

## Effectiveness of Giving Carrot Juice (*Daucus Carota* L) in Overcoming Nipple Crack and Clogged Milk Duct in Breastfeeding Mother

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### ABSTRACT

Exclusive breastfeeding remains difficult to achieve, with prevalence still falling short of national and global targets. One contributing factor is the discomfort experienced during nursing, such as nipple cracks and blocked milk ducts, which can reduce milk output and discourage continued breastfeeding. Carrot juice, rich in beta-carotene, vitamin A, and antioxidants, offers anti-inflammatory benefits that may accelerate healing, relieve pain, and prevent complications like mastitis. Given these properties, carrot juice is a simple, natural addition to postpartum care. Carrot juice should be given urgently to breastfeeding mothers as it contains beta-carotene and antioxidants that help reduce inflammation, relieve nipple pain, and prevent blocked milk ducts. This study aimed to determine the effectiveness of carrot juice (*Daucus carota* L.) in improving breastfeeding outcomes by reducing the incidence of nipple cracks and blocked milk ducts. A quasi-experimental design was used involving 15 breastfeeding mothers. Participants consumed 250 cc of freshly prepared carrot juice daily for seven days. Data were collected before and after the intervention using observation sheets and analyzed with the Wilcoxon test. The results showed a Z value of -3.41 ( $p = 0.001$ ) for nipple cracks and -3.29 ( $p = 0.001$ ) for blocked ducts. Both p-values ( $< 0.05$ ) indicate significant improvement post-intervention. These findings confirm that regular consumption of carrot juice can effectively reduce the severity of nipple injuries and milk duct blockages. Carrot juice is a low-cost, accessible, and safe nutritional therapy that supports lactation. Further research is recommended to explore its mechanism of action and potential dosage optimization for broader clinical application.

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### INTRODUCTION

From the time of birth until they reach the age of two, the optimal nutrition for newborns is breast milk, often known as ASI. Babies get all the nutrients they need to grow and develop from their mothers' milk, including macronutrients like protein and fat as

well as micronutrients like vitamins and minerals. So that low exclusive breastfeeding is a risk for growth and development. Based on WHO (World Health Organization) recommendations, the duration of exclusive breastfeeding is 6 months. There is a comparison between babies with a short duration of



breastfeeding (3-4 months) and babies with a duration of breastfeeding for 6 months. Babies with a duration of breastfeeding for 6 full months have good growth and development and do not experience a deficit in weight or length growth (Gurning et al., 2021).

In Malang Regency, exclusive breastfeeding coverage remained suboptimal—just 63.7% in 2020 and still trailing behind city figures, while Pakis sub-district's Puskesmas Pakis reported only about 11.4% SPM treatment coverage by mid-2024 (indicating low uptake of postpartum support services).

There are significant obstacles to efficient breastfeeding because to the prevalence of frequent early breastfeeding issues. Some of the most frequent issues with breasts include abscesses, mastitis, cracked or painful nipples, engorgement, and flat or inverted nipples. Most of these problems begin in the first or second week postpartum and can last up to two months (Asnidawati & Ramdhan, 2021).

Nipple cracks or often called nipple crack and clogged milk ducts are common problems faced by breastfeeding mothers around the world.

Research done by the Republic of Indonesia's Ministry of Health indicates that around 30% of nursing moms get nipple crack during the first weeks of breastfeeding (Nurmisih et al., 2022). In addition, data from WHO shows that more than 50% of mothers breastfeed. Experiencing problems related to milk production, including engorgement, during the breastfeeding period. This incidence suggests that these problems not only affect the comfort of the mother, but also the health of the baby who relies on breast milk. With this increasing incidence, it is important to explore effective solutions, including the use of carrot juice as an alternative treatment.

The causes of nipple crack and engorgement are very diverse, and are often related to improper breastfeeding techniques. According to research by Santos et al., (2016) factors such as incorrect breastfeeding position, mismatch between the shape of the nipple and the baby's mouth, and the mother's lack of knowledge about breastfeeding techniques can contribute to this problem. In addition, sensitive skin conditions or the presence of infections can also worsen the condition (Laageide et al., 2021). Enlargement, on

the other hand, often occurs due to the baby's inability to empty the breast efficiently. This may arise from a variety of sources, such as issues with the baby's health or an insufficient nursing regimen. Understanding these causes is essential to developing appropriate prevention and treatment strategies (Abdullah et al., 2022).

