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The Effectiveness of Oxytocin Massage and Breast Care in Increasing Breast Milk Production in Postpartum Mothers at the Konaro Community Health Center

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Abstract. Suboptimal breast milk production during the postpartum period is one of the causes of low rates of exclusive breastfeeding. Various nonpharmacological interventions have been developed to increase breast milk production, one of which involves a combination of oxytocin massage and breast care. This study aimed to analyze the effectiveness of a combination of oxytocin massage and breast care in increasing breast milk production among postpartum mothers at the Konaro Community Health Center. The study employed a quantitative approach with a pre-experimental design using a one-group pretest–posttest design. The study sample consisted of 25 postpartum mothers selected using total sampling. Breast milk production was measured based on breast milk volume before and after the intervention. Data analysis included the Shapiro–Wilk normality test and a paired t-test with a 95% significance level. The results showed that the average breast milk production volume increased from 34.00 ± 11.71 mL before the intervention to 106.52 ± 34.13 mL after the intervention, with an average increase of 72.52 mL. The results of the paired t-test showed a statistically significant increase in breast milk production following the combination of oxytocin massage and breast care (p=0.000). The combination of these two interventions is effective in increasing breast milk production and has the potential to become a safe, easy-to-implement, and nonpharmacological intervention that can be integrated into midwifery care to support the success of exclusive breastfeeding among postpartum mothers.

Keywords: Breast Care; Breast Milk; Breast Milk Production; Oxytocin Massage; Postpartum Mothers.

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1. Background

Breast milk is the best natural food for infants because it contains a complete range of macro- and micronutrients, immunological factors, hormones, enzymes, and bioactive components that play a crucial role in growth, development, and protection against various infectious diseases. The World Health Organization (WHO) and UNICEF recommend exclusive breastfeeding for the first six months of life, followed by adequate complementary feeding until the age of two years or older. The success of exclusive breastfeeding is greatly influenced by the smooth production of breast milk starting in the early postpartum period, as this phase is a period of physiological adaptation that determines the continuity of the lactation process (World Health Organization [WHO], 2023).

Breast milk production is a physiological process influenced by hormonal interactions, particularly the hormone prolactin, which plays a role in breast milk synthesis, and the e hormone oxytocin, which functions in the milk ejection reflex (let-down reflex). After childbirth, a decrease in progesterone and estrogen levels triggers an increase in prolactin activity, while the baby's suckling and sensory stimulation of the breasts increase oxytocin

secretion. Disruption of either of these mechanisms can result in suboptimal breast milk production and ejection (Ballard & Morrow, 2021).

Low breast milk production remains one of the leading causes of failure to achieve exclusive breastfeeding in many countries. The WHO reports that in 2023, global exclusive breastfeeding coverage reached only about 48%, still falling short of the global target of 70% by 2030 (WHO, 2023). UNICEF also reports that mothers' perception of insufficient breast milk is the most common reason for early cessation of breastfeeding in various countries, particularly during the first week postpartum (UNICEF, 2023). Various studies indicate that delayed onset of lactogenesis II occurs in approximately 20–40% of postpartum mothers, particularly among primiparous mothers, those who delivered via cesarean section, obese mothers, and mothers experiencing high psychological stress (Nommsen-Rivers et al., 2020).

In Indonesia, the success of exclusive breastfeeding still faces various challenges. According to the 2023 Indonesia Health Profile, the national exclusive breastfeeding coverage rate stands at approximately 73%, but it still shows significant variation across regions and has not yet fully met the national target. One of the main causes of low exclusive breastfeeding success is insufficient milk production in the first few days after delivery, leading mothers to tend to introduce formula or complementary foods earlier than recommended (Indonesian Ministry of Health, 2024). This situation highlights that optimizing breast milk production starting from the postpartum period is a critical aspect in supporting the success of exclusive breastfeeding programs.

Suboptimal breast milk production has a direct impact on the health status of both mothers and infants. In infants, insufficient breast milk increases the risk of growth retardation, nutritional deficiencies, dehydration, hypoglycemia, diarrhea, respiratory tract infections, as well as higher rates of hospitalizations and neonatal mortality (Victora et al., 2016). For mothers, breastfeeding failure increases the risk of milk stasis, mastitis, breast abscesses, psychological stress, low confidence in breastfeeding, and early cessation of breastfeeding (Rollins et al., 2016). Additionally, low breast milk production can disrupt the mother–infant bonding process, which plays a vital role in the infant's psychosocial development.

