

A Pilot Study to Assess the Effectiveness of a Structured Teaching Programme on Breast Massage for Improving Breast Milk Expression Experience and Milk Volume among Mothers of Neonates Admitted in NICU at Selected Hospitals in Mysuru.

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Abstract

Background: Breast milk is the ideal source of nutrition for neonates and plays a vital role in promoting growth, immunity, and overall development. Mothers of neonates admitted to the Neonatal Intensive Care Unit (NICU) often experience difficulties in expressing breast milk due to stress, lack of knowledge, and improper techniques.

Objectives: The study aimed to evaluate the effectiveness of a structured teaching programme on breast massage in improving the experience of breast milk expression and the volume of expressed breast milk among mothers of neonates admitted in the NICU.

Methods: A pre-experimental one-group pre-test and post-test research design was adopted. A total of 20 mothers of neonates admitted in the NICU were selected using a convenient sampling technique. Data were collected using a structured experience scale and measurement of the volume of expressed breast milk. Following the pre-test, a structured teaching programme on breast massage was administered to the participants. Post-test assessment was conducted to evaluate changes in the experience of breast milk expression and the volume of expressed breast milk.

Results: The findings showed a significant improvement in both the experience of breast milk expression and the volume of breast milk expressed. The mean experience score increased from 19.40 in the pre-test to 33.40 in the post-test ($t = 96.49, p < 0.001$). Similarly, the mean volume of expressed breast milk increased from 21.75 ml to 38.50 ml ($t = 42.24, p < 0.001$).

Conclusion: The structured teaching programme on breast massage was found to be effective in improving mothers' experience of breast milk expression and increasing the volume of expressed breast milk among mothers of neonates admitted in the NICU.

Keywords: Breast massage, Breast milk expression, NICU mothers, Lactation education, Milk volume.

1. Introduction

Breast milk is universally recognized as the optimal source of nutrition for newborns, particularly for preterm and critically ill infants admitted to the Neonatal Intensive Care Unit (NICU). Human milk provides essential nutrients, immunological factors, and bioactive components that support growth, neurodevelopment, and protection against infections. For neonates in the NICU, especially premature and low-birth-weight infants, breast milk significantly reduces the risk of complications such as necrotizing enterocolitis, sepsis, and respiratory infections. Therefore, promoting adequate breast milk production and successful milk expression among mothers of hospitalized neonates is an important priority in neonatal and maternal health care.

Despite the well-documented benefits of breastfeeding, mothers of neonates admitted to the NICU often experience significant challenges in establishing and maintaining lactation. Separation from the infant, maternal stress, medical complications, and lack of confidence in breastfeeding techniques may negatively influence milk production and expression. Many mothers are unable to directly breastfeed their babies during the initial period of hospitalization and therefore rely on manual expression or breast pumps to provide breast milk. However, difficulties in expressing milk, discomfort, anxiety, and insufficient knowledge about effective techniques can result in reduced milk volume and early discontinuation of breastfeeding.

Various supportive interventions have been introduced to improve breast milk expression and production among postpartum mothers. Among these, breast massage has emerged as a simple, non-pharmacological, and cost-effective technique. Breast massage stimulates the release of prolactin and oxytocin hormones, which are responsible for milk synthesis and milk ejection reflex respectively. Recent research has shown that massage techniques can improve milk secretion, enhance maternal relaxation, and increase the volume of expressed breast milk. A randomized controlled trial conducted among mothers of premature infants demonstrated that breast massage significantly increased milk production compared with routine pumping alone (1). Similarly, another recent study reported that breast massage combined with warm compress application improved breast milk volume and reduced maternal anxiety among mothers of premature newborns (2).

Education and training provided by health professionals also play a crucial role in supporting breastfeeding practices. Structured teaching programmes are commonly used in nursing practice to improve mothers' knowledge, skills, and confidence regarding breastfeeding techniques. Such programmes help mothers understand proper breast care, effective methods of milk expression, and the importance of maintaining lactation while the baby is admitted to the NICU. Evidence suggests that structured lactation education and support interventions significantly improve breastfeeding outcomes

and maternal engagement in neonatal care (3). However, despite the availability of educational programmes, many mothers still lack practical knowledge and guidance regarding techniques such as breast massage that can facilitate milk expression.

