



# The Effect of Oxytocin Massage on Breast Milk Production in Postnatal Mothers

Nurhusna H. Umar<sup>1</sup>, Nila Widya Keswara<sup>2\*</sup>

<sup>1,2</sup> Bachelor of Midwifery, Faculty of Health Sciences, Institute of Science and Health Technology, Dr. Soepraoen Hospital, Malang

\* Corresponding Author: [nilakeswara35@itsk-soepraoen.ac.id](mailto:nilakeswara35@itsk-soepraoen.ac.id)<sup>2</sup>

**Abstract:** Breast milk production during the postpartum period is a crucial factor in successful breastfeeding and achieving exclusive breastfeeding. However, during the early postpartum period, many postpartum mothers experience difficulties in breast milk production, influenced by physical and psychological conditions. One non-pharmacological intervention that can be used to help facilitate breast milk production is oxytocin massage, which aims to stimulate the release of the hormone oxytocin and increase the let-down reflex. This study aims to analyze the effect of oxytocin massage on breast milk production in postpartum mothers at the Marisa Community Health Center. This study used a quantitative pre-experimental design with a one-group pretest–posttest approach. The study sample consisted of 30 postpartum mothers selected using purposive sampling according to the inclusion criteria. Breast milk production was measured before and after the oxytocin massage intervention using a structured observation sheet with units of milliliters (ml). Data analysis was performed using univariate and bivariate methods. Normality was tested using the Shapiro–Wilk test, while differences were tested using the Wilcoxon signed-rank test. The results showed that the average milk output before oxytocin massage was  $18.00 \pm 5.95$  ml, and increased to  $51.83 \pm 10.94$  ml after the intervention. The Wilcoxon test showed a p-value of 0.000 ( $p < 0.05$ ), indicating a significant effect of oxytocin massage on increasing breast milk output. It was concluded that oxytocin massage is effective as a non-pharmacological intervention to increase breast milk production in postpartum mothers and can be integrated into postpartum care in primary health care services.

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

## 1. INTRODUCTION

The postpartum period is a critical period in the female reproductive cycle, especially in relation to the success of breastfeeding initiation and continuation. Breast milk not only serves as an optimal source of nutrition for infants, but also contributes significantly to reducing infant morbidity and mortality and improving maternal health. The World Health Organization (WHO) emphasizes that exclusive breastfeeding for the first six months of life can prevent approximately 823,000 child deaths annually worldwide (, 2023). However, many countries still face challenges in achieving optimal exclusive breastfeeding coverage, mainly due to early breastfeeding problems during the postpartum period, including delayed and insufficient milk production.

Globally, a UNICEF report shows that only about 44% of babies worldwide are exclusively breastfed for the first six months of life (UNICEF, 2022). One of the main factors contributing to breastfeeding failure is problems with milk production and let-down in the early days of the postpartum period, which are often influenced by the mother's psychological condition, fatigue, stress, postpartum pain, and a lack of appropriate support and intervention (Victora et al., 2016). When breast milk does not come out immediately or is perceived to be insufficient, mothers tend to experience anxiety and switch to formula feeding, which can further hinder long-term breastfeeding success.

In Indonesia, similar challenges remain a public health issue. Based on data from the 2023 Indonesian Health Survey (SKI), the national coverage of exclusive breastfeeding has not yet reached the set target, with considerable variation between regions (Indonesian Ministry of Health, 2023). Problems with insufficient milk production in postpartum mothers are often reported in primary health care facilities, especially among primiparous mothers and mothers who have experienced physical or emotional stress during childbirth. This condition underscores the need for effective, safe, and easy-to-implement interventions to support successful breastfeeding from an early stage.

Physiologically, the lactation process is influenced by the complex interaction between the hormones prolactin and oxytocin. Prolactin plays a role in milk production, while oxytocin is responsible for the milk ejection reflex (let-down reflex) through the contraction of myoepithelial cells in the breast alveoli (Uvnäs-Moberg et al., 2020). The oxytocin reflex is highly sensitive to the mother's emotional state; stress, anxiety, and pain can inhibit oxytocin release, so even though breast milk is produced, its release is inhibited (Lawrence & Lawrence, 2016). Therefore, interventions that can increase oxytocin release and create a relaxed state for postpartum mothers are very important.

One non-pharmacological intervention developed to stimulate the oxytocin reflex is oxytocin massage. Oxytocin massage is a massage technique applied to the back, specifically along the spine to the scapula area, which aims to stimulate the release of the hormone oxytocin through parasympathetic nerve stimulation and increased relaxation (Field, 2018). In addition to helping with milk production, oxytocin massage has also been reported to reduce tension, increase comfort, and improve the emotional bond between mother and baby.

