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RESEARCH ARTICLE

EFFECTIVENESS OF BREAST MASSAGE ON MILD BREAST ENGORGEMENT, BREAST MILK pH AND SUCKLING SPEED OF NEONATE AMONG THE POSTNATAL MOTHERS

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ABSTRACT

Background: Postnatal mothers sometimes face breastfeeding problems such as breast engorgement and nipple pain due to excessive milk production, outflow obstruction or poor removal of milk by the baby which sometimes led to early weaning if not corrected.
Aims of study: 1) To assess the level of breast engorgement among postnatal mothers. 2) To assess and compare mild breast engorgement, breast milk pH and neonate's suckling speed before and after the administration of breast massage to postnatal mothers.
Design and Setting: A pre-experimental study was conducted with one group pre-test post-test design. The study was conducted in postnatal ward of Hakeem Abdul Hameed Centenary Hospital, Jamia Hamdard, New Delhi. Sample and sampling: 30 postnatal mothers with their babies who had mild breast engorgement were selected using purposive sampling technique.
Method: Structured interview schedule, Storr breast engorgement scale, numerical pain rating scale, digital pH meter, structured checklist on suckling speed and LATCH system were used to collect the data of mildly engorged postnatal mothers with their babies.
Results: The findings revealed that there was significant difference between pre-test score and post-test score from day 1- 3 which was found to be statistically significant as evident for numerical pain rating scale 't' value 19.7 at 0.05 level of significance, for breast milk pH 't' value 7.67 at 0.05 level of significance and for suckling speed of neonate 't' value 7.86 at 0.05 level of significance respectively. Both descriptive and inferential statistics was used for analysis and interpretation of data.
Conclusion: The current study there was a significant improvement in breastfeeding techniques of postnatal mothers and their babies due to the reduction of breast engorgement after application of breast massage which was effective to relieve mild breast engorgement, breast pain, increase in breast milk pH and increase in the suckling speed of neonates of the postnatal mothers.

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INTRODUCTION

To become mother is the greatest joy and pride for a woman. Becoming a mother is an experience which every woman cherishes. The bondage between them is not severed even after the life comes out from her womb for she nourishes that life with a food which has found no substitute yet despite advances in science and technology, that pristine food is called "Mother's Milk".A wealthy nation is the one which has a healthy population, so to achieve that, all the physical, social and emotional need of a postnatal mother should be met properly (Manna *et al*., 2016). The duration of postnatal period is six weeks. Even though as breastfeeding is practiced universally according to WHO in 2013 exclusive breastfeeding rate is 37%. In India within an hour of birth 96% of new-borns are breast fed of that urban population is 29% and rural population is 21 % (Resmy *et al*., 2014). In India 4.9% of postnatal women face breast engorgement, flat or inverted nipple or mastitis (Iyengar, 2012). According to lactation literature breast engorgement means increase in pain level and swelling of the breast with increased milk production.When this occurs, it increases the capacity of alveoli to store the milk in it. And this leads to over distension of the alveoli which causes the cells which produce the milk to become flat and sometimes rupture (Wikipedia, 2016). There can be mild breast engorgement in which the breast is swollen, firm & with mild pain. Moderate breast engorgement in which the breast is

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heavy and slightly warm with moderate pain. Severely engorged breast is expanded, firm, glossy, warm and slightly uneven to touch. A severely engorged breast can prevent a neonate from feeding properly because he cannot latch on to the nipple of the swollen rigid breast (William and Wilkins, 2015). Severe engorgement may decrease in milk production and interfere with the health of the mother which if not treated may stop the production of mother's milk or lead to the weaning process (Saidy and Aboushady, 2016). Engorgement and milk stasis often precedes mastitis. Affected mother's milk might taste salty than usual because of increased sodium levels within the swollen and inflamed tissue. The neonate will notice the change and stop feeding (Cho *et al*., 2012) The goal of treatment of breast engorgement is to relieve pain, discomfort, control swelling, to prevent engorgement & to enhance early breastfeeding.Proper and timely management of breast engorgement can lead to successful long-term lactation.It includes analgesics, ice packs, an uplift support bra to minimize oedema, breast massage, gel pack, GuaShatherapy, breast binding, application of warmth, cool compress,hand expression or use of breast pump and cold cabbage leaves also used to reduce swelling in moderate to severe engorgement (Saidy and Aboushady, 2016). Breast massage is referred to a technique in which the engorged breast is kneaded, rubbed, and applied squeezing strokes to the soft tissue of the breast to increase lymph and blood circulation. Before nursing, gentle massage toward the nipple allow some milk to flow out and help to soften the nipple for easier latch.During nursing, gentle compress and massaging will stimulate the letdown of milk. It is the easiest and cheapest method. Inverted nipples can be easily cured by following right technique. Massage controls the blood circulation and tissue fluid circulation (Moon and Humenick, 1989). Breast massage helps in reducing engorgement; it reduces the breast pain as well as blood congestion in the mother's breast. Breast massage increases the sweetness in mother's milk. It improves circulation, increases good quality of mother's milk with increased pH (Cho *et al*., 2012). A sweet liquid increases the sucking response in the infant (Rebecca *et al*., 1999). If we ignore breast engorgement, it can develop into mastitis and breast abscess during the breast feeding period and adequate management is fundamental, if not treated will lead to early weaning (WHO, 2000).