Various interventions have been developed to increase breast milk production, through both pharmacological and non-pharmacological approaches. Non-pharmacological interventions are more highly recommended because they are relatively safe, easy to implement, inexpensive, and have minimal side effects. Two methods widely used in midwifery practice are oxytocin massage and breast care. Oxytocin massage is a technique involving massage of the paravertebral region from the thoracic to the lumbar spine, aimed at stimulating the release of the hormone oxytocin to facilitate the milk ejection reflex. Meanwhile, breast care is a set of breast care practices that includes gentle massage, warm compresses, and nipple stimulation to improve blood circulation, prevent milk stasis, and facilitate the lactation process (Marmi, 2021).

Physiologically, oxytocin massage stimulates the parasympathetic nervous system, which increases the secretion of oxytocin from the posterior pituitary gland, thereby making the contractions of the alveolar myoepithelial cells more effective in expelling breast milk. On the other hand, breast care improves vascularization of breast tissue, maintains the patency of the lactiferous ducts, reduces edema, and enhances the mother's comfort during breastfeeding (Kent et al., 2019). The combination of these two interventions is expected to produce a synergistic effect in increasing milk production and facilitating milk flow.

Various studies have demonstrated the effectiveness of these two interventions. A systematic review by Gavine et al. (2022) showed that breast stimulation and lactation support can improve breastfeeding success during the postpartum period. A study by Kent et al. (2019) reported that mechanical stimulation of the breasts enhances the oxytocin reflex and the volume of breast milk expressed. In Indonesia, various studies published in accredited national journals have also shown that oxytocin massage and breast care significantly improve the flow of breast milk production, accelerate the first milk ejection, and increase the success of exclusive breastfeeding among postpartum mothers.

The Konaro Community Health Center (Puskesmas), as a primary health care facility, has been providing postpartum care and breastfeeding counseling. However, there are still postpartum mothers who complain that their milk production is not yet established in the early days after childbirth, which could potentially hinder the success of exclusive breastfeeding. To date, scientific evidence regarding the effectiveness of the combination of oxytocin massage and breast care in increasing breast milk production within the Konaro Community Health Center's service area remains limited. Therefore, this study is important

to serve as a basis for developing evidence-based complementary interventions in midwifery care.

Based on the above, this study aims to analyze the effectiveness of oxytocin massage and breast care in increasing breast milk production among postpartum mothers at the Konaro Community Health Center. The study results are expected to provide a scientific basis for strengthening lactation services, enhancing the competence of health workers in implementing evidence-based nonpharmacological interventions, and supporting the success of exclusive breastfeeding programs and improvements in maternal and infant health.

2. Theoretical Review

Breast milk production is a physiological process influenced by the interaction of the hormones prolactin and oxytocin. Prolactin plays a role in breast milk synthesis, while oxytocin stimulates contractions of the myoepithelial cells in the breast alveoli, allowing breast milk to be released through the let-down reflex. Smooth breast milk production is influenced by hormonal conditions, breastfeeding frequency, the mother's psychological state, nutrition, and breast stimulation (Kent et al., 2019; Ballard & Morrow, 2021).

One of the most widely used nonpharmacological interventions to increase breast milk production is oxytocin massage and breast care. Oxytocin massage is performed on the paravertebral region to stimulate the release of the hormone oxytocin through stimulation of the parasympathetic nervous system, while breast care aims to improve blood circulation, maintain breast hygiene, prevent milk engorgement, and facilitate milk ejection. The combination of these two interventions is believed to have a synergistic effect in increasing breast milk production and flow in postpartum mothers (Kent et al., 2019; Gavine et al., 2022).

Various studies have demonstrated the effectiveness of these two interventions. Gavine et al. (2022), through a systematic review, reported that breast stimulation and lactation support increase breastfeeding success among postpartum mothers. The study by Kent et al. (2019) showed that mechanical stimulation of the breasts enhances the oxytocin reflex and increases breast milk volume. In Indonesia, studies by Rahmawati et al. (2023), Nugroho and Putri (2023), Widuri et al. (2024), and Sari and Putri (2023) also showed that both oxytocin massage and breast care significantly improved breast milk production in postpartum mothers.

