

## Effect of Lukewarm Water Compresses Versus Cold Gel Packs on Breast Engorgement Among Puerperal Women

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### Abstract:

Breast engorgement can cause breastfeeding difficulties. Different non-pharmacological methods to relieve breast engorgement have been attempted and investigated. **The aim of the study** was to assess the effect of lukewarm water compresses versus cold gel packs on breast engorgement among puerperal women. **Subject and method:** A quasi-experimental research design was utilized. This study was conducted at the Obstetric and Gynecologic Department of Damanshour National Medical Institution at El-Behira Governorate. A convenient sample of 80 puerperal women was recruited according to inclusion criteria. The selected women were assigned randomly and equally into two groups; group 1 (lukewarm water compresses) and group 2 (cold gel packs). Three tools were used to collect the necessary data (basic data structured interview schedule, Six-Point self-rated engorgement scale and Visual Analogue Scale). **Results:** According to the breast engorgement rating scale, a highly statistically significant difference ( $P=0.000$ ) was found between the two groups after the 2<sup>nd</sup> intervention day. **Conclusion:** breast engorgement and pain intensity were significantly reduced after the second intervention day among lukewarm water compresses group, compared to the cold gel packs group. **Recommendations:** nurses should be trained to advise women during their discharge teaching plan about lukewarm water compresses application to relieve breast engorgement.

**Keywords:** Breast engorgement, Cold gel packs & Lukewarm water compresses.

### Introduction:

Mother's breast milk is the healthiest nourishment for newborns since it contains all of the vital nutrients, antibodies, and other components needed for normal growth and development. Breastfeeding has also been shown to result in short and long term extensive physical and psychological benefits for both the mother and the newborn. Moreover, over the last three decades, the number of new mothers who breastfeed their babies has increased dramatically. On the other hand, breastfeeding can be a painful, unpleasant, and frustrating experience for many women (Awaliyah et al., 2019 & Wong et al., 2017). The most prevalent problems that mothers may experience during the first postpartum week are failure of the baby to latch and adequately empty the breast as well as breast engorgement. On the other hand, most full-term, healthy newborns are ready and eager to start nursing within the first half-hour to two hours of birth. Otherwise, delaying the onset of lactation may increase the dangers of breast engorgement, which may have a negative effect in the long run (Carreiro et al., 2018).

Breast engorgement is a painful condition that affects 40% of breastfeeding mothers. It is an accumulation

of milk in the breasts that commonly happens in the first few days after giving birth. Breast engorgement can develop if the rate of milk secretion exceeds the rate of its ejection or if the baby's latching on is poor (Cash et al., 2020; Zakarija-Grkovic, Stewart (2020); & Leung, 2016). It can also be caused by a variety of factors, including separation of the baby from the mother, delay in the baby's nursing, and insufficient breastfeeding (e.g. incorrect positioning and attachment, decreased frequency and time of breastfeeding, and substitution of breast milk with other fluids (Yingfeng, 2013).

Breast engorgement can result in swollen, firm, and painful breasts as well as nipple swelling, which can make sucking and continued breastfeeding difficult for the baby (Khosravan et al., 2017). It can also cause nipple pain or trauma as a result of inadequate and inappropriate sucking. In addition, untreated breast engorgement can lead to pathological conditions such as mastitis and breast abscess, which in turn can contribute to early weaning (Australian Breastfeeding Association, 2021 & Brown, 2017). However, breast engorgement is an uncomfortable experience and is associated with frustration, which may make lactating mothers to discontinue

breastfeeding after the first few days (Anderson & Kynoch, 2017).

The first week of puerperium is critical for the mother to develop proper breastfeeding technique, gain confidence, and have positive breastfeeding experience (Odom et al., 2013). Breast engorgement can be prevented by establishing and maintaining the flow of breast milk as well as emptying the milk effectively via the baby or expression (National Library of Medicine, 2011). On the other hand, non-pharmacological treatments of breast engorgement are becoming increasingly popular. They include cabbage leaves, hot/cold pack, effective milk removal, acupuncture, Gua-Sha (scraping therapy), cold gel packs and lukewarm water application. Although many forms of these treatments have been studied, a little evidence has been proven to be beneficial (Pustotina, 2016).