Method

A formal permission was obtained from the Medical Superintendent, Head of Department (Obstetrics & Gynaecology), Head of Department (Paediatrics) and Ethical Committee (JHIEC), New Delhi to conduct the pilot and final research study in HAHC Hospital, Jamia Hamdard, New Delhi.

Sample and sampling

A total of 30 mild breasts engorged postnatal mothers with their babies were selected using purposive sampling technique who were admitted in the postnatal ward of HAHC Hospital, Jamia Hamdard, New Delhi during the period from 24th October 2016 till 18th November 2016.A written consent was taken from all ofthe participants after explaining the purpose of the study to gain their confidence and co-operation.

Criteria for Sample Selection

Inclusion criteria: Mild breast engorged postnatal mothers with their babies, who are willing to participate in the study and are available during data collection period.

Exclusion criteria: Postnatal mothers with mastitis, breast abscess and moderate or severe breast engorgement and mothers whose babies are not with them.

Ethical consideration: The importance of ethical consideration is to safeguard the human rights when conducting the research. According to them, each aspect of the study plan needs to be scrutinized to determine whether the rights of the participants have been adequately protected. They also recommend a formal presentation to an ethical committee. Likewise, the following measures were taken to safeguard the participant's rights.

1) Ethical permission was obtained from Jamia Hamdard Institutional Ethics Committee (JHIEC), New Delhi to conduct the research study.
2) A written informed consent was taken from each study subject. They were assured of confidentiality of the information provided during the study .The consent also gave the right to the subject to withdraw from the study any time.
3) Also coding of the subjects was done which ensured their anonymity.
4) A written permission was obtained from Faculty of Interdisciplinary Science and Technology to use digital pH meter as well as the laboratory.

Measurement

Structured interview schedule: The structured interview schedule was prepared by the researcher to assess the background data of the postnatal mothers as well as their breastfeeding techniques. Interview schedule was prepared using content provided in review of literature and direct contact with the patients and significant others during clinical posting.The structured interview schedule was prepared which comprises of 15 items for assessing background data of postnatal mothers.The sample characteristics were described in terms of age, education qualification, occupation, number of children, type of family, gestation period, type of delivery, postnatal day, time of breastfeed initiation, source of breastfeeding information, cues when baby is ready to breastfeed, frequency of breastfeeding, time spend on breastfeeding on each breast, cues when baby's stomach is full and sign that baby is getting enough milk.

Breast engorgement: The Storr breast engorgement scale was used to check the level of breast engorgement. It is a standardized tool. Which was developed in the year 1988 by Gail Blair Storr (Storr, 1988). Storr breast engorgement scale comprised of scores for the level of breast engorgement. The score was as follows.Normal secretory breast and no pain-score 0, Breast beginning to feel full and mild pain – score 1, Breast heavy and slightly warm and moderate pain – score 2, Breast warm and heavy and severe pain – score 3, Breast very hard and worst pain – score 4 (Storr, 1988).

Breast pain: The numerical pain rating scale was used it is a standardized tool. It is a scale marked as "0" and "10". An increase in score denotes an increase in pain level (Berry *et al*., 2001). A numeric pain rating scale helped the researcher to locate the level of breast pain the participants had. They were asked to pick the number from the pain scale 0 (no pain) to 10 (worst pain). So, No pain (0), Mild pain (1-3), Moderate pain (4-6), Severe (7-10) (McCaffery, 1989).

