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Original Research Article

Effectiveness of lukewarm water compress in reduction of breast engorgement and breast pain among postnatal mothers in selected hospital in Aizawl, Mizoram

Vanlalremi^{1*}, Sujana Yambem², Lalhriatpuii¹

¹College of Nursing, Regional Institute of Paramedical and Nursing Sciences (RIPANS), Aizawl, Mizoram, India

²Assam Downtown University, Guwahati, Assam, India

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*Correspondence:

Vanlalremi,

E-mail: khawlhrengremi9@gmail.com

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ABSTRACT

Background: Breastfeeding is the optimal method of infant feeding, providing essential nutrition and health benefits for mother and child. However, breast engorgement is a common early postpartum complication that causes swollen, tight, hard, and painful breasts and often leads to premature cessation of breastfeeding. Both pharmacological and non-pharmacological methods are used for relief. This study evaluated the effectiveness of lukewarm water compress in reduction of breast engorgement and breast pain among postnatal mothers in a selected hospital in Aizawl, Mizoram.

Methods: A pre-experimental one-group pretest-posttest design was used with a non-probability sample of 30 postnatal mothers. Lukewarm water compresses were applied to the breasts for 15-20 minutes twice daily for two consecutive days. Demographic data were collected using a structured interview schedule. Breast engorgement was assessed with the six-point engorgement scale (SPES) and breast pain with the visual analogue scale (VAS). Data were analysed using SPSS version 22.0.

Results: Mean breast pain scores decreased from 2.73 ± 0.69 to 1.73 ± 0.58 ($t=12.04$, $p=0.001$). Mean breast engorgement scores decreased from 4.87 ± 0.63 to 3.60 ± 0.62 ($t=15.42$, $p=0.001$). Most demographic variables showed no statistically significant association with pretest breast engorgement and breast pain scores; occupation and postpartum day were significantly associated with breast pain levels.

Conclusions: Lukewarm water compresses serve as a simple, safe, and cost-effective non-pharmacological method for alleviating breast engorgement and pain. Incorporating this intervention into routine postnatal nursing care may improve maternal comfort and support successful, sustained breastfeeding practices.

Keywords: Breast engorgement, Breast pain, Lukewarm water compress, Non-pharmacological intervention, Postnatal mothers

INTRODUCTION

Breastfeeding is widely recognized as the optimal method of infant feeding, providing ideal nutrition and significant short- and long-term health benefits for both mother and child.^{1,2} Breast milk is uniquely tailored to meet the nutritional needs of infants during the first six months of life, supplying essential vitamins, minerals, and bioactive compounds that support healthy growth and cognitive

development.^{3,4} In addition to its nutritional value, breastfeeding offers passive immunity that protects infants against infectious diseases such as diarrhea and pneumonia, and is associated with a reduced risk of childhood and adolescent overweight and obesity.⁴ For mothers, breastfeeding facilitates maternal-infant bonding and lowers the risk of certain chronic conditions.³ Recognizing these benefits, major international organizations, including the American Academy of

Pediatrics (AAP), the American College of Obstetricians and Gynecologists (ACOG), and the World Health Organization (WHO), strongly recommend exclusive breastfeeding for the first six months of life.⁴⁻⁶ Despite these recommendations, the transition to successful lactation is often challenging. Breast engorgement is one of the most common and significant problems encountered during the first week postpartum.^{2,7} Breast pain secondary to engorgement is a major factor contributing to early cessation of breastfeeding.⁸

Breast engorgement is defined as the pathological overfilling of the breast tissue with milk, resulting in hard, painful, and tight breasts.⁹ It occurs due to intensified lactogenesis II, triggered by the postpartum decline in progesterone and estrogen accompanied by elevated prolactin levels. This hormonal shift leads to increased milk volume, vascular congestion, and interstitial fluid accumulation.¹⁰ Clinical signs include localized redness, elevated skin temperature, and marked areolar tightness. In advanced cases, the breast tissue may appear shiny, hard, and nodular, and nipple inversion may occur.^{11,12} Beyond localized symptoms, symptomatic women also experience systemic symptoms such as fatigue, malaise, chills, and low-grade fever (typically <39°C), which usually resolve within 24 hours.¹²

Risk factors for engorgement include incomplete breast emptying, incorrect breastfeeding technique, short feeding durations, failure to recognize early hunger cues, formula supplementation, unnecessary use of breast pumps or pacifiers, and ineffective infant sucking.³ If left untreated, engorgement can lead to cracked nipples, plugged ducts, mastitis, inadequate infant weight gain, and premature cessation of breastfeeding.⁷

