

## The effect of cabbage leaves application in mothers having breast engorgement

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### RESEARCH ARTICLE ABSTRACT

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**Objective:** The study aimed to determine the impact of cabbage application on pain, breast tissue relief, amount of the milk pumped and anxiety level in mothers suffering from engorgement and their satisfaction with cabbage application.

**Methods:** The study was conducted with 18 mothers who had an infant hospitalized in the Neonatal Intensive Care Unit and suffered from engorgement on both breasts. The study data were collected using the "Mother's Introduction Form" and State-Trait Anxiety Scale. Cabbage was applied to one breast of the mothers for two hours. No application was performed on the other breast. Then both breasts were milked via an electronic expressing milk pump at the same time and at the same vacuum and speed. Following this procedure, both breasts of the mothers were reevaluated in terms of pain, relief, satisfaction level, amount of the milk pumped and anxiety level.

**Results:** Examining the impact of engorgement experienced by the mothers on breast-feeding or expressing milk procedures; 27.8% of them were affected less, 27.8% moderately and 44.4% highly. According to the findings acquired from the study data; the mothers suffering from engorgement had a lower pain severity on the breast receiving cabbage application and lower state anxiety scale scores than the breast not receiving cabbage application. Also it was found that the relief and satisfaction levels and the amount of milk increased significantly.

**Conclusions:** Cabbage application can be recommended to mothers suffering from engorgement. It can also be recommended that healthcare professionals be trained on this matter.

**Keywords:** cabbage, breast, lactation, pain

## INTRODUCTION

Every baby that comes into the world has right to and needs nutrition which is right and appropriate for its development term. The responsible person for newborn care needs to pay attention to a fundamental right of the newborn. Since human breast milk has advantages as nutritious, immunological, psychological and economical, it should be preferred in babies (Cakmak, 2002; Eryilmaz, 2015; Mangesi & Zakarija-Grkovic, 2016; Sivri & Karataş, 2015; Zenciroğlu & Özbaş, 2015).

Most of mothers feel temporary engorgement and swelling during milk secretion or following transformation from colostrum to transitional milk. This engorgement is formed due to increased blood flow and milk accumulation in enlarged glands. Even though engorgement occurs within the first week of postpartum generally, it can occur further terms sometimes. Separation of mother and baby (working mothers and mothers whose babies are in newborn intensive care unit because of various problems, etc.) results

with increased engorgement (Öztürk & Sevil, 2016). Engorgement consists increased blood flow to the breasts, venous and lymphatic stasis and edema in surrounding tissue of milk glands. This leads to prevent milk flow and result with milk accumulation in breast. Thus, it is important to eject milk from the breast completely and frequently. Inadequate ejection from breast in case of expressing milk and accumulation of milk in ducts can be followed by serious circumstances, atrophy in milk secreting cells even. If engorgement extends, it may conclude as inhibition of milk production, nipple crack, mastitis and cessation of lactation. Mother should be encouraged, relaxed, supported about pain alleviation and informed for expressing milk to maintain milk secretion (Cakmak, 2002; Eryilmaz, 2015; Mangesi & Zakarija-Grkovic, 2016; Sivri & Karataş, 2015; Zenciroğlu & Özbaş, 2015).

Hot-cold application (ice package and frozen peas package around breast), massage, etc. provided by nurses may be effective in the alleviation of engorgement. One of these applications and

**Table 1.** Data collecting method**COLLECTED DATA PRE-APPLICATION**

Maternal Information Form

State Trait Anxiety Inventory

Cabbage Leaf Application (Duration: 2 hours)

Expressing milk of breasts with electric breast pump at the same time (Duration: 15-20 minutes)

**COLLECTED DATA POST-APPLICATION****Cabbage Applied Breast**

- Pain, relaxing and satisfaction level of mother with VAS,
- Amount of milk (mL) and
- Anxiety level is determined with SAI.