Previous studies have evaluated the effectiveness of oxytocin massage on breast milk production, with generally positive results. An experimental study in Indonesia showed that oxytocin massage significantly increased the smoothness of milk production in postpartum mothers compared to the control group (Rahayu et al., 2019). Another study reported that postpartum mothers who received oxytocin massage had better breastfeeding frequency and higher breastfeeding satisfaction (Sari et al., 2020). At the international level, research by Uvnäs-Moberg et al. (2020) confirms that oxytocin stimulation through therapeutic touch plays an important role in successful lactation and postpartum maternal well-being.

Although evidence regarding the benefits of oxytocin massage is growing, there are still research gaps that need to be addressed. First, some studies use relatively small sample sizes and diverse designs, so the results are not entirely consistent. Second, the indicators of milk production used vary, ranging from maternal perception, breastfeeding frequency, to signs of

milk adequacy in infants, which makes it difficult to compare results across studies. Third, contextual research in Indonesian primary health care services, particularly those evaluating oxytocin massage as part of routine postpartum care, is still limited.

In the Indonesian context, oxytocin massage has great potential to be integrated into midwifery practice because it is simple, safe, low-cost, and in line with the loving mother care approach. Midwives, as the frontline health workers in postpartum care, have a strategic role in implementing this intervention to support successful breastfeeding. Furthermore, oxytocin massage aligns with WHO recommendations emphasizing the importance of psychosocial support and non-pharmacological interventions in enhancing positive breastfeeding experiences (WHO, 2022).

The urgency of research on oxytocin massage is increasing given the low coverage of exclusive breastfeeding and the high rate of early breastfeeding failure in various regions. Effective interventions in the early postpartum period have the potential to have a long-term impact on the success of exclusive breastfeeding, infant health, and maternal well-being. Therefore, scientific studies evaluating the effect of oxytocin massage on milk production are urgently needed as a basis for strengthening evidence-based midwifery practices.

Based on this description, the purpose of this study is to analyze the effect of oxytocin massage on milk production in postpartum mothers. The results of this study are expected to contribute scientifically to the development of non-pharmacological interventions to support successful breastfeeding and to form the basis for recommendations for the implementation of oxytocin massage in postpartum care at health facilities.

## **2. RESEARCH METHOD**

This study is a quantitative study with a pre-experimental approach, which aims to analyze the effect of oxytocin massage on milk production in postpartum mothers at the Marisa Community Health Center. A quantitative approach was chosen because the study focused on objectively measuring changes in milk production before and after the oxytocin massage intervention, allowing for statistical analysis to assess the effects of the intervention.

The research design used was a one-group pretest–posttest design. In this design, respondents' milk production was first measured before the intervention (pretest), then they were given the oxytocin massage intervention according to standard procedures, and finally, their milk production was measured again after the intervention (posttest). This design was considered appropriate for assessing the effectiveness of non-pharmacological interventions in

primary health care because it was practical, ethical, and did not interfere with routine postpartum services.

The study was conducted at the Marisa Community Health Center (UPTD Puskesmas Marisa), considering that this health center is a primary health care facility that provides postnatal care and breastfeeding support. The study period included the preparation of instruments, initial data collection, implementation of the oxytocin massage intervention, final data collection, and data processing and analysis.

The population in this study was all postpartum mothers who received postpartum services at the Marisa Community Health Center during the study period. The study sample consisted of postpartum mothers who met the inclusion and exclusion criteria. The inclusion criteria included postpartum mothers with stable maternal and infant conditions, mothers who were willing to breastfeed, able to communicate well, and willing to participate in the entire research process. The exclusion criteria included postpartum mothers with severe complications, breast disorders that inhibited breastfeeding, or medical conditions that did not allow oxytocin massage. The sample size was determined using purposive sampling.

The independent variable in this study was oxytocin massage, while the dependent variable was breast milk production in postpartum mothers. Oxytocin massage was administered in the form of gentle, structured massage on the back along the spine to the scapula area, in accordance with oxytocin massage standards. The intervention was carried out by researchers or trained health workers, with the same duration and frequency for all respondents to maintain consistency of treatment.

Breast milk production was measured using an observation sheet or structured questionnaire, which assessed indicators of breast milk production, such as breast milk discharge during massage or breastfeeding, breastfeeding frequency, breast fullness, and signs of early breast milk sufficiency. Measurements were taken before and after the oxytocin massage intervention.

