



## Effectiveness of Ginger Herbal Remedies, Ginger Boreh, and Infrared Therapy in Increasing Breast Milk Production

Lena Sri Diniyati<sup>1</sup>, Rahmawati<sup>1</sup>

<sup>1</sup>Akademi Kebidanan Al-Ikhlas Cisarua, Bogor, Indonesia

Correspondence author: Lena Sri Diniyati

Email: [Lenasridiniyati@gmail.com](mailto:Lenasridiniyati@gmail.com)

Address: Jl. Hankam Cisarua, Bogor 16750 Jawa Barat, Indonesia Telp. 085718554447

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### ABSTRACT

**Introduction:** The high incidence of stunting and the low prevalence of exclusive breastfeeding in Indonesia are primarily caused by insufficient breast milk production.

**Objective:** This study aims to determine the effectiveness of ginger herbal remedies, ginger boreh, and infrared therapy in increasing breast milk production in breastfeeding mothers.

**Methods:** This research utilized a quantitative experimental method. A pre-experimental design with a one-group pre-test and post-test approach was employed. The subjects were observed before the intervention and re-observed after the intervention. The study population consisted of postpartum mothers in the working area of Cisarua. The sample included 30 breastfeeding mothers, selected through purposive sampling. The sample was filtered from the population based on inclusion and exclusion criteria.

**Results:** Statistical analysis using the Wilcoxon test revealed a significant p-value of 0.000, which is smaller than the significance threshold ( $p\text{-value} = 0.05 > 0.000$ ). Thus, it can be concluded that the administration of ginger herbal remedies, ginger boreh, and infrared therapy is effective in increasing breast milk production in postpartum mothers.

**Conclusion:** This study can serve as a therapy in maternal breastfeeding care and as a foundation for future research development, focusing on method enhancements or innovative approaches.

**Keywords:** breast milk, exclusive breastfeeding, ginger herbal remedies, stunting prevention

## Introduction

Stunting is defined as a condition of short or very short stature based on length/height-for-age that is less than -2 standard deviations (SD) on the WHO growth curve. It occurs due to irreversible conditions caused by inadequate nutritional intake and/or recurrent or chronic infections during the first 1,000 days of life (HPK). Stunting poses a significant threat to the quality of Indonesia's population. It not only disrupts physical growth but also impairs brain development, which affects children's abilities and achievements (WHO).

Recognizing that stunting is a high-risk health problem that can influence a child's growth into adulthood, it is crucial to understand various preventive efforts (WHO). Factors contributing to stunting in Indonesia include, among others, the non-exclusive breastfeeding during the first six months of life (Beal, 2018). Stunting prevention can be initiated during the preconception, pregnancy, and postpartum periods. One such effort in the postpartum phase is exclusive breastfeeding. Therefore, addressing stunting can be achieved by improving nutrition through increased breast milk production (Rizal, 2019).

Currently, the prevalence of stunting in Indonesia stands at 21.6%, while the targeted reduction is 14% by 2024 (BKKBN, 2023). According to the World Health Organization (WHO), exclusive breastfeeding involves feeding infants only breast milk without any additional fluids such as formula milk, water, juice, or other complementary foods until the infant reaches six months of age (Ministry of Health of Indonesia, 2013). Meanwhile, the coverage of exclusive breastfeeding in Indonesia is 52.2%, where infants aged 0–5 months receive exclusive breastfeeding. This figure remains far below the targeted 80%. Breast milk contains high nutritional value, which is immensely beneficial for infant health. The WHO recommends exclusive breastfeeding for six months. Thus, collaborative efforts are needed to achieve the target, starting from the smallest societal unit—the family.

The government has implemented various strategies to promote exclusive breastfeeding through multiple media. Increasing breast milk production can be achieved through pharmacological or non-pharmacological approaches. Non-pharmacological methods focus more on traditional techniques that do not involve medication but utilize herbal remedies to enhance breast milk production, such as turmeric, katuk leaves, moringa leaves, red ginger, and other herbs (Ayuningtyas, 2019). Additionally, pharmacological or non-pharmacological methods can be employed to boost breast milk production. Medications like metoclopramide, chlorpromazine, and sulphide may be prescribed, but these drugs have potential side effects if consumed regularly (Prawiroharjo, 2016). The use of traditional techniques and herbal remedies offers a safer alternative to enhance breast milk production (Marjan, 2018).