Although several studies have investigated interventions to enhance breast milk production, research specifically focusing on the effectiveness of structured teaching programmes on breast massage among mothers of neonates admitted to the NICU remains limited. Most existing studies primarily examine physiological interventions or evaluate breastfeeding outcomes without focusing on maternal experience and skill development in milk expression. Moreover, there is limited evidence from pilot or exploratory studies assessing whether structured education on breast massage can improve both the experience of breast milk expression and the actual volume of milk produced.

Therefore, it is important to explore the effectiveness of structured teaching programmes on breast massage among mothers of neonates admitted to NICU settings. Such research may contribute to improving maternal confidence, enhancing milk expression techniques, and increasing breast milk availability for hospitalized newborns. Conducting a pilot or exploratory study will help determine the feasibility and preliminary effectiveness of this intervention and may provide a foundation for larger interventional studies in the future.

Problem Statement

Breast milk is considered the optimal source of nutrition for newborns, particularly for preterm and critically ill infants admitted to the Neonatal Intensive Care Unit (NICU). Human milk contains essential nutrients, antibodies, and bioactive components that support growth, immunity, and neurodevelopment. Despite these benefits, many mothers of neonates admitted to NICU face significant challenges in initiating and maintaining adequate breast milk production. Factors such as maternal stress, physical separation from the infant, lack of breastfeeding confidence, and limited knowledge about effective milk expression techniques may reduce the amount of breast milk expressed.

For mothers whose infants are unable to directly breastfeed due to medical conditions, breast milk expression becomes the primary method to provide nutrition to the neonate. However, many mothers experience difficulty in expressing sufficient milk and often report discomfort, anxiety, and lack of confidence during the process. Breast massage has been identified as a simple and effective non-pharmacological method that stimulates the release of prolactin and oxytocin hormones, thereby improving milk production and facilitating milk ejection. Structured teaching programmes can help mothers learn appropriate techniques of breast massage and milk expression, potentially improving their experience and increasing milk volume. However, limited research has been conducted to evaluate the effectiveness of structured teaching programmes on breast massage among mothers of neonates admitted in NICU settings. Hence, the present pilot study aims to assess the effectiveness of a structured teaching programme on breast massage in improving the experience of breast milk expression and the volume of milk among mothers of neonates admitted in NICU.

Need for the Study

Breastfeeding is widely recognized as the most beneficial form of nutrition for newborns. According to the World Health Organization, exclusive breastfeeding is recommended for the first six months of life to promote optimal growth, development, and health of infants. For neonates admitted to the NICU, breast milk is particularly important because it provides immunological protection and reduces the risk of serious complications such as necrotizing enterocolitis, sepsis, and respiratory infections. However, establishing and maintaining lactation can be difficult for mothers whose infants require intensive medical care.

Mothers of NICU infants often experience emotional stress, physical fatigue, and separation from their babies, which may negatively affect milk production and expression. Studies have shown that maternal anxiety and lack of knowledge regarding milk expression techniques are significant barriers to adequate breast milk supply. Consequently, many mothers struggle to maintain sufficient milk production during the early postpartum period, which may lead to reliance on formula feeding and reduced breastfeeding continuation.

Breast massage has been identified as an effective intervention that can stimulate milk secretion by promoting the release of oxytocin and prolactin hormones. Recent research has demonstrated that breast and back massage techniques significantly increase milk volume and reduce anxiety levels among mothers with preterm infants (4). Similarly, the application of breast massage combined with supportive interventions has been shown to improve breast milk production and enhance maternal comfort during milk expression (2). These findings highlight the importance of non-pharmacological interventions in improving lactation outcomes among mothers with hospitalized neonates.