3. Research Method

This study used a pre-experimental design with a one-group pretest–posttest design to analyze the effectiveness of a combination of oxytocin massage and breast care in increasing breast milk production among postpartum mothers at the Konaro Community Health Center. The study was conducted in 2026 and involved 25 postpartum mothers who met the inclusion criteria. Total sampling was used, meaning the entire population meeting the criteria served as the study participants.

The independent variables were the oxytocin massage and breast care intervention, while the dependent variable was breast milk production, measured based on breast milk volume (mL) before and after the intervention and classified into the categories of insufficient, adequate, and good. The respondent characteristic data collected included age, education, occupation, parity, postpartum days, delivery history, nipple condition, nutritional status/BMI, family support, breastfeeding frequency, and previous breastfeeding history. The intervention was administered in accordance with Standard Operating Procedures (SOPs) by trained healthcare workers.

Data analysis began with univariate analysis to describe respondent characteristics and the distribution of breast milk production before and after the intervention. Normality was tested using the Shapiro–Wilk test. Subsequently, the effectiveness of the intervention was analyzed using a paired t-test if the data were normally distributed or the Wilcoxon signed-rank test if the data were not normally distributed. All tests were conducted at a 95% confidence level with a significance threshold of $p < 0.05$. The study adhered to the ethical principles of health research by obtaining informed consent, maintaining the confidentiality of respondents' identities, and upholding the principles of beneficence, non-maleficence, and justice.

4. Results and Discussion

Table 1. Demographic Data.

Var		n	F (%)
Ages	<20 years old	2	8.0
	20–35 years old	23	92.0
	>35 years old	0	0
Education	No education	0	0
	Elementary school	0	0
	Junior high school	4	16.0
	High school	12	48.0
	College	9	36.0
Employment	Housewife	13	52.0
	Private-sector employee	2	28.0
	Teacher/lecturer	0	0
	Civil Servant	5	20.0
Parity	First-time mother	11	44.0
	Multipara	10	40.0
	Grandemultipara	4	16.0
Labor	Normal	14	56.0
	Cesarean Section	11	44.0
Nipple condition	Inverted	4	16.0
	Flat	4	16.0
	Normal	14	56.0
	protruding	3	12.0
Nutritional status	Very thin	2	8.0
	Thin	2	8.0
	Normal	13	52.0
	Fat	5	20.0
	Obese	3	12.0
Previous breastfeeding	No	11	44.0
	Yes	14	56.0
Total		25	100

(source: primary data, 2026)

Based on the demographic data presented in Table 1, the total number of respondents in this study was 25 postpartum mothers. The majority of respondents were within the healthy and safe reproductive age range, specifically the 20–35 age group, comprising 23 individuals (92.0%), while the under-20 age group accounted for only 8.0% (2 individuals). In terms of educational level, the highest percentage was dominated by high school (SMA) graduates, totaling 12 participants (48.0%), followed by college/university graduates, totaling 9 participants (36.0%). In terms of employment status, more than half of the participants were housewives, totaling 13 participants (52.0%). Based on parity, the primiparous group accounted for the highest proportion at 44.0% (11 women), followed by multiparous women at 40.0% (10 women). Regarding delivery method, 14 respondents (56.0%) had a vaginal delivery, and 11 respondents (44.0%) underwent a cesarean section (C-section). Regarding breast anatomy, the majority had normal nipples (56.0%). In terms of nutritional status, the majority of respondents were classified as having a normal body weight at 52.0% (13 women). Additionally, 14 respondents (56.0%) reported having previous breastfeeding experience.

Table 2. Numerical Data.