Alternate warm and cold compresses are one of non-pharmacological methods, which can be used to relieve breast engorgement. Although heat stimulates blood flow, its application on engorged breast is typically counterproductive (Kamali et al., 2013). Lukewarm water is another method of breast engorgement relief; the word "lukewarm" is derived from the Middle English word "lukewarme" where "luke" comes from "lew," which means "tepid," or "just mildly warm." Thus, lukewarm water is neither hot nor cold, but there is no set standard for its exact temperature. Some believe lukewarm water temperature to be between 98° F and 105° F (36.5°C to 40.5°C). This can be identified by applying running warm water on the wrist and feeling it slightly warmer than the body temperature, but not hot (Sheelavathi et al., 2019).

Ice gel packs are also types of non-pharmacological therapies of breast engorgement relief. The application of cold is assumed to be relaxing and decreases blood flow to the skin by vasoconstriction, which is expected to reduce engorgement. Non-medical interventions are gaining popularity as valid therapy options since they are more readily available, generally simple to use, convenient, and inexpensive than medical interventions. (Zakarija-Grkovic & Stewart (2020).

### Significance of the study:

However, breast engorgement has a negative impact on breast sucking and breastfeeding. A lot of mothers may wish to breastfeed their babies, but this problem interferes with the continuity of breastfeeding. So, early detection and treatment of such a problem, seen in the postpartum period, is essential for maternal and newborn health (Karaçam & Sağlık, 2018; Coca et al., 2016). Proper management of breast

engorgement is necessary for successful long-term lactation. So, the aim of this study was to assess the effect of lukewarm water compresses versus cold gel packs on breast engorgement among puerperal women

### Aim of the study:

This study aimed to assess the effect of lukewarm water compresses versus cold gel packs on breast engorgement among puerperal women.

### Research hypothesis:

Puerperal women who apply lukewarm water compresses on engorged breast exhibit less breast hardness and pain, compared to those who apply cold gel packs.

### Subject and Method:

#### Research design:

A quasi-experimental research design was utilized, where the effect of independent variable (lukewarm water compresses and cold gel packs) on dependent variable (breast engorgement) was examined.

#### Setting:

This study was conducted at the Obstetric and Gynecologic Department of Damanhur National Medical Institution at El-Behira Governorate.

#### Subjects

A convenient sample of 80 puerperal women was recruited according to the following criteria: suffering from breast engorgement, within the first two weeks of postnatal period, willing to breastfeed babies and having no other breast problems.

Epi info 7 statistical program was used to estimate the sample size using the following parameters:

Population size= 416 (per month)

Expected frequency=50%

Acceptable error= 10%

Confidence coefficient= 95%

Minimal sample size= 78

The final sample size will be 80 for possible normal response

The selected puerperal women were assigned randomly and equally into two groups; group 1 (lukewarm water compresses) and group 2 (cold gel packs).

#### Tools:

Three tools were used:

**Tool one: basic data structured interview schedule**, which was developed by the researchers and included three parts:

**Part I:** Socio-demographic data such as age, educational level, occupation, current residence and type of family.

**Part II:** Reproductive history such as parity and type of delivery.

**Part III:** History of breastfeeding and engorgement such as time of initiation, way, frequency and

duration of breastfeeding as well as onset of breast engorgement.

**Tool two: Six-Point self-rated engorgement scale:**

It was developed by Hill & Humenick (1994) and adapted by the researchers to assess the degree of breast engorgement. The score of this scale ranged from 1-6 and is classified as: 1(soft, no change), 2 (slight change), 3 (firm, non-tender), 4 (firm, beginning tenderness), 5 (firm, tender), and 6 (very firm, very tender). Engorgement scale can also be classified as: 1 (normal), 2-3 (mild), 4-5 (moderate) and 6 (severe).