**Cabbage not Applied Breast**

- Pain, relaxing and satisfaction level of mother with VAS,
- Amount of milk (mL) and
- Anxiety level is determined with SAI.

as a traditional method is application of cabbage leaves to breast cold or at room temperature in case of engorgement. Cabbage leaves are covered with epicuticular wax layer. This is an important step to protect the application area from external factors (Eryılmaz, 2015; Mangesi & Zakarija-Grkovic, 2016; Sivri & Karataş, 2015; Öztürk & Sevil, 2016; Tamer, 1992; Kunts & Samuels, 2003). White cabbage is one of the vegetables with phytoestrogen content. It has been stated that phytoestrogens upregulate prolactin receptor (PRL-R) in milk glands. Phytoestrogens are a type of xenoestrogens that present in many plants, vegetables and herbs consumed generally. These are herbal compounds that can bind estrogen receptors and have both estrogenic and antiestrogenic effects regarding receptor expression in the cells and estrogen amount in the body (Cassy et al., 2000). Cabbage leaves contain enzymes as sinigrin, rapin and sulphur compounds that may have anti-inflammatory effect on breast and result with decrease of swelling and pain (Hatfield, 2004; Joy & Kharde, 2016).

In this study, purpose is to define effects of cabbage application to mothers with engorgement on pain, soothe the breast, amount of milk after expressing milk with breast pump, anxiety level of mother and satisfaction from cabbage application.

**MATERIALS and METHODS****Universe and sample**

Universe of the study was included mothers of 315 hospitalized babies in second and third level of a newborn intensive care unit between September 2018-January 2019. Power analysis was made to define the sample number using with G\*Power (v3.1.7) program. According to power analysis that was made with first ten people, mean of pain level difference between cabbage applied and cabbage not applied groups is 2.30, standard deviation (SD) is 2.00 and effect size is (d) 0.975. At least 11 mothers should be included to the study according to the calculation. The study has been terminated after participation of 18 mothers. Depending on mothers' application, effect size of pain intensity measurement in breast is 1.431, post hoc power 99.99%. Effect size of soothe level measurement is 2.042, post hoc power 100%. Effect size of satisfaction level measurement is 1.66, post hoc power 99.9%. Effect size of expressing milk amount measurement is 1.096, post hoc power 99.2%. Post-

application effect size of SAI score is 0.894 compared to pre-application and post hoc power is 94.64%.

Inclusion criteria for mothers as follows being older than 18, be able to communicate, being literate, not to expressing milk at least two hours before participation to study, have engorgement in both breasts, have no condition to prevent milk secretion, have no history of breast cancer and not to be diagnosed with psychological disorders.

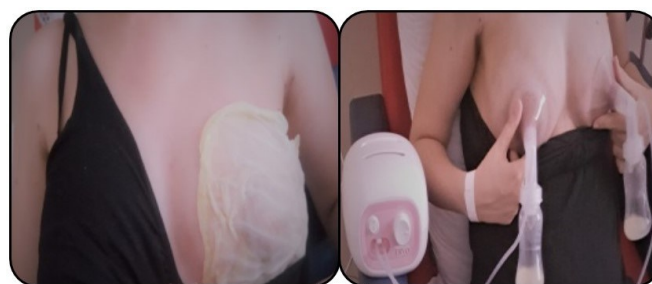
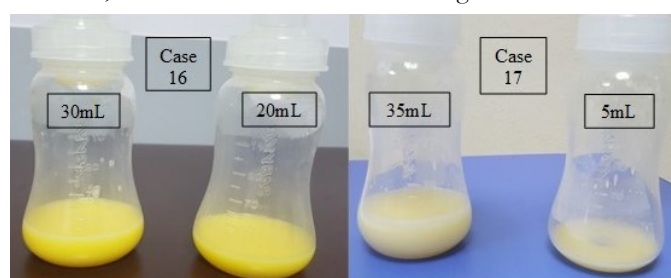


Figure 1. cabbage leaf

**Data collecting methods**

One group experimental procedure was designed to evaluate effect of cabbage application on engorgement due to can't be controlled of daily fluid and food consumption, preferences and lactogenic agent use of mother. "Maternal Information Form" developed by the researcher regarding the relative literature and State Trait Anxiety Inventory were used that formed (validity and reliability also tested) by Oner and Le Compte (1998) in the first comparison before the application. After the first comparison, one of the mother's breast was covered with cabbage leaf (Figure 1) and applied for two hours. There was no application for the other breast. There was no preliminary procedure for the cabbage. Cabbage was only washed and thick vessels were peeled off in order to cover the breast and kept at room temperature. After the two hours of application, expressing milk of breasts was carried out with electric breast pump with the same speed and vacuum settings (Figure 2). After expressing milk procedure was done, evaluations of both breasts were given in Table 1.