The impact of nipple crack and breast milk stagnation is not only felt by the mother, but also by the baby. Mothers who experience nipple crack often feel pain, which can reduce their motivation to breastfeed, potentially reducing the duration of exclusive breastfeeding. Furthermore, mastitis, an infection of the breast tissue, is more likely to occur when breast milk does not move freely, which may be very painful. When there isn't enough breast milk for a baby, it may stunt their development, put them at danger of dehydration and malnutrition, and more.

Therefore, it is important to address this issue as quickly as possible so that the breastfeeding process can run smoothly and pleasantly for both parties (Foundation Trust, 2023). Research on the effectiveness of carrot juice in overcoming breastfeeding problems is still limited, but some early studies have

shown promising results. A study conducted by Mei Winarni et al., (2021) found that regular administration of carrot juice can reduce symptoms of nipple crack in breastfeeding mothers by up to 70% within two weeks.

Another study by Perintisari et al., (2024) this study aims to determine the effectiveness of Brastagi carrot juice as a safe and natural therapy for healing sore nipples and relieving breast milk stasis in breastfeeding mothers further shown that women suffering from breast milk stasis might enhance their milk production volume by drinking carrot juice. These results indicate the potential of carrot juice as a safe and effective additional therapy in overcoming breastfeeding problems. Carrot juice may have beneficial effects, but further study is required to understand how it works and what dosage is most effective.

## RESEARCH METHODS

Experimental research utilizing pre- and post-test procedures is the research design used in this study. This research design is carried out by conducting initial observations (pre-test) before being given an intervention, after which the intervention is given.



The population in this study were breastfeeding mothers in the period August - September 2024 at TPMB "D". The sampling technique used purposive sampling. There are various factors to think about while deciding on a sample size. Therefore, the researcher did not use a random sampling method; rather, he decided on the sample himself. Following these inclusion criteria, the study sample was selected: 2. Mothers who are breastfeeding and have infants between the ages of 0 and 1 month; 3. Breastfeeding mothers who are not consuming ASI boosters; and 4. Breastfeeding mothers who are not using nipple cream.

The instrument used in this study used an observation sheet that was filled out before the respondents were given treatment and on the 3rd and 7th days when the researcher visited the respondents' homes. This observation sheet was filled out by the researcher. The stages in data collection are as follows: 1. The researcher determines the respondents for the intervention (according to the inclusion criteria); 2. Provide an explanation to respondents regarding the research to be conducted (giving carrot juice); 3. Invite

respondents to sign a consent form agreeing to participate in this research; 4. Before treatment, researchers assessed problems with the mother's breasts, namely cracked nipples and clogged milk ducts; 5. Explain to respondents how to make carrot juice and the frequency juice consumption in 1 day; 6. Researchers give carrots to respondents to consume for 1 week with a dose of 1 day 2 times (morning and evening). Every day researchers will observe the occurrence of nipple cracks and clogged milk ducts through online media (whatsapp); 7. Researchers conducted home visits on the 3rd, 5th and 7th days to observe and evaluate nipple cracks and clogged milk ducts in breastfeeding mothers.

In research involving nutritional interventions such as carrot juice, it is essential to provide respondents with a standard operating procedure (SOP) to ensure consistency in preparation and consumption. This SOP is often delivered in the form of a leaflet or instructional guide

The data collected through the observation sheet was edited and coded and then processed using the SPSS 26.0 program in 2022. Furthermore, the data was analyzed using the Wilcoxon

Signed Rank Test statistical test.

Ethical Clearance Certificate with No. 563/KEPK-POLKESMA/2024 was obtained from the Ministry of Health Polytechnic of Malang.

## RESULTS AND DISCUSSION

Understanding the demographic and obstetric characteristics of research participants is essential in interpreting the outcomes of an intervention. These characteristics can influence the susceptibility of breastfeeding mothers to nipple cracks and clogged milk ducts, as well as their response to treatment. The following table presents the distribution of respondents based on age and parity. Example of table presentation.