The high prevalence of stunting and the low rate of exclusive breastfeeding in Indonesia are mainly caused by insufficient breast milk production. This issue prompted researchers to investigate the effectiveness of ginger preparations, ginger boreh (topical application), and infrared therapy for increasing breast milk production in breastfeeding mothers. During the breastfeeding period, issues such as reduced breast milk production or the absence of milk in the early days often arise, preventing infants from receiving sufficient breast milk and adequate nutrition. Current healthcare interventions to increase breast milk production in breastfeeding mothers vary, including counseling and administering medications to stimulate, maintain, or enhance milk production (Paritakul, 2016).

Ginger (*Zingiber officinale Roscoe*) is a rhizome plant with various medicinal properties, characterized by its spicy taste and aroma (Ariyanti, 2021). Ginger, widely available and easy to obtain, can be utilized as an herbal remedy, especially for breastfeeding mothers. Ginger preparations, such as traditional ginger drinks containing galactagogues or ginger extracted into boreh (a topical ginger mask), have been shown to stimulate milk production. Ginger boreh provides a warming effect, relaxing body muscles, and optimizing milk production. Additionally, ginger is recognized as a galactagogue that stimulates lactation.

A study on the application of herbal ginger compresses in Thailand evaluated the effects of breast compresses on lactation. The findings revealed that the compresses reduced the time to lactation and enhanced postpartum milk production compared to routine clinical care (Dhippayon T, 2015). Similarly, warm ginger compresses, a traditional treatment, can be independently administered by nurses, patients' families, or patients themselves. This intervention alleviates pain without side effects and at a low cost. Non-pharmacological interventions, such as warm compresses, can independently be utilized by nurses to reduce breast pain, relax muscles, alleviate spasms, and provide localized warmth (Nurdahlia & Fitriani, 2021; Kozier, 2018).

Literature reviews suggest that consuming herbal galactagogues, such as ginger, effectively promotes milk production. Consuming ginger enhances lactation and prevents milk deficiency without adverse effects (Gusti Ayu, 2022). Research combining infrared therapy and ginger for increasing milk production remains limited. The specific objective of this study is to evaluate the combination of ginger preparations, ginger boreh, and infrared therapy to enhance milk production. This intervention aims to improve breastfeeding success, enabling mothers to provide adequate nutrition to their babies.

Infrared therapy is a physiotherapy modality offering relaxation benefits. Its therapeutic application involves 10-15 minutes of treatment at patient-tolerant intensity, with a distance of 35-45 cm perpendicular to the mother's back. The physiological effects of infrared include warmth, relaxation, vasodilation, improved blood circulation, and the stimulation of endorphin and oxytocin hormone production (Herawati & Wahyuni, 2017). Combining ginger preparations, ginger boreh, and infrared therapy induces a relaxation effect on the central nervous system, particularly the hypothalamus, which regulates oxytocin hormone production. This relaxation facilitates increased oxytocin production, subsequently enhancing milk production. This study, rooted in the health sciences, focuses on midwifery and explores traditional health practices to address stunting. The research approach involves understanding breastfeeding issues, planning and implementing therapy, addressing problems, and evaluating therapeutic outcomes.

## **Objective**

This study aims to determine the effectiveness of ginger herbal remedies, ginger boreh, and infrared therapy in increasing breast milk production in breastfeeding mothers.

## **Method**

This study employed a quantitative experimental research method with a pre-experimental design using the one-group pre-test–post-test approach. The subjects were observed before the intervention and re-evaluated after the intervention. The population of this study comprised postpartum mothers in the working area of Cisarua Health Center. A total

of 30 breastfeeding mothers were selected as the sample. The sampling technique applied was purposive sampling, where participants were selected based on inclusion and exclusion criteria. Prior to participating, respondents who agreed to take part in the study were asked to sign an informed consent form as a statement of their willingness. Data collection was conducted through interviews and the completion of questionnaires. The study was carried out in the working area of the Cisarua Health Center, Bogor Regency, with sample collection conducted from October 1 to October 31, 2024.

## Result

### *Univariate analysis*

Table 1. Sociodemographic of participants

Characteristics	f	%
<b>Age</b>		
1. <20 and >35	13	30
2. 20 to 35	22	70
<b>Parity</b>		
1. Primipara	12	40
2. Multipara	8	26.7
3. Grand Multipara	10	33.3
<b>Education</b>		
1. Primary School	17	56.7
2. Secondary School	8	26.7
3. Tertiary School	5	16.6

Table 1 shows the characteristics of the respondents in terms of age, parity, and education level. Regarding age, the majority of respondents, 22 out of 30 (70%), fall within the 20 to 35 years age range, while the remaining 13 respondents (30%) are either younger than 20 or older than 35 years. In terms of parity, 12 respondents (40%) are primipara (first-time mothers), 8 respondents (26.7%) are multipara (mothers with one or more children), and 10 respondents (33.3%) are grand multipara (mothers with five or more children). As for education level, most respondents (17 out of 30, or 56.7%) have completed primary school, 8 respondents (26.7%) have completed secondary school, and 5 respondents (16.6%) have pursued tertiary education. This demographic distribution provides insights into the diverse background of the study participants.