Amount of milk [cabbage applied and cabbage not applied (left to right)]

**Table 2.** Distribution of mothers regarding sociodemographic and obstetric characteristics

Sociodemographic characteristics		n=18	%
Year	Min.-Max. (Median)	19-41 (29.5)	
	Mean±SD	29.78±6.44	
Education status	Literate	2	11.1
	Primary school	5	27.8
	Secondary school	3	16.7
	High school	2	11.1
	Higher education	6	33.3
Occupation	Housewife	13	72.2
	Officer	4	22.2
	Self-employed	1	5.6
Health Insurance	Republic of Turkey Social Security Institution	18	100.0
Income status	Income lower than expenditure	4	22.2
	Income equal with expenditure	13	72.2
	Income higher than expenditure	1	5.6
Place	Province	13	72.2
	Town	5	27.8
Family type	Nuclear	15	83.3
	Extended	3	16.7
Marriage duration (year)	Min.-Max. (Median)	1-20 (3)	
	Mean±SD	6.19±5.90	
Obstetric characteristics		n=18	%
Intentional pregnancy	Yes	16	88.9
	No	2	11.1
Number of pregnancies	Min-Max (Median)	1-5 (1)	
	Mean±sd	2.11±1.45	
	1 pregnancy	10	55.6
	≥2 pregnancies	8	44.4
Number of births	Min-Max (Median)	1-5 (1)	
	Mean±sd	1.78±1.17	
	1 birth	11	61.1
	≥2 births	7	38.9
Miscarriage situation	Yes	2	11.1
	No	16	88.9
Abortion	Yes	2	11.1
	No	16	88.9
Number of prenatal check-ups	Min-Max (Median)	4-35 (13.5)	
	Mean±sd	13.33±8.21	

**Table 3.** Distribution of mothers with and without cabbage in terms of pain intensity, relaxation, satisfaction levels and amount of milk expressed from the breast

	Not applied to cabbage		Applied to cabbage	
	Min-Max (Median)	Mean±sd	Min-Max (Median)	Mean±sd
Pain intensity	4-10 (6)	6.50±1.98	0-7 (4)	3.56±2.12
<sup>a</sup> p	0.001**			
Relaxation level	2-7 (4.5)	4.33±1.24	4-10 (8)	7.83±1.95
<sup>a</sup> p	0.001**			
Satisfaction level	1-7 (5)	4.72±1.71	4-10 (8.5)	7.94±2.10
<sup>a</sup> p	0.001**			
Amount of milk expressed from the breast (ml)	3-100 (20)	30.1±29.2	4-110 (35)	46.4±34.9
<sup>a</sup> p	0.001**			

<sup>a</sup>Wilcoxon Signed Ranks Test

\*\*p&lt;0.01

accepted in the world literature. It is safe and easy to apply. The following template is used to determine the values on the line.

State Trait Anxiety Inventory. Developed by Spielberger and his colleagues in 1970 and adapted to Turkish society by Öner and Le Compte in 1983, it is a likert-type scale that measures state and trait anxiety levels separately with 20 questions. High scores indicate high anxiety levels, low scores indicate low anxiety levels. The total score obtained from both scales varies between 20-80. The SAI is a highly sensitive tool in assessing sudden emotional reactions. The TAI, located in the second section of the scale, aims to measure the continuity of anxiety that a person generally tends to experience. State and trait anxiety scale is evaluated as 0-19 points (no anxiety), 20-39 points (mild anxiety), 40-59 points (moderate anxiety), 60-79 points (severe anxiety), and 80 points (severe anxiety-panic).

