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# Effect of breast massage on breast milk volume and experience on the expression of breast milk among mothers of preterm neonates

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## Abstract

Prematurity is a serious and unmet challenge in perinatal health care. The incidence of premature births in India in 2010 was about 13%. As survival rates of preterm infants improve, prime attention is given on the management of nutrition and the mothers are motivated to supply expressed breastmilk to improve the quality of survival. **Methods:** The study included mothers of preterm neonates who belonged to the 27 to 34 weeks of gestational age. Recruitment to the study was based on breast engorgement screening using a breast engorgement screening scale on the second and the third postnatal day. The study had two groups i.e., experimental and control group, 20 mothers in each group. The 24-hour breast milk volume was measured on the third and fourth postnatal day. **Results:** The results revealed that there was a remarkable difference in breast milk volume ( $p = 0.023$ ) and the total duration of manual breast milk expression ( $p = 0.006$ ) between the experimental and control group and no significant difference in the manual breast milk expression experience between experimental and control group. The study also showed that the parity ( $p=0.036$ )

and previous breast milk expression ( $p=0.023$ ) has a significant association with maternal breast milk expression experience. **Conclusion:** The study concluded that breast massage is effective in increasing the breast milk volume and reducing the total duration of manual expression of breast milk among the mothers of premature neonates.

**Key words:** Breast massage, breast milk expression experience, breast milk volume, preterm neonate

## Introduction

Prematurity is a serious and unmet challenge in perinatal health care. Preterm birth not only affects the neonates and their families but also has a lot of implications for the health services as these babies may have to spend several weeks in the hospitals. According to the World Health Organization (WHO), the number of preterm births is increasing every year and about 15 million premature births occur each year. As per WHO, the reliable data on premature births from 184 countries revealed an incidence rate of 5% to 18%. The incidence

of premature births in developed countries is about 9% (WHO, 2018). According to the National Health Portal of India's data of 2010, approximately 3.5 million preterm births occur every year in India (National Health Portal of India, 2010). Across the world, prematurity is the most common cause of neonatal death and according to WHO, one million children died in 2015 owing to the complications of preterm birth (WHO, 2018).

As survival rates of preterm infants improve, prime attention is given on the quality of survival through the management of nutrition and mothers are encouraged to supply expressed breast milk, so that the incidence of necrotizing enterocolitis can be reduced to a great extent.

The provision of breast milk is an important factor in the establishment of early nutrition in a premature infant. Since preterm babies are not able to suckle for many days, a successful strategy for expression of breast milk is needed to initiate and maintain production of breast

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milk (Jones, 2010). In NICUs, mothers of premature infants' experience difficulty in expression of breast milk and are not able to supply enough breast milk to meet the nutritional requirements of their preterm neonates.

The main problems encountered by mothers of preterm infants are a delay in the initiation of breastfeeding, mammary gland's immaturity, and the hindrance of milk ejection reflex caused by nervous tension which in turn can end up in poor breast milk production and supply. Mothers frequently ventilate that when medical professionals take care of their infant, supply of their breast milk is the only pragmatic contribution that they can make towards their infants. These mothers often experience feelings of helplessness and guilt due to poor breast milk supply (Lawrence & Lawrence, 2015).