Data analysis was performed in stages. Univariate analysis was used to describe the characteristics of the respondents and the distribution of milk output before and after the intervention. Next, bivariate analysis was performed to determine the difference in milk output before and after oxytocin massage.

If the breast milk production data was ordinal or not normally distributed, the Wilcoxon signed-rank test was used. If the data was dichotomous (e.g., breast milk production was smooth/not smooth), the analysis was performed using the McNemar test. If the data was

normally distributed and numerical, the analysis used the paired t-test. A p-value < 0.05 was set as the statistical significance threshold.

The entire research process was carried out in accordance with the principles of health research ethics. Respondents were given an explanation of the objectives, benefits, and procedures of the research and were asked to provide written informed consent. The confidentiality of the respondents' identities was maintained, and the data obtained was used solely for research purposes.

With this research method, it is hoped that scientific evidence can be obtained regarding the effect of oxytocin massage on breast milk production in postpartum mothers at the Marisa Community Health Center, so that the research results can be used as a basis for strengthening non-pharmacological midwifery interventions to support successful breastfeeding.

### 3. RESULTS AND DISCUSSION

#### Results

**Table 1.** Demographic data

	Var	n	F (%)
Age	< 20 years old	3	10
	20-35 years old	25	83.3
	>35 years old	2	6.7
Education	Elementary school	2	6.7
	Junior high school	3	10.0
	High School	21	70.0
	College/university	4	13.3
Occupation	Housewife	25	83.3
	Farmer	0	0
	Private employee	2	6.7
	Government employee	3	10.0
<b>Total</b>		<b>30</b>	<b>100</b>

(source: primary data, 2025)

This study involved 30 postpartum mothers as respondents. Respondent characteristics included age, education level, and occupation.

Based on age group, most respondents were in the 20–35 age range, namely 25 people (83.3%), which is the ideal reproductive age. There were 3 respondents (10.0%) aged <20 years, while 2 respondents (6.7%) were aged >35 years. This distribution shows that the majority of postpartum mothers are at an age that biologically supports successful breastfeeding, although a small proportion are in an age group that may face specific challenges in adapting to the postpartum period.

In terms of education level, most respondents had a high school education, namely 21 people (70.0%). There were 4 respondents (13.3%) with a college education, 3 respondents (10.0%) with a junior high school education, and 2 respondents (6.7%) with an elementary school education. This relatively good level of education has the potential to support mothers' understanding of health information, including education about breastfeeding and postpartum care.

Based on occupation, the majority of respondents were housewives, namely 25 people (83.3%). Respondents who worked as private employees numbered 2 people (6.7%), while civil servants numbered 3 people (10.0%). There were no respondents who worked as farmers. This condition shows that most respondents have relatively more flexible time to take care of themselves and breastfeed during the postpartum period.

Overall, the characteristics of the respondents indicate that the majority of postpartum mothers are of ideal reproductive age, have a medium to high level of education, and are housewives. These characteristics are an important context in analyzing the effect of oxytocin massage on milk production in postpartum mothers.

**Table 2.** Variable Data

Var	N	min	max	Mean	SD
Breast milk output before (ml)	30	10	30	6:00	5.95
Breast milk output after (ml)	30	35	70	51.83	10.94

(source: primary data, 2025)

The results of the descriptive analysis show a clear difference in the breast milk output of postpartum mothers before and after the oxytocin massage intervention.

Before oxytocin massage, the average milk production of postpartum mothers was 18.00 ml with a standard deviation (SD) of 5.95 ml. The lowest milk production recorded was 10 ml, while the highest milk production reached 30 ml. These data indicate that in the early postpartum period, the milk production of respondents was still relatively low and varied between individuals.

After receiving oxytocin massage intervention, there was a significant increase in the amount of breast milk production. The average breast milk production increased to 51.83 ml with a standard deviation of 10.94 ml. The minimum breast milk output after the intervention was 35 ml, while the maximum reached 70 ml. The increase in the average value and range of breast milk output indicates that most postpartum mothers experienced an increase in breast milk production and output after oxytocin massage.