**Tool three: Visual Analogue Scale (VAS):**

It was developed by Gift (1989) and adapted by the researchers to measure intensity of breast pain. It is a self-report scale that consists of a horizontal line in centimeters from 0 to 10, representing 0 (no pain), 1-3 (mild pain), 4-6 (moderate pain), 7-9 (strong pain) and 10 (unbearable pain).

**Method:**

**The study was accomplished as follows:**

1. An approval from Ethical Research Committee, Faculty of Nursing, Damanshur University was obtained.
2. An official letter was sent from the Faculty of Nursing, Damanshur University to the manager of the study setting requesting his permission to collect data after clarifying the objectives of the study.
3. Tool one was developed by the researchers after extensive review of recent and relevant literature. It was reviewed for content validity by a jury of five experts in obstetrics and gynecologic nursing and was checked for its reliability by using Cronbach's alpha test and the result was reliable (0.864).
4. Tools two & three were adapted by the researchers and used to assess the degree of breast engorgement and intensity of breast pain respectively. Cronbach's Alpha coefficient test was used to examine the tool's two and three reliability. The tools had a reasonably homogeneous set of elements, as evidenced by its great reliability. The tools' internal consistency was 0.7904 and 0.8168, respectively.
5. **Pilot study:** It was conducted on eight puerperal women (who were not included in the study population) to determine the feasibility of the study as well as the tools' relevance, clarity, and application. Tools were reviewed, recreated, and made ready for use after making few changes.
6. Before women's discharge from the hospital, data of tool one (parts I & II) was collected through an interview schedule which was conducted individually to 100 puerperal women after obtaining the mother's written consent to

participate in the study. The researchers recruited this extra number after accounting for a 25% drop-out rate. The required subjects for each group was 40 woman. This interview was carried out in the postpartum ward for 15 minutes with each woman.

7. Puerperal women were then followed through telephone calls to ask them about breastfeeding and engorgement using tool one, part III. The researcher asked the woman about breast feeding initiation, way, frequency and duration of breastfeeding as well as onset of breast engorgement if occurred. Puerperal women were also asked about their preferred way of follow-up (either coming to the hospital or through home visits).
8. Puerperal women who fulfilled the inclusion criteria were divided randomly by using a computer program into two groups of 40.
9. Puerperal women of group (1) were asked to apply lukewarm water compresses on both breasts for 15-20 minutes, meanwhile, soaking compresses in water and reapply them every 2 minutes. The first compresses were applied during the first contact of the researchers with the women, who was asked to apply these compresses to themselves 3 times per day for two consecutive days. Beforehand, the researchers taught puerperal woman how to detect lukewarm water; they asked her to test water temperature by applying running warm water on her wrist till it felt slightly warmer than her body temperature, but not hot.
10. The researchers distributed gel packs to the women in the group (2), and asked them to put these packs in the freezer for 15 minutes or in the fridge for 1 hour to become cold. They were also asked to apply one cold gel pack on each breast for 15-20 minutes, three times per day, for two consecutive days.
11. Puerperal women of both groups were asked to nurse their newborn from both breasts every 2 to 3 hours, for 10 to 15 minutes, during the two days of intervention.
12. The researchers contacted puerperal women continuously through telephone calls to ascertain compliance with instructions and to make appointments for home visits in order to perform assessment of breast engorgement and pain.
13. Using tools two & three, the researchers assessed breast engorgement and pain for puerperal women of both groups 3 times, before intervention, and after the first and the second intervention days. The researchers observed and palpated the breasts and explained to the women on which basis they marked the VAS.

14. Data were collected over a period of 7 months, starting from the beginning of December 2020 till the end of June 2021.

