MEDISAINS - VOL. 21 NO. 3 (2023) 74-78

MEDISAINS
Jurnal Ilmiah Ilmu - Ilmu Kesehatan

Original Article

Combination of Woolwich massage and hydrogel made from red ginger for breastfeeding mothers to increase baby weight

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ARTICLE INFORMATION

Received: July 27, 2023
Revised: October 12, 2023
Accepted: October 16, 2023

KEYWORDS

Massage; Ginger Extract; Breast Feeding; Birth Weight

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A B S T R A C T

Background: The amount of breast milk that nursing moms make is still insufficient, affecting the infant's weight. One attempt to increase the baby's weight is administering a combination of Woolwich massage and red ginger hydrogel, which has never been done in prior studies.

Purpose: To demonstrate the impact of a Woolwich massage and red ginger hydrogel on infant weight.

Method: This experimental study with a pre-post-test control group design. Thirty-six breastfeeding mother respondents were selected using simple random sampling; 18 were given a combination of Woolwich massage and red ginger hydrogel, and 18 were given standard breast care during the postpartum period. Treatment was given for seven days—analysis of baby weight using the Paired Samples T-Test and the Mann-Whitney test.

Results: The average increase in body weight of infants of the intervention group (405,56 g) was higher than the control group (238,89 g), $p<0.05$.

Conclusion: Breastfeeding mothers given a combination of Woolwich massage and hydrogel made from red ginger rhizomes could have babies with a higher birth weight than mothers who were only given standard breast care.

INTRODUCTION

Lack of breast milk production is one of the causes of low coverage of exclusive breastfeeding. According to survey results in Indonesia, as many as 38% of mothers stopped giving breast milk to their babies because of a lack of milk production. Failure during the breastfeeding process will impact the health of the mother and baby.[1] Babies can experience various diseases, including Sudden Infant Death Syndrome (SIDS), due to being given food that does not meet nutritional needs. Apart from that, mothers can experience complications that occur during the postpartum period.[2,3]

Efforts to increase breast milk production can be made pharmacologically and non-pharmacologically. Woolwich massage is performed on the lactiferous sinus area to express breast milk. Previous research shows that Woolwich massage can stimulate breast milk production with the result that there are differences in breast milk volume in the groups before and after the intervention.[3]

Another non-pharmacological effort to increase breast milk production can be using warm compresses on the breasts because it can increase the flow of breast milk to the glands that function as breast milk producers, stimulate the letdown reflex, and prevent breast milk retention, which can cause breast swelling. Previous research showed that there was a significant difference in the average increase in breast milk production before and after three days of treatment in the intervention group 32,250 ml and the control group 26,472 ml, meaning that warm herbal compresses as breast care can increase the hormone oxytocin and average breast milk production for postpartum mothers.[4] The warm compress mechanism can also be obtained from spice plants with a warming mechanism, one of which is red ginger (*Zingiber officinale* Rosc. Red).

Red ginger is considered an herbal medicine with safe or mild side effects. Red ginger contains essential oils and non-volatile oleoresins, which increase permeability so that it can conduct heat, which causes vasodilation, relaxes muscles, and improves blood circulation when

https://doi.org/10.30595/10.30595/medisains.v21i3.18609

placed on the skin surface without causing irritation or damage to peripheral circulation.[5] The warm feeling caused by red ginger will relax the mother so that more oxytocin hormone flows to the breasts to meet the need for expressing breast milk and prevent breast milk dams, which can cause breast swelling.

Previous research used a compress of grated red ginger for 20 minutes on both breasts, which was given once a day for five days to postpartum mothers to prevent breast swelling effectively.[6] In vivo research showed the anti-inflammatory ability of administering carrageenin to male Wistar rat test animals with red ginger extract hydrogel preparation was significantly better than the control.[7] Hydrogel has the advantages of having good dispersion power on the skin, having a cooling effect due to the slow evaporation of water on the skin, not inhibiting the physiological functions of the skin, being easily rinsed with water, not clogging the skin pores, and having good drug release.

