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THE EFFECT OF ALTERNATING APPLICATION OF COLD AND HOT COMPRESS ON PAINFUL BREAST ENGORGEMENT AMONG POSTNATAL MOTHERS AT TERTIARY CARE HOSPITAL

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ABSTRACT
Objective: To evaluate the effectiveness of alternating hot and cold compresses on painful breast engorgement among postnatal mothers.
Methods: A quasi-experimental study was conducted among 142 postnatal mothers following cesarean delivery at Queen Mary Hospital, KGMU. Participants were assigned to an experimental group (n=71) and a control group (n=71). Breastfeeding outcomes were assessed using the Bristol Breastfeeding Assessment Tool (BBAT), LATCH score, pain scale, and Six-Point Breast Engorgement Scale. The experimental group received alternating hot and cold compresses.
Results: Post-intervention, the experimental group demonstrated significantly improved BBAT and LATCH scores and significantly reduced pain and breast engorgement scores compared with the control group ($p < .001$).
Conclusions: Alternating hot and cold compresses effectively reduce breast engorgement and pain while improving breastfeeding outcomes among postnatal mothers.
KEYWORDS: Breast engorgement; breastfeeding; hot compress; cold compress; postpartum mothers; nursing intervention.

INTRODUCTION

Breastfeeding is essential for infant growth, immunity, and maternal health. Exclusive breastfeeding during the first six months of life provides optimal nutrition and protection against infections, while also promoting maternal recovery and reducing long-term health risks. Despite its well-established benefits, breastfeeding is frequently challenged by postpartum breast complications, among which breast engorgement is one of the most common.

Breast engorgement is characterized by painful breast swelling resulting from increased milk production, vascular congestion, and lymphatic edema during the early postpartum period. It typically occurs between the third and fifth day after birth and is associated with breast firmness, tenderness, warmth, and pain. The condition is particularly common among primiparous women and mothers who experience delayed breastfeeding initiation, cesarean birth, infrequent feeding, or ineffective infant latch.

Breast engorgement can negatively affect breastfeeding by impairing infant attachment and milk transfer, leading to maternal discomfort, reduced breastfeeding confidence, and early breastfeeding discontinuation. If not managed effectively, it may progress to complications such as blocked ducts, mastitis, and breast abscesses.

Nonpharmacologic interventions are widely recommended for managing breast engorgement. Warm compresses may facilitate milk flow and the milk ejection reflex, whereas cold compresses help reduce pain, edema, and inflammation through vasoconstriction. Alternating hot and cold compresses represents a simple, low-cost, and accessible intervention; however, evidence regarding its effectiveness among postnatal mothers remains limited.

Therefore, this study was conducted to evaluate the effectiveness of alternating hot and cold compresses on painful breast engorgement and breastfeeding outcomes among postnatal mothers following cesarean birth.

Need for the Study

Although exclusive breastfeeding is strongly recommended by the World Health Organization, breastfeeding challenges remain common during the early postpartum period. Breast engorgement is one of the most frequent breastfeeding complications, particularly among primiparous and post-cesarean mothers. It is associated with pain, breast swelling, ineffective infant latch, reduced milk transfer, and early breastfeeding discontinuation.

If not managed promptly, breast engorgement may progress to blocked ducts, mastitis, and other breastfeeding-related complications, negatively affecting maternal comfort and infant feeding outcomes. Previous studies have suggested that alternating warm and cold compresses can reduce breast pain and engorgement; however, evidence regarding their effectiveness in postnatal mothers remains limited.
Therefore, this study was undertaken to evaluate the effectiveness of alternating hot and cold compresses on painful breast engorgement among postnatal mothers. The findings may provide evidence for a simple, safe, and cost-effective nursing intervention to improve breastfeeding outcomes and maternal well-being.

OBJECTIVES OF THE STUDY
PRIMARY OBJECTIVE
1. To determine the effectiveness of the alternative application of Cold and hot compresses on painful breast engorgement among postnatal mothers.
SECONDARY OBJECTIVES
2. To find an association between the pretest intervention score of painful breast engorgement with selected demographic variables among postnatal mothers.

HYPOTHESIS
H_1: There will be a statistically significant difference in the pre-test and post-test levels of breast engorgement between the study group receiving alternating hot and cold compress therapy and the control group.

MATERIAL AND METHODS
Research approach- quantitative approach

Research Design- Quasi-experimental design

Setting of the study- Postnatal ward at queen mary's Hospital, KGMU

DESCRIPTION OF THE TOOL
A research tool is described as any instrument used to gather information for a study. The tool employed in this research is divided into three sections. These include the structured interview schedule, Bristol breastfeeding assessment tool, LATCH questionnaire, pain assessment scale, 6- Point Breast Engorgement Scale,
Part I: Structured Interview Schedule. It includes sections designed to collect demographic information such as age, educational qualification, occupation of mother, family type, postnatal day, and number of children.
Part II: The Bristol Breastfeeding Assessment Tool, created by Jenny Ingram in 2015 (Ingram et al. 2015), was designed to evaluate common breastfeeding challenges experienced postpartum, and its validity has been established.
Part III: The LATCH system is a structured instrument used to assess individual breastfeeding sessions. It evaluates five key components of breastfeeding, with each scored on a scale of 0, 1, or 2. Each letter in LATCH corresponds to a specific area: **L** assesses the infant's latch, **A** evaluates audible swallowing, **T** examines the mother's nipple type, **C** considers the mother's comfort level, and **H** measures the assistance needed by the mother to hold her baby during breastfeeding.
Part IV: It is a 10-point visual analogue scale represented by a straight line, where 0 indicates no pain and 10 represents the highest level of pain. This scale is used to assess the intensity of pain. The researcher writes an appropriate score based on the patient's response.