Overall, these descriptive results illustrate a clinically significant increase in breast milk output in postpartum mothers after oxytocin massage. These findings form the basis for inferential statistical analysis to assess the significant effect of oxytocin massage on breast milk output in postpartum mothers at the Marisa Community Health Center

**Table 3.** Statistical Analysis

Independent variable	n	P Value	
Breast milk output before	30	0.005	
Breast milk output after		0.005	
<i>Shapiro-Wilk</i>			
Independent variable	N	P Value	Dependent variable
Breast milk output before	30	0.000	Breast milk output after
<i>Wilcoxon</i>			

\*significant

(source: primary data, 2025)

Before analyzing the difference in breast milk output, a normality test was first performed using the Shapiro–Wilk test. The normality test results showed that the breast milk output data before and after oxytocin massage were not normally distributed, with p-values of 0.005 ( $p < 0.05$ ), respectively. Based on these results, the difference analysis did not meet the assumptions of parametric testing.

Therefore, to determine the difference in milk production before and after the oxytocin massage intervention, the Wilcoxon signed-rank test was used as an alternative non-parametric test.

The Wilcoxon test results showed a p-value of 0.000 ( $p < 0.05$ ), indicating that there was a statistically significant difference between milk production before and after oxytocin massage. Thus, the null hypothesis ( $H_0$ ) was rejected and the alternative hypothesis ( $H_1$ ) was accepted.

These findings indicate that oxytocin massage has a significant effect on increasing milk production in postpartum mothers. Clinically, these results are in line with descriptive findings showing an increase in average milk production after oxytocin massage intervention, so this intervention can be considered an effective non-pharmacological method to support smooth breastfeeding during the postpartum period.

## Discussion

This study shows that oxytocin massage has a significant effect on increasing milk production in postpartum mothers. The Wilcoxon test results show a significant difference between milk production before and after the intervention ( $p = 0.000$ ). Descriptively, the increase in the average volume of breast milk after oxytocin massage reflects a real and relevant

clinical impact, especially in the early postpartum period when the milk ejection reflex is often not yet optimal.

These findings are consistent with the understanding of lactation physiology, which places oxytocin as the key to the let-down reflex. Oxytocin triggers contractions of myoepithelial cells in the breast alveoli, pushing milk into the ducts and out through the nipple. Postpartum stress, pain, and anxiety are known to inhibit oxytocin release, even though milk production (which is influenced by prolactin) has already occurred. Oxytocin massage works through tactile stimulation that increases parasympathetic nervous system activation, reduces stress response, and facilitates endogenous oxytocin release; this mechanism explains the observed increase in milk ejection (Uvnäs-Moberg et al., 2020; Carter & Porges, 2019).

The results of this study are consistent with various previous studies. Several clinical and quasi-experimental trials have reported that oxytocin massage or therapeutic touch on the back improves milk flow, increases breastfeeding frequency, and reduces complaints of breast engorgement (Widodo et al., 2018; Kurniawati et al., 2021). Other studies indicate that touch-based interventions reduce postpartum anxiety in mothers, which indirectly improves the let-down reflex (Field, 2018; Shorey et al., 2018). A meta-analysis of non-pharmacological interventions in the postpartum period also confirms that relaxation approaches contribute to better breastfeeding outcomes, although heterogeneity in design and indicators remains (Chen et al., 2020).

Differences in findings between studies—including effect sizes—may be influenced by variations in milk output indicators (measured volume vs. clinical indicators), timing of intervention, and maternal characteristics (primiparous vs. multiparous, stress levels, family support). In this study, measuring milk volume provided a strong objective picture of post-intervention changes, thereby reducing perception bias. However, contextual factors such as breastfeeding techniques, infant suckling frequency, and family support still have the potential to moderate the effects of oxytocin massage.

These significant findings also need to be read in conjunction with insignificant findings in other aspects that are often reported in the literature, for example, in studies that found no significant differences when the intervention was given late or with inconsistent doses/frequencies. This emphasizes the importance of standardizing procedures, appropriate timing (early postpartum), and practitioner competence. Oxytocin massage appears most effective when administered in a structured, repeated manner and combined with adequate breastfeeding education.

From a clinical perspective, the implications of this study are important for midwifery practice in primary care. Oxytocin massage is a safe, simple, low-cost intervention that can be performed by midwives after brief training. Its integration into postpartum care has the potential to accelerate milk flow, reduce maternal anxiety, and increase the success of early and sustained breastfeeding. This approach aligns with comprehensive breastfeeding support recommendations emphasizing biological and psychosocial aspects (World Health Organization, 2022).

Additionally, increased milk production in early postpartum has long-term effects on the sustainability of exclusive breastfeeding. When mothers feel that their milk is "coming in quickly" and is sufficient, their confidence in breastfeeding increases and their dependence on formula decreases (Dennis et al., 2017). Thus, oxytocin massage can be positioned as part of a promotive-preventive strategy to increase exclusive breastfeeding coverage, especially in areas with early breastfeeding challenges.