#### Ethical considerations

This study was approved by Clinical Ethics Committee of Ege University School of Medicine (Report number, place and date: 18-5.1/37, Izmir-Turkey, 22.05.2018) and Ege University School of Medicine Hospital (Report number, place and date: 69631334-100, Izmir-Turkey, 28.06.2018). The study was conducted in accordance with the Declaration of Helsinki and the ethical standards of the country of origin. Informed consent and written permission for publication of data were obtained from all individuals participating in the study. Cabbage application was made to one of the breasts of mothers while data collecting. However, cabbage application was made also to the other breast of mother in order to soothe after data collection related to study. In addition, the application was taught to mother and a written application procedure was given to cabbage application after the study.

#### Data analysis

NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used for statistical analysis. Descriptive statistical methods (Mean, Standard Deviation, Median, Frequency, Ratio, Minimum, and

Maximum) were used in the evaluation of study data. Normal distribution of quantitative data was checked with Shapiro-Wilk test and graphical observations. Quantitative variables have abnormal distribution were compared with Mann Whitney U Test in two groups comparison. As for in comparison of three or more groups that have abnormal distribution, Kruskal Wallis test was used and Bonferroni-Dunn Test for binary comparisons. Paired Samples t Test was used in comparison of variables have normal distribution pre- and post-application. Wilcoxon Signed Ranks Test was used in comparison of variables have abnormal distribution according to applied and not applied groups. Pearson Correlation Analysis was used in the assessment of relation between variables have normal distribution, for variables have abnormal distribution Spearman's Correlation Analysis was used. Fisher-Freeman-Halton test was used in comparison of qualitative data. p<0.05 was accepted as significance level.

## RESULTS

The sociodemographic and obstetric characteristics of the mothers are given in detail in Table 2. Mean pregnancy number of mothers was 2.11±1.45. It was stated that 10 mothers had their first pregnancy and 8 of mothers had second or more pregnancies.

Mean age of babies was 7.05±8.33 (4-40) days old. Mean of babies' birth weeks was 36.94±3.89 (27-41) weeks. Seven of mothers were given vaginal birth and 11 of them had caesarean. Three mothers were breastfeeding, four mothers by expressing milk and 11 of them used both methods to feed the babies. Mean of engorgement was started 3.78±2.96 (2-15) days after the birth. Mean duration of mothers feel engorgement was 3.28±5.57 (1-25) days. When examined the relation of engorgement and breastfeeding/expressing milk, five mothers were affected less, five mothers were affected as medium level and eight mothers were affected more.

The mean pain intensity was found to be 6.50±1.98 and 3.56±2.12, the mean relaxation level was found to be 4.33±1.24 and 7.83±1.95, the mean satisfaction level was found to be 4.72±1.71 and 7.94±2.10, and the mean expressing milk amount was found to be 30.06±29.24 mL and 46.44±34.99 mL in the breasts that were not and were applied with cabbage, respectively (Table 3).

Pre-application mean state anxiety inventory (SAI) score of mothers was 44.00±12.09 and mean trait anxiety inventory (TAI) score was 40.94±6.93. SAI Cronbach's Alpha coefficient was 0.921 and it was observed as highly reliable. TAI Cronbach's Alpha coefficient was 0.754 and it was observed as quite reliable. Post-application mean SAI score of mothers was 34.33±8.76 and Cronbach's Alpha coefficient was 0.898. It was observed that the scale was highly reliable (Table 4).

**Table 4.** Distribution of mothers according to state-trait anxiety scale mean scores

	Min-Max (Median)	Mean±sd	Cronbach's Alpha
Pre-application			
SAI	26-73 (40.5)	44.00±12.1	0.921
TAI	29-52 (42)	40.94±6.93	0.754
Post-application			
SAI	22-58 (32.5)	34.33±8.76	0.898
<sup>b</sup> p	0.001**		

It was found that pain intensity of mothers with engorgement decreased in cabbage applied breast compared to cabbage not

applied breast significantly, soothe level, satisfaction level and milk amount were significantly increased ( $p=0.001$ ,  $p<0.01$ ). It was determined that mothers with engorgement had significantly lower SAI score in post-application compared to pre-application ( $p=0.001$ ,  $p<0.01$ ).

