

To study the impact of unilateral breast massage on milk volume among postnatal mothers - A quasi-experimental study

Santhosh Kumar Kraleti¹, Swapna Lingaldinna², Sravani Kalvala³, Sadiqua Anjum⁴, Himabindu Singh⁵

From ¹Executive Director, ²Assistant Professor, ³Medical Officer, ⁴DM Resident, ⁵Head, Departments of Neonatology and Dhaatri Mother's Milk Bank, Niloufer Hospital, Lakdikapul, Hyderabad, Telangana, India

Correspondence to: Dr. Swapna Lingaldinna, Department of Neonatology, Niloufer Hospital, Lakdikapul, Hyderabad, Telangana, India. E-mail: drswapnalingaldinna@gmail.com

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ABSTRACT

Background: Breast massage is known to increase the volume of breast milk. This is known to occur through stimulation of oxytocin and prolactin. None of the studies have been done which looked at the local effects of breast massage. **Objective:** The objective was to study the impact of unilateral breast massage on breast milk output among postnatal mothers. **Materials and Methods:** This quasi-experimental study was conducted in a tertiary health-care hospital, Telangana. Postnatal mothers who approached the center's milk bank for expressing breast milk were included in the study. The enrolled mothers were shown video of breast massage and also demonstrated the technique of breast massage using breast module by the lactational counsellors of the milk bank, at the hospital in Hyderabad. All the mothers were asked to do massage to the left breast for 10 min and later were asked to express breast milk separately from both breast using electrical hospital grade breast pump. The volume of milk produced from both the breasts was recorded separately at the third session. **Results:** A total of 42 postnatal mothers were enrolled in the study. The median volume of breast milk expressed from the left breast after breast massage was 22.5 ml (10,30) and the median volume of breast milk expressed from the right breast without breast massage was 15 ml (10,25). The volume of breast milk produced from the side of breast massage was significantly higher when compared to unmassaged side with $p < 0.001$. **Conclusion:** Breast massage increases the volume of breast milk production. If this increase in breast milk production is due to oxytocin and prolactin, then breast massage on one side should have its effect equally on both the breasts. However, in our study, the volume of milk produced on the massaged side was significantly higher than the unmassaged side. Hence, apart from oxytocin and prolactin, there may be some other local factors responsible for increased milk secretion which requires further research.

Key words: Breast massage, Breast milk, Milk bank

Millions of deaths can be averted by scaling up exclusive breastfeeding. In the Lancet Child Survival series, it was estimated that breastfeeding, alone if universalized, could reduce under-5 child deaths by 13%. However, proportion of infants on Exclusive breast feeding decreased to 69%, 51% and 27.6% by 2nd, 4th and 6th months of age respectively [1]. Failure in the breastfeeding process is often caused by several factors, such as maternal, infant, sociocultural, and personnel factors [2]. There has been an inverse relationship between gestational age and breastfeeding outcome. One of the main maternal factors for the lack of breast milk production is the stress of the baby being admitted in neonatal intensive care unit (NICU) [2]. Stress results in a lack of stimulation of prolactin and oxytocin hormones, which play an important role in the production of breast milk [2].

Several common problems that may arise during the breastfeeding period, such as breast engorgement, plugged milk duct, breast infection, and insufficient milk supply, originate from condition that leads the mother to inadequate empty the breasts [2]. The adequate management of these conditions is

essential to prevent early weaning. There are specific measures that should be taken to empty the breast effectively. One such intervention is breast massage before breastfeeding or breast milk expression. The breast base consists of connective tissue and is known to be affected to various degrees by the conditions of the mother's life. It is hypothesized that the base or mammary depth appears to expand after the massage and the elasticity of the base is improved. This improves the lymphatic and venous drainage, thus preventing engorgement and facilitating milk drainage [3].

There has been evidence that performing breast massage before lactation improves not only the quantity but also the quality of the secreted milk, thereby providing a sense of security to the mother. It does this by increasing the oxytocin and prolactin levels in the mother which probably is also responsible for its beneficial effect on the quality of breast milk produced [4,5]. Breast massage has been found to increase the volume and fat content of breast milk; increasing the fat content increases the caloric value. Breast massage improves the quality of human milk by significantly increasing total solids, lipids, and casein

concentration and gross energy.

Breast massage before breastfeeding stimulates the oxytocin reflexes or letdown reflex to secrete hormonocytosine into the blood. This oxytocin causes the myoepithelium cells around the alveoli to contract and make the milk flow from the alveoli to the ductules to the sinuses and then to the nipples [4]. This finding suggests that breast massage should cause only ejection of milk already stored in acini. Breast massage will clear the milk ducts and cause the milk to flow more freely which will help empty the breast and therefore trigger higher milk production [6]. Several studies have proven the beneficial effects of breast massage on milk production, but none were done to differentiate whether breast massage has any local effect in increasing the breast milk output. Our study aims to study the impact of unilateral breast massage on breast milk volume.