**Statistical analysis:**

- It was done by the researchers as follows:
- The collected data were categorized, coded, computerized, tabulated and analyzed using Statistical Package for Social Sciences (SPSS) version 23 program.
  - Statistical measures were used such as cross tabulation to describe and summarize categorical variables of the two groups.
  - A descriptive and analytical statistics were used such as percentages, mean & SD; whereas Chi-square-test, Fisher Exact-test and t-test were used to

find out the difference in the results at 0.05 (5%) level of significance.

- The effect of lukewarm water compresses versus cold gel packs on breast engorgement was determined by comparing the degree of breast engorgement and pain intensity of the two groups before and after the interventions.

**Ethical Consideration:**

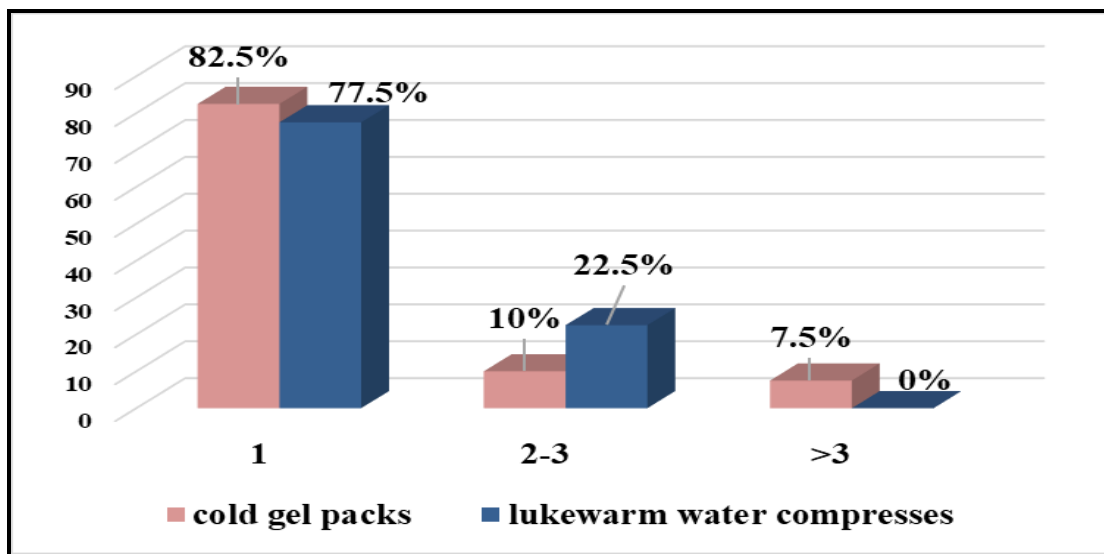
The following issues were considered for each recruited puerperal woman: obtaining the subject's written informed permission after describing the study's purpose, maintaining her privacy, right to withdraw at any time, and ensuring the confidentiality of her data.

**Results:**

**Table (1): Distribution of puerperal women according to their socio-demographic data**

Socio -demographic data	Lukewarm water compresses group (n =40)		Cold gel packs group (n =40)		t-test (P) F / $\chi^2$ (P)
	No.	%	No.	%	
<b>Mean age (years):</b>	23.325 ± 4.085		24.525 ± 5.800		1.070 (0.288)
<b>Educational Level:</b>					4.073 (0.130)
- Illiterate/ read & write	18	45.0	11	27.5	
- Less than university	17	42.5	26	65.0	
- University & more	5	12.5	3	07.5	
<b>Occupation:</b>					0.157 (0.692)
- Housewife	37	92.5	36	90.0	
- Working	3	07.5	4	10.0	
<b>Current residence:</b>					0.524 (0.469)
- Urban	14	35.0	11	27.5	
- Rural	26	65.0	29	72.5	
<b>Type of family:</b>					0.000 1.000
- Nuclear	17	42.5	17	42.5	
- Extended	23	57.5	23	57.5	

$\chi^2$  (P): Chi-Square Test & P for  $\chi^2$  Test    F (P): Fisher Exact test & P for F Test    \*: Significant at  $P \leq 0.05$