**Table 1. Frequency distribution of respondent characteristics**

Age (years)	n	%
20 - 25	5	33.3
26 - 30	6	40.0
31 - 35	4	26.7
Parity	n	%
Primigravida	11	73.33
Multigravida	4	26,67

Based on Table 1, the frequency distribution of respondent characteristics based on age shows that the majority of respondents are in the age range 26-30 years as many as 6 people (40%). This shows that most of

the breastfeeding mothers who participated in this study were in productive age which generally have optimal physical condition to support the breastfeeding process. Of the total 15 respondents, as many as 11 breastfeeding mothers (73.33%) were included in the primigravida category and as many as 4 breastfeeding mothers (26.67%) were in the multigravida category. This data is relevant to evaluate the effectiveness of giving carrot juice (*Daucus carota L*) in overcoming nipple cracks and clogged milk ducts. Primigravida mothers tend to be more susceptible to breastfeeding problems than multigravida mothers due to lack of previous experience.

The severity of nipple cracks and clogged milk ducts in breastfeeding mothers was assessed before and after the intervention using carrot juice (*Daucus carota L*). This comparison is crucial to evaluate the effectiveness of the intervention in improving breast health and comfort during lactation. The frequency distribution of these conditions is presented in Table 2.



**Table 2. Frequency distribution table of Nipple Crack events before and after intervention**

Parameter	Before Intervention		After Intervention	
	n	%	n	%
Nipple Crack				
Light	2	13.3	8	53.3
Medium	5	33.3	6	40
Heavy	8	53.3	1	67.7
Logged Milk Duct				
Mild	3	20	10	66.7
Medium	6	40	4	26.6
Severe	6	40	1	6.67

Based on table 2, the majority of nipple crack incidents in breastfeeding mothers were at a severe level, namely 8 (53.3%) breastfeeding mothers and 6 (40%) breastfeeding mothers experienced moderate to severe clogged milk ducts.

**Table 3. Analysis test**

Parameter	Median Pre-Test	Median Post-Test	Z-Value	p-Value
Nipple Crack	7,0	3,0	-3,41	0,001
Clogged Milk Duct	5,0	2,0	-3,29	0,001

The results of the Wilcoxon test showed a significant decrease in the severity of nipple cracks and the incidence of clogged milk ducts after administration of carrot juice ( $p < 0.05$ ). The analysis revealed a statistically significant decrease in both nipple crack severity and clogged milk duct incidence following the intervention ( $p = 0.001$ ). The median score for nipple cracks dropped from 7.0 to 3.0, indicating a substantial improvement in skin integrity around the nipple area. Similarly, the median score for clogged milk ducts decreased from 5.0 to 2.0, reflecting improved milk flow and reduced duct obstruction. These findings confirm that the administration

of carrot juice had a meaningful therapeutic effect on breastfeeding-related complications. The negative Z-values also indicate a consistent trend of symptom reduction across the majority of respondents.

Nipple crack or often called sore nipple is defined as a macroscopic skin lesion in the nipple and areola area. A sore nipple is an abnormality in the normal structure of the nipple skin caused by primary lesions, which manifest as alterations in the thickness and color of the nipple skin (Fauziah & Musiin, 2022).

Most breastfeeding mothers report experiencing more nipple crack over time, Most study on nipple crack



focuses on prevention and rehabilitation, therefore the incidence and frequency of the condition are unclear. In the first thirty days after birth, nipple cracks are more common than in any other period. Between 26 and 52 percent of women have a nipple crack between the third and seventh day after giving birth, and for some mothers, it may persist for as long as six weeks (Feenstra et al., 2018).

The most common causes of nipple crack have been shown to be improper positioning and attachment of the baby to the breast, poor breastfeeding technique, breast engorgement, and depigmented nipples. Other potential causes of sore and painful nipples include flat or inverted nipples, use of soap to clean the nipples and minimizing sun exposure, vitamin deficiencies, use of pacifiers and bottles, improper removal of the baby from the breast, use of nipple shields, and changes in frequency or duration of breastfeeding (Mohsen et al., 2024a).

