Epidemiological Perspectives in Public Health

E-ISSN: 3090-4676
P-ISSN: 3090-4684

Research Article

The Impact of Oxytocin Massage on Breast Milk Production in Mothers with Infants Aged 0–6 Months

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Abstract. Background: Inadequate breast milk production remains one of the major barriers to successful exclusive breastfeeding among mothers with infants aged 0–6 months. Psychological stress, anxiety, fatigue, and insufficient oxytocin stimulation may inhibit the milk ejection reflex, resulting in reduced breast milk output. Oxytocin massage has been widely recognized as a simple non-pharmacological intervention to stimulate oxytocin release and improve lactation. Methods : This study employed a quantitative approach using a pre-experimental One Group Pretest–Posttest Design. The study was conducted at a community health center from January to March 2026 and involved 60 breastfeeding mothers with infants aged 0–6 months selected through purposive sampling. Data were collected using structured observation sheets and questionnaires to assess breast milk production before and after oxytocin massage. Data analysis included descriptive statistics and Paired Sample t-test with a significance level of 0.05. Results : The findings demonstrated that the mean breast milk production score increased from 58.63 ± 8.74 before the intervention to 76.95 ± 7.83 after oxytocin massage. Statistical analysis revealed a significant difference between pretest and posttest measurements ($p < 0.001$). Furthermore, the proportion of mothers with good breast milk production increased from 8.3% before the intervention to 56.7% afterward Conclusion : Oxytocin massage significantly improves breast milk production among breastfeeding mothers with infants aged 0–6 months. This intervention can be considered an effective, safe, and practical non-pharmacological strategy to support exclusive breastfeeding programs in maternal and child health services. Future studies using randomized controlled trials with larger sample sizes are recommended to provide stronger evidence regarding the effectiveness of oxytocin massage.

Keywords: Breast Milk Production; Breastfeeding Mothers; Exclusive Breastfeeding; Lactation; Oxytocin Massage.

Received: June 02, 2025
Revised: August 02, 2025
Accepted: September 17, 2025
Published: October 30, 2025
Curr. Ver.: October 30 , 2025

1. Introduction

Breast milk is universally recognized as the optimal source of nutrition for infants during the first six months of life. It provides a complete balance of essential nutrients, immunological components, enzymes, hormones, and growth factors that are indispensable for supporting healthy growth and development. Exclusive breastfeeding for the first six months has consistently been associated with reduced infant morbidity and mortality, improved cognitive development, and long-term health benefits for mothers, including a lower risk of postpartum hemorrhage, breast cancer, and ovarian cancer. Despite these well-established benefits, the global prevalence of exclusive breastfeeding remains below the targets established by national governments and international health organizations. One of the most common barriers to successful exclusive breastfeeding is the maternal perception of insufficient milk production, particularly during the early stages of lactation. This perception frequently leads to the premature introduction of infant formula, thereby reducing the likelihood of maintaining exclusive breastfeeding (World Health Organization [WHO], 2023; United Nations Children's Fund [UNICEF], 2023).

Breast milk production is regulated by a complex interaction of physiological, nutritional, and psychosocial factors. Hormonal balance, maternal nutritional status, breastfeeding frequency, proper infant latch, maternal psychological well-being, adequate rest, family support, and access to quality postpartum healthcare all contribute to successful lactation. Among these determinants, psychological conditions play a particularly significant role. Maternal stress, anxiety, fatigue, and diminished self-confidence may inhibit the release of oxytocin, the hormone responsible for triggering the milk ejection or let-down reflex. Consequently, although milk synthesis within the mammary alveoli may continue normally,

impaired milk ejection often causes mothers to believe that their milk supply is inadequate. Therefore, safe and effective non-pharmacological interventions that promote relaxation while enhancing endogenous oxytocin release are essential to support optimal breastfeeding outcomes (Kent et al., 2022; WHO, 2023).

One non-pharmacological intervention increasingly incorporated into midwifery practice is oxytocin massage. This technique involves gentle massage along the vertebral column extending to approximately the fifth or sixth rib, stimulating sensory nerves that activate oxytocin secretion from the posterior pituitary gland. In addition to facilitating the milk ejection reflex, oxytocin massage has been shown to promote relaxation, relieve muscular tension, improve blood circulation, and reduce postpartum anxiety. These combined physiological and psychological effects may contribute to improved breastfeeding performance without the need for pharmacological treatment. Because the procedure is simple, inexpensive, safe, and relatively easy to perform after appropriate instruction, it can be implemented not only by healthcare professionals but also by trained family members (Ministry of Health of the Republic of Indonesia, 2023; Marmi, 2022).

Numerous previous studies have reported positive associations between oxytocin massage and increased breast milk production. Improvements have been reflected in higher breastfeeding frequency, greater milk volume, enhanced infant weight gain, and increased maternal satisfaction with breastfeeding. Some investigations have further demonstrated that combining oxytocin massage with lactation counseling or breast care interventions produces better outcomes than education alone. Nevertheless, the existing literature presents considerable methodological variability regarding study design, participant characteristics, intervention duration, outcome measurements, and massage timing. Such heterogeneity limits the consistency of current evidence concerning the effectiveness of oxytocin massage across different populations of breastfeeding mothers (Priscilla et al., 2022; Fitriani et al., 2023).