**Figure (1): Percent distribution of puerperal women according to their number of deliveries**

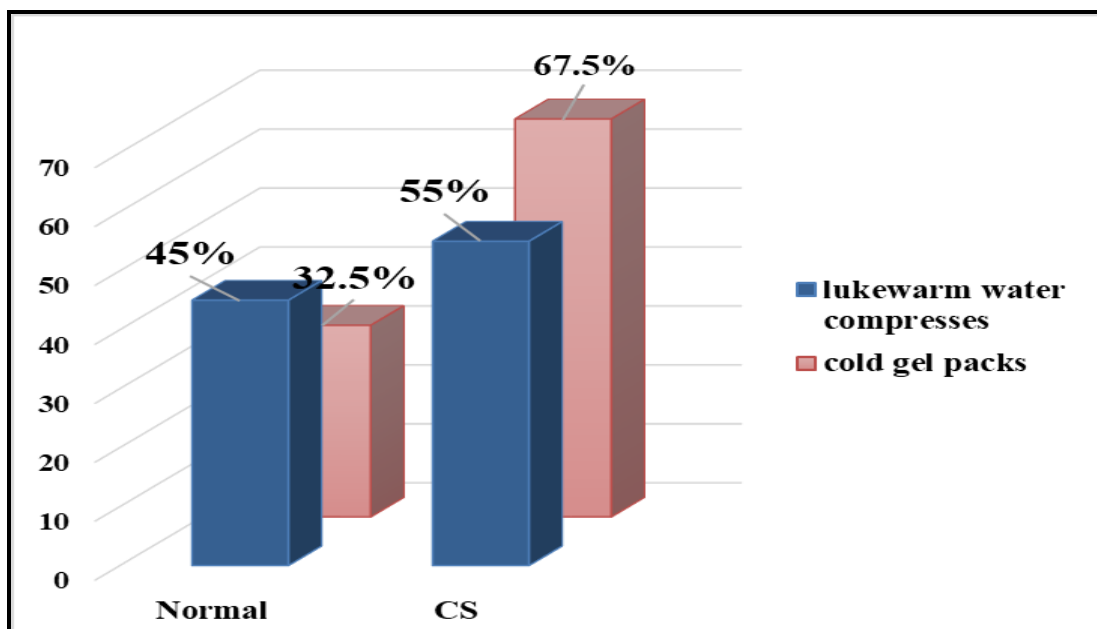


Figure (2): Percent distribution of puerperal women according to their type of delivery

Table (2): Distribution of puerperal women according to their current history of breastfeeding and engorgement

Current history of breastfeeding and engorgement	Lukewarm water compresses group (n =40)		Cold gel packs group (n =40)		F / $\chi^2$ (P)
	No.	%	No.	%	
<b>Time of initiating breastfeeding after delivery:</b>					
- Within 30 minutes	7	17.5	1	02.5	12.113 (0.004)*
- 30 minutes -1 hour	2	05.0	0	00.0	
- 2 hours – 24 hours	22	55.0	17	42.5	
- After 24 hours	9	22.5	22	55.0	
<b>Way of breastfeeding:</b>					
- Schedule	13	32.5	17	42.5	0.853 (0.356)
- On demand	27	67.5	23	57.5	
<b>Frequency of breastfeeding:</b>	(n=13)		(n=17)		
- Every 30 minutes	11	84.6	14	82.4	0.027 (0.869)
- Every 2 hours	2	05.4	3	17.6	
<b>Duration of breastfeeding:</b>					
5-10 minutes	25	62.5	24	60.0	0.053 (0.818)
11-15 minutes	15	37.5	16	40.0	
<b>One side breastfeeding:</b>					
- Yes	10	25.0	7	17.5	0.672 (0.412)
- No	30	75.0	33	82.5	
<b>Onset of breast engorgement after delivery:</b>					
- From 4-6 days	39	97.5	39	97.5	0.000 (1.000)
- After 6 days	1	02.5	1	02.5	

