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Original Article

# Cabbage leaves extract gel for breast engorgement during lactation

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## ARTICLE INFORMATION

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## A B S T R A C T

**Background:** National surveys have found that painful breasts are the second most common reason to stop breastfeeding, with most mothers reporting the most intense breast engorgement after discharge from the hospital or health center. Many solutions to deal with breast swelling include a cabbage extract compress. In previous studies, cabbage leaves can treat breast swelling, but nothing has been made in more practical topical preparations such as gels.

**Objective:** Making and testing cabbage gel to decrease breast engorgement.

**Methods:** This is an experimental study with a pretest-posttest design. Respondents totaled 32 breastfeeding mothers on the second to tenth day, 16 were given cabbage gel 3.75 grams, and 16 were given breast care for 10 minutes. The intervention was carried out in the morning and evening for four days, and breast engorgement was measured using the Six Point Engorgement Scale (SPES) instrument. Data were analyzed using the Mann-Whitney test.

**Results:** The results of breast treatment using cabbage gel were better than standard breast care, the swelling breast score decreased from the first to the fourth day from an average of 4.94 to 1.00, and the cabbage gel treatment was more effective for three days ($p<0.05$).

**Conclusion:** Cabbage gel is suitable for reducing breast engorgement during breastfeeding.



## INTRODUCTION

The incidence of breast engorgement occurs in almost 90% of postpartum women; as a result, mothers do not breastfeed their babies and would experience breastfeeding problems such as breast engorgement.[1] It occurs due to hormonal changes, which is the release of the hormones prolactin and oxytocin would be released, and 24 h after giving birth, the colostrum comes out from the breast. Then, the breast becomes full and gets heavier (72-96h), and milk production increases in 3-5 days after the delivery so that the breast will be whole with milk, tense, stiff, and painful. Appropriate and effective treatment is needed to prevent serious breast problems such as mastitis and breast abscess.[2]

Pharmacologically the treatment of breast engorgement can be given symptomatic therapy to reduce the pain, such as paracetamol, ibuprofen, and serrapeptase as an anti-inflammatory. Meanwhile, non-pharmacological efforts to reduce breast engorgement can be made by improving breastfeeding, breast care, alternating hot and cold compresses; warm herbal compresses, cold compresses of cabbage leaves, cold gel packs, gua-sha as a form of Chinese massage, and acupuncture.[3-5]

Conventional efforts usually carried out are breast care, namely, breast massage using pressure and touch, then warm and cold compresses are applied to swollen breasts.[6] However, in the case of swollen breasts, breast massage directly without starting with a warm compress, and the breast will feel more painful. Previous studies used cold cabbage leaf compresses to reduce breast pain and obtained better results than warm compresses. The cold effect caused by cabbage can block the transmission of pain transmitted to the hypothalamus.[7] Cabbage leaves contain enzymes such as flavonoids which function as anti-inflammatories and help reduce breast swelling in breastfeeding mothers.[8]

However, no research has applied it in the form of a gel dosage form. Gels have a better potential for administering

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topical drugs than the compress and ointment method because of their non-sticky texture, requiring less energy for the formulation, stability, and pleasing aesthetics.[9] Practical use of cabbage leaves made into cabbage gel and tested its effective decreasing breast engorgement in breastfeeding mothers. This study aims to make topical medicinal preparations in the form of gel from cabbage and determine the effectiveness of cabbage gel as a non-pharmacological therapy for swollen breasts.