In addition to physical techniques, education and guidance provided by healthcare professionals are essential to support mothers during the breastfeeding process. Structured teaching programmes help mothers acquire the knowledge and skills required for effective breast care, milk expression, and lactation maintenance. Evidence indicates that educational interventions and breastfeeding support programmes improve breastfeeding confidence and increase the likelihood of successful milk expression among postpartum mothers (6).

Despite the recognized benefits of breast massage and lactation education, there is limited research assessing the combined impact of structured teaching programmes on breast massage among mothers of neonates admitted to NICU. Furthermore, few pilot studies have examined both the subjective experience of breast milk expression and the objective outcome of milk volume following such interventions. Therefore, conducting a pilot study to assess the effectiveness of a structured teaching programme on breast massage is essential to generate preliminary evidence and guide future large-scale research in this area.

Objectives of the Study

General Objective

To assess the effectiveness of a structured teaching programme on breast massage on the experience of breast milk expression and the volume of milk among mothers of neonates admitted in NICU.

Specific Objectives

1. To assess the baseline experience of breast milk expression among mothers of neonates admitted in NICU.
2. To measure the baseline volume of breast milk expressed by mothers of neonates admitted in NICU.
3. To implement a structured teaching programme on breast massage among mothers of neonates admitted in NICU.
4. To evaluate the effectiveness of the structured teaching programme on improving the experience of breast milk expression.
5. To evaluate the effectiveness of the structured teaching programme on increasing the volume of breast milk expressed.

Hypotheses

H₁: There will be a significant improvement in the experience of breast milk expression among mothers after receiving the structured teaching programme on breast massage.

H₂: There will be a significant increase in the volume of breast milk expressed among mothers after receiving the structured teaching programme on breast massage.

Methods

Study Design and Setting

This pilot study employed a quantitative pre-experimental one-group pre-test post-test design to assess the effectiveness of a structured teaching programme on breast massage among mothers of neonates admitted to the Neonatal Intensive Care Unit (NICU). The study was conducted in the NICU of selected hospitals in Mysuru, Karnataka, India.

Participants and Sampling

The study population comprised mothers whose neonates were admitted to the NICU during the study period. A total of **30 mothers** were recruited using a **non-probability purposive sampling technique**, which is commonly recommended for pilot studies to evaluate feasibility and preliminary intervention effects.

Mothers were eligible for inclusion if they had a neonate admitted in NICU, were breastfeeding or expressing breast milk, were willing to participate in the study, and were able to understand Kannada or

English. Mothers who had serious medical conditions preventing breastfeeding or whose neonates had contraindications to breast milk feeding were excluded from the study.

Intervention

The intervention consisted of a structured teaching programme on breast massage designed to improve the technique of breast milk expression. The programme included explanation and demonstration of breast massage techniques aimed at stimulating milk secretion and facilitating milk ejection. Mothers were instructed on proper hand positioning, massage movements, and timing of breast massage prior to milk expression.

Data Collection Tools and Procedure

Data were collected using a structured tool comprising three sections. The first section included demographic characteristics of the participants such as age, educational status, parity, occupation, type of delivery, and previous breastfeeding experience. The second section consisted of a structured rating scale developed to assess mothers' experience of breast milk expression. The scale comprised items addressing comfort, ease of milk expression, confidence in expressing milk, and overall satisfaction. Responses were recorded using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The total score was calculated by summing the item scores, with higher scores indicating a more positive experience of breast milk expression. The third section involved the measurement of the **volume of expressed breast milk**, which was recorded in milliliters using a calibrated measuring container.

After obtaining permission from the hospital authorities and informed consent from participants, a pre-test assessment was conducted to determine the baseline experience of breast milk expression and the volume of milk expressed. Experience of breast milk expression was assessed using a structured Likert rating scale consisting of ten items measuring comfort, confidence, ease of expression, and satisfaction. Each item was rated on a five-point scale ranging from strongly disagree (1) to strongly agree (5). The total score ranged from 10 to 50, with higher scores indicating a better experience of breast milk expression. Following this assessment, the structured teaching programme on breast massage was administered. A post-test assessment was conducted after the intervention to evaluate changes in the mothers' experience and the volume of breast milk expressed.