## DISCUSSION

The findings of this study indicate that the application of cabbage leaves is an effective non-pharmacological intervention for alleviating breast engorgement-related pain in postpartum women. These results align with numerous previous studies that have explored the use of cabbage leaves in managing breast engorgement and its associated symptoms (Roberts, 1995; Nikodem et al., 1993; Wong et al., 2017; Aprilina et al., 2021; Elzehri et al., 2023; Dhoom et al., 2024; Soliman et al., 2022). The physiological basis of this effect is attributed to the paraffin-like waxy structure of cabbage leaves, which may serve as an occlusive dressing, and their phytochemical content, particularly phytoestrogens, which have anti-inflammatory and analgesic properties (Hatfield, 2004).

In the current study, cabbage leaf application was associated with a significant reduction in pain scores among breastfeeding mothers experiencing engorgement. This finding supports Roberts' (1995) observation that 68% of mothers reported relief from engorgement within a few hours of cabbage leaf application. Similarly, Wong et al. (2017), in a randomized controlled trial comparing cold cabbage leaves, gel packs, and routine care, found that cabbage leaves significantly reduced breast pain and were associated with the highest maternal satisfaction levels among the three methods.

What sets this study apart from prior research is its intra-subject comparison design, wherein cabbage leaves were applied to one breast while the contralateral breast served as the control. This approach eliminates interindividual variability and strengthens the internal validity of the findings. The observed superiority of cabbage application in this design suggests that the physical and possibly bioactive properties of cabbage leaves exert a localized therapeutic effect.

Maternal satisfaction, an important aspect of postpartum care, was significantly higher in the cabbage-applied group. This result echoes previous findings by Wong et al. (2017), who reported that mothers expressed greater satisfaction with cabbage leaf treatment compared to other interventions. Similarly, Roberts et al. (1995) found that chilled cabbage leaves were more effective and better tolerated than room-temperature leaves or gel packs. These findings underscore the holistic value of cabbage application, not only for pain relief but also for enhancing maternal comfort and psychological well-being.

Another noteworthy finding of this study is the significant increase in breast milk volume associated with cabbage leaf application. Although there is limited empirical evidence directly linking cabbage use with milk production, our results suggest that reduced pain and improved comfort may facilitate more effective breastfeeding, thereby indirectly promoting milk ejection. Previous studies have emphasized the role of early initiation of breastfeeding, frequent feeding, maternal confidence, and appropriate technique in optimizing milk production (Ozkaya & Korukcu, 2023). The current findings add a novel perspective to this discourse by suggesting that cabbage application may serve as a supportive intervention to enhance lactation outcomes.

In a related context, Nikodem et al. (1993) found that cabbage leaves effectively prevented the progression of breast engorgement and supported successful breastfeeding. Similarly,

Elzehri et al. (2023) demonstrated that cabbage leaves were superior to hot compresses in reducing engorgement and improving breastfeeding outcomes. In a recent study, Dhoom et al. (2024) reported that cabbage application significantly reduced breast hardness and pain while also prolonging the duration of exclusive breastfeeding. These studies collectively support the hypothesis that cabbage leaves not only alleviate physical symptoms but also promote maternal self-efficacy and confidence, which are crucial for successful breastfeeding.

Psychological factors, such as anxiety and stress, are known to influence lactation physiology. Although there is a paucity of research specifically addressing anxiety in the context of breast engorgement, this study observed a significant reduction in mothers' State Anxiety Inventory (SAI) scores following cabbage application. This reduction is likely due to the alleviation of physical discomfort and the subsequent improvement in maternal comfort. Soliman et al. (2022) reported similar outcomes, noting that non-pharmacological interventions such as cabbage leaf application, olive oil massage, and warm ginger therapy contributed to both physical and emotional relief in postpartum women.

Furthermore, the educational component of lactation management, when combined with physical interventions like cabbage compresses, has been shown to enhance maternal outcomes (Napisah et al., 2021). Aprilina et al. (2021) also concluded that cabbage compresses significantly reduced engorgement levels among postpartum mothers, reinforcing the value of integrating natural therapies into routine postpartum care.