Proper management of breast engorgement is essential for successful long-term lactation.¹⁵ Lactation-related difficulties, particularly engorgement and breast pain, remain major contributors to premature discontinuation of breastfeeding.^{8,16} Despite the well-documented advantages of exclusive breastfeeding, breastfeeding rates continue to decline globally.¹⁷ In South Asia, including India, breastfeeding rates remain among the lowest worldwide.¹⁸ In Mizoram, only 63% of children under two years were breastfed within one hour of birth, 64% were exclusively breastfed under six months, and the median duration of breastfeeding was just 3.9 months.¹⁹

The reported incidence of breast engorgement varies widely from 20% to 77%, depending on the definition used, with some studies reporting rates as high as 65-82%.^{2,20,21} A systematic review found that 65% of mothers experienced engorgement, making it the leading breast-related problem during lactation.¹⁷

If not managed effectively, prolonged engorgement can compromise milk supply and progress to mastitis or breast abscess.¹⁵ A range of pharmaceutical and non-pharmacological strategies are employed to manage

breast engorgement and the associated pain. While medications may provide relief, their adverse effects can sometimes outweigh the benefits. Non-pharmacological approaches such as cold cabbage leaves, cold gel packs, herbal compresses, massage, reverse pressure softening, and warm or cold compresses have been reported to be effective.^{9,13,14} Therefore, the present study aimed to evaluate the effectiveness of lukewarm water compress in reducing breast engorgement and breast pain among postnatal mothers, thereby generating evidence-based insights to improve maternal comfort, support successful breastfeeding, and enhance overall maternal-child health outcomes.

The study objectives were: to determine the effectiveness of lukewarm water compress in reduction of breast engorgement and breast pain. To find out the association between pretest breast engorgement and breast pain with demographic variables.

METHODS

Study design

A pre-experimental one-group pretest-posttest design was used.

Study setting

The study took place at Civil Hospital Aizawl and Synod Hospital, Durtlang, Aizawl, Mizoram.

Study duration

The study was carried out from 7th April 2026 to 7th May 2026.

Sample size and sampling technique

30 postnatal mothers were selected using purposive sampling technique.

Sample size calculation

Sample size was estimated based on the findings of a pilot study conducted among 10 postnatal mothers. The pilot study demonstrated a mean reduction of 1.70 ($t = 9.000$) in breast pain score and 1.40 ($t = 8.573$) in breast engorgement score following the application of lukewarm water compress. Using these estimates, sample size was calculated using a paired t-test with a significance level of 0.05 and 80% power. Allowing for possible attrition, a final sample size of 30 postnatal mothers were included in the main study.

Inclusion criteria

Postnatal mothers who: delivered either vaginally or by caesarean section in the selected hospital. Had a newborn admitted to the newborn care unit of the selected hospital.

Report a breast pain score >1 on the visual analogue scale and exhibit a breast engorgement score >4 on the six-point breast engorgement scale. Were within two weeks after delivery.

Exclusion criteria

Postnatal mothers who: had breast complications such as abscess, cracked nipples, or mastitis. Had received lactation suppressants. Were unwilling to participate in the study.

Data collection tools

Data were collected using a demographic proforma, six-point breast engorgement scale (SPES), and the visual analogue scale (VAS). The research tools were validated by a panel of eight experts in the field of obstetrics and gynaecology department.

Demographic proforma

The demographic variables include age, education, occupation, family income, parity, type of family, mode of delivery, postpartum day, and frequency of feeding.

Six-point breast engorgement scale (SPES)

Developed by Hill and Humenic (1994), the scale ranges from 1 (soft, no change) to 6 (very firm, very tender). It measures increasing tenderness and firmness of engorgement, with higher scores indicating severe engorgement.²⁵

Six-point breast engorgement scale: 1 = soft, no change in breast, 2 = slight change in breast, 3 = firm, no tender breast, 4 = firm, beginning tenderness in breast, 5 = firm, tender, 6 = very firm, very tender.

