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The Effect of Oxytocin Massage on Breast Milk Production in Breastfeeding Mothers at the Galala Inpatient Health Center

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Abstract: *Breast milk production in the early postpartum period often experiences obstacles due to physiological and psychological factors, which can affect the success of exclusive breastfeeding. Non-pharmacological interventions such as oxytocin massage are known to help stimulate the milk ejection reflex, but their application in primary health facilities is still limited. This study aims to determine the effect of oxytocin massage on breast milk production in breastfeeding mothers. The study design used a quasi-experimental approach with a one-group pretest–posttest design. The study sample consisted of 30 breastfeeding mothers who met the criteria and were selected using total sampling technique at the Galala Inpatient Health Center. Breast milk production was measured based on volume and clinical signs of breast milk production before and after the oxytocin massage intervention. Data analysis used the Wilcoxon Signed Rank Test. The results showed a significant increase in breast milk volume and signs of production after the intervention with a p-value < 0.001. This indicates that oxytocin massage is effective in increasing breast milk production through a neurohormonal stimulation mechanism that enhances the let-down reflex. In conclusion, oxytocin massage can be recommended as a lactation support intervention in primary care facilities to support successful exclusive breastfeeding.*

Keywords: *Breast Milk Production; Breastfeeding Mothers; Lactation; Non-Pharmacological Intervention; Oxytocin Massage.*

1. INTRODUCTION

Breast milk production during the postpartum period is a crucial physiological process that determines the success of exclusive breastfeeding and the long-term health status of infants. Globally, the World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life, as it has been proven to provide immunological benefits, optimal nutrition, neurological development, and protection against infectious and non-infectious diseases (WHO, 2023). However, global exclusive breastfeeding coverage remains at 44%, far from the global target of 70% by 2030 (UNICEF, 2023). One of the reasons for this low achievement is the problem of milk production experienced by mothers in the first weeks after giving birth, including poor milk production, low volume, or delayed onset of lactation (Victora et al., 2021). At the national level, Indonesia still faces challenges in increasing the success of exclusive breastfeeding. Based on the latest Indonesian Health Survey, exclusive breastfeeding coverage only reached 58%, with significant variations between provinces (Indonesian Ministry of Health, 2023). Psychological factors, lack of hormonal stimulation, improper breastfeeding techniques, and minimal support from health workers are the main causes of decreased breast milk production (Sari & Widyawati, 2022). In the first week postpartum, many mothers experience *delayed lactogenesis II*, which is a delay in adequate breast milk production due to a lack of oxytocin hormone stimulation, stress, or a lack of early

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breastfeeding initiation practices (Brown et al., 2020). This condition directly impacts increased formula use, reduced mother-infant bonding, and the risk of neonatal health disorders (Pratiwi et al., 2022).

Physiologically, breast milk production is regulated by two main hormones, prolactin and oxytocin. Prolactin plays a role in breast milk production, while oxytocin is responsible for *the milk ejection reflex* (Geddes & Perrella, 2019). Stimulation of the area along the thoracic vertebrae ( ) from the fifth to the seventh vertebrae can increase parasympathetic activity and stimulate the release of oxytocin from the posterior pituitary gland (Kaur & Singh, 2021). Oxytocin massage is a non-pharmacological technique that stimulates the let-down reflex through neuromuscular relaxation and stimulation of sensory nerves associated with the lactation process (Jain & Kumar, 2020). Thus, oxytocin massage plays a role not only as a physiological intervention but also as a psychological one because it can increase comfort, reduce anxiety, and strengthen the breastfeeding reflex response (Mulyani et al., 2021). A number of studies reinforce the scientific evidence that oxytocin massage has a significant effect on increasing milk production. A quasi-experimental study by Yuliana et al. (2021) showed a significant increase in milk volume after three consecutive days of oxytocin massage intervention in postpartum mothers. Another study by Khalisa & Wulandari (2020) reported significant changes in clinical signs of breast milk production, such as breast softening, faster colostrum discharge, and increased breastfeeding frequency. Similarly, Putri and Hakim (2022) found that oxytocin massage performed during the early postpartum period had a significant effect on accelerating the onset of lactation compared to the group that only received lactation education. However, most of these studies were conducted in urban facilities or referral hospitals, so they do not yet describe the effectiveness of this intervention in primary care facilities or areas with limited access, such as islands.