Research on the combination of giving Woolwich massage and using red ginger as a hydrogel preparation for breastfeeding mothers to increase baby weight has never been carried out in previous research. Therefore, this study aims to prepare red ginger hydrogel topical and prove the effect of the combination of Woolwich massage and red ginger hydrogel as a non-pharmacological therapy on increasing baby weight in breastfeeding mothers.

METHOD

Study Design

This research is an experimental study with a pre-post-test control group design.[8]

Setting and Respondents

This research was conducted in the working area of the Talun Public Health Center, Cirebon Regency, in March - April 2023. The population in this study were postpartum mothers. Sample in the study of 36 respondents with inclusion criteria: a standard history of delivery, 14th day postpartum, no anatomical and physiological abnormalities in the breast, Body Mass Index (BMI) >18.5-25kg/m m^2, Mid-upper arm circumference >23.5cm, are on work/housewife leave, have never done breast care or special massage that can increase milk production, and have no history of red ginger allergy. In baby criteria is a baby born at full term (37-42 weeks) with average birth weight (2500-4000 grams), baby's weight on the 14th day back to birth weight, the baby only gets breast milk without any additional food/drink, the baby's sucking reflex is good, the baby does not have Labioskizis and Tounge Tie abnormalities. Exclusion criteria in this study were mothers with conditions that make it impossible to breastfeed their baby (such as mothers who are currently undergoing HIV, tuberculosis, and cancer treatment), smoke, consume alcohol, consume breast milk supplements, giving formula milk or other additional food and drinks for babies, babies were not hospitalized with mothers, and babies were sick during treatment. Samples were randomly divided into the intervention group (n=18), which received a combination of Woolwich massage and red ginger hydrogel, and the control group (n=18), which received standard breast care during the puerperium.

Making the red ginger hydrogel

The manufacture of red ginger hydrogel was carried out at the CV Laboratory. Cendikia Nanotech Hutama (CNH) Semarang. The tools used are analytical scales, extraction container, magnetic stirrer, 1-liter glass enlementer, Wathman No. 40 filter paper, rotary evaporator, dryer cabinet, hot plate, petri dish, oven, pH meter, object glass, rheometer, viscometer, and extensometer. The ingredients used are 2 kg of red ginger simplicia, 5 liters of 96% ethanol, 2 grams of HPMC, 15 ml of propylene glycol, 1 gram of PVC, 100 ml of Aquades, 10 ml of Glycerin, and 1-2 ml of Triethanolamine (TEA).

First, red ginger extract was made by maceration using 96% ethanol solvent for three days and stirring every 6 hours for 5 minutes to obtain flavonoid compounds. The maserate is separated from the filtrate by filtration using Wathman filter paper no. 40. After the filtrate is filtered, the maserate is separated from the ethanol solvent by evaporating using a rotary evaporator at a temperature of 45-50°C with a pressure of 0.08 MPa until it becomes thick and constant, called yield. Next, it is dried in a cabinet at a temperature of 45-50°C and transferred to a container.

Second, 4% red ginger extract is processed into red ginger hydrogel by heating distilled water to a temperature of 45-50°C for 3-5 minutes, stirring using a magnetic stirrer to make the hydrogel base, then HPMC is put into a mortar, and PVC, Glycerin, Propylene glycol are added, and TEA, wait until it thickens and turn off the magnetic stirrer. Carry out a homogeneous process with a homogenizer and transfer to a container. Next, the hydrogel base was dissolved in 1:2 distilled water (hydrogel base: distilled water) and stirred using a magnetic stirrer. Add 4% red ginger extract (1080 grams) slowly and turn off the magnetic stirrer. Carry out a homogenizing process with a homogenizer and package it in a tube containing 60 grams of red ginger hydrogel, then test the flavonoid content and the quality of the preparation on the red ginger hydrogel.