MATERIALS AND METHODS

The study was a quasi-experimental study conducted in the milk bank of a tertiary care hospital, Hyderabad. Those mothers whose babies were admitted in the newborn care unit and those mothers who visited the milk bank for expressing breast milk for their own babies were enrolled after obtaining informed written consent. A detailed explanation of the study was given to the participants by the medical officer. Postnatal mothers who were sick to do breast massage, those who have undergone breast surgery in the past, and those who have already started breast massage before enrolment were excluded from the study. The duration of the study was from June 01, 2018, to June 31, 2018.

The sample size was calculated from the pilot study. In the pilot study, the mean volume of milk expressed from the massaged breast was 23.4 ml and the mean volume of milk expressed from the unmassaged breast was 17.2 ml. Keeping the power at 80% and alpha error at 5, the estimated sample size was 42 mothers. From the total of 49 mothers who were eligible for the study, 5 mothers did not give consent for the study, and one mother was sick to express breast milk and another mother had previous breast surgery for fibroadenoma of breast and hence excluded from the study.

Baseline characteristics of mother were recorded in the questionnaire by the lactational counselors; the mothers were then shown the video of breast massage and also demonstrated the technique of breast massage using breast module by the lactational counselors. Lactational counselors trained in breast massage helped mother to massage the left breast for the duration of 10 min which included rubbing, stroking, and kneading left breast followed by massaging breast by the finger in small circular movements over the entire breast in a clockwise manner with specific movement aiming to loosen the base of the breast in each quadrant of the breast.

The mothers were then asked to express breast milk separately from each breast using hospital grade electronic breast pump. This procedure was repeated second and third times on the same day after a gap of 3 h, and at third expression, the mothers were made to do breast massage herself under the supervision of lactational

counselors. This was done to ensure that the mother was confident, comfortable and relaxed to express the breast milk after learning the process. The volume of milk produced from both the breasts was recorded separately at the 3rd time. The volume of expressed breast milk was measured using 10 ml syringe.

Statistical analysis was performed; the data obtained were represented using mean and standard deviation if the distribution was normal and median and interquartile range if the distribution was skewed.

RESULTS

A total of 42 postnatal mothers were enrolled in the study after being screened for exclusion criteria. The baseline characteristics of the enrolled mothers are represented in Table 1. Among the study population, 62% of the mothers were primi mothers and the mean gestational age at delivery was 30 weeks. The median volume of breast milk expressed from the right breast without breast massage was 15 ml (10,25) and the median volume of breast milk expressed from the left breast after breast massage was 22.5 ml (10,30). The volume of breast milk expressed from the left breast (massaged side) was significantly higher than the right side (without breast massage) with $p < 0.001$ (Table 2).

DISCUSSION

From our study, it is clear that breast massage before breast milk expression is effective in increasing the volume of expressed breast milk. This is consistent with several studies which have demonstrated the beneficial effect of various massage techniques on milk production [7,8]. In a study conducted among 30 postnatal mothers whose babies were admitted in NICU by Divya *et al.*, the mean pre-test volume of milk expressed was 7.33 ± 4.86 ml which increased to 15.56 ± 8.38 after breast massage [8]. In a study conducted by Foda *et al.*, a mean crematocrit from the massaged breast was 1.92% higher than from the non-massaged breast [9]. It has been demonstrated in various studies that breast massage also reduces pain, reduces breast engorgement, and increases the pH of breast milk which aids in the growth and development of the infant [10].

Theoretically increased milk production happens due to prolactin secretion and increased ejection of flow due to oxytocin;