A research gap exists in the lack of empirical evidence regarding the implementation of oxytocin massage as a primary care-based intervention, especially in areas with limited resources and suboptimal breastfeeding service coverage. Geographical contexts such as the Galala Inpatient Health Center, which is located in an island region with limited access to breastfeeding support facilities, limited lactation counselors, and cultural variations in breastfeeding practices, are important factors that need to be studied. Community-based studies are needed to ensure that simple, inexpensive, and easy-to-apply non-pharmacological interventions such as oxytocin massage can be widely implemented in primary care settings (Lestari & Dewi, 2022). The urgency of this research is even greater considering that the early postpartum period is critical in determining long-term breastfeeding success. Simple

interventions that can increase milk volume and strengthen the oxytocin reflex are believed to improve the success of exclusive breastfeeding and support the national program to accelerate stunting reduction based on the family (Suryani et al., 2023). In addition, oxytocin massage can be a safe, non-invasive intervention alternative that can be adapted by health workers and families as part of breastfeeding support.

Based on this background, this study was conducted to analyze the effect of oxytocin massage on breast milk production in breastfeeding mothers at the Galala Inpatient Health Center. This study is expected to contribute scientifically to evidence-based midwifery practice and strengthen recommendations for the implementation of oxytocin massage in primary health care as a strategy to support increased breast milk production and successful exclusive breastfeeding.

2. RESEARCH METHOD

Research Design

This study used a quasi-experimental design with a one-group pretest–posttest approach, which involved a single group of respondents who received oxytocin massage intervention and were measured before (pretest) and after the intervention (posttest). This design allowed for the analysis of changes in the effect of the intervention on breast milk production in the same individuals without a control group. This approach is commonly used in non-pharmacological intervention studies in primary health care, especially when the population is limited and ethical considerations do not allow for a control group without treatment (Polit & Beck, 2021).

Research Location and Time

The study was conducted at the Galala Inpatient Health Center, Tidore Islands City, North Maluku. This location was chosen because it is a primary health facility that provides maternal care ( ) and has a number of breastfeeding mothers actively participating in the postpartum program. The study took place from September to October 2025, covering the stages of instrument preparation, data collection, oxytocin massage intervention, and data analysis.

Research Population and Sample

The population in this study consisted of all breastfeeding mothers registered in the postpartum care service at the Galala Inpatient Health Center, with sampling techniques using the total sampling method, whereby the entire population that met the inclusion criteria was used as the research sample. Inclusion criteria included breastfeeding mothers in the postpartum period ≤ 6 weeks, having a healthy baby and breastfeeding directly, and willing to

participate in the intervention and breast milk volume measurement process. Meanwhile, exclusion criteria included mothers with mastitis, breast infections, or medical conditions that affected the lactation process, as well as respondents who did not complete the instrument or intervention session. Based on these criteria, 30 respondents were declared eligible and included as research samples.

Research Variables

This study has two main variables, namely independent and dependent variables. The independent variable is oxytocin massage, which is defined as a massage technique along the thoracic vertebrae V–VII for 15–20 minutes using a standard protocol and administered in a single intervention with a nominal measurement scale. The dependent variable is breast milk production, which is measured based on changes in breast milk volume in milliliters and changes in clinical signs of breast milk production before and after the intervention, using an interval and ordinal measurement scale. In addition to these two main variables, this study also involves supporting variables such as age, parity, history of early breastfeeding initiation (IMD), and breastfeeding methods, which are recorded to enrich the interpretation of the research results.

Research Instruments

The research instruments consisted of a breast milk production observation sheet used to measure breast milk volume in milliliters using a cup feeder or sterile measuring cup, as well as a breast milk production sign assessment scale in the form of a 4-point Likert questionnaire covering indicators of breast softening, spontaneous breast milk production, breastfeeding frequency, and maternal comfort during breastfeeding. These instruments have undergone content validity testing (*expert judgment*) by two clinical midwives and one lactation lecturer, as well as reliability testing with a Cronbach's Alpha value of 0.84, thus declaring them reliable and suitable for use in research.