Breastmilk pH: It refers to mother's milk acidity and alkalinity checked with the help of digital pH meter. To check mother's milk pH, it was collected in the clean & sterile plastic container. Marked with mother's name, date and time of sample collected & stored in an ice box which was brought to lab for checking pH with digital pH meter within two hours of collection.

Suckling speed of neonate: Suckling speed means the number of times a neonate suckles on the breast at the start of breast feed during 1 min and checking it for another 1 min and then taking the mean of the two measurements within 5 minutes of beginning of breastfeeding as assessed by structured checklist on suckling speed.

Latch Score: It is a standardized and documentation tool to check for proper breastfeeding process. The LATCH acronymde notes an area of proper breastfeeding assessment were "L" stands for how infant will attach onto the breast, "A" stands for the audible swallowing amount, "T" stands for type of nipple of the mother, "C" stands for mother's comfort level, "H"stands for how much help mother needs to hold infant to the breast. The nurse can assess both the mother and the infant variable with the help of LATCH system and can provide interventions according to priority as well as provide health teaching. (Jenson *et al*., 1994)

Validity & Reliability: To ensure the content validity of the structured interview schedule and the recording sheet was obtained, it was submitted to 9 experts in the field of Obstetrics and Gynaecology and Paediatrics both doctors and nursing personnel were selected as per the experience and interest in the problem area. There was 98% agreement among the experts on the selection of the tool. A few changes were made according to the expert's suggestion and opinions which were duly incorporated and final draft of the tool was prepared. Reliability of the breast massage was checked. The inter-rater reliability was checked. The value was computed and the reliability score was found to be r = 0.92 which is highly reliable.

Procedure for data collection

- Assessment of mothers for breast engorgement was done.
- A total of 30 mild breast engorged postnatal mothers with their babies were assigned for the study.
- A written consent was taken from all of the participants after explaining the purpose of the study.
- Then mild breast engorged mothers were interviewed and data was collected from mothers and their records.
- All the variables like breast engorgement, breast pain, breast milk pH and the suckling speed of neonates was checked and recorded in the recording sheet before massage (Cho *et al*., 2012).
- Breast massage was administered for 10 min (three times a day for three consecutive days).
- After the breast massage, all the variables breast engorgement, breast pain, breast milk pH and the suckling speed of neonates were checked and recorded in the recording sheet (Cho *et al*., 2012).

Data Analysis

The data was entered in master data sheet and followed by analysis and interpretation using descriptive and inferential statistics. The data and the finding have been organized and presented under the following tables.

Table 1. Point prevalence of mild breast engorgement among postnatal mothers of H.A.H.C Hospital New Delhi

n=48

Condition	Number	Prevalence Rate
Mild breast Engorgement	30/48	62.5%

RESULTS

Section I

Findings related to point prevalence of mild breast engorgement among postnatal mothers of H.A.H.C Hospital, New Delhi. Findings in this section reveal that out of 48 postnatal mothers 30 postnatal mothers had mild breast engorgement and prevalence rate was 62.5%.

Section II

Findings in this section reveals that the mean pre-test numerical pain rating score of day 1-3 was 0.88 with SD (0.94) was greater than the mean post-test numerical pain rating score of day 1-3 which was 0.10 with SD (0.32) with mean difference of 0.78 which was found to be statistically significant as evident from 't' value 19.7. It shows that application of breast massage was effective in reducing mild breast pain among postnatal mothers.

Section III

Findings in this section reveals that the mean post-test breast milk pH score of day 1- 3 was 7.31 with SD (0.24) was greater than the mean pre-test breast milk pH score of day 1-3 which was 7.28 with SD (0.28) with mean difference of 0.03 which was found to be statistically significant as evident from 't' value 7.67. It shows that application of breast massage was effective in increasing the mother's milk pH among postnatal mothers.

Section IV

Findings in this section reveals that the mean post-test score of suckling speed of neonate from day 1- 3 was 61.3 with SD (13.5) was greater than the mean pre-test score of suckling speed of neonate from day 1-3 which was 57.8 with SD (13.9) with mean difference of 3.47 which was found to be statistically significant as evident from 't' value 7.86. It shows that application of breast massage was effective in increasing the suckling speed of neonates of postnatal mothers.