## METHOD

### *Study Design*

This is an experimental study with a pretest-posttest control group design.[10]

### *Setting and Respondents*

This study was conducted at two Health Centers, Konda Health Center and Atari Jaya Public Health Center, South Konawe Regency, Southeast Sulawesi, from April to May 2022. The research sample ware all postpartum mothers with criteria inclusion: postpartum on days 2 to 10, who were breastfeeding and had breast engorgement. Mothers who had indications of breast engorgement and were willing to be respondents. The inclusion criteria as many as 32 mothers were randomly assigned to the intervention group (n=16) and the control group (n=16).[11]

### *Making the Cabbage Gel*

The process of making cabbage gel is carried out in two places: the Catholic Laboratory of Mangunwijaya Theresiana Semarang. Researchers have submitted a proposal for flavonoid content in cabbage gel at the Laboratory of the Center of Nano research for Humanity (CNH) Semarang. The tools used are an analytical balance, hot plate, stirrer, petri dish, pH meter, steamer, rheometer, viscometer, and extensometer. The ingredients used are 3 kg of fresh cabbage, 2 liters of 70% ethanol, 14.4 grams of CMC Na, 48 grams of Propyleneglycol, 0.96 grams of Na Benzoate, and 344.64 grams of Aquadest.[12,13]

The production of cabbage extract begins with washing the cabbage material and cutting it into small pieces, then maceration (soaking). The fresh cabbage material used in this study was 3000 grams or 3 kg, then cut into pieces, put into a maceration containing and mixed with 70% ethanol solution soaked for three days. After three days, the marinade is filtered using a flannel cloth, and the dregs are set aside. The filtering results were collected using a rotary evaporator to separate the ethanol solution from the cabbage extract.

Cabbage gel was made by mixing two formulas (formula I 15% cabbage extract and formula II gel base). Formula I consisted of CMC Na (14.4 grams), which was developed with hot water (aqua dest 344.64 grams) and mixed with Na Benzoate (0.96 grams) until homogeneous formula I was stirred using a stirrer until a gel mass was formed. Propylene glycol (48 grams) was added, stirring again until homogeneous. The formula I was mixed with formula II, namely 15% cabbage extract (72 grams), then stirred until homogeneous and packaged in tubes containing 30 grams of cabbage gel, then tested for flavonoid content and quality preparation test on cabbage gel.[14]

### *Experimental Procedure*

The intervention group was given 3.75 grams of cabbage gel for breast care twice a day in the morning and evening for four days, while the control group was given standard breast care twice daily in the morning and evening for four days.

### *The Variable, Instrument and, Measurement*

The variables measured were Breast Engorgement using an instrument in the form of a breast engorgement observation sheet containing signs and symptoms of swollen breasts, a SPES (Six Point Engorgement Scale) scale checklist sheet consisting of a score of 1 to 6, and having a reliability value of 0.84.[1] A score of 1 for flaccid breasts and no consistency in the breast, a score of 2 for the condition there is a slight change in the breast with clear boundaries, a score of 3 for the condition of a palpable breast lump with clear boundaries, complex but not painful, a score of 4 for a challenging breast condition starting feel to pain, a score of 5 for stiff and painful breasts, a score of 6 for the condition of the breast being palpable hard and very painful. Measurements were made on the first day before and the third and fourth days after the intervention.

### *Statistical Analysis*

The analysis was conducted using the Mann-Whitney test to determine differences in breast engorgement scores in the intervention and control groups.

### *Ethical Consideration*

This study was approved by the Ethics Commission of the Poltekkes of the Ministry of Health Semarang on April 8, 2022, with the number No. 0225/EA/KEPK/2022.

## RESULTS

Figure 1 is an example of Cabbage Leaf Extract Gel with the brand name "GelKu". This product contains 30 grams of cabbage gel with 4.26 mgQE/g levels of flavonoids. Based on Table 1, the distribution of the characteristics of respondents in both groups was seen to be more at the age of 20-30 years. There were more mothers in the primiparous category, and the breastfeeding frequency between the intervention group and the control group had an average of 11 times a day, which means enough.