Nipple crack can be characterized by a number of symptoms, including ulceration, erythema, edema, fissures, broken skin, ecchymosis, blisters, cracks, abrasions, and dark spots. Lesions in the nipple-

areola region that are marked by skin diseases include: Abrasion: a process of skin excoriation that exposes the dermis, also known as cracked skin: skin lesions that are superficial and affect the epidermis or Fissure: higher dermal involvement in slit-like lesions (Rahayu et al., 2015). A clogged milk duct occurs when the flow of milk is interrupted, causing milk to build up in the breast ducts. Causes of a clogged milk duct include, firstly, the breast milk is not emptied optimally. If the baby is not breastfeeding effectively or the mother is not expressing the remaining milk, the milk can build up and block the ducts.

Research by Safitriana et al., (2024), in the International Breastfeeding Journal found that blocked milk ducts are more common in mothers with babies who have difficulty breastfeeding. Second, excess breast milk production. An imbalance between breast milk production and baby consumption can cause excess breast milk, which triggers blockages. In a study by Arizona Department of Health Science (2020), mothers with excess breast milk production have a higher risk of experiencing clogged milk ducts. Third, external pressure on



the breasts. Pressure from bras that are too tight, shoulder bags, or sleeping on their stomachs can block the flow of milk. In a study by Puspita et al., (2021) it was stated that mechanical pressure on the breasts increases the risk of blocked milk ducts by up to 30%. Fourth, stress and fatigue. Psychological factors such as stress can affect the hormone oxytocin which plays a role in the release of breast milk, so that the flow of milk is disrupted. Mothers who experience chronic stress are more likely to report clogged milk ducts. Fifth infection or inflammation (mastitis). Inflammatory conditions in the breast caused by bacteria can cause blockage of the milk ducts. According to Al Manasra & Al-Hurani (2016), mastitis is a common complication of clogged milk ducts if not treated properly.

Carrots are rich in vitamin A, which is known to play an important role in skin regeneration and repairing damaged tissues. In cases of nipple cracks, the skin condition on the nipple is damaged and susceptible to infection. Vitamin A helps improve the cell regeneration process, so that cracks in the nipples can heal faster (Shastak & Pelletier, 2023). In addition, vitamin C

contained in carrots also functions as an antioxidant that helps prevent infection and supports collagen production. Collagen is very important for accelerating the healing process of wounds on the nipples.

In this study, the type of carrot used is the Brastagi variety. The reason for choosing Brastagi carrots is because they have several advantages compared to other carrot types. Brastagi carrots, a local variety grown in the highlands of North Sumatra, Indonesia, are considered nutritionally superior compared to other common carrot types. They contain higher levels of beta-carotene and vitamin A approximately 16,700 IU per 100 grams making them richer than many standard carrots, which typically contain only around 13,000–14,000 IU (Ismail et al., 2023). In addition, Brastagi carrots are abundant in antioxidants, vitamin C, potassium, and essential minerals such as calcium and iron. These components are crucial in supporting tissue repair and reducing inflammation, making Brastagi carrots especially beneficial for breastfeeding mothers who experience nipple cracks or clogged milk ducts (Zakarija-Grkovic & Stewart, 2020). The high beta-carotene content aids in



collagen formation and skin healing, while the antioxidants work to reduce oxidative stress and inflammation in breast tissue, which are key factors in alleviating pain and swelling. Studies have shown that carrot extracts possess strong antioxidant activity and when combined with Brastagi citrus, can significantly reduce oxidative stress levels in animal models (Darvin et al., 2022). Furthermore, evidence from lactation research indicates that anti-inflammatory agents and herbal compresses can help relieve breast engorgement and support recovery (Kouassi et al., 2022). Compared to other carrot varieties, the Brastagi type offers a more potent natural alternative that may support nipple healing and milk flow when consumed regularly or used topically (El-Moslemany et al., 2025). While more clinical trials are needed to directly assess its effects on lactating women, Brastagi carrots hold promising potential as a natural, nutrient-rich option for breastfeeding support.

The vitamin A content in carrots plays an important role in the regeneration process of damaged skin in nipple cracks. Vitamin A helps accelerate wound healing and maintain

healthy skin tissue. Vitamin C and antioxidants in carrots are thought to play a role in reducing inflammation and the risk of infection. Vitamin C also supports collagen formation, which is important for tissue repair in cracked nipple skin (Ikram et al., 2024).