Experimental Procedure

The intervention group was given a combination of Woolwich massage and 3.75 grams of red ginger hydrogel, which was applied evenly, gently, and carefully avoiding the areola twice a day in the morning and evening for seven days, while the control group was given standard

breast care only twice a day in the morning and evening for seven days.

Variables, Instruments, and Measurements

The variable in this study was the baby's weight, measured using a baby scale on the first day before treatment (14th day postpartum) and the eighth day after treatment (21st day postpartum) in the morning.

Statistical Analysis

The data in this study were analyzed using the Paired Samples T-test to determine the difference in baby weight before and after the intervention and the Mann-Whitney test to determine the difference in baby weight between the intervention and control groups.

Ethical Consideration

This research has passed the ethical test conducted by the Ethics Commission of the Poltekkes of the Ministry of Health Semarang, registration number 0220/EA/KEPK/2023.

RESULTS

Figure 1 is an example of a red ginger hydrogel product. This product contains 60 grams of red ginger hydrogel with a flavonoid content of 1.32 mgQE/g. Table 1 shows that the majority of respondents in this study were multiparous. All respondents had good breastfeeding frequency, good eating and resting patterns, and normal psychological status. Figure 2 shows that the results of the baby's weight gain in the intervention group were higher than those in the control group, with a difference in the weight gain of babies in the intervention group of 405.56 grams compared to the control group of 238.89 grams (p=0.000).

Figure 1. Red Ginger Hydroge

Table 1. Characteristics of Respondents (n=36)

Characteristic	Results
Parity	
Primiparous (1)	17 (47.2%)
Multiparous (2 - 4)	19 (52.8%)
Grandemultiparous (> 4)	0 (0%)
Breastfeeding Frequency	
Good (>12 times/24 hours)	36 (100%)
Enough (8-12 times/24 hours)	0 (0%)
Less (<8 times/24 hours)	0 (0%)
Dietary Habit	
Good (≥Median)	28 (77.8%)
Less(<Median)	8 (22.2%)
Rest Pattern	
Good (Score 0 - 5)	36 (100%)
Poor (Score 6 - 21)	0 (0%)
Psychological Status	
Normal/Not at risk for depression (Score 0 - ≤ 9)	36 (100%)
Need referral/At risk of depression (Score > 9)	0 (0%)

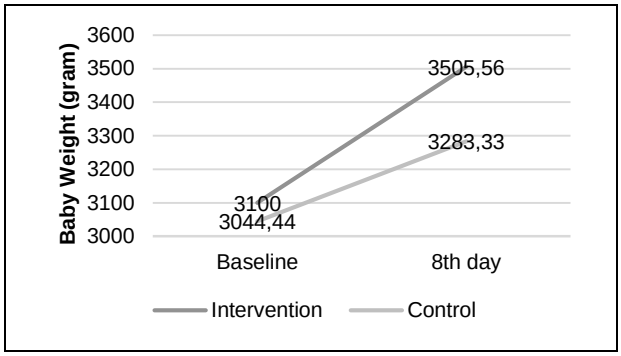

Figure 2. Graph of Average Baby's Weight

DISCUSSION

A combination of Woolwich massage and red ginger hydrogel in this study it can increase breast milk production for breastfeeding mothers, seen from the baby's weight indicator. The average increase in baby weight in the intervention group was higher than in the control group. Assessment of breast milk production can refer to the volume of breast milk secreted by the mother's breasts.[9] The baby's weight is influenced by lactose in the digestive tract, which is then converted into glucose and galactose and metabolized into energy and calories, so one indicator for assessing breast milk production is the baby's weight.[10,11] The standard for baby weight gain is 20-30 grams per day or 140-200 grams per week for the first six months.[12,13]