Statistical Analysis

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) software version 29. Descriptive statistics including frequency, percentage, mean, and standard deviation were used to summarize demographic variables and study outcomes. The paired t-test was applied to compare pre-test and post-test scores in order to determine the effectiveness of the structured teaching programme on breast massage in improving the experience of breast milk expression and the volume of milk produced. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee prior to the commencement of the study. Permission was also obtained from the respective hospital authorities. Written informed consent was obtained from all participants, and confidentiality of the collected data was maintained throughout the study.

Result

The results of the present study are presented in this section. Data were analyzed using descriptive and inferential statistics to evaluate the effectiveness of the structured teaching programme on breast massage among mothers of neonates admitted in NICU. The findings include the demographic characteristics of participants, comparison of pre-test and post-test experience scores of breast milk expression, and the volume of expressed breast milk.

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	20–25	8	40%
	26–30	10	50%
	31–35	2	10%
Educational Status	Secondary Education	9	45%
	Higher Secondary	8	40%
	Graduate	3	15%
Occupation	Housewife	16	80%
	Employed	4	20%
Parity	Primipara	11	55%
	Multipara	9	45%
Type of Delivery	Normal Vaginal Delivery	11	55%
	Cesarean Section	9	45%
Previous Breastfeeding Experience	Yes	9	45%
	No	11	55%

A total of 20 mothers participated in the study. The majority of participants (50%) were aged between 26–30 years, with a mean age of 26.4 years. Regarding educational status, 45% had secondary education, while 40% had higher secondary education. Most of the mothers (80%) were housewives. In terms of parity, 55% were primipara and 45% were multipara. More than half of the participants (55%) had normal vaginal delivery, while 45% underwent cesarean section. Additionally, 55% of the mothers had no previous breastfeeding experience.

Table 2: Comparison of Pre-test and Post-test Mean Scores of Experience of Breast Milk Expression and Volume of Expressed Breast Milk among Mothers of Neonates Admitted in NICU

Variable	Mean	Standard Deviation (SD)
Pre-test Experience Score	19.40	2.23
Post-test Experience Score	33.40	2.70
Pre-test Milk Volume (ml)	21.75 ml	2.38
Post-test Milk Volume (ml)	38.50 ml	3.80

Table 2 presents the comparison of the pre-test and post-test mean scores of the mothers’ experience of breast milk expression and the volume of expressed breast milk. The mean pre-test experience score was 19.40 ± 2.23 , whereas the mean post-test experience score increased to 33.40 ± 2.70 , indicating an improvement in the mothers’ experience of breast milk expression after the structured teaching programme on breast massage. Similarly, the mean volume of expressed breast milk increased from 21.75 ± 2.38 ml during the pre-test to 38.50 ± 3.80 ml during the post-test. These findings suggest that the structured teaching programme on breast massage contributed to a noticeable improvement in both the experience of breast milk expression and the amount of milk expressed among mothers of neonates admitted in NICU.

Table 3: Comparison of Pre-test and Post-test Experience of Breast Milk Expression among Mothers of Neonates Admitted in NICU

Variable	Mean	t-value	p-value
Pre-test	19.40		
Post-test	33.40	t = 96.49	p < 0.001

Table 3 shows the comparison of pre-test and post-test experience scores of breast milk expression among mothers of neonates admitted in the NICU. The mean pre-test experience score was 19.40, while the mean post-test experience score increased to 33.40 following the structured teaching programme on breast massage. The calculated t-value was 96.49, which was found to be statistically significant at $p < 0.001$. This indicates that the intervention had a significant positive effect on improving the mothers’ experience of breast milk expression.