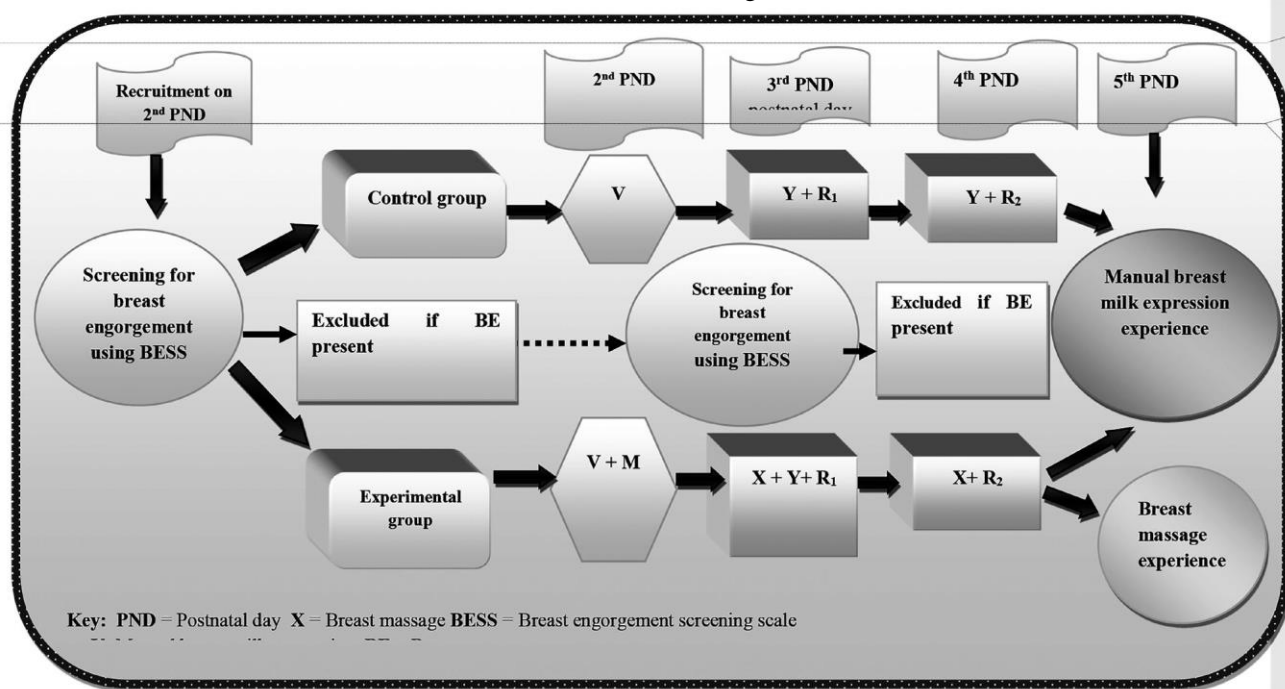
From the literature, it is evident that the milk expression after preterm delivery is difficult for mothers of preterm neonates due to a variety of reasons and necessitates an intervention. While reviewing the literature, the investigator came across a study which measured the effect of breast massage on milk volume and its fat content (Jones, Dimmock, & Spencer, 2001).

### Objective

To find the effect of breast massage on breast milk volume and experience on expression of breast milk among mothers of preterm neonates.

### Material and methods

The research approach is quantitative and used quasi - experimental post-test only control group design, conducted from 10<sup>th</sup> January 2011 to 18<sup>th</sup> April 2011. Once eligible mothers of preterm neonates got admitted to the postnatal ward, consent was taken to participate in the study. The study had two groups i.e., experimental and control group. By purposive sampling method, the first twenty mothers were considered in the control group and the next twenty mothers were included in the experimental group to avoid sample contamination. Breast engorgement was assessed using a breast engorgement screening scale initially before recruiting and then subsequently on the third and fourth postnatal day and when breast engorgement was present or developed during these days, mothers were excluded from the study. The control group mothers were taught manual breast milk expression technique, and the experimental group mothers were taught breast massage followed by manual breast milk expression technique using a video on the second postnatal day and the demonstration of the technique taught was taken immediately within five minutes after this video teaching.



The 24-hour breast milk volume was measured using a calibrated conical measure on the third and fourth postnatal day. Mothers' 24-hour fluid intake as reported by them was assessed on third and fourth postnatal day. Opinionnaire on breast milk expression experience was given to the control group mothers and opinionnaire on both breast milk expression experience and breast massage was given to the experimental group mothers on the fifth postnatal day to find their experiences of breast milk expression and breast massage.

**Results**

*Description of the occurrence of breast engorgement in mothers of preterm neonates*

During the study period, two mothers (one in the experimental group and one in the control group) had developed mild breast engorgement (11 and 13 scores respectively) and one mother (control group) had developed moderate breast engorgement (16 score) on the third postnatal day and as per the sampling criteria, they were excluded from the analysis of the study finding. But, from the ethical point of view, these mothers were also taught hot fomentation, breast massage and manual breast milk expression and were also advised by the investigator to express breast milk frequently to relieve engorgement.

*Sample characteristics*

**Table 1**

*Frequency and percentage distribution of mothers of preterm neonates*

N = (21+22=43)

| Sample characteristics                               | Experimental Group |     | Control Group |     |
|------------------------------------------------------|--------------------|-----|---------------|-----|
|                                                      | (f)                | (%) | (f)           | (%) |
| <b>1. Age (in years)</b>                             |                    |     |               |     |
| a. 20 - 31                                           | 13                 | 62  | 14            | 64  |
| b. 32 - 43                                           | 8                  | 38  | 8             | 36  |
| <b>2. Type of delivery</b>                           |                    |     |               |     |
| a. Caesarean section                                 | 15                 | 71  | 15            | 68  |
| b. Vaginal delivery                                  | 6                  | 29  | 7             | 32  |
| <b>3. Parity</b>                                     |                    |     |               |     |
| a. Primipara                                         | 13                 | 62  | 14            | 64  |
| b. Multipara                                         | 8                  | 38  | 8             | 36  |
| <b>4. Previous breast milk expression experience</b> |                    |     |               |     |
| a. Yes                                               | 2                  | 10  | 1             | 5   |
| b. No                                                | 19                 | 90  | 21            | 95  |
| <b>5. Presence of breast engorgement</b>             |                    |     |               |     |
| a. Yes                                               | 1                  | 5   | 2             | 9   |
| b. No                                                | 20                 | 95  | 20            | 91  |