Carrot juice can be applied topically to the affected area or taken orally for overall nutritional benefits. In a study conducted by Erarslan & Kültür, (2024), breastfeeding mothers who consumed carrot juice regularly showed a significant decrease in the severity of nipple cracks compared to the control group who did not consume carrot juice. This study used a recognized assessment scale to measure the severity of the injury, and the results showed that 75% of respondents experienced improvement within two weeks of consuming carrot juice (Pokhrel et al., 2022).

The anti-inflammatory components in carrot juice also contribute to reducing inflammation around the nipple area. This is supported by research conducted by Ibrahim et al., (2019), which shows that the antioxidants found in carrots can reduce oxidative stress which is often the cause of inflammation in the tissue.



By reducing inflammation, the healing process can take place more quickly, and breastfeeding mothers can be comfortable again while breastfeeding.

The wound-healing capabilities of carrots are excellent. Utilizing an excision wound model, mice administered a topical cream containing carrot root ethanol extract at different doses exhibited a considerable improvement in wound area, epithelialization time, and scar breadth in comparison to the control group (Nguyen et al., 2021). At the same time, there was a marked acceleration in the rate of wound contraction. Furthermore, animals administered a topical cream formulation of an ethanol extract from carrot seeds showed a considerable improvement in wound tensile strength, hydroxyproline content, and protein content (Mohsen et al., 2024b).

The effectiveness of carrot juice in treating nipple cracks can vary depending on individual factors, such as the severity of the injury, hygiene, and breastfeeding technique. Therefore, a holistic approach that includes education on proper breastfeeding techniques and hygiene care should also be applied along with the administration

of carrot juice. Thus, breastfeeding mothers can optimize healing and prevent future nipple cracks (Abobaker et al., 2020).

Carrot juice is rich in vitamin A and beta-carotene, which act as antioxidants that can help reduce inflammation in breast tissue. In a study conducted breastfeeding mothers who regularly consumed carrot juice reported a reduction in symptoms of clogged milk ducts within one week (Anjani et al., 2022). The study showed that 60% of participants felt significant improvement after consuming carrot juice, with symptoms of pain and swelling reduced (Tian et al., 2024). Carrot juice can also improve the quality of breast milk, which is important in preventing clogged milk ducts. According to research by Tirtawati et al., (2020), the nutrients contained in carrot juice can help increase milk production, thereby reducing the risk of blockage in the milk ducts. This study shows that mothers who consume carrot juice regularly experience an increase in breast milk volume significantly compared to mothers who did not consume it.

Using carrot juice in the form of juice or as part of a balanced diet can be an effective natural solution. However, it is important for breastfeeding mothers to continue to pay attention to breastfeeding techniques and frequency of breastfeeding to prevent clogged milk ducts. Giving carrot juice should be combined with advice from health workers to ensure that the mother gets the right care.

Several studies suggest that maternal diet plays a supportive role in breast milk production, even when the foods consumed are not classified as galactagogues. The production of breast milk is primarily regulated by the hormones prolactin and oxytocin, which are influenced by factors such as the frequency of breastfeeding, maternal stress levels, and nutritional status. Nutrient-rich foods such as those containing vitamins A, B-complex, and essential fatty acids—may indirectly enhance milk production by supporting maternal metabolism and hormonal balance (Wambach & Riordan, 2020).

Found that non-galactagogue foods with high antioxidant content may promote general lactation health by reducing oxidative stress and supporting endocrine function, including the

hypothalamic-pituitary axis that controls prolactin secretion. These findings highlight the importance of a balanced diet combined with frequent breastfeeding and emotional well-being as key synergistic factors in optimizing breast milk production.

## CONCLUSIONS

From the results of the analysis, it can be concluded that the administration of carrot juice has a significant effect in reducing the intensity of pain due to nipple cracks and improving the smoothness of breast milk in mothers who experience clogged milk ducts. The administration of carrot juice can be recommended as a complementary therapy for breastfeeding mothers who experience nipple cracks and clogged milk ducts. However, further research with larger samples and dose variations can help ensure the optimal dose and strengthen the results of this study.



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