management education may have a positive effect on maternal confidence, this effect was not strong enough to create a statistically significant difference between the groups. This may be due to the influence of other factors such as maternal motivation, previous breastfeeding experience, and ongoing support after discharge.

3.4. Breastfeeding and Formula Feeding Characteristics

At the 3rd month, a significant difference was observed between the groups in terms of exclusive breastfeeding and exclusive formula feeding ($p = 0.008$). Similarly, at the 6th month, a significant difference was found between the groups in exclusive breastfeeding and formula feeding rates ($p = 0.001$). However, no significant differences were found between the groups when comparing exclusively breastfeeding, mostly breastfeeding, or partially breastfeeding status ($p > 0.05$) (Table 4).

These findings indicate that planned breastfeeding education may positively influence feeding practices, particularly in terms of exclusive breastfeeding and formula feeding, although it may not be sufficient alone to sustain exclusive breastfeeding over time.

Table 4. Breastfeeding Self-Efficacy and Feeding Characteristics (n=130)

Variables	Experimental Group (n=65)	Control Group (n=65)	F / X^2	p-value
	Mean ± SD	**Mean ± SD**		
Self-efficacy score at 3 months	51.58 ± 5.18	45.60 ± 5.61	0.508	0.477
Self-efficacy score at 6 months	55.32 ± 6.27	47.23 ± 5.35	0.619	0.433
Breastfeeding/formula feeding at 3 months	**n (%)**	**n (%)**		
Exclusive breastfeeding	38 (62.3)	23 (37.7)	6.949	0.008
Exclusive formula feeding	27 (39.1)	42 (60.9)		
Breastfeeding level at 3 months*				
Exclusive breastfeeding	18 (81.8)	4 (18.2)	7.973	0.019
Predominant breastfeeding	19 (55.9)	15 (44.1)		
Partial breastfeeding	1 (20.0)	4 (80.0)		
Breastfeeding/formula feeding at 6 months				
Exclusive breastfeeding	20 (80.0)	5 (20.0)	11.143	0.001
Exclusive formula feeding	45 (42.9)	60 (57.1)		
Breastfeeding level at 6 months*				
Exclusive breastfeeding	20 (87.0)	3 (13.0)	0.150	0.904
Predominant breastfeeding	15 (88.2)	2 (11.8)		

Values are presented as mean ± standard deviation or number (percentage).
ANOVA test was used for continuous variables, and chi-square test was used for categorical variables.
*Breastfeeding level variables were analyzed only among mothers who reported breastfeeding at the respective follow-up periods; therefore, total sample sizes differ from overall group sizes.

4. DISCUSSION

International health organizations, including the World Health Organization and UNICEF, emphasize the importance of initiating breastfeeding within the first hour after birth and maintaining exclusive breastfeeding for the first six months and the continuation of breastfeeding with appropriate complementary foods for at least two years (20). Maternal breastfeeding self-efficacy is considered a key determinant of breastfeeding duration and success (18, 19, 21, 22, 23, 24, 25). In the Neonatal Intensive Care Unit (NICU), where maternal–infant separation is common, structured nursing interventions play an essential role in supporting breastfeeding

International health organizations, including the World Health Organization and UNICEF, emphasize the importance of initiating breastfeeding within the first hour after birth and maintaining exclusive breastfeeding for the first six months. Maternal breastfeeding self-efficacy is considered a key determinant of breastfeeding duration and success (18, 19, 20,25, 26). In the Neonatal Intensive

Care Unit (NICU), where maternal–infant separation is common, structured nursing interventions play an essential role in supporting breastfeeding.

In the present study, no statistically significant differences were found between the experimental and control groups in terms of maternal characteristics (age, education, employment) and neonatal clinical parameters (gestational age, delivery mode, and duration of hospitalization) ($p > 0.05$), indicating that the groups were comparable at baseline. Similar findings have been reported in previous studies (24, 25) and meta-analyses (19).

Regarding breastfeeding-related characteristics, no significant differences were observed between the groups in terms of prenatal education, intention to use formula, and pacifier/bottle use ($p > 0.05$). However, a significant difference was found in breastfeeding experience ($p = 0.024$). Although previous studies have suggested that prior experience may influence maternal self-efficacy (27), the findings of this study indicate that structured breastfeeding education may help support breastfeeding outcomes even among mothers with limited prior experience.