The data presented in Table 1 show that the majority of mothers in the experimental group, 13 (62%) were in the age group of 20-31 years, 15 (71%) had undergone caesarean section and 13 (60%) were primipara. In the control group, majority of the mothers, 14 (64%) were in the age group of 20-31 years, 15 (68%) had undergone caesarean section and 14 (64%) were primipara. The majority of them in the experimental group, 19 (90%) and control group, 21 (95%) did not have previous breast milk expression experience.

The common cause for preterm delivery in the experimental group was due to pregnancy-induced hypertension (PIH) 7 (35%) and preterm premature rupture of membrane (PPROM) was the common cause 7 (35%) for preterm delivery among mothers of preterm neonates in the control group. Most of the preterm neonates whose mothers belonged to both experimental 10 (50%) and control group 7 (35%), expressed breast milk was introduced on 3rd day of life.

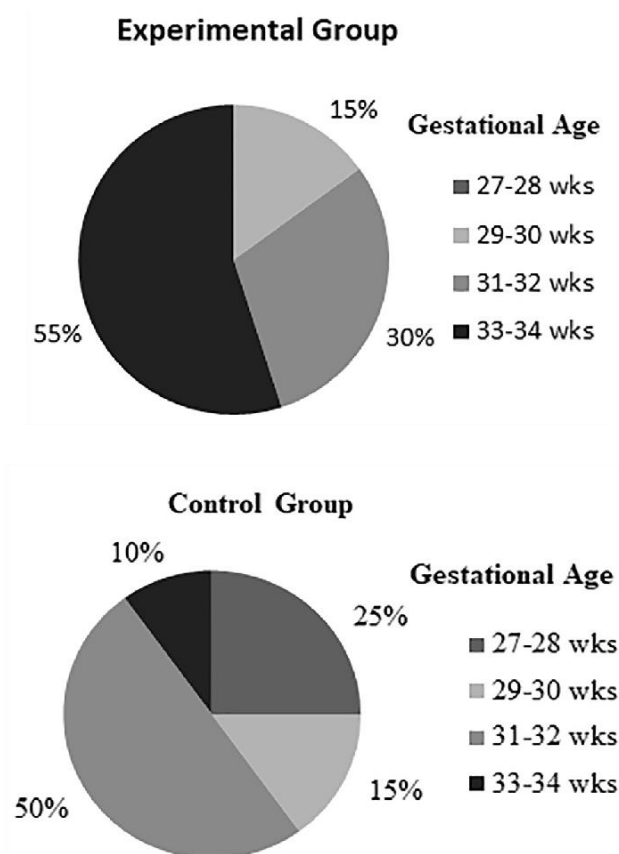


Figure 2: Pie diagram showing gestational age of preterm neonates in weeks in both experimental group and control group

The data presented in Figure 2 shows that most of the preterm neonates in the experimental group, 11 (55%) belonged to 33-34 weeks of gestational age and most of the preterm neonates in the control group, 10 (50%) belonged to 31-32 weeks of gestation.

*Effect of breast massage on expressed breast milk volume between the experimental and control group.*

Independent ‘t’ test was used to find the effect of breast massage on expressed breast milk volume between the experimental and control group.

Data presented in Table 2, show that the mean difference between experimental and control group was 6.859 and p-value obtained for effect of breast massage on expressed breast milk volume was (p= .023), which is significant at less than 0.05 level of significance. There was a significant difference in expressed milk volume between experimental and control group. It can be inferred that breast massage was effective in increasing the expressed breast milk volume among mothers of preterm neonates in the experimental group.

*Effect of breast massage on manual breast milk expression experience between experimental and control group.*

Independent ‘t’ test was used to find the effect of breast massage on manual breast milk expression experience between the experimental and control group.

Data presented in Table 3, show that the mean difference between experimental and control group was 0.800 and the obtained p-value (p= .607), for the effect of breast massage on milk expression experience is not significant at less than 0.05 level of significance. It can be inferred that breast massage was not effective in enhancing the breast milk expression experience of mothers of preterm neonates in the experimental group.

*Effect of breast massage on the total duration of manual breast milk expression between experimental and control groups.*

Independent ‘t’ test was used to find the effect of breast massage on the total duration of manual breast milk expression between the experimental and control group.

The mean difference between the experimental and control group was 3.706 and the obtained p-value for the effect of breast massage on total duration of manual breast milk expression was p=.006. Therefore, it can be inferred that breast massage was effective in reducing the total duration of manual breast milk expression of mothers of premature neonates in the experimental group.