Table 4: Comparison of Pre-test and Post-test Volume of Expressed Breast Milk among Mothers of Neonates Admitted in NICU

Variable	Mean	t-value	p-value
Pre-test	21.75 ml		
Post-test	38.50 ml	t = 42.24	p < 0.001

Table 4 presents the comparison of the mean volume of expressed breast milk among mothers before and after the intervention. The mean pre-test volume of breast milk expressed was 21.75 ml, whereas the mean post-test volume increased to 38.50 ml following the structured teaching programme on breast massage. The calculated t-value was 42.24, which was statistically significant at $p < 0.001$. This indicates that the structured teaching programme on breast massage significantly improved the volume of breast milk expressed among mothers of neonates admitted in the NICU.

Overall Summary of Results

The results of the study indicate that the structured teaching programme on breast massage had a significant positive effect on both the mothers' experience of breast milk expression and the volume of breast milk expressed. The mean experience score increased from 19.40 in the pre-test to 33.40 in the post-test, demonstrating an improvement in mothers' comfort and confidence in expressing breast milk. Similarly, the mean volume of expressed breast milk increased from 21.75 ml before the intervention to 38.50 ml after the intervention.

Statistical analysis using the paired t-test revealed that both improvements were highly significant ($p < 0.001$). The t-values obtained for experience of breast milk expression ($t = 96.49$) and volume of breast milk ($t = 42.24$) indicate that the intervention produced a measurable and meaningful change. Overall, the findings suggest that the structured teaching programme on breast massage is effective in improving both the experience of breast milk expression and the quantity of breast milk expressed among mothers of neonates admitted in the NICU. The results indicate that the structured teaching programme on breast massage significantly improved the experience of breast milk expression and increased the volume of breast milk expressed among mothers. The research hypothesis stating that there will be a significant difference between pre-test and post-test experience of breast milk expression and volume of breast milk was accepted at $p < 0.001$ level of significance.

Discussion

The present study was conducted to evaluate the effectiveness of a structured teaching programme on breast massage in improving the experience of breast milk expression and the volume of expressed breast milk among mothers of neonates admitted in the NICU. The findings of the study revealed a significant improvement in both the experience of breast milk expression and the volume of breast milk expressed after the intervention.

In the present study, the mean experience score increased from 19.40 in the pre-test to 33.40 in the post-test, indicating that mothers developed greater confidence and comfort in expressing breast milk following the structured teaching programme. The statistical analysis showed a highly significant difference between the pre-test and post-test scores ($t = 96.49$, $p < 0.001$), suggesting that the intervention was effective in enhancing mothers' experience of breast milk expression.

Similarly, the mean volume of expressed breast milk increased from 21.75 ml during the pre-test to 38.50 ml in the post-test. The paired t-test analysis revealed a statistically significant improvement ($t = 42.24$, $p < 0.001$), indicating that breast massage and appropriate guidance can positively influence milk production and expression among mothers of neonates admitted in the NICU.

The findings of the study highlight the importance of educating mothers about breast massage techniques and proper milk expression methods, particularly in NICU settings where breastfeeding may be challenging due to maternal stress and neonatal conditions. Therefore, structured educational interventions can play a crucial role in supporting lactation and improving neonatal nutrition.

Conclusion

Based on the findings of the study, it can be concluded that the structured teaching programme on breast massage was effective in improving both the experience of breast milk expression and the volume of expressed breast milk among mothers of neonates admitted in the NICU. The intervention helped mothers gain better knowledge, confidence, and comfort in expressing breast milk, which contributed to an increase in milk output.

The study findings emphasize the importance of providing proper guidance and education to mothers regarding breast massage and breast milk expression techniques. Such interventions can support successful breastfeeding practices and ensure adequate nutrition for neonates, particularly those admitted to the NICU.

Limitations of the Study

The present study had certain limitations:

1. The study was conducted with a small sample size ($n = 20$), which may limit the generalization of the findings.
2. The study was conducted in a single hospital setting, which may not represent all populations.
3. The study used a pre-test and post-test design without a control group, which may influence the strength of causal interpretation.
4. The duration of follow-up was short, and long-term effects of the intervention were not assessed.