Pain Score	Pain Level	Description
0	No Pain	No pain experienced
1–3	Mild Pain	Very mild, discomforting, tolerable
4–6	Moderate Pain	Distressing, very distressing, intense
7–10	Severe Pain	Very intense, utterly horrible, excruciating, unbearable, unimaginable, unspeakable

Part V: The Six-Point Breast Engorgement Scale is a standardized instrument developed by Dr. Hill P.D. to evaluate the severity of breast engorgement. The tool was explained to the mothers, and scoring was performed through a combination of self-reporting and direct observation.

Scoring Key

Engorgement Score	Level of Breast Engorgement
0	No Breast Engorgement
1–2	Mild Breast Engorgement
3–5	Moderate Breast Engorgement
6–9	Severe Breast Engorgement

RELIABILITY OF THE TOOL

According to **Wood and Heber**, "Reliability is defined as the extent to which the instrument yields the same result on repeated measures. It is then concerned with consistency, accuracy, stability, and homogeneity".[40]

Bristol Breastfeeding Assessment Tool: The BBAT has shown *good internal consistency and inter-rater reliability* across multiple studies. It was developed to provide a structured and objective assessment of breastfeeding technique. The reliability score is 0.89.

LATCH Questionnaire: The LATCH tool is widely used and has been validated in numerous studies. It has demonstrated *high inter-rater reliability*, making it suitable for bedside assessments. The reliability score is 0.95.

Pain Assessment tool: The reliability of pain assessment tools varies depending on the specific instrument. Most standardized pain scales have *strong test-retest reliability and internal consistency*. The score is 0.85

Six Point breast engorgement scale: This scale has demonstrated *moderate to high inter-rater reliability* in assessing the severity of breast engorgement. The reliability score is 0.81.

PILOT STUDY

A pilot study was conducted to assess the feasibility of the main research. It took place in the postnatal ward of the Department of Obstetrics & Gynecology at KGMU Hospital, after obtaining formal permission from the relevant authorities. The pilot study lasted for 15 days and included 14 postnatal mothers who met the inclusion criteria, divided into the study and control groups. The results indicated that the study could be successfully conducted and that the objectives were achievable. Following these findings, data collection for the main study was commenced.

DATA COLLECTION PROCESS

Ethical approval and administrative clearance were obtained from the Institutional Ethics Committee of KGMU. Participants were selected using a purposive sampling method based on the established inclusion criteria. For experimental group, The investigator introduced herself and explained the purpose of the study to the participants. Informed consent was obtained, and demographic information was collected. Breast engorgement levels and breastfeeding practices among postnatal mothers were assessed using a standardized tool, followed by a pre-test. After assessment, alternating cold and hot compresses were applied to manage painful breast engorgement. A post-test evaluation was conducted three days after the intervention for the experimental group.

For the control group in this study consist of postnatal mothers experiencing painful breast engorgement who receive routine hospital care without the alternative application of cold and hot compress. Ethical clearance and permission from the hospital authority were obtained before data collection. Eligible mothers were selected based on inclusion criteria, and informed written consent was taken after explaining the purpose of the study. Baseline demographic and clinical data were collected using demographic and standardized tool. The severity of breast engorgement was assessed using a breast engorgement scale and pain was measured using the numeric pain rating scale.

Participants un the control group received routine hospital care, including breastfeeding support and breast care advice, without the application of cold and hot compress therapy. Follow-up assessment were conducted using the same tools, and all observations were recorded systemically while maintaining confidentiality. The collected data were later compared with the experimental group to evaluate the effectiveness of the intervention.

Data Analysis and Findings

A total of 142 postnatal mothers (71 experimental, 71 control) participated in the study. Baseline demographic characteristics, including age, education, occupation, family type, postnatal day, and number of children, were comparable between groups ($p > .05$).

At baseline, most mothers experienced moderate to severe breast engorgement and poor breastfeeding outcomes. Following the intervention, mothers in the experimental group who received alternating hot and cold compresses demonstrated significantly lower breast engorgement scores compared with the control group (2.23 ± 0.88 vs. 3.68 ± 0.65, $p < .001$). Pain scores were also significantly reduced in the experimental group (3.69 ± 0.95 vs. 4.56 ± 1.46, $p < .001$).

Breastfeeding outcomes improved significantly after the intervention. The experimental group achieved higher Bristol Breastfeeding Assessment Tool scores (6.61 ± 1.40 vs. 4.76 ± 1.34, $p < .001$) and higher LATCH scores (12.38 ± 1.20

vs. 11.65 ± 1.00, $p < .001$) than the control group. Additionally, 66.2% of mothers in the experimental group reported mild engorgement after the intervention, whereas most mothers in the control group continued to experience moderate engorgement.

No significant association was found between preintervention breast engorgement scores and selected demographic variables ($p > .05$).

CONCLUSION

Alternating hot and cold compresses effectively reduced breast engorgement and pain while improving breastfeeding outcomes among postnatal mothers following cesarean birth. This simple, safe, and low-cost intervention may be incorporated into routine postpartum nursing care to support successful breastfeeding.