Var	N	min	max	Mean	SD
Breast milk volume before	25	12.00	50.00	34.00	11.71
Breast milk volume after	25	35.00	160.00	106.52	34.13

(source: primary data, 2026)

Table 2 documents the distribution of numerical data on respondents' breast milk production volume before and after receiving the combined Oxytocin Massage and Breast Care intervention. Before the intervention (pre-test), the mean breast milk volume of the respondents was quite low, at 34.00 mL (SD = 11.71 mL), with the lowest volume at 12.00 mL and the highest reaching only 50.00 mL. After the intervention (post-test), there was a massive surge in lactation volume, with the average breast milk production increasing to

106.52 mL (SD = 34.13 mL). The minimum post-intervention breast milk volume crept up to 35.00 mL, and the maximum volume surged sharply to 160.00 mL. In absolute terms, this intervention resulted in a mean difference of 72.52 mL.

Table 3. Statistical Analysis (Numerical Data).

Independent variable	n	P-Value	
Breast milk volume before	25	0.124*	
Breast milk volume after	25	0.380*	
Shapiro-Wilk			
Independent variable	**N**	**P-value**	**Dependent Var**
Breast milk volume before	25	0.000*	**Breast milk volume after**
Paired t-test			

*significant

(source: primary data, 2025)

Before testing the hypotheses, the assumption of data normality was tested using the Shapiro-Wilk test, given that the sample size $N < 50$. The test results showed that the breast milk volume data were normally distributed, both in the pre-intervention phase ($p = 0.124$) and post-intervention phase ($p = 0.380$), since the p-values were greater than 0.05. Based on the fulfillment of the normality assumption, hypothesis testing was conducted using the parametric Paired t-test. Based on Table 3, the results of the paired t-test analysis show a P-value of 0.000 ($p < 0.05$). These statistical findings empirically prove that there is a highly significant effect of Oxytocin Massage and Breast Care on increasing breast milk production in postpartum mothers at the Konarom Community Health Center.

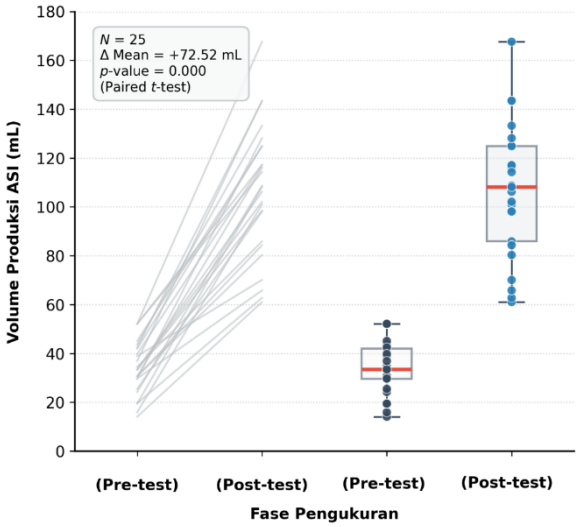


Figure 1. Box plot of changes in breast milk production volume.

Box plot and trends in individual changes in breast milk production volume before and after the combined Oxytocin Massage and Breast Care intervention (N = 25). The gray vertical lines connect the coordinate points of the same subjects to illustrate the direction of change for each individual. The thick red horizontal line indicates the group median. Analysis using a paired t-test confirmed a statistically highly significant increase in lactation volume from baseline (mean = 34.00 mL; SD = 11.71 mL) to post-intervention (mean = 106.52 mL; SD = 34.13 mL) (p = 0.000).

Discussion

The main findings of this study confirm that the combination of Oxytocin Massage and Breast Care is significantly effective in doubling breast milk production volume in a group of postpartum mothers. The average increase in lactation volume from the initial baseline of 34.00 mL to 106.52 mL post-intervention indicates that this non-pharmacological physical manipulation has a strong therapeutic effect on the optimization of the mammary glands. The

success of this combined intervention can be explained by the integration of neuroendocrine mechanisms (hormonal factors) and local mechanical stimulation (vascularization factors), which work synergistically in the postpartum mother's body.

The primary mechanism behind the effectiveness of oxytocin massage lies in tactile stimulation along the parasympathetic nervous system pathways. Structured massage of the area from the spine (vertebrae) to the fifth or sixth rib transmits calming efferent signals to the hypothalamus. According to Rahmawati et al. (2023), tactile stimulation of this area of the back has been shown to significantly reduce plasma serum cortisol levels. This reduction in cortisol (a stress hormone) eliminates the inhibitory effect on the posterior pituitary gland, thereby triggering the impulsive release of oxytocin into the bloodstream. This adequately released oxytocin stimulates the contraction of the myoepithelial cells surrounding the breast alveoli, which in turn triggers the milk ejection reflex or let-down reflex (Wijaya & Lestari, 2023). The smooth functioning of this ejection reflex ensures that synthesized breast milk can flow freely into the lactiferous sinuses without encountering retention barriers.