$\chi^2$  (P): Chi-Square Test & P for  $\chi^2$  Test  
 \*: Significant at  $P \leq 0.05$

F (P): Fisher Exact test & P for F Test

**Table (3):**Distribution of puerperal women according to their degree of breast engorgement using six points self-rated engorgement scale

Degree of breast engorgement	Lukewarm water compresses group (n =40)		Cold gel packs group (n =40)		F / $\chi^2$ (P)
	No.	%	No.	%	
<b>Before intervention:</b>					
- Mild	2	05.0	4	10.0	2.23 (0.328)
- Moderate	20	50.0	24	60.0	
- Severe	18	45.0	12	30.0	
<b>After the 1<sup>st</sup> intervention day :</b>					
- Normal	5	12.5	2	5.0	4.642 (0.200)
- Mild	10	25.0	5	12.5	
- Moderate	19	47.5	22	55.0	
- Severe	6	15.0	11	27.5	
<b>After the 2<sup>nd</sup> intervention day :</b>					
- Normal	10	25.0	7	17.5	21.815 (0.000)**
- Mild	20	50.0	5	12.5	
- Moderate	10	25.0	18	45.0	
- Severe	0	00.0	10	25.0	
<b>F / <math>\chi^2</math> (P)</b>	49.964 (0.000)**		9.866 (0.130)		

$\chi^2$  (P): Chi-Square Test &P for  $\chi^2$  Test  
\*: Significant at P ≤0.05

F (P): Fisher Exact test &P for F Test  
\*\*: highly Significant at P ≤0.05

**Table (4):** Distribution of puerperal women according to their breast pain intensity using VAS

Breast pain intensity	Lukewarm water compresses group (n =40)		Cold gel packs group (n =40)		F / $\chi^2$ (P)
	No.	%	No.	%	
<b>Before intervention:</b>					
- No pain	2	05.0	2	05.0	0.493 (0.920)
- Mild	4	10.0	5	12.5	
- Moderate	15	37.5	17	42.5	
- Severe	19	47.5	16	40.0	
<b>After the 1<sup>st</sup> intervention day :</b>					
- No pain	4	10.0	5	12.5	15.796 (0.001)*
- Mild	25	62.5	8	20.0	
- Moderate	6	15.0	17	42.7	
- Severe	5	12.5	10	25.0	
<b>After the 2<sup>nd</sup> intervention day:</b>					
- No pain	12	30.0	9	22.5	22.095 (0.000)**
- Mild	28	70.0	14	35.0	
- Moderate	0	00.0	13	32.5	
- Severe	0	00.0	4	10.0	
<b>F / <math>\chi^2</math> (P)</b>	67.869 (0.000)**		17.173 (0.009)*		

$\chi^2$  (P): Chi-Square Test &P for  $\chi^2$  Test  
\*: Significant at P ≤0.05

F (P): Fisher Exact test &P for F Test  
\*\*: highly Significant at P ≤0.05

**Table (1):** Displays distribution of puerperal women according to their socio-demographic data. Mean age was found to be 23.325 ± 4.085 years for the lukewarm water compresses group and 24.525 ± 5.800 years for cold gel packs group. Furthermore, 45% of lukewarm water compresses group were

illiterate or just read and write, compared to 27.5% of cold gel packs group. In addition, most of lukewarm water compresses and cold gel packs groups (92.5% & 90%) respectively were housewives. Moreover, a sizeable proportion of the latter and the former groups (72.5% & 65%) respectively were rural residents.

**Figure (1):** Illustrates percent distribution of puerperal women according to their parity. It was clarified that a considerable proportions of cold gel packs and lukewarm water compresses groups (82.5% & 77.5%) respectively were primiparae. However, the relationship between the two groups was not statistically significant.