**Figure 1.** Cabbage Leaf Extract Gel

**Table 1.** Characteristics of Respondents (n=32)

| Characteristic | Result |
|---|---|
| **Age, years** | |
| <20 | 2 (6.25%) |
| 20-30 | 22 (68.75%) |
| >30 | 8 (25%) |
| **Parity** | |
| Primipara | 23 (71.8%) |
| Multipara | 9 (28.1%) |
| Grandemultipara | 0 (0%) |
| **Breastfeeding Frequency** | |
| <10 times in 24 hours | 5 (15.6%) |
| ≥10 times in 24 hours | 27 (84.3%) |

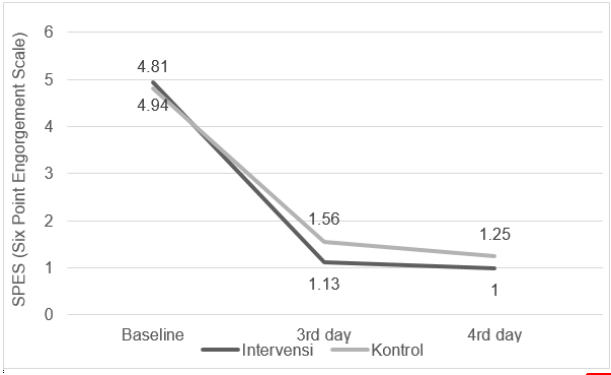


**Figure 2.** The Average Decrease in Breast Engorgement

Figure 2 illustrates the decrease in breast swelling, measured on the first day before treatment, the third day after treatment, and the fourth day after treatment. It can be seen that the blue line is the intervention group which experienced a faster decrease compared to the orange line, namely the control group. As seen in the graph above, the average decrease in breast swelling on the third day in the group given cabbage leaf extract gel was 1.13, while in the standard breast care treatment group, it was 1.56. The average decrease on the fourth day in the intervention group was 1.00, and the control group was 1.25. Based on the statistical test results, there was a significant difference between the intervention and control groups on the third day of measurement (p = 0.010) and on the fourth day (p= 0.035). The average decrease in the swelling score on the third day after the intervention was 0.43.

## DISCUSSION

This study's results show that the cabbage gel proved to be effective compared to conventional treatment in reducing breast engorgement. In this study, cabbage was made more practical into a gel to make its application more accessible and more practice two times a day for four days. Supported by previous studies which showed the results of using cabbage leaves to be effective in reducing breast swelling 88% to 15% (p<0.001).[15] From the calculation of the effect size obtained, 0.69 (average criteria). This means that cabbage gel has effectiveness in reducing breast engorgement.

The results showed that cabbage gel significantly reduced breast engorgement, which was carried out for four days. This was due to the active compounds contained in cabbage gel, namely flavonoid compounds. Based on the results of laboratory tests in 15gr of 15% cabbage extract gel, 2.13 mgQE/g of flavonoid content was obtained. The content of flavonoid compounds in 100gr of fresh cabbage was 1.98 mg/g. This happens because the cabbage material is extracted using the maceration method first and without going through an artificial drying process. The cabbage material is taken from a cold area and has fertile soil, namely the Bandungan plantation, so it affects the results of the flavonoid content test. Other factors such as light, temperature, pH, altitude, and temperature will affect the phytochemical results. The phytochemical content of secondary metabolites such as flavonoids from a plant will, of course, also be different in each region influenced by these environmental factors.[16] Flavonoids are a group of polyphenols with a basic structure of phenol whose compounds are easily oxidized and sensitive to heat so that the drying step will affect the result of the flavonoid content of cabbage.[17]

Inflammation or swelling is a defense mechanism of the body and is an immune response used to fight infection.[18] Cabbage leaves contain rich flavonoid and phenolic compounds that function as therapeutics such as antioxidants, anti-inflammatory, and anti-fungal and can accelerate healing.[19] This study supported the results of previous studies, which state that cold cabbage leaves have the potential to decrease breast engorgement and pain significantly because cabbage contains active compounds such as flavonoids, sinigrin which can increase vasodilation and circulation in the ducts, which can facilitate breastfeeding.[20]