Section I Demographic Profile

Table 1: Frequency and percentage distribution of Sociodemographic Characteristics of Postnatal Mothers in the study and Control GroupsN=142

Socio-demographic variable	Study group (n = 71)	n (%)	Control group (n = 71)	n (%)	χ^2	df	p-value
Age of mother (years)							
20–25	26	36.6%	24	33.8%	1.90	3	0.592
26–30	23	32.4%	23	32.4%			
31–35	21	29.6%	20	28.2%			
36–40	1	1.4%	4	5.6%			
The education of the mother							
Illiterate	9	12.7%	4	5.6%	3.99	3	0.263
High school	16	22.5%	24	33.8%			
Intermediate	20	28.2%	16	22.5%			
Graduation	26	36.6%	27	38.0%			
Occupation of the mother							
Working	3	4.2%	2	2.8%	Fisher's exact p=0.526		
Housewife	68	95.8%	67	94.4%			
others	0	0.0%	2	2.4%			
Type of family							
Nuclear	6	8.5%	7	9.9%	Fishers exact test p=0.779		
Joint	65	91.5%	63	88.7%			
Other	0	0.0%	1	1.4%			
Postnatal day							
0-1 day	1	1.4%	7	9.9%	4.92	3	0.178
2-3 days	54	76.1%	51	71.8%			
4-5 days	15	21.1%	12	16.9%			
6-7 days	1	1.4%	1	1.4%			
Number of children							
1	44	62.0%	41	57.7%	1.26	2	0.532
2	23	32.4%	28	39.4%			
3	4	5.6%	2	2.8%			
≥4	0	0.0%	0	0.0%			

Table 1 presents the socio-demographic characteristics of the study and control groups

SECTION II Bristol Breastfeeding Assessment Tool

Table 2: Comparison of Bristol Breastfeeding Assessment Scores Between Study and Control Groups Pre-intervention Bristol Breastfeeding Assessment N = 142

Bristol assessment item	Score category	Study group n= 71	n (%)	Control group n=71	n (%)	χ^2	df	p-value
Positioning	Poor	55	77.5%	54	76.1%	00.4	1	0.843
	moderate	16	22.5%	17	23.9%			
Grasping/ attachment	Poor	54	76.1%	47	66.2%	1.68	1	0.195
	Moderate	17	23.9%	24	33.8%			
Sucking	Poor	55	77.5%	50	70.4%	0.91	1	0.339
	Moderate	16	22.5%	21	29.6%			
Swallowing/ gulping	Poor	50	70.4%	48	67.6%	0.13	1	0.717
	Moderate	21	29.6%	23	32.4%			

Table 2(A) The table compares the pre-intervention Bristol Breastfeeding Assessment scores between the study and control groups (N = 142). The majority of postnatal mothers in both groups demonstrated poor breastfeeding practices across all domains. In positioning, 77.5% of the study group and 76.1% of the control group had poor scores (χ^2 = 0.04, df = 1, p = 0.843). For grasping/attachment, poor scores were observed in 76.1% of the study group and 66.2% of the control group (χ^2 = 1.68, df = 1, p = 0.195). Similarly, poor sucking was found in 77.5% of the study group and 70.4% of the control group (χ^2 = 0.91, df = 1, p = 0.339). For swallowing/gulping, poor scores were seen in 70.4% of the study group and 67.6% of the control group (χ^2 = 0.13, df = 1, p = 0.717).
Overall, no statistically significant differences were observed between the groups (p > 0.05), indicating that both groups were comparable at baseline

A. Post-intervention Bristol Breastfeeding Assessment

Bristol Assessment Item	Score category	Experimental (n = 71)	n (%)	Control (n = 71)	n (%)	χ^2	df	p-value
Positioning	Poor	1	1.4%	1	1.4%	35.59	2	<0.001†
	Moderate	22	31.0%	57	80.3%			
	Good	48	67.6%	13	18.3%			
Grasping / Attachment	Poor	1	1.4%	1	1.4%	25.74	2	<0.001†
	Moderate	21	29.6%	51	71.8%			
	Good	49	69.0%	19	26.8%			
Sucking	Poor	4	5.6%)	0	0.0%)	35.59	2	<0.001†
	Moderate	20	28.2%)	55	77.5%)			
	Good	47	66.2%	16	22.5%			
Swallowing / Gulping	Poor	4	5.6%)	2	2.8%)	52.88	2	<0.001†
	Moderate	16	22.5%	59	83.1%			
	Good	51	71.8%	10	14.1%			

**chi-square test*
Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)
Table 2(B) The table presents the post-intervention comparison of Bristol Breastfeeding Assessment scores between the study group and control groups (N = 142). A marked improvement was observed in the study compared to the control group. Regarding position, 67.6% of the mothers in study group achieved good scores, whereas 80.3% in the control group remained moderate (χ^2 = 35.59, df = 2, p < 0.001). For grasping/attachment, 69.0% in study group had a good score compared to 26.8% in the control group, with most controls in the moderate category (71.8%) (χ^2 = 25.74, df = 2, p < 0.001). Regarding sucking, 66.2% of the study group achieved good scores, while 77.5% of the control group remained moderate (χ^2 = 35.59, df = 2, p < 0.001). For swallowing/gulping, 71.8% in the study group had good scores compared to 14.1% in the control group, with 83.1% remaining moderate (χ^2 = 52.88, df = 2, p < 0.001).
Hence, it is interpreted that the post-intervention findings indicate that the intervention was highly effective in enhancing breastfeeding practices, as reflected by significantly better Bristol Breastfeeding Assessment scores in the experimental group compared to the control group across all the assessed domains (p < 0.001).

Table 3: Comparison of Pre- and Post-Intervention Bristol Breastfeeding Total Scores Between study and Control Groups N= 142

Bristol Breastfeeding Score	study (n = 71) Mean ± SD	Control (n = 71) Mean ± SD	t	df	p-value
Pre-intervention Bristol total score	0.99 ± 1.56	1.20 ± 1.70	0.77	140	0.443
Post-intervention Bristol total score	6.61 ± 1.40	4.76 ± 1.34	8.04	140	<0.001†

**Independent sample t-test*
Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

Table 3 compares the pre- and post-intervention Bristol Breastfeeding total scores between the study and control groups (N = 142).
At pre-intervention, the mean Bristol score in the study group (0.99 ± 1.56) was comparable to the control group (1.20 ± 1.70), with no significant difference (t = −0.77, df = 140, p = 0.443). At post-intervention, the study group showed a higher mean score (6.61 ± 1.40) compared to the control group (4.76 ± 1.34), which was statistically highly significant (t = 8.04, df = 140, p < 0.001), indicating the effectiveness of the intervention.
Therefore, the results suggest that although both groups were similar at baseline, the study group demonstrated a significantly greater improvement in breastfeeding outcomes after the intervention, as assessed using the Bristol Breastfeeding Assessment Tool.