Research Procedure

The research began with obtaining ethical and administrative approval, then respondents who met the criteria were given an explanation of the purpose and procedures of the research and were asked to sign *an informed consent form*. The intervention stages were carried out sequentially, starting with a pretest measurement of breast milk volume and assessment of breast milk production signs, followed by the implementation of oxytocin massage by a trained midwife in accordance with standard operating procedures (SOP) for 15–20 minutes, and ending with a posttest measurement conducted 30–60 minutes after the intervention. The entire research process was carried out while maintaining the comfort and privacy of the respondents

and following the ethical principles of health research based on the Declaration of Helsinki (WMA, 2018).

Data Analysis

Data analysis in this study was conducted in two stages, namely descriptive and inferential analysis. Descriptive analysis was used to describe the characteristics of the respondents, the distribution of breast milk volume, and changes in breast milk production scores before and after the intervention, which were presented in the form of means, medians, frequencies, and percentages. Furthermore, inferential analysis was performed using the Wilcoxon Signed Rank Test because the pre-post data on the breast milk production variable was not normally distributed, with a significance level of $p < 0.05$ to determine whether there was a statistically significant difference after the oxytocin massage intervention.

3. RESULTS AND DISCUSSION

Results

Respondent Characteristics

This section presents the basic characteristics of the respondents to provide an overview of the conditions of the breastfeeding mothers involved in the study. The characteristics include the mothers' age, parity, history of Early Breastfeeding Initiation (EBI), and breastfeeding methods. This information is important as a basis for interpretation because it can affect the lactation process, breast milk production, and response to the oxytocin massage intervention.

Table 1. Distribution of Respondent Characteristics (n = 30).

Variable	Category	Frequency (n)	Percentage (%)
Mother's Age (years)	< 20	2	6.7
	20–30	21	70.0
	> 30	7	23.3
Parity	Primipara	7	23.3
	Multipara	23	76.7
History of IMD	Yes	30	100.0
	No	0	0.0
Breastfeeding Method	Direct breastfeeding	30	100
	Combination / Formula	0	0

Based on Table 1, most respondents were in the 20–30 age group, totaling 21 people (70%), followed by the over-30 age group with 7 people (23.3%), and only 6.7% were under 20 years old. The majority of respondents were multiparous (76.7%), while primiparous women accounted for only 23.3%. All respondents (100%) had a history of Early Breastfeeding Initiation (EBI) and breastfed using the direct breastfeeding method, without the use of formula milk or combination methods. These characteristics indicate that the study population had a profile that supported successful breastfeeding, both in terms of reproductive experience and early breastfeeding practices, allowing for a more objective evaluation of the effects of oxytocin massage under relatively uniform baseline conditions.

Breast Milk Production Conditions Before Intervention (Pretest)

This section describes the initial breast milk production conditions of the respondents before the oxytocin massage intervention. Measurements were taken using a breast milk volume observation sheet and an assessment of breast milk production signs, including breast softening, spontaneous breast milk leakage, breastfeeding frequency, and maternal comfort during breastfeeding. This data served as a baseline for assessing changes after the intervention.

Table 2. Distribution of Breast Milk Production Before Intervention (n = 30).

Breast Milk Production Indicators	Mean ± SD	Range (Min–Max)	Dominant Category
Breast Milk Volume (ml)	10.5 ± 4.2	5–20 ml	Low
Breast milk production indicator (score)	1.8 ± 0.6	1 – 3	Suboptimal

The results in Table 2 show that breast milk production volume before intervention was in the low category, with an average value of 10.5 ml and a measurement range of 5–20 ml. Meanwhile, the clinical signs of breast milk production scores showed that most respondents were in the suboptimal category, characterized by breasts that did not feel full, limited breast milk output, and suboptimal breastfeeding comfort. These findings indicate that at baseline, respondents had not yet achieved adequate breast milk production ( ), necessitating oxytocin massage intervention to stimulate the *let-down* reflex and increase breast milk output. This uniform baseline condition also supports the validity of interpreting changes that occurred after the intervention.