The limitations of the study should be noted. The single-group design without a control group limits stronger causal inferences; the moderate sample size and single-facility context also limit generalizability. Future research is recommended to use a controlled or randomized design, evaluate the optimal dose/frequency of massage, and include additional outcomes such as maternal satisfaction, breastfeeding frequency, and sustainability of exclusive breastfeeding. Multivariate analysis may also help control for confounding factors.

Overall, the findings of this study strengthen the evidence that oxytocin massage is effective in increasing milk production in postpartum mothers. Standardized implementation in primary care has the potential to provide meaningful and sustainable clinical benefits for mothers and infants.

#### **4. CONCLUSION**

This study concludes that oxytocin massage has a significant effect on increasing milk production in postpartum mothers. The results of the analysis show a significant difference between milk production before and after the oxytocin massage intervention, indicating the effectiveness of this intervention in supporting the milk ejection reflex. Clinically, oxytocin massage helps create relaxation, reduce stress, and increase the release of oxytocin, thereby facilitating milk production. These findings indicate that oxytocin massage is a safe, simple, and applicable non-pharmacological intervention to support successful breastfeeding during the postpartum period, especially in the early postpartum period. Therefore, oxytocin massage

should be considered as part of comprehensive postpartum care in midwifery practice in primary health care.

**Acknowledgement.** The author would like to express his gratitude to the Head of the Marisa Community Health Center UPTD and all health workers, especially midwives, who have provided support and facilitated the implementation of this research. Thanks are also extended to all postpartum mothers who were willing to be respondents and actively participated in the research. The highest appreciation is given to the educational institution, the supervising lecturer, and all parties who provided guidance, direction, and moral and technical support so that this research could be completed successfully.

## **REFERENCES**

- Carter, C. S., & Porges, S. W. (2019). The biochemistry of love: An oxytocin hypothesis. *Psychoneuroendocrinology*, 101, 47–55.
- Chen, X., et al. (2020). Non-pharmacological interventions for breastfeeding outcomes: A meta-analysis. *BMC Pregnancy and Childbirth*, 20, 680.
- Dennis, C.-L., et al. (2017). Breastfeeding self-efficacy and outcomes. *Journal of Human Lactation*, 33(1), 35–48.
- Field, T. (2018). Massage therapy research review. *Complementary Therapies in Clinical Practice*, 31, 167–175.
- Field, T. (2018). Massage therapy research review. *Complementary Therapies in Clinical Practice*, 31, 167–175.
- Kurniawati, D., et al. (2021). Oxytocin massage and milk ejection. *Journal of Maternal and Child Health*, 6(3), 280–287.
- Lawrence, R. A., & Lawrence, R. M. (2016). *Breastfeeding: A Guide for the Medical Profession* (8th ed.). Elsevier.
- Ministry of Health of the Republic of Indonesia. (2023). Results of the 2023 Indonesian Health Survey (SKI).
- Rahayu, D., et al. (2019). Effect of oxytocin massage on breast milk production in postpartum mothers. *Journal of Maternal and Child Health*, 4(2), 120–127.
- Sari, Y., et al. (2020). Oxytocin massage and breastfeeding outcomes among postpartum women. *Indonesian Journal of Midwifery*, 11(1), 45–52.
- Shorey, S., et al. (2018). Postnatal interventions and maternal outcomes. *Journal of Advanced Nursing*, 74(3), 567–578.
- UNICEF. (2022). *Infant and Young Child Feeding*.

- Uvnäs-Moberg, K., et al. (2020). Oxytocin, stress, and human social interaction. *Frontiers in Psychology*, 11, 224.
- Uvnäs-Moberg, K., et al. (2020). Oxytocin, stress, and social interaction. *Frontiers in Psychology*, 11, 224.
- Victora, C. G., et al. (2016). Breastfeeding in the 21st century. *The Lancet*, 387(10017), 475–490.
- WHO. (2022). Recommendations on maternal and newborn care for a positive postnatal experience.
- WHO. (2022). WHO recommendations on maternal and newborn care for a positive postnatal experience.
- WHO. (2023). Breastfeeding counseling: A training course.
- WHO. (2023). Breastfeeding.
- Widodo, A., et al. (2018). Effect of oxytocin massage on breastfeeding. *Midwifery*, 62, 141–147.
- Yilmaz, S., et al. (2019). Touch-based interventions and lactation. *Journal of Perinatal Education*, 28(2), 90–98.
- Zhao, J., et al. (2021). Stress reduction and milk ejection reflex. *International Breastfeeding Journal*, 16, 12.