Table 4: Comparison of Breastfeeding Categories (Bristol Total Score) Between Study and Control Groups (Pre- and Post-Intervention) N= 142

Assessment time	Breastfeeding category	study (n = 71)	n (%)	Control (n = 71)	n (%)	χ^2	df	p-value
Pre-intervention	Poor	60	84.5%	57	80.3%	0.44	1	0.509
	Fair	11	15.5%	14	19.7%			
	Good	0	0%	0	0%			
Post-intervention	Poor	1	1.4%	2	2.8%	38.75	2	<0.001†
	Fair	25	35.2%	60	84.5%			
	Good	45	63.4%	9	12.7%			

. Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

Table 4 compares breastfeeding categories based on the Bristol total score between the study and control groups at pre- and post-intervention stages (N = 142).
At pre-intervention, most postnatal mothers in the study (84.5%) and control (80.3%) groups had poor breastfeeding, with no significant difference ($\chi^2 = 0.44$, df = 1, p = 0.509). At post-intervention, the study group showed improvement, with 63.4% achieving good breastfeeding, while the control group predominantly remained classified under the fair category (84.5%), with fewer achieving good breastfeeding (12.7%). A statistically significant difference was observed ($\chi^2 = 38.75$, df = 2, p < 0.001).
Thus, the findings indicate that although both groups were similar at baseline, the intervention resulted in a marked improvement in breastfeeding outcomes in the study group compared to the control group, evidenced by a significant increase in the number of mothers demonstrating good breastfeeding practices.

Table 5: Comparison of LATCH Questionnaire Scores Between study and Control Groups (Pre-test and Post-Intervention) N = 142

A. Pre-intervention LATCH Assessment

LATCH item	Response	Experimental (n = 71)	n (%)	Control (n = 71) n (%)		χ^2	df	P-value
How to latch onto the breast?	Too sleepy	45	63.4%	45	63.4%	0.00	1	1.000
	Repeated attempts	26	36.6%	26	36.6%			
Audible swallowing	A few with stimulation	54	76.1%	53	74.6%	1.01	2	0.604
	Spontaneous	17	23.9%	17	23.9%			
	None	0	0.0%	1	1.4%			
Type of nipple	Flat	13	18.3%	13	18.3%	2.23	3	0.526
	Everted	49	69.0%	52	73.2%			
	Inverted	9	12.7%	5	7.0%			
	Other	0	0.0%	1	1.4%			
Comfort	Filling/tendered	15	21.1%	25	35.2%	5.50	3	0.139
	Soft / non-tender	1	1.4%	0	0.0%			
	Engorged	55	77.5%	45	63.4%			
	Other	0	0.0%	1	1.4%			
Amount of help	Need help	70	98.6%	68	95.8%	1.03	1	0.310
	Minimal assist	1	1.4%	3	4.2%			

Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

Table 5(A) The table presents the pre-intervention comparison of LATCH questionnaire scores between the study and control groups (N = 142). The two groups showed similar breastfeeding practices at baseline, with no significant differences across all items. For latching, identical distributions were observed ($\chi^2 = 0.00$, df = 1, p = 1.000). Audible swallowing showed no significant difference ($\chi^2 = 1.01$, df = 2, p = 0.604). The type of nipple was comparable between groups ($\chi^2 = 2.23$, df = 3, p = 0.526). Comfort levels were also similar ($\chi^2 = 5.50$, df = 3, p = 0.139), and the amount of help required did not differ significantly ($\chi^2 = 1.03$, df = 1, p = 0.310).

Overall, no statistically significant variations were found (p > 0.05), indicating that both groups were comparable before the intervention.

Post-intervention LATCH Assessment

LATCH item	Response	study n = 71	n (%)	Control n = 71	n %	χ^2 (df), p-value	df	p-value
How to latch onto the breast?	Repeated attempts	1	1.4%	33	46.5%	39.60	1	<0.001†
	Grasp breast	70	98.6%	38	53.5%			
Audible swallowing	A few with stimulation	18	25.4%	32	45.1%	6.10	2	0.047†
	Spontaneous	52	73.2%	38	53.5%			
	None	1	1.4%	1	1.4%			
Type of nipple	Flat	9	12.7%	13	18.3%	11.79	3	0.008†
	Everted	42	59.2%	52	73.2%			
	Inverted	20	28.2%	5	7.0%			
	Other	0	0.0%	1	1.4%			
Comfort	Filling/tendered	0	0.0%	23	32.4%	27.45	1	<0.001†
	Soft / non-tender	71	100.0%	48	67.6%			

	Engorged	0	0	0	0			
Amount of help	Minimal assist	34	47.9%	0	0.0%	44.70	1	<0.001†
	No assist	37	52.1%	71	100.0%			

Table 5(B) The table presents the post-intervention comparison of LATCH questionnaire scores between the study and control groups (N = 142). A marked improvement was recorded in the study group. For latching, 98.6% of postnatal mothers in the study group had the ability to grasp the breast effectively compared to 46.5% in the control group ($\chi^2 = 39.60$, df = 1, $p < 0.001$). Audible swallowing was showed higher levels in the study group (73.2%) than control group (53.5%) ($\chi^2 = 6.10$, df = 2, $p = 0.047$). The type of nipple also demonstrated statistical significant difference ($\chi^2 = 11.79$, df = 3, $p = 0.008$).
Regarding comfort, 100.0% of postnatal mothers in study group reported soft breasts compared to 32.4% in control group ($\chi^2 = 27.45$, df = 1, $p < 0.001$). For the amount of help required, 52.1% in the study group required no assistance, whereas all mothers in the control group required help ($\chi^2 = 44.70$, df = 1, $p < 0.001$).
Overall, the findings demonstrated a statistically significant improvement in LATCH scores in the study group compared to the control group ($p < 0.05$).