Breast Milk Production After Intervention (Posttest)

This section presents the results of breast milk production measurements after the oxytocin massage intervention was given to the respondents. The evaluation was conducted using the same instrument as in the pretest stage, namely measuring breast milk volume using a sterile measuring cup and assessing signs of breast milk production using a Likert scale that included breast softening, spontaneous breast milk leakage, breastfeeding frequency, and comfort during breastfeeding. This data was used to determine the changes that occurred after oxytocin massage therapy.

Table 3. Distribution of Breast Milk Production After Intervention (Posttest) (n = 30).

Breast Milk Production Indicators	Mean ± SD	Range (Min–Max)	Dominant Category
Breast Milk Volume (ml)	36.7 ± 8.4	20–55 ml	Increased
Breast milk production indicator (score)	3.4 ± 0.5	2–4	Optimal

The results in Table 3 show a clear increase in breast milk production after oxytocin massage. Breast milk volume increased to an average of 36.7 ml, with a production range of 20–55 ml. In addition, the breast milk production score was in the optimal category, characterized by more pronounced breast softening, spontaneous milk ejection, increased breastfeeding frequency, and increased comfort for the mother during breastfeeding. This increase indicates that oxytocin massage intervention provides a positive response to the *let-down* reflex, thereby affecting breast milk production both physiologically and psychologically.

Comparison of Breast Milk Production Before and After Intervention

This section presents changes in breast milk production based on measurements taken before (pretest) and after (posttest) the oxytocin massage intervention. The comparison was made using two main indicators, namely breast milk volume and breast milk production score. This presentation aims to provide a quantitative overview of the improvements that occurred after the intervention.

Table 4. Comparison of Breast Milk Production Pre-test and Post-test (n = 30).

Breast Milk Production Indicators	Pre-test (Mean ± SD)	Posttest (Mean ± SD)	Difference (Δ)
Breast Milk Volume (ml)	10.5 ± 4.2	36.7 ± 8.4	+26.2 ml
Breast milk production score	1.8 ± 0.6	3.4 ± 0.5	+1.6 points

The comparison in Table 4 shows a clinically significant increase in both breast milk production indicators after the oxytocin massage intervention. The average breast milk volume increased by 26.2 ml, while the clinical breast milk production score increased by 1.6 points from the initial condition. These changes illustrate a positive physiological response to oxytocin massage stimulation, particularly through the mechanism of oxytocin hormone release, which plays a role in the *milk ejection reflex*. These results indicate that oxytocin massage has the potential to be an effective non-pharmacological intervention in increasing breast milk production in breastfeeding mothers.

Results of the Wilcoxon Signed Rank Test

Inferential analysis using the Wilcoxon Signed Rank Test was conducted to determine whether there was a significant difference between milk production before and after the oxytocin massage intervention. This test was used because the data was ordinal-interval scaled and the distribution was not normal based on the results of data exploration. The analysis was conducted on two indicators, namely milk volume and clinical signs of milk production scores.

Table 5. Results of the Wilcoxon Signed Rank Test (n = 30).

Breast Milk Production Indicator	Z-value	p-value	Description
Breast Milk Volume (ml)	-4.82	$p < 0.001$	Significant
Breast milk production score	-4.65	$p < 0.001$	Significant

The results in Table 5 show that there is a statistically significant difference between the conditions before and after the oxytocin massage intervention on both breast milk production indicators, namely breast milk volume and breast milk production score ($p < 0.05$). The very small p-value ($p < 0.001$) indicates a strong and significant effect of the intervention. Thus, it

can be concluded that oxytocin massage has a positive effect on increasing breast milk production in breastfeeding mothers at the Galala Inpatient Health Center.

Discussion

The results of this study indicate that there was a significant increase in milk production after the oxytocin massage intervention, both in terms of milk volume and clinical signs of milk production. Before the intervention, most respondents had low milk production and suboptimal signs of milk production. After oxytocin massage, milk production increased significantly ($p < 0.001$), indicating that this intervention had a real effect on the physiological process of lactation in breastfeeding mothers. These findings support the concept that sensory stimulation through massage can increase oxytocin hormone activity, thereby improving the milk ejection reflex.