## CONCLUSION

The findings of this study reveal that cabbage leaf application is an effective, safe and economical method in the management of breast fullness in the postpartum period. Cabbage leaf application made significant contributions both in reducing pain and increasing the satisfaction levels of mothers. In addition, the findings that the application can positively affect milk production indicate that this method has the potential to support breastfeeding success beyond providing only symptomatic relief. The fact that the application is easily accessible and low-cost is an important advantage, especially for health systems where access to pharmacological and technological interventions is limited.

However, the exact mechanism of action of cabbage leaf application has not yet been fully elucidated. The role of the physical (cooling and occlusive effect) and chemical (phytochemical content, especially phytoestrogens) components of cabbage in this process is still open to investigation. Therefore, further studies to be conducted with different study designs should evaluate the effect of cabbage components in detail and reveal the mechanism of action, especially with multidisciplinary collaborations (from fields such as biochemistry, pharmacology, nursing and women's health).

Future studies with larger samples, randomized controlled trials and long-term follow-up are of great importance in terms of evaluating the long-term effects of cabbage leaf application not only on physical relaxation but also on the breastfeeding process, maternal psychology and infant development. In addition, in the light of these data, it may be possible to develop new treatment products and supportive application materials based on natural materials.



## REFERENCES

- Akkuzu, G. (2016). Newborn nutrition. In L. Taşkın (Ed.), *Obstetric and women's health nursing* (pp. 573–597). Academician Medical Bookstore.
- Aprilina, H. D., Krislinggardini, K., Isnaini, N., & Suratmi, S. (2021). The effect of cabbage leaves compress on breast engorgement in postpartum mother. *Open Access Macedonian Journal of Medical Sciences*, 9(T4), 124–128. <https://doi.org/10.3889/oamjms.2021.5777>
- Arora, S., Vatsa, M., & Dadhwal, V. (2008). A comparison of cabbage leaves vs. hot and cold compresses in the treatment of breast engorgement. *Indian Journal of Community Medicine*, 33(3), 160–162. <https://doi.org/10.4103/0970-0218.42053>
- Aslan, E., & Dinç, H. (2016). Newborn adaptation and care. In N. K. Beji (Ed.), *Women's health and diseases for nurse and midwives* (pp. 477–506). Nobel Medical Bookstores.
- Cakmak, H. (2002). Evaluating and comparing the breast-feeding of mothers who gave birth through cesarean operation and through normal spontaneous delivery [Master's thesis, Marmara University].
- Cassy, S., Charlier, M., Bélair, L., Guillomot, M., Laud, K., & Djiane, J. (2000). Increase in prolactin receptor (PRL-R) mRNA level in the mammary gland after hormonal induction of lactation in virgin ewes. *Domestic Animal Endocrinology*, 18(1), 41–55. [https://doi.org/10.1016/S0739-7240\(99\)00062-4](https://doi.org/10.1016/S0739-7240(99)00062-4)
- Dhoom, S., Maradiya, J., & Doss, J. J. (2024). A study to assess the effectiveness of cabbage leaf application on pain and hardness in breast engorgement and its effect on the duration of breast feeding among postnatal mother in selected hospital at Dharampur. *A and V Publication Journal of Nursing and Medical Research*, 3(2), 67–70. <https://doi.org/10.52711/jnmr.2024.15>
- Elzehri, M. A., El-Kader, R. G. A., Elwasefy, S. A., Elmas, H. A. M., & Elbilgahy, A. A. (2023). Effect of cabbage leaves versus hot compresses on breast engorgement among early breastfeeding postnatal women. *Bulletin of the National Institute of Health Sciences*, 141(2), 3383–3391.
- Eryılmaz, G. (2015). Lactation and breastfeeding. In A. Şirin & O. Kavlak (Eds.), *Women health* (pp. 488–499). Nobel Medical Bookstores.