DISCUSSION

Various studies shows that initiation of breastfeeding during the first hour of delivery and continuing it exclusively for six months of delivery has a great impact on the physical and mental health of both child and the mother. However, in some postnatal mothers, during the initiation of lactation, mothers experience breast feeding problems such as breast engorgement. When breast engorgement is relieved breast pain will also be relieved. Engorgement and milk stasis often leads to mastitis. The engorged breast secretes salty mother's milk which baby can taste and sometimes reduce his suckling or

stops completely as there are higher levels of sodium stored in inflamed or swollen tissue (Cho *et al*., 2012). In the present study it was found that breast massage was effective on relieving mild breast engorgement, breast pain as well as increasing the pH of breast milk and the suckling speed of neonate of the postnatal mothers. Regarding numerical pain rating scale observations done from day 1 to day 3 showed that the mean pre-test numerical pain rating score day 1- 3 was 0.88 with SD (0.94) was greater than the mean post-test numerical pain rating score day 1-3 which was 0.10 with SD (0.32) with mean difference of 0.78 which was found to be statistically significant as evident from 't' value 19.7 at 0.05 level of significance.

't' value 7.67. These findings are supported by Cho, *et al*. in 2012 who conducted a non-equivalent control group with a pertest-post-test design to check the effectiveness of Oketani breast massage on postnatal mother's breast pain, milk pH and neonate's sucking speed. Oketani breast massage was applied by an Oketani massage therapist to the experimental group and for control group conventional massage technique was applied by the nurse. *X2*-test and a t-test was applied. The result showed that breast pain was relieved with increase in breast milk pH in the experimental group as compared to the control group. The sucking speed of the neonates in the experimental group was also increased compared to the control group. So it has been concluded that Oketani breast massage was very

Table 2. Mean, Standard deviation, 't' value for significance of mean difference between pre-test and post-test score of numerical pain rating scale

n=30

Observations	Numerical pain Rating score (day1)		Numerical pain Rating score (day2)		Numerical pain Ratings core (day3)		Numerical pain Rating score (day1-3)	
	M (SD)	't'	M (SD)	't'	M (SD)	't'	M (SD)	't'
Pre-test	1.3 (1.35)	18.8*	0.79 (1.22)	10.8*	0.54 (1.22)	7.9*	0.88 (0.9)	19.7*
Post-test	0.22 (0.76)		0.04 (0.35)		0.02 (0.25)		0.1 (0.32)	

$t_{(29)=2.05}$,$p<0.05$ level *Significant

Table 3. Mean, standard deviation, 't' value for significance of mean difference between pre-test and post-test breast milk pH score

n=30

Observations	Breast Milk pH Score (day1)		Breast Milk pH Score (day2)		Breast Milk pH Score (day3)		Breast Milk pH Score (day1-3)	
	M (SD)	't'	M (SD)	't'	M (SD)	't'	M (SD)	't'
Pre-test	7.24 (0.41)	5.7*	0.79 (0.43)	3.5*	7.3 (0.33)	4.1*	7.28 (0.28)	7.6*
Post-test	7.28 (0.39)		7.33 (0.34)		7.33 (0.28)		7.31 (0.24)	

$t_{(29)=2.05}$,$p<0.05$ level, *Significant

Table 4. Mean, Standard deviation, 't' value for significance of mean difference between pre-test and post-test score of suckling speed of neonate

n=30

Observations	Suckling speed of neonate (day1)		Suckling speed of neonate (day2)		Suckling speed of neonate (day3)		Suckling speed of neonate (day1-3)	
	M (SD)	't'	M (SD)	't'	M (SD)	't'	M (SD)	't'
Pre-test	57.52 (20.29)	5.4*	57.85 (17.2)	4.5*	58.12 (14.6)	3.6*	57.8 (13.9)	7.8*
Post-test	61.46 (20.4)		61.54 (15.2)		60.98 (15.6)		61.3 (13.5)	