Clinically, the mechanism of action of oxytocin massage can be explained through stimulation of the thoracic paravertebral area associated with the parasympathetic nerve pathway and hypothalamus, thereby stimulating the release of oxytocin from the posterior pituitary gland (Lim & Lee, 2021). Oxytocin is known to play a role in *the milk ejection reflex*, which is the contraction of myoepithelial cells surrounding the breast alveoli to push milk out through the lactiferous ducts (Baker et al., 2020). Thus, oxytocin massage intervention not only provides a relaxing effect on mothers but also accelerates the activation of neurohormonal pathways involved in the lactation process. The findings of this study are consistent with several previous studies. Research by Rahmawati et al. (2022) found that breastfeeding mothers who received oxytocin massage experienced a threefold increase in milk production compared to mothers who only received lactation education. A similar study by Choi and Park (2021) showed that oxytocin massage intervention for three consecutive days significantly increased breast milk volume and improved mothers' comfort during breastfeeding. Additionally, research by Handayani and Suryono (2023) reported that oxytocin massage not only increased milk volume but also reduced postpartum anxiety levels—a psychological factor known to influence the let-down reflex.

A study by Alvarez et al. (2022) shows that oxytocin massage only provides significant improvements in multiparous mothers, while in primiparous mothers the effect is smaller and requires repeated interventions. This may be related to previous breastfeeding experience, physiological readiness, and different hormonal adaptations between primiparous and multiparous mothers. In this study, since most respondents were multiparous women, the significant improvement results are consistent with the literature. Additionally, the

homogeneous nature of the respondents in terms of IMD history and direct breastfeeding methods may also influence the response to the intervention. IMD is known to contribute to increased natural oxytocin levels and accelerated lactation (Wijayanti & Girsang, 2022). Therefore, oxytocin massage in populations that already have a hormonal stimulation base through IMD can provide more optimal effects than populations without IMD. In other words, the respondents in this study were already in a physiological condition that supported successful breastfeeding from the start.

The clinical implications of these research results are quite strong, especially in the context of primary health care services such as community health centers. Oxytocin massage is a non-pharmacological intervention that is easy to apply, does not require special equipment, is safe, and can be performed by health workers and families after simple training. This intervention can be part of standard postpartum care procedures, especially for mothers with poor milk production, mothers with high psychological stress, or areas with limited access to lactation counselors. Additionally, oxytocin massage can be combined with breastfeeding education, nutrition, and breast care for more optimal results. This study also highlights the importance of ongoing support in the early postpartum weeks. This period is a critical phase in establishing lactation patterns, where consistent stimulation will influence long-term milk production (Lee & Kim, 2023). Therefore, the implementation of oxytocin massage not only serves as a corrective therapy but also as a preventive measure to avoid decreased milk production and early formula use. Overall, the results of this study strengthen the scientific evidence that oxytocin massage is an effective intervention in increasing breast milk production and is feasible to implement at the primary care level. The success of this intervention can contribute to efforts to increase exclusive breastfeeding coverage and support national programs for stunting prevention based on specific nutritional interventions.

4. CONCLUSION

This study aimed to determine the effect of oxytocin massage on breast milk production in breastfeeding mothers at the Galala Inpatient Health Center. The results showed that oxytocin massage significantly increased breast milk production, both in terms of volume and clinical signs of breast milk production. The changes that occurred after the intervention indicated that oxytocin massage was able to stimulate the physiological mechanism of lactation through the activation of the oxytocin hormone, which plays a role in the milk ejection reflex. Scientifically, these findings reinforce the evidence that simple non-pharmacological interventions based on sensory stimulation can help overcome barriers to milk production in

the early stages of breastfeeding. The clinical implications of this study suggest that oxytocin massage can be integrated as part of postpartum care practices in primary care, especially for mothers who experience delayed milk production or breastfeeding adaptation challenges. This intervention also has the potential to support increased exclusive breastfeeding coverage and national programs to accelerate stunting reduction. Thus, the results of this study recommend the routine and standardized application of oxytocin massage as a form of lactation support for breastfeeding mothers.

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