Table 5C: Between-Group Comparison of Pre-test and Post-test Scores Between study and Control Groups N = 142

Variable	study (Group 1) (n = 71) Mean ± SD	Control (Group 2) (n = 71) Mean ± SD	t	df	p-value
Pre-test score	2.31 ± 1.04	2.66 ± 1.48	1.64	140	0.103
Post-test score	9.13 ± 0.88	5.79 ± 0.83	23.34	140	<0.001†

Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

At pre-test, the mean score of the study group (2.31 ± 1.04) was comparable to the control group (2.66 ± 1.48), with no significant difference ($t = -1.64$, df = 140, $p = 0.103$). At post-test, the study group demonstrated a significantly higher mean score (9.13 ± 0.88) compared to the control group (5.79 ± 0.83), which was statistically highly significant ($t = 23.34$, df = 140, $p < 0.001$).
Hence, the findings indicate that while both groups were similar before the intervention, the study group demonstrated a marked and statistically significant improvement in post-test scores compared to the control group.

Table 5d: Comparison of Pre-test and Post-test Breastfeeding Categories Between the Study and Control Groups N = 142

Breastfeeding category	Study (Group 1) n (%)	Control (Group 2) n (%)	Total n (%)
Pre-test Breastfeeding Category			
Inadequate breastfeeding	63 (88.7%)	49 (69.0%)	8.71 (1), 0.003†
Acceptable feeding	8 (11.3%)	22 (31.0%)	
Post-test Breastfeeding Category			
Inadequate breastfeeding	0 (0.0%)	1 (1.4%)	110.05 (2), <0.001†

Acceptable feeding	0 (0.0%)	61 (85.9%)	
Satisfactory breastfeeding	71 (100.0%)	9 (12.7%)	

Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

Table 5d The table presents the comparison of pre-test and post-test breastfeeding categories between the study and control groups (N = 142). At pre-test, the majority of mothers had inadequate breastfeeding, with a higher proportion in the study group (88.7%) compared to the control group (69.0%), while acceptable feeding was more common in the control group (31.0%) ($\chi^2 = 8.71$, df = 1, p = 0.003).
At post-test, all mothers in the study group achieved satisfactory breastfeeding (100.0%), whereas most mothers in the control group remained in the acceptable category (85.9%), with fewer attaining satisfactory breastfeeding (12.7%) ($\chi^2 = 110.05$, df = 2, p < 0.001).
Overall, the results show a statistically significant improvement in breastfeeding outcomes in the study group after the intervention.

Table 6: Between-Group Comparison of Pre-test and Post-test Pain Scores Between study and Control Groups N = 142

Pain score	**Study (n = 71) Mean ± SD**	**Control (n = 71) Mean ± SD**	**t**	**df**	**p-value**
Pre-test pain score	6.24 ± 1.79	6.04 ± 1.48	0.72	140	0.475
Post-test pain score	3.69 ± 0.95	4.56 ± 1.46	4.22	140	<0.001†

Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

Table 6: The table compares pre-test and post-test pain scores between the study and control groups. At pre-test, the mean pain score in the study group (6.24 ± 1.79) was comparable to the control group (6.04 ± 1.48), with no significant difference (t = 0.72, df = 140, p = 0.475). At post-test, the study group showed a significantly lower mean pain score (3.69 ± 0.95) compared to the control group (4.56 ± 1.46), which was statistically highly significant (t = 4.22, df = 140, p < 0.001).
Hence, the findings suggest that while both groups were comparable in terms of pain before the intervention, the intervention was effective in significantly reducing post-test pain levels in the study group compared to the control group.

Table 6A: Comparison of Pre-test and Post-test Pain Categories Between Study and Control Groups N = 142

Pain category	**Study group**	**n (%)**	**Control**	**n (%)**	**χ^2**	**df**	**p-value**
Pre-test Pain Category							
Mild pain	6	8.5%	0	0.0%	8.98	2	0.011†
Moderate pain	34	47.9%	47	66.2%			
Severe pain	31	43.7%	24	33.8%			
Post-test Pain Category							

Mild pain	28	39.4%	16	22.5%	11.45	2	0.003†
Moderate pain	43	60.6%	47	66.2%			
Severe pain	0	0.0%	8	11.3%			

Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

Table 6A: The table compares pre-test and post-test pain categories between the study and control groups (N = 142). At pre-intervention, most participants reported moderate to severe pain; in the study group, 47.9% had moderate and 43.7% had severe level of pain, while in the control group, 66.2% had moderate and 33.8% had severe pain, with mild pain only in the study group (8.5%) ($\chi^2 = 8.98$, df = 2, p = 0.011). At post-test, more participants in the study group experienced mild pain (39.4%) when compared with the control group (22.5%), with no pain in the study group, whereas 11.3% in the control group still had severe pain ($\chi^2 = 11.45$, df = 2, p = 0.003).
Hence, the findings demonstrate that although baseline pain levels differed between the groups, the intervention was associated with a decrease in level of pain intensity in the study group compared to the control group at the post-test assessment.