**Figure (2):** Exhibits percent distribution of puerperal women according to their type of delivery. It was expounded that 67.5% & 55% of cold gel packs and lukewarm water compresses groups respectively had CS delivery. Anyhow, no statistically significant difference was found between the two groups

**Table (2):** Explains distribution of puerperal women according to their current history of breastfeeding and engorgement. Breastfeeding was initiated after 24 hours of delivery by more than one-half (55%) of cold gel packs group, compared to 22.5% of lukewarm water compresses group. Meanwhile, on demand breastfeeding was reported by 67.5% & 57.5% of the latter and the former groups respectively. Breast engorgement occurred 4-6 days after delivery as reported by almost all (97.5%) of the two groups. However, the relationship between the two groups' current history of breastfeeding and engorgement was not statistically significant, except for initiation of breastfeeding after delivery ( $P=0.004$ ).

**Table (3):** Presents the distribution of puerperal women according to their degree of breast engorgement using six points self-rated engorgement scale. No statistically significant differences were found between the two groups before intervention and after the 1<sup>st</sup> intervention day. However, a highly statistically significant difference ( $P=0.000$ ) was found between them after the 2<sup>nd</sup> intervention day. In addition, a highly statistically significant difference ( $P=0.000$ ) was observed among lukewarm water compresses group, where degree of breast engorgement was decreased after the 1<sup>st</sup> & the 2<sup>nd</sup> intervention days.

**Table (4):** Elucidates distribution of puerperal women according to their breast pain intensity using VAS. The relationship between the two groups was not statistically significant before intervention. Yet, it was statistically significant ( $P=0.001$ ) between them after the 1<sup>st</sup> intervention day and highly statistically significant ( $P=0.000$ ) between them after the 2<sup>nd</sup> intervention day. Nevertheless, the relationship was highly statistically significant ( $P=0.000$ ) among lukewarm water compresses group, while it was statistically significant ( $P=0.009$ ) among cold gel packs group, where considerable diminish in the degree of breast pain was more noticeable among the former group than the latter one after the 1<sup>st</sup> & the 2<sup>nd</sup> intervention days.

## Discussion:

Breastfeeding is an appropriate method for feeding an infant, who should be breastfed exclusively until six months of life, then continued until two years. However, breast engorgement may occur during the postnatal period due to expansion and pressure exerted by the synthesis and storage of breast milk. It can lead to breast and nipple pain, as well as nipple damage, breast infections, failure of an infant to achieve a deep latch and discontinuation of breastfeeding, in addition to breast abscess, if left untreated (Anandhi et al., 2017).

Drugs have been shown to be effective in the treatment of breast engorgement. But, non-medical treatments such as breast massage, cold cabbage leaves, cold gel packs and lukewarm water application are receiving increasing attention because they are more easily available, generally easy to use, convenient and cheap. Therefore, determining their efficacy for the treatment of breast engorgement is becoming increasingly important (Kaur & Priyadarshani, 2018). So, this study aimed to assess the effect of lukewarm water compresses versus cold gel packs on breast engorgement among puerperal women

The results of the present study revealed that breast engorgement was significantly decreased after the 2<sup>nd</sup> intervention day among lukewarm water compresses group, compared to cold gel packs group. This may be contributed to the fact that lukewarm water helps to soften the breasts and nipples in order to allow the newborn to latch on easier. It also improves blood circulation by making vasodilatation of the blood vessel and lactiferous duct, increasing cell metabolism and relaxing the muscles, so that pain is reduced, and the ejection of the breast milk become smooth (Wahyuningsih & Liliana 2019).

The current finding relatively coincides with the study of El-Saidy & Aboushady (2016) in Cairo, Egypt, where they concluded that an application of warm compresses and cold cabbage leaves are effective for relieving breast engorgement. It also relatively agrees with the master thesis of Dhanya (2017) in Kanyakumari District, India, where it was reported that Alma Alfatir compresses over breast are found to be an effective nursing intervention to reduce breast engorgement.