## Bivariate analysis

Table 2. Wilcoxon analysis

Breast Milk	Frequency (f)	Percentage (%)
<b>Before Treatment</b>		
Sufficient	3	10.0
Insufficient	27	90.0
<b>Total</b>	30	100.0
<b>After Treatment</b>		
Sufficient	30	100.0
Insufficient	0	0.0
<b>Total</b>	30	100.0

The table shows the distribution of respondents' breast milk production before and after the intervention with ginger formulation, ginger paste, and infrared therapy. Before the intervention, 27 out of 30 respondents (90.0%) had insufficient breast milk, while only 3 respondents (10.0%) had sufficient breast milk production. After the intervention, all 30 respondents (100%) reported having sufficient breast milk, and none experienced insufficient production. The statistical analysis using the Wilcoxon test yielded a p-value of 0.000, which is smaller than the significance level of 0.05. This result indicates a significant improvement in breast milk production after the intervention, confirming its effectiveness in enhancing milk production among postpartum mothers.

## Discussion

Ginger (*Zingiber officinale* Roscoe) is a widely available rhizome plant that can be used as an herbal remedy, particularly for breastfeeding mothers. Ginger concoctions are traditional drinks containing galactagogues, while ginger extracts are used to create ginger paste (boreh). Boreh ginger is a ginger mask that produces a warming effect, which can stimulate the increase in breast milk production. The stimulation provided by ginger causes the muscles in the body to relax, thus optimizing milk production.

Ginger, a medicinal plant with significant therapeutic properties, is categorized into three types based on its aroma, color, shape, and size. These types include elephant ginger, which has a mild aroma and a less pungent taste; small ginger (emprit), which is smaller, has a sharper aroma, and is spicier; and red ginger, characterized by its red-orange to light orange color. Among these, red ginger has the most potent aroma and spiciness (Aryanti, 2015). The warming sensation caused by the application of ginger paste can improve blood circulation and enhance breast milk production (Fitriani et al., 2020). In addition to warming, red ginger helps reduce discomfort and inflammation, facilitating better blood flow. The heat and spiciness from red ginger alleviate pain, stiffness, and muscle spasms (Aryanti, 2019). Active compounds that boost milk production include 10-dehydroginger-dione, 10-ginger-dione, 6-gingerdion, and 6-gingerol (Purwakusuma, 2014). Ginger stimulates milk secretion in breastfeeding mothers due to its anti-inflammatory properties and antioxidant content,

making it effective in alleviating pain caused by breast inflammation, which is common among nursing mothers, while also aiding in milk flow (Anggaini, 2022).

Galactagogues are substances believed to stimulate the formation, increase, and sustain breast milk production. These substances contain precursors that promote the proliferation of milk gland ducts responsible for milk production. Galactagogues are commonly found in traditional plants like ginger. The administration of ginger extract capsules to postpartum mothers has been shown to increase breast milk production (Korompis & Purwandari, 2019). Ginger's ability to stimulate milk production is due to its anti-inflammatory properties and antioxidant content, which help relieve pain from breast inflammation and promote milk secretion (Anggraini et al., 2022; Jauhary, 2020; Kriswiyanti et al., 2021).

Infrared is a physiotherapy modality known for its relaxation benefits. Infrared rays have longer wavelengths than regular red light, allowing them to penetrate body tissues and provide various health benefits. The physiological effects of infrared include warmth and relaxation, resulting in vasodilation, which improves blood circulation and boosts the production of endorphins and oxytocin, stimulating prolactin hormone release.

Infrared has been widely utilized, particularly in the medical field. According to Nurhayati (2010), human skin can absorb almost all infrared radiation, which is perceived as warmth. Most of the infrared radiation that reaches the skin is absorbed by the outer layers of the skin. Infrared has the characteristic of being invisible to the human eye, meaning it cannot penetrate opaque materials. It is produced by components that generate heat. The wavelength of infrared radiation is inversely related to temperature, meaning as temperature increases, the wavelength decreases (Michell, 2012).