Table 6A: Comparison of Pre-test and Post-test Pain Categories Between Study and Control Groups N = 142

Pain category	**study**	**n (%)**	**Control**	**n (%)**	**χ^2**	**df**	**p-value**
Pre-test Pain Category							
Mild pain	6	8.5%	0	0.0%	8.98	**2**	0.011†
Moderate pain	34	47.9%	47	66.2%			
Severe pain	31	43.7%	24	33.8%			
Post-test Pain Category							
Mild pain	28	39.4%	16	22.5%	11.45	2	0.003†
Moderate pain	43	60.6%	47	66.2%			
Severe pain	0	0.0%	8	11.3%			

Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

Table 6A compares the distribution of pre-test and post-test pain categories between the study and control groups (N = 142).
At pre-intervention, most participants in both groups reported moderate to severe pain; in the study group, 47.9% had moderate and 43.7% experienced severe pain, whereas the control group, 66.2% had moderate and 33.8% had severe pain, with mild pain only in the study group (8.5%) ($\chi^2 = 8.98$, df = 2, p = 0.011). At post-test, more participants in the study group experienced mild pain (39.4%) in relative to the control group (22.5%), no severe pain was reported in the study group, whereas 11.3% in the control group continued to have severe pain ($\chi^2 = 11.45$, df = 2, p = 0.003).
Hence, it interprets that baseline pain levels differed between the groups; the intervention resulted in a greater reduction in pain intensity in the study group relative to the control group at the post-test.

Table 7: Between-Group Comparison of Pre-test and Post-test Breast Engorgement Scores Between study and Control Groups N = 142

Breast engorgement score	Study (n = 71) Mean ± SD	Control (n = 71) Mean ± SD	t	df	p-value
Pre-test breast engorgement score	5.65 ± 0.54	5.30 ± 0.62	3.62	140	<0.001†
Post-test breast engorgement score	2.23 ± 0.88	3.68 ± 0.65	11.16	140	<0.001†

Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

Table 7 presents the between-group comparison of pre-test and post-test breast engorgement scores between the study and control groups.

At the pre-intervention stage, the study group exhibited a higher mean breast engorgement score (5.65 ± 0.54) in relative to the control group (5.30 ± 0.62), and this difference was statistically significant (t = 3.62, df = 140, p < 0.001). At post-test stage, a marked reduction in level of breast engorgement was observed in the study group, with a lower mean score (2.23 ± 0.88) compared to the control group (3.68 ± 0.65). This difference was statistically highly significant (t = −11.16, df = 140, p < 0.001), reflecting the positive impact of the intervention in reducing breast engorgement.

Hence, it interprets that a baseline difference existed between the groups; the study group showed a substantially marked reduction in the breast engorgement following the intervention compared to the control group.

Table 7A: Comparison of Pre-test and Post-test Breast Engorgement Categories Between Study and Control Groups N = 142

Breast engorgement category	study n (%)	n (%)	Control n (%)		χ^2	df	p-value
Pre-test Breast Engorgement Category							
Moderate breast engorgement	23	32.4%	44	62.0%	12.46	1	<0.001†
Severe breast engorgement	48	67.6%	27	38.0%			
Post-test Breast Engorgement Category							
Mild breast engorgement	47	66.2%	1	1.4%	68.84	2	<0.001†
Moderate breast engorgement	23	32.4%	70	98.6%			
Severe breast engorgement	1	1.4%	0	0.0%			

Footnotes: n = number of subjects, % = percentage, χ^2 = Chi-square test , df = degrees of freedom, p value > 0.05 = not statistically significant, Experimental group (n = 71); Control group (n = 71)

The table compares the distribution of breast engorgement categories between the study and control groups at pre-test and post-test assessments.

At pre-test, all participants in both groups showed moderate or intense breast engorgement. Among the study group, 32.4% had moderate breast engorgement and 67.6% had severe breast engorgement, whereas in the control group, 62.0% had moderate breast engorgement and 38.0% had severe breast engorgement ($\chi^2 = 12.46$, df = 1, p < 0.001). At post-test, most postnatal mothers in the study group reported mild engorgement (66.2%), with only 1.4% remaining severe, while the control group largely remained moderate (98.6%) with no severe cases ($\chi^2 = 68.84$, df = 2, p < 0.001). Hence, these findings indicate that although at baseline breast engorgement varied between the groups, the intervention was associated with a substantial curtailment in the level of breast engorgement in the study group relative to the control group, as evidenced by the shift towards milder categories at the post-test assessment.

Table 8: Association Between Pre-test Breast Engorgement Categories and Selected Sociodemographic Variables Among Postnatal Mothers N = 142

Sociodemographic Variable	Moderate Breast Engorgement n	(%)	Severe Breast Engorgement n (%)	%	χ^2	(df)	p-value
Age (in years)							
• 18–20 years	24	35.8%	26	**34.7%**	0.64	**3**	**0.888**
• 21–23 years	20	29.9%	26	**34.7%**			
• 24–26 years	20	29.9%	21	**28.0%**			
• ≥27 years	3	4.5%	2	**2.7%**			
Educational Status							
• Primary education	5 ()	7.5%	8	**10.7%**	0.93	3	0.819
• Secondary education	21	31.3	19	**25.3%**			
• Higher secondary education	17	25.4%	19	**25.3%**			
• Graduate and above	24	35.8%	29	**38.7%**			
Occupation							
• Government employee	2	3.0%	3	**4.0%**	2.36	2	0.308
• Homemaker	63	94%	72	**96.0%**			
• Private employee	2	3%	0	**0.0%**			
Type of Family					1.41	**2**	0.494
• Nuclear family	7	10.4%	6	**8.0%**			
• Joint family	59	88.1%	69	**92.0%**			
• Extended family	1	1.5%	0	**0.0%**			
Postnatal Day							
• 1st postnatal day	6	9%	2	**2.7%**	3.61	3	0.306
• 2nd postnatal day	50	74.6%	55	**73.3%**			
• 3rd postnatal day	10	14.9%	17	**22.7%**			
• ≥4th postnatal day	1	1.5%	1	**1.3%**			
Number of Children							
• One child	36	53.7%	49	**65.3%**	**3.18**	**2**	0.204
• Two children	29	43.3%	22	**29.3%**			
• Three or more children	2	3%	4	**5.3%**			

Table 8 shows the association between pre-test breast engorgement categories and selected sociodemographic variables among postnatal mothers (N = 142). The findings revealed that there was **no statistically significant association** between pre-test breast engorgement categories and variables such as age, educational status, occupation, type of family, postnatal day, and number of children ($p > 0.05$).