*Relationship between expressed breast milk volume and selected variables in the experimental group and control group.*

**Table 2:**  
*Mean, mean difference and ‘t’ test values and p-value of the effect of breast massage on expressed breast milk volume (in milliliters) between experimental and control group*

| N = (20+20=40) |              |                              |                 |         |    |         |
|----------------|--------------|------------------------------|-----------------|---------|----|---------|
| Variable       | Group        | Mean of weighted mean(in ml) | Mean difference | t value | df | p-value |
| Milk volume    | Experimental | 19.484                       | 6.859           | 3.407   | 38 | 0.002*  |
|                | Control      | 12.343                       |                 |         |    |         |

Weighted mean calculation\* Total breast milk volume on 3rd and 4th postnatal day of a mother  
Total number of breast milk expressions on 3rd and 4th postnatal day

**Table 3:**  
*Mean, mean difference and ‘t’ test values and p-value of breast milk expression experience between the experimental and control group*

| N = (20+20=40)             |              |       |                 |         |    |         |
|----------------------------|--------------|-------|-----------------|---------|----|---------|
| Variable                   | Group        | Mean  | Mean difference | t value | df | p-value |
| Milk expression experience | Experimental | 27.05 | 0.800           | 0.518   | 38 | 0.607   |
|                            | Control      | 26.25 |                 |         |    |         |

Karl Pearson's coefficient of correlation test was used to find the relationship between expressed breast milk volume and gestational age of neonate, age and fluid intake of the mother in the experimental and control group.

The variables like the gestational age of neonate, age and fluid intake of the mother, the obtained p-value for experimental group was respectively 0.439, 0.293 and 0.293 and for control group was 0.372, 0.217 and 0.131 respectively.

*Relationship between expressed breast milk volume and parity of the mother in the experimental and control group.*

Mann Whitney U test was used to find the relationship between expressed breast milk volume and parity of the mother. For the variable, parity of mother, the obtained p-value for experimental and control group was 0.589 and 0.28 respectively.

*Association between manual breast milk expression experience and selected variables in the experimental and control group.*

Mann Whitney U test was used to find the association between manual breast milk expression experience and selected variables like parity and previous expression experience of the mother in the experimental and control group. The p-value obtained for association between manual breast milk expression experience and parity of the mother for the control group was  $p=0.036$  and it was inferred that maternal breast milk expression experience has a significant association with parity in the control group. The p-value obtained for association between manual breast milk expression experience and previous expression experience of the mothers in the experimental group was  $p=.023$  and it was inferred that manual breast milk expression experience has a significant association with previous breast milk expression.

### **Discussion**

The findings of this study indicate that there was a significant difference in milk volume between the experimental and control group ( $p=0.023$ ), which infers that breast massage was effective in increasing the breast milk volume among mothers of preterm neonates in the experimental group. The previous research study compared the methods of milk

expression after preterm delivery which showed that breast massage was effective in improving milk production ( $p < .01$ ) in both simultaneous breast pumping and sequential breast pumping group of mothers of preterm neonates (Jones et al., 2001). This finding supports the findings of this study that breast massage is effective in increasing the breast milk volume among mothers of preterm neonates.

The findings of this study indicate that expressed breast milk volume is independent of variables like gestational age of neonate, age, parity and fluid intake of the mother. A previous study that compared testing of two techniques namely hand technique and electric pumping with the breast milk production in mothers' of preterm infants' showed that the selected variable and maternal age was inversely associated with the week two mean daily volume, but was no longer evident by week eight. This finding supports the findings of this study that milk volume is independent of variables like age and parity of the mother (Morton et al., 2009).

### **Conclusion**

This study aimed to find out the effect of breast massage on breast milk volume and experience on the expression of breast milk among mothers of preterm neonates admitted to NICUs. The study concluded that breast massage was effective in increasing the volume of breast milk among mothers of premature neonates, breast massage had no effect on improving the breast milk expression experience in mothers of premature neonates, breast massage is effective in reducing the total duration of manual breast milk expression in mothers of premature neonates, the expressed breast milk volume is independent of gestational age of neonate, age and fluid intake of the mother but parity and previous breast milk expression were significantly associated with maternal breast milk expression experience and manual breast milk expression experience is independent of age of the mother and duration of expression.

**Limitations:** The study used a non-probability purposive sampling which limits the generalizability of the study findings to the study sample. Self-development of tools and data collection by the investigator herself including breast milk volume measurement could contribute to some error in the study findings. The study

did not take into consideration extraneous variables like nutritional status of mothers, constitutional differences stress and anxiety of mothers which could influence the breast milk volume. The fluid intake of mothers was self-reported which could cause subjectivity in the data collection on fluid intake.

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