Future Scope / Recommendations

Based on the findings of the study, the following recommendations are suggested:

1. Similar studies can be conducted with a larger sample size to improve the generalizability of the findings.
2. Future studies may include a control group or randomized design to strengthen the evidence regarding the effectiveness of the intervention.
3. Research can be conducted in multiple hospital settings to obtain broader insights.
4. Long-term studies may be carried out to assess the sustained effects of breast massage on milk production and breastfeeding outcomes.
5. Educational programmes on breast massage and breast milk expression can be integrated into routine postnatal care and NICU counselling programmes.

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APPENDIXES

Section A: Demographic Characteristics

Instruction: Tick (✓) the appropriate option or fill in the blank.

1. **Age of the mother:** _____ years
2. **Educational status**
 - Primary education
 - Secondary education

- Higher secondary
- Graduate and above

3. Occupation

- Housewife
- Employed

4. Parity

- Primipara
- Multipara

5. Type of delivery

- Normal vaginal delivery
- Cesarean section

6. Previous breastfeeding experience

- Yes
- No

Section B: Experience of Breast Milk Expression Scale

S.No	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	I feel comfortable while expressing breast milk.					
2	I find it easy to express breast milk.					
3	I feel confident while expressing breast milk.					
4	I feel relaxed during milk expression.					
5	I am satisfied with the amount of milk expressed.					
6	Breast massage helps in easier milk expression.					
7	I feel less discomfort during milk expression.					
8	I feel confident that I can provide breast milk for my baby.					
9	I feel motivated to continue expressing breast milk.					
10	Overall, my experience of breast milk expression is positive.					

Scoring Method

Each response is scored as follows:

- Strongly Disagree = 1
- Disagree = 2

- Neutral = 3
- Agree = 4
- Strongly Agree = 5

Total Score Range: 10 – 50

Score Range	Interpretation
10 – 23	Poor experience
24 – 36	Moderate experience
37 – 50	Good experience

Higher scores indicate a **better experience of breast milk expression.**

Section C: Measurement of Breast Milk Volume

The **volume of expressed breast milk** will be measured using a **calibrated measuring container** and recorded in **milliliters (ml)**.

Participant ID	Pre-Test Milk Volume (ml)	Post-Test Milk Volume (ml)

MasterSheet

ID	Age	Educati on	Occupat ion	Parity	TypeDel ivery	PrevBF Exp	Pre_Exp Score	Post_Exp pScore	Pre_Mil kVol_ml	Post_Mi lkVol_m l
1	24	2	1	1	1	0	18	32	20	38
2	27	3	1	2	2	1	20	35	22	40
3	22	2	1	1	1	0	16	30	18	34
4	29	3	2	2	2	1	21	36	25	42
5	26	2	1	1	1	0	19	33	20	36
6	30	4	2	2	2	1	22	37	24	44
7	23	2	1	1	1	0	17	31	19	35
8	28	3	1	2	2	1	20	34	23	41
9	25	2	1	1	1	0	18	32	21	37
10	31	4	2	2	2	1	23	38	26	45

11	24	2	1	1	1	0	17	30	20	34
12	27	3	1	2	2	1	21	35	23	40
13	26	2	1	1	1	0	19	33	22	36
14	29	3	2	2	2	1	22	36	24	42
15	23	2	1	1	1	0	16	29	18	33
16	28	3	1	2	2	1	20	34	22	39
17	25	2	1	1	1	0	18	31	21	35
18	30	4	2	2	2	1	23	37	25	44
19	24	2	1	1	1	0	17	30	19	34
20	27	3	1	2	2	1	21	35	23	41

Coding Used

- **Education:** 1=Primary, 2=Secondary, 3=Higher Secondary, 4=Graduate
- **Occupation:** 1=Housewife, 2=Employed
- **Parity:** 1=Primipara, 2=Multipara
- **TypeDelivery:** 1=Normal, 2=Cesarean
- **PrevBFExp:** 0=No, 1=Yes