When breastfeeding self-efficacy scores were examined, the experimental group showed higher mean scores at both the 3rd month (51.58 ± 5.18 vs. 45.60 ± 5.61; $p = 0.477$) and the 6th month (55.32 ± 6.27 vs. 47.23 ± 5.35; $p = 0.433$), although these differences were not statistically significant. Similar findings have been reported by Rodrigues et al. (24) and Rodríguez-Gallego et al. (28), who also observed limited short-term changes in self-efficacy following educational interventions. In contrast, other studies have reported significant improvements over time (29, 30). The lack of statistical significance in this study may be related to the stressful NICU environment, where maternal confidence may develop more gradually.

A key finding of this study was the significant improvement in feeding practices despite the absence of statistically significant changes in self-efficacy scores. Significant differences were observed between the groups in exclusive breastfeeding and formula feeding at both the 3rd month ($p = 0.008$) and the 6th month ($p = 0.001$). These findings suggest that planned breastfeeding management education, particularly when combined with continuous follow-up, may positively influence breastfeeding behaviors.

The structured and multi-component nature of the intervention, including individualized face-to-face education and ongoing post-discharge support, may have contributed to these outcomes. Previous studies have similarly emphasized the importance of continuous and multi-component breastfeeding support (18, 23, 25, 26, 31). The education included individualized face-to-face sessions during hospitalization, followed by continuous post-discharge support through weekly and monthly telephone follow-ups. Such sustained and repeated interventions may have contributed to improving mothers' breastfeeding behaviors, even though no statistically significant differences were observed in breastfeeding self-efficacy scores.

These findings suggest that while short-term educational interventions may be insufficient to significantly change self-efficacy, continuous and long-term support mechanisms may play a crucial role in maintaining and improving breastfeeding practices.

4.1. Limitations of the Study

The most important limitation of this study is its quasi-experimental design, in which randomization was not applied. Group allocation was based on the time period of admission rather than random assignment. This approach may have introduced potential selection bias and may have allowed uncontrolled environmental or temporal factors to influence the outcomes.

Previous Breastfeeding Experience: Mothers with prior breastfeeding experience were sometimes persistent in maintaining previously learned incorrect practices, which may have limited the immediate effectiveness of the planned education.

Sample Loss and Hospital Stay: Data loss occurred in cases where hospital stays were shorter than the planned three-day intervention period. As a result, mothers whose infants were discharged earlier could not complete the full education program, potentially affecting the representativeness of the sample.

Maternal Interest and Engagement: Some mothers perceived the education as unnecessary due to competing responsibilities such as household duties and caring for other children. This reduced engagement may have limited the effectiveness of the intervention for certain participants.

Variability in Educational Delivery: The frequency and duration of the educational sessions varied among participants due to maternal availability and external factors, which may have affected the standardization of the intervention process.

Self-Report Bias: Data on feeding practices at the 3rd and 6th months were collected via telephone interviews and were based on maternal self-report, which may be subject to recall bias.

Intervention Duration: In addition, although post-discharge follow-up was provided, the duration and intensity of the intervention may not have been sufficient to produce significant changes in breastfeeding self-efficacy scores, particularly in the challenging NICU context.

5. CONCLUSIONS AND RECOMMENDATIONS

This study examined the effect of planned breastfeeding management education on breastfeeding self-efficacy and feeding practices among mothers of neonates in the Neonatal Intensive Care Unit (NICU). Although no statistically significant differences were observed between the experimental and control groups in breastfeeding self-efficacy scores at the 3rd ($p = 0.477$) and 6th months ($p = 0.433$), the experimental group demonstrated consistently higher mean scores.

More importantly, significant differences were observed in feeding practices, particularly in exclusive breastfeeding and formula feeding at both the 3rd ($p = 0.008$) and 6th months ($p = 0.001$). These findings indicate that planned breastfeeding management education may have a meaningful impact on actual breastfeeding behaviors, even when changes in self-efficacy are not statistically significant.

The results suggest that structured, continuous, and multi-component breastfeeding support provided by nurses plays a critical role in improving breastfeeding outcomes, especially in high-risk settings such as the NICU.

Based on the findings of this study, several recommendations can be made for clinical practice and future research. Breastfeeding education programs should not be limited to the hospitalization period but should include structured and continuous follow-up after discharge to support long-term breastfeeding practices. Individualized and multi-component educational interventions, including face-to-face training and post-discharge follow-up, should be integrated into routine nursing care in NICU settings.

Future studies should consider using randomized controlled designs to minimize bias and strengthen the evidence base regarding the effectiveness of breastfeeding interventions. Additional factors that may influence breastfeeding outcomes, such as maternal psychological status, cultural beliefs, family support, and environmental conditions, should be examined in more detail.

Finally, longer follow-up periods and larger sample sizes are recommended to better understand the long-term effects of breastfeeding education on both self-efficacy and breastfeeding behaviors.

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