$t_{(29)=2.05}$,$p<0.05$ level *Significant

The findings of the present study were further confined by a study by Zhou who conducted a RCT on the treatment on early acute mastitis; the participants were 198 cases of acute mastitis from three different Maternity and Child Health Hospital. Participants were randomly divided into experimental group and control group. For control group cefradine was orally administered and for experimental group manipulation treatment of kneading was given. Before and after the treatment clinical sign and symptoms were observed. It was concluded that kneading and dispersing manipulation is safe and repeatable and effects on early-stage acute mastitis. (Zhou *et al*., 2009). The present study findings also shows that the mean post-test suckling speed of neonate observations from day 1-3 was 61.3 with SD (13.5) which was greater than the mean pre-test score of suckling speed of neonate from day 1-3 which was 57.8 with SD (13.9) with mean difference of 3.47 which was found to be statistically significant as evident from 't' value 7.86. Similarly the difference in the mean post-test breast milk pH score day 1-3 which was 7.31 with SD (0.24) was greater than the mean pre-test breast milk pH score day 1-3 which was 7.28 with SD (0.28) with mean difference of 0.03 which was found to be statistically significant as evident from

effective in decreasing breast pain and increasing milk pH as well as neonate's sucking speed of postnatal mothers who had breast engorgement. (Cho *et al*., 2012) For the present study pre-experimental study one group pre-test post-test design was applied. It is the simplest type of pre-experimental design, where only the experimental group is selected as the study subjects. A pre-test was done on the dependent variables before the administration of the treatment to the selected participants, the treatment is administered and finally a post-test was done on the dependent variables to check the effect of treatment on the participants. Massage controls the blood circulation and tissue fluid circulation. For the problem of engorged breast, which results into accumulation of milk in breast causing lumps, breast massage helps in reducing engorgement (Saidy and Aboushady, 2016). Which is further supported by a study conducted by Guo Xiaoqin who done an experimental study on the effect of breast massage on the subjective discomfort of mother, the skin surface temperature changes in breast & breast engorgement in Oita prefectural university of nursing in Japan. The participants were 35 mothers & midwife measured breast engorgement using visual analogue scale rating from 0-10. The breast skin surface

temperature measurement was assessed by infrared thermometer after 1 minutes, 3 minutes & 5 minutes after breast massage. Their result shows that breast massage is very effective way to relieve discomfort of breast engorgement (Xiaoqui, 2017).

Implications

In nursing education, students should be enlightened with adequate knowledge on assessment of breast engorgement. They should be trained to relieve breast engorgement of postnatal mothers at its early stage with technique of breast massage to relieve breast engorgement at its early stage itself and should know other methods to relieve breast engorgement. Adequate support should be given with man, money and material for conducting planned teaching program on exclusive breastfeeding in hospitals, health centers as well as community. There must be a trained person with designation for teaching mothers in wards. Proper policies should be made to check whether doctors and nurses are carrying out patient teaching activities, ensure that every antenatal mother is well informed about proper techniques and initiation of breastfeeding in 1st hour of birth of baby, postnatal mother should be informed and taught well about the importance of breastfeeding along with breast massage that they should follow even after the discharge from the hospital. Nursing administrator should take the initiative in fixing of posters, charts, pamphlets having information's on importance of early initiation of breastfeeding, benefits and importance of breastfeeding to all the postnatal mothers and their families.

Limitation of the study

The limitations which was recognized during the present study are

- The study was conducted with small number of samples due to shortage of time for data collection, therefore generalization cannot be done.
- Only one hospital was taken and obtaining the desired sample within a limited time period was much difficult for the researcher. Therefore, generalization cannot be done.
- The study sample was restricted to only one setting.

Recommendations

- A similar study can be done with sample size large in different setting to strengthen the findings.
- This study could be done for a longer time period as this would give more significant results.
- A comparative study can be conducted between breast massage and some other non-pharmacological methods to relieve the breast engorgement.
- A study can be done to find that the breast engorgement is more in normal delivery or caesarean delivery.
- A study can be done to find that the breast engorgement occurs more in primi mothers or multiparous.
- A comparative study can be conducted between different preventive measures to prevent the occurrence of breast engorgement.
- A comparative study can be conducted between warm compression and breast massage.

Conclusion

The following conclusion was drawn from the study. There was significant reduction in the mild breast engorgement scores ($t_{(29)=2.05}$), significant increase in mother's milk pH ($t_{(29)=2.05}$) and with increase in the suckling speed of the neonates ($t_{(29)=2.05}$) after the administration of breast massage among the postnatal mothers.

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