The benefits of infrared include its ability to activate water molecules in the body. This is due to the fact that infrared waves have vibrations that match those of water molecules. As these molecules break apart, single molecules are formed, which increases bodily fluids. It also enhances microcirculation. The vibration of water molecules and the effects of infrared generate heat, causing capillaries to expand and increasing skin temperature, improving blood circulation, and reducing heart pressure. Infrared can also enhance body metabolism. When microcirculation in the body increases, toxins are removed through metabolism, reducing the burden on the liver and kidneys. Infrared light can help balance the body's pH and purify the blood (Tipler P.A, 2001).

The combination of ginger concoctions, ginger paste (boreh), and infrared therapy produces a relaxing effect on the central nervous system, particularly on the hypothalamus, which plays a role in producing oxytocin. This relaxation effect helps stimulate the production of oxytocin, which in turn increases breast milk production. Infrared therapy aids breastfeeding, which is an essential aspect of postpartum recovery. The warmth stimulated by infrared can help promote breast milk production by increasing blood flow to the breast and relaxing the tissues, facilitating the flow of milk.

Ginger contains key compounds such as flavonoids, which are classified as phytoestrogenic chemicals that can optimize endogenous estrogen. These compounds help enhance the growth of mammary gland cells, which play a role in the formation of the secretion system, and prolactin, which optimizes milk production. Flavonoids resemble estradiol, an endogenous steroid hormone, and exhibit estrogenic activity. These compounds have the ability to bind to estrogen receptors  $\alpha$  and  $\beta$ , optimizing their affinity. The presence of phytoestrogens, or flavonoids, also helps increase progesterone levels, which promotes the

growth of mammary glands, leading to an increase in milk production. This is achieved by binding to estrogen receptors in mammary duct cells, stimulating the proliferation of glandular cells (Idris & Unitley, 2020). Topical red ginger gel can be applied to the breast to dilate blood vessels, making it easier for breast milk (ASI) to flow. The gel expands blood vessels and mammary glands, facilitating the release of breast milk. The warmth spreads from one end of the breast to the other, and milk gradually flows from the nipple (Hegar & Sahetapy, 2019).

Ginger also contains steroids that help trigger prolactin reflexes or stimulate alveoli to produce breast milk. These steroids also activate oxytocin, which enhances milk flow and secretion. The hormonal effects of sterols containing estrogen help increase breast milk production (Triananinsi et al., 2020). The infrared effect enhances microcirculation. The vibration of water molecules, combined with infrared exposure, generates heat, causing capillaries to dilate, thus improving metabolism. This dilation of blood vessels further promotes the secretion and flow of breast milk.

### ***Clinical Implications***

This study suggests that the integration of traditional herbal treatments, such as ginger and ginger boreh, with modern therapeutic approaches like infrared therapy, could be a viable non-pharmacological intervention for improving breastfeeding outcomes. Healthcare providers, including nurses and midwives, can incorporate these methods into postpartum care to support lactating mothers. Given the positive effects on milk production, this intervention can be especially useful in community health settings or for mothers experiencing difficulties in lactation, providing an affordable and accessible option to enhance breastfeeding success. Further research with larger sample sizes and controlled designs is recommended to confirm these findings and explore the long-term impacts of this combined therapy on maternal and infant health.

### **Conclusion**

The combination of ginger extract, ginger boreh, and infrared therapy significantly enhances breastmilk production (ASI) in postpartum mothers. The data from this study indicate that the intervention improved the flow of breast milk from "insufficient" to "sufficient" in all 30 respondents, with a statistically significant change ( $p$ -value = 0.000). The use of ginger, a known galactagogue, in combination with infrared therapy appears to optimize milk production by enhancing blood circulation and promoting hormonal responses, including the release of prolactin and oxytocin, which are essential for lactation. The results demonstrate that the combination of these natural interventions can be an effective non-pharmacological treatment to address low milk supply in breastfeeding mothers.

### ***Conflict of interest***

The researchers stated that there is no conflict of interest related to the implementation and publication of the results of this research. The entire research process, from planning, data collection, analysis, to report preparation, was carried out independently without any influence or pressure from any third party. A commitment to research ethics is upheld throughout the research process, ensuring transparency, accuracy and honesty in reporting results. Respondents' participation was voluntary with informed consent, and their confidentiality and privacy were maintained in accordance with applicable research ethics

standards. With this statement, researchers hope that the research results can be trusted and used as a valid reference for the development of science and health practices related to ethnomedicine and reproductive health.

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### **Authors' contribution**

Each author makes an equal contribution to all parts of the research. All authors have reviewed and approved the final draft critically and are responsible for the index and similarity of the manuscript.

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