The majority of mothers with both moderate and severe breast engorgement belonged to the age group of 18–26 years, were homemakers, belonged to joint families, and were on the 2nd postnatal day. Severe breast engorgement was more commonly observed among mothers having one child. However, none of these variables showed a statistically significant association with breast engorgement severity.

Overall, the findings indicate that selected sociodemographic variables did not significantly influence pre-test breast engorgement among postnatal mothers.

DISCUSSION

The first objective was to assess the pre-test level of painful breast engorgement among postnatal mothers.

In the present research, pre-test demonstrates showing that the mean breast engorgement score in the study group was higher than the control group (5.65 ± 0.54 vs 5.30 ± 0.62; $t = 3.62$, $p < 0.001$), showing a significant difference at baseline. However, pain scores were comparable between the groups (6.24 ± 1.79 vs 6.04 ± 1.48; $t = 0.72$, $p = 0.475$).

The majority of postnatal mothers in both groups experienced moderate to severe pain. A significant difference was observed in pain categories ($\chi^2 = 8.98$, $p = 0.011$). Breastfeeding assessment revealed that most postnatal mothers had poor breastfeeding in both groups (84.5% vs 80.3%), with no significant difference ($p = 0.509$). Similarly, LATCH scores showed no significant difference ($p > 0.05$), indicating comparable baseline breastfeeding difficulties. Thus, it can be concluded that painful breast engorgement, moderate to severe pain, and ineffective breastfeeding were common among postnatal mothers before intervention.

The results are consistent with **Indrani and Sowmya (2020),** who reported a high prevalence of moderate to severe breast engorgement among lactating mothers, with associated pain and breastfeeding challenges [(36)]. Their findings support the observation that engorgement remains a common postpartum problem requiring timely management. This study assessed breast engorgement among 90 lactating mothers using the SPES and VAS scales. Findings showed that 59-68 mothers experienced engorgement and pain, with an overall prevalence of 65-75%

The results of the current study align with those reported by Kumari 38, who found that the mean initial pain scores for both groups were similar at baseline and after 20 minutes. Furthermore, pain levels in both groups gradually decreased over six time intervals, with comparable reductions observed in the hot water bag group and the cold green cabbage leaf group[38].

The second objective was to determine the effectiveness of the alternative application of Cold and hot compresses on painful breast engorgement among postnatal mothers.

In the present study, the experimental group showed a markedly greater reduction in breast engorgement scores compared to the control group at post-test (2.23 ± 0.88 vs. 3.68 ± 0.65; $t = 11.16$, $p < 0.001$), indicating the intervention's strong effectiveness in alleviating engorgement. A significant difference was also observed across engorgement categories ($\chi^2 = 68.84$, $p < 0.001$). Likewise, pain scores decreased significantly in the study group (3.69 ± 0.95 vs. 4.56 ± 1.46; $t = 4.22$, $p < 0.001$), with no mother reporting severe pain, while 11.3% of mothers in the control group experienced severe pain, demonstrating notable clinical effectiveness. Breastfeeding outcomes also showed significant improvement.. The mean Bristol score increased (6.61 ± 1.40 vs 4.76 ± 1.34; $t = 8.04$, $p < 0.001$), and the LATCH score improved markedly (9.13 ± 0.88 vs 5.79 ± 0.83; $t = 23.34$, $p < 0.001$). Significant improvements were seen in latch ability, breast comfort, and reduced need for assistance ($p < 0.001$).

The findings of the present study are in agreement with those of Alshakhs et al. (2024), who conducted a randomized controlled trial involving 100 lactating mothers and found that alternating cold and hot compresses significantly decreased breast engorgement and pain, while also improving LATCH scores ($p < 0.001$). No significant baseline differences were noted between the study and control groups.

The third objective is to find an association between the pretest intervention score of painful breast engorgement with selected demographic variables among postnatal mothers.

The results of the present study revealed no statistically significant relationship between pre-test breast engorgement scores and selected demographic factors, including age, education, occupation, family type, postnatal day, and number of children, as all calculated p-values exceeded 0.05 ($p > 0.05$).

This indicates that breast engorgement severity occurs uniformly among postnatal mothers irrespective of their demographic characteristics. In other words, demographic factors did not significantly influence the occurrence or severity of painful breast engorgement in the present study.

The findings of Kumari [38], which align with the results of the present study, reported no statistically significant differences between the study and control groups regarding sociodemographic and obstetric characteristics. Similarly, Lamadah et al. [39] noted that the mean age of participants receiving lukewarm water compresses was approximately 23 years and 4 months, while the group receiving cold gel packs had a mean age of about 25 years and 6 months. Most participants in both groups were homemakers, comprising 90% and 92.5%, respectively, and a large proportion were multiparous (82.5% and 77.5%). Cesarean deliveries occurred in 67.5% and 55% of cases, respectively, with no statistically significant difference between the groups. Additionally, breastfeeding was initiated between 8 and 24 hours after delivery in both groups.

CONCLUSION

The study results demonstrated a statistically significant reduction in breast engorgement scores in the experimental group compared to the control group (2.23 ± 0.88 vs. 3.68 ± 0.65; $t = 11.16$, $p < 0.001$). Pain scores were also notably lower in the study group (3.69 ± 0.95 vs. 4.56 ± 1.46; $p < 0.001$). Furthermore, breastfeeding outcomes improved significantly, with higher Bristol and LATCH scores observed in the experimental group ($p < 0.001$). These findings suggest that the alternating application of cold and hot compresses is an effective, safe, and cost-efficient nursing intervention for alleviating breast engorgement and enhancing breastfeeding among postnatal mothers.