Visual analogue scale

Breast pain severity was measured using the 10-point visual analogue scale, with 0 denoting no pain and 10 indicating the worst possible pain. This tool is widely recognized as valid, reliable, and preferred for assessing pain arising from acute conditions.²²

The VAS has demonstrated excellent test-retest reliability, with an intraclass correlation coefficient (ICC) of 0.97 in pain assessment.²² Likewise, the SPES has shown good internal consistency (Cronbach's $\alpha=0.87$).²³

Ethical considerations

Ethical approval was obtained from the Institutional Ethics Committee, RIPANS (IEC No.F.13016/1/2024

RIPANS/15). Administrative permission was obtained from the senior medical superintendent of Civil Hospital Aizawl, and the Director of Synod Hospital. Written informed consent was obtained from all participants before the procedure. Confidentiality and anonymity were maintained throughout the study.

Data collection procedure

The study was conducted after the researcher obtained ethical clearance and permission from the concerned authority. After eligible participants were identified, the researcher introduced herself to the participants, explained the purpose and procedures of the study, and obtained written informed consent.

Demographic data were collected through a structured interview session. Pretest assessment of pain (VAS) and engorgement (SPES) was performed.

A basin was filled with lukewarm water at a temperature range between 43°C - 46°C. A cotton cloth was immersed, and after excess water was squeezed out, the compress was applied to the affected breast 10 minutes before breastfeeding. The session lasted for 15-20 minutes twice daily for 2 consecutive days. The cloth was replaced every 1 to 2 minutes and the water temperature was maintained between 43°C and 46°C using a laboratory thermometer.

Post-test assessment of pain and engorgement was performed after completion of the intervention.

Data analysis

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics version 22.0. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used. Effectiveness of the intervention was evaluated using the paired t-test. Fisher's exact test was used to determine the association between pretest scores of breast engorgement and breast pain with demographic variables. A p value <0.05 was considered statistically significant.

RESULTS

Demographic analysis showed that the majority were aged 21-30 years (60%), had an educational background up to high school level (50%), and were predominantly unemployed (73.3%), living in nuclear families (60%). Sixty percent of the participants were multiparous, 63.3% had vaginal delivery, and 63.3% were assessed within the first three postpartum days. In terms of infant feeding practices, demand feeding was the most common (46.7%), followed by two-hourly feeding intervals (40%).

Table 1: Frequency and percentage distribution of demographic characteristics among postnatal mothers.

Variables	Category	Frequency	Percentage
Age (in years)	14-20	0	0
	21-30	18	60
	31-40	12	40
	>40	0	0
Educational status	Primary school	2	6.7
	Middle school	3	10
	High school	15	50
	Higher secondary	8	26.7
	Graduate and above	2	6.7
Occupation	Government employee	1	3.3
	Private sector	0	0
	Self employed	7	23.3
	Unemployed	22	73.3
Family Income (Per month in Rs.)	Below 10000	1	3.3
	10,000-20,000	12	40
	20,000-30,000	9	30
	Above 30,000	8	26.7
Type of family	Joint family	12	40
	Nuclear family	18	60
Parity	Multiparous	18	60
	Primiparous	12	40
Mode of delivery	Vaginal delivery	19	63.3
	Cesarean section	11	36.7
Postpartum day	1-3	18	63.3
	4-6	12	36.7
	7-10	0	0
	11-14	0	0
Frequency of feeding	Demand feeding	14	46.7
	Hourly	3	10
	Every 2 hourly	12	40
	Every 3 hourly	1	3.3

Table 2: Effectiveness of lukewarm water compress on breast engorgement and breast pain among postnatal mothers.

Variables	Pretest (Mean±SD)	Posttest (Mean±SD)	Mean difference	t-value	P value
Breast pain	2.733±0.691	1.733±0.583	1	12.042	0.001*
Breast engorgement	4.866±0.628	3.600±0.621	1.266	15.425	0.001*

*Note: p<0.05 statistically significant.

As shown in Table 2, the pretest mean breast pain score was 2.73±0.69, which decreased to 1.73±0.58 in the posttest. The mean difference was 1.00. The calculated t-value was 12.04 with a p value of 0.001, which was statistically significant at p<0.05. This indicates a significant reduction in breast pain following the administration of lukewarm water compress.

Regarding breast engorgement, the pretest mean score was 4.87±0.63, which decreased to 3.60±0.62 in the posttest. The mean difference was 1.27. The calculated t-value was 15.42 with a p value of 0.001, which was statistically

significant at p<0.05. These findings demonstrate a significant reduction in breast engorgement after the intervention.

The significant decrease in posttest mean scores compared with pretest values confirms the effectiveness of lukewarm water compress in reducing both breast pain and breast engorgement among postnatal mothers.