Woolwich massage performed on breastfeeding mothers in the lactiferous sinus area, precisely 1-1.5 cm outside the mammary areola, will stimulate vegetative nerves and subcutaneous tissue, which can release tissue, thereby accelerating neurotransmitters to stimulate the medulla oblongata to send messages to the hypothalamus in the posterior pituitary to produce the hormone oxytocin.[11] Once produced, the hormone oxytocin will stimulate the contraction of the myoepithelial cells that surround the mammary alveoli and lactiferous ducts to improve blood flow, remove the remains of ductal system cells that obstruct the flow of breast milk, and push breast milk out of the mammary alveoli and lactiferous ducts into the lactiferous sinuses and milk will be stored. Emptying breast milk will stimulate the release of the hormone prolactin in the

anterior pituitary. Next, the hormone prolactin will stimulate the acinus cells in the alveoli to produce breast milk.[14]

Red ginger consists of shogaol, a gingerol compound that changes at high temperatures and has hotter and spicier characteristics. Red ginger also has zingerone, which can add a spicy taste.[15] The hot and spicy taste produced by red ginger can conduct heat (conduction) so that topical administration of red ginger hydrogel causes vasodilation of blood vessels and increases capillary permeability, widens the channels in the lactiferous ducts to improve blood flow to the breasts, relaxes muscles, and stimulates the posterior pituitary to releases the hormone oxytocin which then makes the myoepithelium in the mother's breasts contract so that breast milk can be pushed through the lactiferous ducts and sinuses and out of the breast.[6,16]

Giving red ginger hydrogel can also stimulate the effector system, which makes the mother relax so that the process of expressing breast milk can run smoothly because, in theory, it is known that it can influence the mother's psychological condition, such as relaxation and mental calm to produce the hormone oxytocin. The more often breast milk is expressed, the more breast milk is produced. Sufficient or excessive breast milk production will affect the baby's weight gain.[6,17]

Previous research found the same thing related to increasing baby weight by giving Woolwich massage to breastfeeding mothers ($p<0.05$).[18] The results of another study comparing Woolwich massage with standard breast care showed that the group that received Woolwich massage experienced a more significant increase in baby weight than the group that received standard breast care.[19] Also supported by research comparing the effectiveness of red ginger and warm compresses, the results show that both treatments improve blood flow, but red ginger compresses provide more significant results than warm compresses.[20]

The use of red ginger contains phenolic compounds in ginger oleoresin, which have been proven to help speed up and improve blood flow, have an anti-inflammatory effect, and can reduce or prevent muscle tension.[21,22] he gingerol compound in red ginger, which has a spicy and hot effect, can increase blood flow by causing vasodilation in blood vessels.[23] This effect can be felt within 20 minutes after application.[24,25]

Other research states that red ginger, which contains oleoresin, has been proven to widen the ducts in the lactiferous ducts and relax the muscles, improving blood flow to the breasts and preventing breast swelling.[6] This is supported by research that explains that the red ginger hydrogel preparation has good physical stability and meets the requirements for gel preparations. The results of the anti-inflammatory test on male Wistar strain rats using red ginger extract hydrogel provided a significant difference from the control.[7] Combining Woolwich massage and red ginger hydrogel can be a non-pharmacological therapy to increase subsequent breast milk production.

CONCLUSIONS AND RECOMMENDATION

Breastfeeding mothers who were given a combination of Woolwich massage and red ginger hydrogel had a higher increase in baby weight compared to mothers who were only given standard breast care during the postpartum period. For further research, viscosity, and endurance tests of the red ginger hydrogel can be carried out. Red ginger can be used as a non-pharmacological topical ingredient that does not have adverse side effects in increasing breast milk production, so it can be developed and studied further by considering the benefits of red ginger and controlling for all variables that might affect milk production, such as breastfeeding techniques. It is necessary to do research by dividing groups, such as the group that received Woolwich massage, the group that received red ginger hydrogel, and the group that received a combination of Woolwich massage and red ginger hydrogel, to find out which treatment had the most effect on milk production.

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