Ethics Approval

Ethical approval for this study was obtained from the Institutional Ethics Committee (IEC), College of Nursing, King George's Medical University (KGMU), Lucknow, Uttar Pradesh, India (Approval No. __36-PGTSC-IIC-NUR/P20_____, Date: 23/6/25).

All procedures performed in this study involving human participants were in accordance with the ethical standards of the Institutional Ethics Committee

REFERENCES

1. Curtis C. Breastfeeding online [Internet]. 2003. Available from: http://www.breastfeeding.com
2. Riordan J, Wambach K. *Breastfeeding and human lactation*. 4th ed. Jones & Bartlett Learning; 2010.
3. World Health Organization. *Guideline: counselling of women to improve breastfeeding practices*. Geneva: WHO; 2018. Available from: https://www.ncbi.nlm.nih.gov/books/NBK539314/
4. Berens P, Brodribb W. ABM clinical protocol #20: Engorgement, revised 2016. *Breastfeed Med*. 2016;11(4):159–63.
5. Fraser DM, Cooper MA. *Myles textbook for midwives*. Churchill Livingstone; 2003. p. 762–63.
6. Riordan J, Wambach K. *Breastfeeding and human lactation*. 4th ed. Jones & Bartlett Learning; 2010.
7. Fraser DM, Cooper MA. *Myles textbook for midwives*. Churchill Livingstone; 2003. p. 762–63.
8. Fraser DM, Cooper MA. *Myles textbook for midwives*. Churchill Livingstone; 2003. p. 762–63.
9. Riordan J, Wambach K. *Breastfeeding and human lactation*. 4th ed. Jones & Bartlett Learning; 2010.
10. U.S. Department of Health and Human Services. Healthy People 2030: Increase the proportion of infants who are breastfed exclusively through age 6 months (MICH-15) [Internet]. Available from: https://health.gov/healthypeople
11. Alshakhs FH, Katooa NE, Badr HA, Thabet HA. Effect of alternating application of cold and hot compresses on reduction of breast engorgement among lactating mothers. *Cureus*. 2024;16(1):e53134.
12. Mansur LS, Hasan AA, et al. Effect of lukewarm water compresses versus cold gel packs on breast engorgement among puerperal women. *Int J Nurs Midwifery Res*. 2021;8(2):45–52.
13. Arora S, Vatsa M, Dadhwal V. Breastfeeding practices. *Indian J Community Med*. 2008;33(3):5.
14. Cochrane Database of Systematic Reviews. Treatments for breast engorgement. Available from: https://doi.org/10.1002/14651858.CD006946.pub4
15. Nanthini R, Bhuvaneswari G. Study to assess the effectiveness of cold cabbage leaves vs hot water application on breast engorgement. *Int J Sci Res*. 2013;4:9.
16. Prashanth C. Effectiveness of cabbage leaves application on breast engorgement. *Indian J Appl Res*. 2014;4(12):472–74.
17. Sharma P. Study to assess knowledge of postnatal mothers regarding breast engorgement. *Int J Nurs Educ*. 2013;5(2):130–32.
18. Williams Obstetrics. Breastfeeding and engorgement. 24th ed. McGraw-Hill; 2014.
19. Thomas A, Chhugani M, Thokchom S. Effectiveness of chilled cabbage leaves on breast engorgement. *Int J Nurs Midwifery Res*. 2017;4(1).
20. Mangesi L, Zakarija-Grkovic I. Treatments for breast engorgement during lactation. *Cochrane Database Syst Rev*. 2016.
21. Guilbert ER, Brown JP, Kaunitz AM, et al. Use of cabbage compress to reduce breast engorgement. 2012;79(3):167–177.
22. Ward S, Hisley S, Kennedy A. *Maternal and child nursing care*. 2nd ed. FA Davis; 2016. p. 555–604.
23. World Health Organization. Management of breast conditions and other breastfeeding difficulties [Internet]. 2009. Available from: https://www.ncbi.nlm.nih.gov/books/NBK148955/
24. Verma N, Bala K, Kumar L. Breast engorgement management. *Int J Trend Sci Res Dev*. 2018;2(6).
25. Sharma P. Breast engorgement studies. *Int J Nurs Educ*. 2013;5(2).
26. Hill PD, Humenick SS. International Lactation Consultant Association [Internet]. Available from: www.researchgate.net
27. World Health Organization. *Guideline: counselling of women to improve breastfeeding practices*. Geneva: WHO; 2018. Available from: https://www.ncbi.nlm.nih.gov/books/NBK539314/
28. Mustar H, Hnasidar, Indrayani. Factors influencing breast engorgement. *J Maternal Child Health*. 2021;6(2):123–130.
29. Ara R, Parvin S, Yasmin D, Haiq F, et al. Assessment of postpartum breast complications. *J Dhaka Med Coll*. 2024;32(1):45–52.
30. Anandhi R, Vahitha S, Sasirekha R. Lukewarm water compress on nipple pain and engorgement. *Int J Curr Med Pharm Res*. 2017;3(7):1860–63.
31. Vandhana R, Rajesh R, Rajamma V. Effectiveness of cold cabbage leaves vs hot application. *Int J Nurs Res*. 2025;13(1):37–42.

32. Nagre SS, Parker U. Comparative study of cabbage leaves vs hot application. *Int J Nurs Med Res*. 2023;2(2):45–48.
33. Eittah HFA, Ashour ESS. Warm compress vs chilled cabbage leaves. *Menoufia Nurs J*. 2021;6(2):45–58.
34. Zagloul MC, Naser EG, Hassan HE. Hot compress vs cabbage leaves. *Am J Nurs Res*. 2020;8(3):177–184.