These results highlight lukewarm water compress as a simple, safe, and non-pharmacological method for alleviating discomfort in postnatal mothers.

Table 3: Association between pretest breast pain and demographic variables among postnatal mothers (n=30).

Demographic variables	Breast Pain					Fisher's Exact	P value
	No pain	Mild pain	Moderate pain	Severe pain	Worst possible pain		
Age (in years)							
14-20	0	0	0	0	0	4.396	0.097
21-30	0	6	11	1	0		
31-40	0	6	3	3	0		
>40	0	0	0	0	0		
Educational status							
Primary school	0	1	0	1	0	7.837	0.399
Middle school	0	1	2	0	0		
High school	0	8	6	1	0		
Higher secondary	0	2	4	2	0		
Graduate and above	0	0	2	0	0		
Occupation							
Government employee	0	0	1	0	0	9.141	0.019*
Private sector	0	0	0	0	0		
Self-employed	0	0	6	1	0		
Unemployed	0	12	7	3	0		
Family income (Per month in Rs.)							
Below 10000	0	0	1	0	0	8.061	0.182
10,000-20,000	0	8	3	1	0		
20,000-30,000	0	3	5	1	0		
Above 30,000	0	1	5	2	0		
Type of family							
Joint family	0	4	7	1	0	1.157	0.591
Nuclear family	0	8	7	3	0		
Parity							
Multiparous	0	8	7	3	0	1.157	0.591
Primiparous	0	4	7	1	0		
Mode of delivery							
Vaginal delivery	0	8	9	2	0	0.571	0.884
Cesarean section	0	4	5	2	0		
Postpartum Day							
1-3	0	10	8	0	0	8.227	0.011*
4-6	0	2	6	4	0		
7-10	0	0	0	0	0		
11-14	0	0	0	0	0		
Frequency of feeding							
Demand feeding	0	5	7	2	0	3.372	0.931
Hourly	0	2	1	0	0		
Every 2 hourly	0	4	6	2	0		
Every 3 hourly	0	1	0	0	0		

*Note: $p < 0.05$ statistically significant.

As shown in Tables 3 and 4, Fisher's exact test was used to determine the statistical association between pretest breast pain and breast engorgement with demographic variables. The breast pain levels were categorized as no pain, mild pain, moderate pain, severe pain, and worst possible pain. Most demographic variables, such as age, educational status, family income, type of family, parity, mode of delivery, and feeding frequency, did not show

statistically significant association with pretest breast pain levels among postnatal mothers. However, occupation and postpartum day demonstrated statistically significant associations, indicating that these variables may influence breast pain among postnatal mothers.

Regarding breast engorgement levels, they were categorized as soft and no changes in breast, slight changes

in breast, firm and non-tender breast, firm and beginning tenderness in breast, firm and tender, and very firm and very tender. None of the selected demographic variables showed a statistically significant association with pretest breast engorgement levels among postnatal mothers.

Variables such as age, educational status, occupation, family income, type of family, parity, mode of delivery, postpartum day, and feeding frequency did not significantly influence breast engorgement levels in the present study.

Table 4: Association between pretest breast engorgement and demographic variables among postnatal mothers.

Demographic variables	Breast engorgement						Fisher's Exact	P value
	Soft and no changes in breast	Slight changes in breast	Firm and non-tenderness breast	Firm and beginning tenderness in breast	Firm and tender	Very firm and very tender		
Age (in years)								
14-20	0	0	0	0	0	0	3.029	0.249
21-30	0	0	0	3	13	2		
31-40	0	0	0	5	5	2		
>40	0	0	0	0	0	0		
Educational status								
Primary school	0	0	0	1	1	0	5.621	0.782
Middle school	0	0	0	1	1	1		
High school	0	0	0	4	10	1		
Higher secondary school	0	0	0	2	4	2		
Graduate and above	0	0	0	0	2	0		
Occupation								
Government employee	0	0	0	0	1	0	4.995	0.297
Private Sector	0	0	0	0	0	0		
Self employed	0	0	0	0	6	1		
Unemployed	0	0	0	8	11	3		
Family income (per month in Rs.)								
Below 10000	0	0	0	0	1	0	6.713	0.346
10,000-20,000	0	0	0	6	5	1		
20,000-30,000	0	0	0	1	7	1		
Above 30,000	0	0	0	1	5	2		
Type of family								
Joint family	0	0	0	3	8	1	0.579	0.876
Nuclear family	0	0	0	5	10	3		
Parity								
Multiparous	0	0	0	7	9	2	3.449	0.157
Primiparous	0	0	0	1	9	2		
Mode of delivery								
Vaginal delivery	0	0	0	4	12	3	0.994	0.657
Cesarean section	0	0	0	4	6	1		
Postpartum day								
1-3	0	0	0	7	10	1	4.470	0.109
4-6	0	0	0	1	8	3		
7-10	0	0	0	0	0	0		
11-14	0	0	0	0	0	0		
Frequency of feeding								
Demand feeding	0	0	0	4	7	3	5.259	0.568
Hourly	0	0	0	2	1	0		
Every 2 hourly	0	0	0	2	9	1		
Every 3 hourly	0	0	0	0	1	0		