The synergy of these interventions is reinforced by breast care components that provide direct mechanical stimulation to the target organ. Smith and Jones (2023) explain that local mechanical stimulation of the areola and nipple triggers a neuroendocrine reflex arc that stimulates the secretion of the hormone prolactin by the anterior pituitary lobe. The hormone prolactin plays a crucial role as the primary regulator in the lactogenesis synthesis process within the breast acinar cells. In addition to stimulating hormonal pathways, intensive breast care treatments provide local hygienic benefits, soften crusts at the openings of the lactiferous ducts, and improve local blood flow (Nugroho & Putri, 2023). Therefore, the combination of these two physical therapies ensures the continuity of both the upstream and downstream processes of lactation: breast care stimulates milk volume through prolactin, while oxytocin massage ensures milk ejection through oxytocin (Widuri et al., 2024).

Compared to pharmacological or herbal galactagogue modalities, this combined physical therapy offers the advantage of a faster response and is free from systemic gastrointestinal side effects for both mother and baby. By comparison, the addition of organic galactagogue agents such as the enzyme papain found in papaya requires a relatively long trans-systemic metabolic phase to affect the anterior pituitary (Putri & Wijaya, 2025). Although diversifying lactogenic foods has been shown to improve the nutritional quality of breast milk (Sari & Putri, 2023; Pratama et al., 2024), massage and direct breast care instantly stimulate local mechanoreceptors. This approach is particularly strategic for implementation in primary healthcare facilities such as community health centers (Puskesmas) to reduce the rate of failure in exclusive breastfeeding during the early postpartum days.

The demographic characteristics of the respondents in this study also contributed positively to the magnitude of the intervention's effect. The majority of respondents were within the prime reproductive age range (20–35 years), which, according to Sulistyo et al. (2025), corresponds to a functional capacity of breast glandular tissue that is highly responsive to fluctuations in lactation hormones. However, there was a significant clinical challenge, as 44.0% of the respondents gave birth via cesarean section (CS). Mothers who have undergone a CS typically experience a delay in stage II lactogenesis due to surgical pain and postoperative anxiety, which suppress milk production. The implementation of oxytocin massage and structured breast care can serve as a bridge to psychological recovery, thereby enhancing breastfeeding self-efficacy—or a mother's confidence in her ability to breastfeed (Sari & Putri, 2023). The success of restoring lactation volume ultimately contributes directly to the stability of objective hydration parameters in newborns (Kurniawati & Lestari, 2024). Although the pre-experimental study design has limitations in controlling for confounding variables related to daily nutritional intake (Sitompul & Simanjuntak, 2024), rigorous baseline measurements in the same subjects confirm that the increase in breast milk volume observed is purely a clinical effect of the Oxytocin Massage and Breast Care intervention.

5. Conclusions And Recommendations

This study demonstrates that the combination of oxytocin massage and breast care is effective in increasing breast milk production among postpartum mothers at the Konaro Community Health Center. The analysis results show a statistically significant increase in breast milk production volume after the intervention compared to before the intervention ($p<0.05$). These findings suggest that nonpharmacological stimulation through Oxytocin Massage and Breast Care can serve as a safe, easily implementable alternative intervention with the potential to support successful breastfeeding during the postpartum period.

However, the study results should be interpreted with caution because the study used a pre-experimental design without a control group, involved a relatively small sample size, and was conducted at only one health care facility; therefore, the generalizability of the results remains limited.

Based on these findings, healthcare providers—particularly midwives—are advised to integrate oxytocin massage and breast care as part of routine care for postpartum mothers to support unimpeded breast milk production and the success of exclusive breastfeeding. Future research is expected to employ a stronger design, such as a randomized controlled trial or a quasi-experimental study with a control group, involve a larger sample size and multiple healthcare facilities, and consider other factors that may influence breast milk production, such as nutritional status, breastfeeding frequency, the mother's psychological condition, and family support.

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