Table 1: Baseline characteristics of the mothers

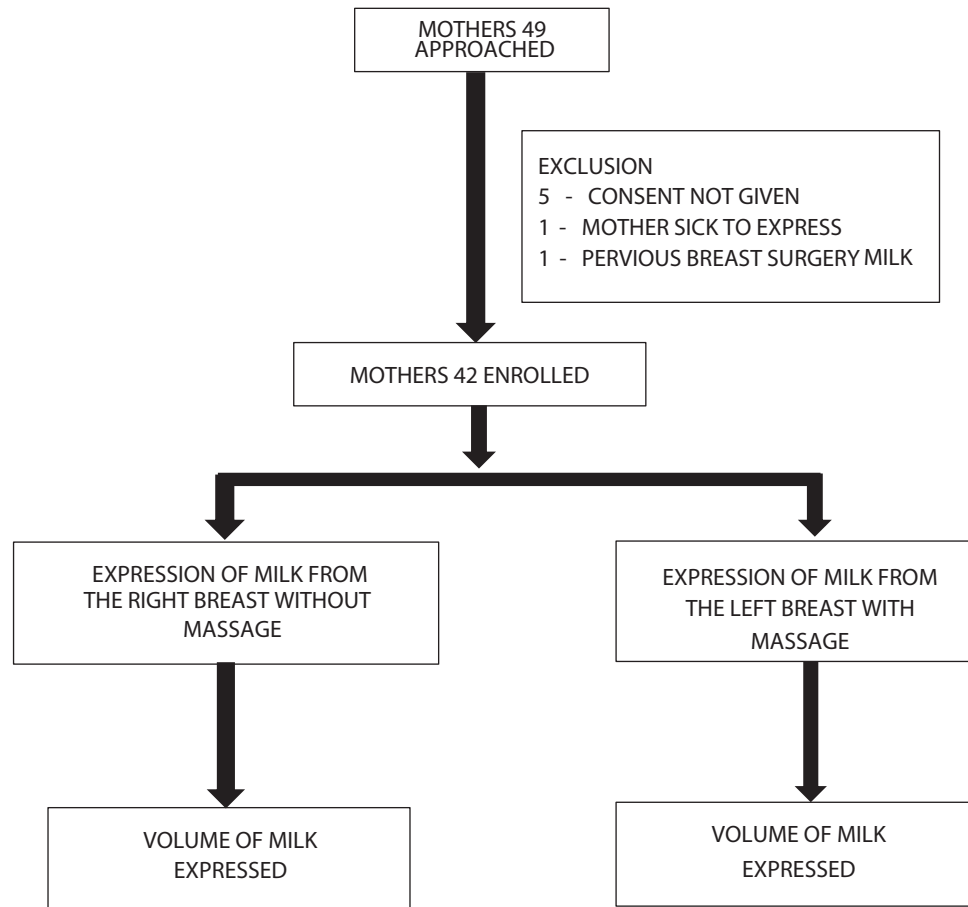
Maternal characteristics	Measurement
Illiterate	45%
Primary education	20%
Primi mothers	62%
Vaginal delivery	42.5%
Maternal age	26 (SD±2.6) years
Gestational age at delivery	30 (SD±3) weeks
Birth weight of the baby	1.5 (SD±0.3) kg
Postpartum age when breast massage was initiated	3 (SD±0.5) days

SD: Standard deviation

Table 2: Comparison of volume of breast milk produced with and without breast massage

Group	n	Breast milk produced				Change in breast milk produced in ml after massage				p-value
		Median	IQR	Minimum	Maximum	Median	IQR	Minimum	Maximum	
Right breast without massage	42	15	(10,25)	2.5	50	5	(0,10)	-10	35	<0.001
Left breast post massage	42	22.5	(10,30)	2.5	80					

IQR: Interquartile range



Flow chart 1: Flow diagram of the study outline

hence, the beneficial effect of any intervention to increase milk production is by increasing the above-mentioned hormones. Oxytocin causes contraction of myoepithelial cells and release of breast milk when baby starts sucking the breast. Breast massage has been shown to cause a significant increase in plasma oxytocin levels and no increase in the plasma prolactin level. The question that was unanswered was if hormone production was solely responsible for increased milk volume, then the massage on one side should increase milk volume equally from both the breasts as the oxytocin massage done in previous studies.

When massage is done, oxytocin is released which should act on both the breasts and cause contraction of myoepithelial cells and should cause letdown of milk stored in the breast. However, in our study, the massage on the one side has produced a significant increase in breast milk volume on that side when compared to non-massaged side, and hence, there must be local factors (enhanced lymphatic, venous drainage, increase in retro mammary space, paracrine hormones such as insulin-like growth

factors (IGF) I and IGF II, transforming growth factor beta, alfa lactoalbumin, serotonin, casein-derived phosphopeptides, PTrP, and somatostatin) which may be responsible for the beneficial effect of massage technique [11]. There are also studies which have shown significant improvement in the quality of breast milk composition which may affect the growth potential and nutritional status of the baby which is subject to further research.

Whatever may be the cause of insufficient milk, breast massage can be instrumental to enhance milk production. As breast massage does not require any additional equipment or cost, all postnatal mothers should be demonstrated the technique of breast massage which will facilitate breast milk expression and also help in relieving breast engorgement. Lactation counselors should be adequately trained to perform and teach the technique of breast massage. Labor room, postnatal ward, and NICU nurses should be trained on the technique of breast massage.

CONCLUSION

Breast massage increases the volume of breast milk production. If this increase in breast milk production is due to oxytocin and prolactin, then breast massage on one side should have its effect equally on both the breasts. However, in our study, the volume of milk produced on massaged side was significantly higher than the unmassaged side. Hence, apart from oxytocin and prolactin, there may be some other local factors responsible for increased milk secretion which requires further research.

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