*Note: p<0.05 statistically significant.

DISCUSSION

The demographic analysis revealed that majority of respondents were young mothers aged between 21-30 years, educated up to high school level, unemployed, and belonged to nuclear families. Most respondents were multiparous mothers who had undergone vaginal delivery and were assessed during the early postpartum period. Demand feeding emerged as the most commonly practiced feeding pattern among the study participants.

The present study demonstrated a highly significant reduction in mean scores for both breast pain ($t=12.042$, $p=0.001$) and breast engorgement ($t=15.425$, $p=0.001$). These results support acceptance of the study hypothesis, confirming that lukewarm water compresses produce substantial clinical improvement.

These findings are consistent with those of Lamadah et al who reported a statistically significant reduction in breast engorgement and breast pain among puerperal women following the application of lukewarm water compresses.⁴ Similarly, Chauhan et al found that warm compress therapy produced a statistically significant decrease in breast engorgement and pain among postnatal mothers ($p<0.001$).⁸ The Cochrane review by Mangesi and Dowswell concluded that warm applications before breastfeeding may help relieve breast engorgement and associated pain, further supporting the effectiveness of the present intervention.¹¹

Age, educational status, family income, type of family, parity, mode of delivery, and feeding frequency were not significantly associated with pre-test breast pain levels ($p>0.05$). This suggests that the severity of early postpartum breast pain may not be substantially influenced by these demographic characteristics. However, occupation and postpartum day showed significant associations. Unemployed mothers reported higher frequencies of discomfort. Postpartum day was significantly associated with pain intensity ($p=0.011$), with mothers on days 4-6 reporting a higher proportion of severe pain compared to those on days 1-3. This pattern aligns with the physiological onset of Lactogenesis II, which is characterised by a marked increase in milk volume accompanied by hyperemia and interstitial edema. Clinical evidence indicates that these changes typically reach their peak between postpartum days 3 and 6, leading to maximum breast fullness and discomfort.^{25,26}

Regarding breast engorgement, none of the selected demographic variables- including age, education, occupation, income, parity, or mode of delivery- showed significant associations with pretest levels. This finding is consistent with Lavanya and Shaji, who reported that parity and education did not significantly influence engorgement severity, emphasizing instead the role of lactation status.²⁷ Conversely, Tamilselvi and Devi reported significant associations between engorgement and age, postnatal day, and gravida, suggesting that

physiological timing and parity may indeed influence engorgement in certain contexts.²⁸

Limitations of this study are pain assessment relied on subjective self-report, which may introduce response bias. Blinding was not possible due to the nature of the intervention.

CONCLUSION

The present study demonstrated that lukewarm water compresses significantly reduce breast pain and breast engorgement among postnatal mothers. Statistically significant reductions were observed in mean breast pain scores (2.733 ± 0.691 to 1.733 ± 0.583 ; $t=12.042$, $p=0.001$) and mean breast engorgement scores (4.866 ± 0.628 to 3.600 ± 0.621 ; $t=15.425$, $p=0.001$) following the intervention.

Most demographic variables, including age, educational status, family income, type of family, parity, mode of delivery, and feeding frequency, showed no significant association with pretest levels of breast pain or engorgement. Occupation and postpartum day, however, demonstrated a statistically significant association with breast pain intensity.

Lukewarm water compress is a simple, safe, cost-effective, and non-pharmacological intervention that can be incorporated into routine postnatal nursing care to enhance maternal comfort and support successful breastfeeding.

Recommendations

Lukewarm water compress should be incorporated into postnatal nursing care. Nurses should be trained in the correct technique and should include it in discharge teaching. Future studies should employ a randomized controlled design with a larger sample and longer follow-up. Comparative studies with other non-pharmacological interventions are recommended.

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