In addition, the present finding is congruent with the study of Kaur & Priyadarshani (2018) in Jaipur, Rajasthan, India, where their study revealed that lukewarm water compresses are beneficial for relieving breast engorgement among postpartum mothers. Moreover, it matches the study of Sheelavathi et al., (2019) in Namakkal, Tamil Nadu, India, where they concluded that the application of lukewarm water compression is effective in reducing

breast engorgement and nipple pain among postnatal mothers. However, the results of the present study may be related to the fact that warm compresses can assist expansion of the ducts and allow milk to flow into the breast ducts. It also causes more oxytocin to flow toward breasts, and expediting the secretion of breast milk (Batubara et al., 2017)

On the other hand, the present finding doesn't relatively correspond with the study of Eittah & Ashour (2019) in Menoufia, Egypt, where they reported that chilled cabbage leaves application is more effective than warm compresses to relieve breast engorgement and pain among breastfeeding mothers. The discrepancy between their finding and the present one may be due to using different method of comparison with warm compresses, where chilled cabbage leaves as a home remedy were used instead of cold jell packs.

Intensity of breast pain was also significantly diminished among the lukewarm compresses group, compared to cold gel packs group in the present study. This may reflect the fact that the use of warm compresses for areas of tension and pain are considered able to relieve pain. Warm reduces muscle spasms caused by ischemia, which stimulates neurons that block the transmission of further painful stimuli causing vasodilatation and increased blood flow to the compressed area (Handayani et al., 2019).

The current finding is conformable with the study of Resmy et al (2014) in Tamil Nadu, India, where their study suggested that lukewarm water compresses consistently prevent nipple pain and breast engorgement among primiparous . It also relatively coincides with the study of El- Saily & Aboushady (2016) in Cairo, Egypt, where they observed statistically significant differences between the pre and post- intervention scores of breast pain and breast engorgement for the cold cabbage and the warm compresses groups.

In addition, the present finding is relatively similar to the study of Lucas & McGrath (2016) in Hartford, Connecticut, USA, where their study indicated that the use of warm compresses before and after breastfeeding was effective in decreasing breast and nipple pain due to engorgement. Moreover, it relatively accords with the study of Anandhi et al (2017) in Puducherry, India, where they concluded that the application of lukewarm water compresses is effective in preventing the nipple pain and breast engorgement among postnatal mothers whose babies are admitted in nursery. These results may be attributed to the physiological effects of the heat which includes: sedation, increasing capillary permeability, rising cell metabolism, increased blood flow to the infected region and promoting tissue cure (Zagloul et al., 2020).

Furthermore, the current finding partly tallies with the review study of Razmjouei et al (2020) in Iran, where they detected that pain and hardness in breast engorgement were significantly relieved by application of cold cabbage leaves and cold gel packs among postpartum lactating mothers. It is also partly congruent with the study of Wong et al (2017) in Singapore, where they concluded that cold gel packs can relieve pain and hardness in breast engorgement among postnatal lactating mothers. In contrast, it partly and relatively disagrees with the study of Manna et al (2016) in Pune, Maharashtra, India, where they found that cold compresses were more effective in reduction of breast pain intensity than hot fomentation, among postnatal mothers with breast engorgement. In addition, it doesn't match the Cochrane data base of systemic reviews carried out by Zakarija-Grkovic & Stewart (2020) in Split, Croatia, where they found that cold gel packs are more effective in reduction of breast pain and hardness than routine care. Although cold gel packs may be promising for the treatment of breast engorgement, the certainty of evidence is very low and they cannot draw robust conclusions about their effectiveness.

### Conclusion:

According to the findings of the present study, breast engorgement and pain intensity were significantly reduced after the second intervention day among lukewarm water compresses group, compared to the cold gel packs group. However, the results of this study support the researchers' hypothesis. While both lukewarm water compresses and cold gel packs can be used for puerperal women to manage their engorged breasts, lukewarm water compresses are more highly recommended

### Recommendations:

According to the existing findings, it is suggested that:

1. Nurses should be trained to advice women during their discharge teaching plan about lukewarm water compresses application to relieve breast engorgement.
2. Further studies about the use of cold therapy for the treatment of breast engorgement are needed.

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