Flavonoid compounds can stimulate the formation of enzymes that function to protect cells and tissues from oxidative damage by free radicals. Flavonoids' anti-inflammatory and antioxidant content can absorb interstitial fluid that

accumulates in the lactiferous ducts to reduce swelling.[21] The cold effect of cabbage gel can stimulate the skin through transduction, conveying to the hypothalamus to stimulate the effector system so that vasodilation and vasoconstriction of capillary blood vessels can occur, which can increase blood flow and release blocked milk in the lactiferous ducts and relax tense muscles so that swelling can be reduced.[22] The cold effect of cabbage gel through transduction can reduce the temperature in hot breasts due to tension in the walls of the alveoli cells and can block the transmission of pain to the brain so that pain can be reduced.[23]

In line with previous research, which proved that cabbage leaves contain compounds that function as good anti-inflammatory agents to reduce pain and swelling in the breast ($p<0.001$).[24] Supported by the results of previous researchers who conducted a study of 40 postpartum mothers who experienced breast engorgement, it was found that using cabbage leaves can reduce pain and swelling in the breasts. Cabbage leaves also secrete a cold gel that can absorb heat, making the mother feel comfortable.[25] Leaves cabbage secretes a cold gel that can absorb heat, making the client feel comfortable, and the cabbage leaves become or ripen after being attached to the swollen breast.

Previous research has proven a significant difference in the average breast engorgement after being given a cabbage leaf compress with a mean of 6.10 ($p<0.005$), done twice a day for three days.[26] In line with the previous study stated that there was a difference in difference in the score of decreasing breast swelling before and after treatment ($p<0.001$) between the intervention and control groups where the management of cabbage compresses was more effective than breast care alone which was carried out two times a day for three days.[27] The drawback of the breast care technique is that a warm compress is applied after the breast massage. Meanwhile, in the case of breast engorgement, direct breast massage without starting with a warm compress, the breast will feel more painful, thus making the mother traumatized to repeat the breast care technique.

In this study, breast care using cabbage in gel form has more advantages than regular breast care because it is practical. The soft gel consistency causes the gel to be more evenly applied, easily absorbed into the skin, and feels soft on the skin.[28] Overall, mothers feel comfortable and like to use cabbage gel because the shape is more practical, making it easier to use, and the resulting cold effect is more pronounced.

Based on the results of research and theory and previous studies that support that cabbage belongs to the anti-inflammatory group. This antioxidant is beneficial in the process of reducing breast engorgement in nursing mothers. The use of cabbage gel in this study is an alternative to herbal medicine that is safe to use in reducing breast swelling; the cabbage plant itself is a plant that is easy to obtain.

## CONCLUSIONS AND RECOMMENDATION

Breastfeeding mothers with cases of breast engorgement who use cabbage gel are proven significantly effective in reducing breast engorgement compared to mothers who use standard breast care. In cases of breast swelling, giving non-pharmacological alternative medicines such as cabbage gel is better because it has been proven to help reduce breast sticking in nursing mothers. For further research, it is possible to carry out toxicity and expiry tests on cabbage gel and make a complete label.

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Kendari, October 6, 2023

To : Medisains Journal Editor

In Place

Dear Mr/Mrs

The Medisains Journal accepted the article I submitted with the title "Cabbage leaves extract gel for breast engorgement during lactation" on November 21, 2022 with Volume 20 Number 3 (2022) 77-81.

In this regard, I submit a respectful request to the editor of the Mediscience Journal to retract the article. I am retracting this article because there was a substantial error in entering the data.

Based on the matters above, the author apologizes to the readers and editors of the Medisains Journal. Thank you for your attention, Mr/Mrs Editor.

Sincerely,

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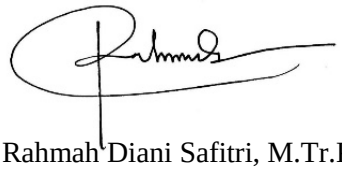
|  |  |  |
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