- Hatfield, G. (2004). *Encyclopedia of folk medicine: Old world and new world traditions* (pp. 59–60). ABC-CLIO.
- Joy, J., & Kharde, S. N. (2016). A study to evaluate the effectiveness of chilled cabbage leaves application for relief of breast engorgement in volunteered postnatal mothers who are admitted in maternity ward of selected hospital in Belgaum. *International Journal of Biological & Medical Research*, 7(3), 5655–5659.
- Kunts, L., & Samuels, A. L. (2003). Biosynthesis and secretion of plant cuticular wax. *Progress in Lipid Research*, 42(1), 51–80. [https://doi.org/10.1016/S0163-7827\(02\)00045-0](https://doi.org/10.1016/S0163-7827(02)00045-0)
- Mangesi, L., & Zakarija-Grkovic, I. (2016). Treatments for breast engorgement during lactation. *Cochrane Database of Systematic Reviews*, (6), CD006946. <https://doi.org/10.1002/14651858.CD006946.pub3>
- Napisah, P., Widiastih, R., Maryati, I., Hermayanti, Y., & Natasya, W. (2021). The effectiveness of cabbage leaf compress and the education of lactation management in reducing breast engorgement in postpartum. *Open Access Macedonian Journal of Medical Sciences*, 9(T6), 106–110. <https://doi.org/10.3889/oamjms.2021.7318>
- Nikodem, V. C., Danziger, D., Gebka, N., Gulmezoglu, A. M., & Hofmeyr, G. J. (1993). Do cabbage leaves prevent breast engorgement? A randomized, controlled study. *Birth*, 20(2), 61–64. <https://doi.org/10.1111/j.1523-536X.1993.tb00418.x>
- Ozkaya, M., & Korukcu, O. (2023). Effect of cold cabbage leaf application on breast engorgement and pain in the postpartum period: A systematic review and meta-analysis. *Health Care for Women International*, 44(3), 328–344. <https://doi.org/10.1080/07399332.2022.2090567>
- Öner, N., & Le Compte, A. (1998). *Discontinuous State-Trait Anxiety Inventory Handbook* (2nd ed., pp. 22–36). Boğaziçi University Publications.
- Öztürk, R., & Sevil, Ü. (2016). Newborn nutrition. In Ü. Sevil & G. Ertem (Eds.), *Perinatology and care* (pp. 552–562). Nobel Medical Bookstores.
- Roberts, K. L. (1995). A comparison of chilled cabbage leaves and chilled gelpaks in reducing breast engorgement. *Journal of Human Lactation*, 11(1), 17–20. <https://doi.org/10.1177/089033449501100118>
- Roberts, K. L., Reiter, M., & Schuster, D. (1995). A comparison of chilled and room temperature cabbage leaves in treating breast engorgement. *Journal of Human Lactation*, 11(3), 191–194. <https://doi.org/10.1177/089033449501100319>
- Satır, D. G., & Sevil, Ü. (2016). Problems in newborn and nursing care. In Ü. Sevil & G. Ertem (Eds.), *Perinatology and care* (pp. 596–597). Nobel Medical Bookstores.
- Savaser, S. (2002). Newborn nutrition. In T. Dagoglu & G. Görak (Eds.), *Basic neonatology and nursing principles* (pp. 211–241). Nobel Medical Bookstores.
- Sivri, B. B., & Karataş, N. (2015). Cultural aspect of the society: Traditional practices of mother and baby care during postpartum period and the relevant examples from the world. *Journal of Current Pediatrics*, 13(3), 183–193. <https://doi.org/10.4274/jcp.50479>
- Soliman, A. S., Helmy, H. K., Masoud, H. K., & Ragab, H. M. R. (2022). Effect of cabbage leaves, olive oil massage and warm ginger on relief breast engorgement among postpartum women. *Egyptian Journal of Health Care*, 13(4), 1510–1524. <https://doi.org/10.21608/ejhc.2022.273050>
- Tamer, L. (1992). The investigation of the antitumoral effect of brassica oleracea var. capitata extract and its effect on adenosine 5 triphosphatase enzyme system [Master's thesis, Cukurova University].
- Wong, B. B., Chan, Y. H., Leow, M. Q. H., Lu, Y., Chong, Y. S., Koh, S. S. L., et al. (2017). Application of cabbage leaves compared to gel packs for mothers with breast engorgement: Randomised controlled trial. *International Journal of Nursing Studies*, 76, 92–99. <https://doi.org/10.1016/j.ijnurstu.2017.08.014>
- Zenciroğlu, A., & Özbaş, S. (2015). *Basic newborn care*. Ozyurt Typography.