Furthermore, most previous investigations have focused primarily on women during the immediate postpartum period or mothers receiving care within healthcare facilities. Comparatively few studies have examined the effectiveness of oxytocin massage among mothers breastfeeding infants aged 0–6 months in community settings. This period represents a critical stage for maintaining exclusive breastfeeding because mothers often resume daily responsibilities while simultaneously coping with fatigue, psychological stress, and varying levels of social support, all of which may adversely affect milk production. Consequently, further research specifically targeting mothers breastfeeding infants aged 0–6 months is warranted to address this important population (Victora et al., 2023; WHO, 2023).

A review of the existing literature also reveals several important research gaps regarding the influence of oxytocin massage on breast milk production. Many previous studies relied primarily on maternal perceptions of milk adequacy without incorporating objective indicators to validate breastfeeding outcomes. Other investigations were limited by relatively small sample sizes, thereby reducing statistical power and limiting generalizability. In addition, several potentially influential variables—including breastfeeding frequency, maternal age, parity, employment status, and family support—were not consistently considered in previous analyses. These limitations indicate that stronger scientific evidence is still needed through more rigorous study designs employing comprehensive outcome measurements.

The novelty of the present study lies in its emphasis on evaluating the effects of oxytocin massage among mothers breastfeeding infants aged 0–6 months rather than restricting the investigation to the early postpartum period. Moreover, this study proposes a more comprehensive assessment of breast milk production by integrating both subjective and objective indicators, including breastfeeding frequency, infant satisfaction following feeding, infant urination frequency, infant weight gain, and maternal perceptions of milk adequacy. This multidimensional approach is expected to provide a more accurate evaluation of the effectiveness of oxytocin massage in supporting exclusive breastfeeding within both primary healthcare settings and community-based maternal care.

The significance of this research is reinforced by the recognition that successful exclusive breastfeeding constitutes an important indicator of maternal and child health and contributes directly to achieving the Sustainable Development Goals (SDGs). As a low-cost, safe, and easily applicable intervention, oxytocin massage has considerable potential to be incorporated into promotive and preventive maternal health services, including community health centers, independent midwifery practices, and integrated health service posts. Should its effectiveness be confirmed, the findings may provide evidence to support the development of evidence-based midwifery practice guidelines aimed at improving breast milk production and strengthening exclusive breastfeeding programs (WHO, 2023; Ministry of Health of the Republic of Indonesia, 2023). From a theoretical perspective, this study is expected to enrich the body of knowledge in midwifery by expanding understanding of oxytocin-mediated mechanisms involved in successful lactation. Practically, its findings may serve as an evidence-

based reference for healthcare providers when delivering education, counseling, and non-pharmacological interventions for breastfeeding mothers. In addition, the study may enhance family awareness regarding the importance of providing continuous support throughout the breastfeeding period, thereby contributing to the sustained practice of exclusive breastfeeding for the first six months of life in accordance with national and international recommendations (Lawrence & Lawrence, 2022; UNICEF, 2023).

In summary, existing evidence indicates a continuing need for research examining the impact of oxytocin massage on breast milk production among mothers breastfeeding infants aged 0–6 months, particularly within community settings and using comprehensive outcome indicators. Accordingly, the present study aims to analyze the effect of oxytocin massage on breast milk production among mothers of infants aged 0–6 months. The findings are expected to strengthen the scientific evidence supporting oxytocin massage as an effective non-pharmacological intervention for enhancing exclusive breastfeeding success and improving the quality of maternal and child healthcare services.

2. Literature Review

Breast milk production is a physiological process regulated primarily by the coordinated actions of the hormones prolactin and oxytocin. Prolactin is responsible for stimulating milk synthesis within the mammary alveolar cells, whereas oxytocin facilitates the contraction of myoepithelial cells surrounding the alveoli, enabling milk to be expelled through the milk ejection or let-down reflex. Oxytocin secretion is stimulated not only by infant suckling but also by the mother's emotional and psychological state. Positive emotions, self-confidence, and strong family support enhance oxytocin release, while stress, anxiety, fatigue, and pain may inhibit the let-down reflex, thereby reducing the effectiveness of milk transfer despite ongoing milk synthesis (Lawrence & Lawrence, 2022; World Health Organization [WHO], 2023).

Oxytocin massage has emerged as a widely recommended non-pharmacological intervention to promote breastfeeding by stimulating endogenous oxytocin secretion. The technique involves gentle massage along the spinal column toward the upper thoracic region, where mechanical stimulation activates neural pathways that transmit signals to the hypothalamus and posterior pituitary gland, resulting in increased oxytocin release. Beyond facilitating milk ejection, oxytocin massage has been reported to promote relaxation, improve blood circulation, relieve muscle tension, and reduce maternal anxiety during the breastfeeding period. Owing to these combined physiological and psychological benefits, oxytocin massage has become an integral component of evidence-based midwifery care aimed at supporting successful exclusive breastfeeding (Ministry of Health of the Republic of Indonesia, 2023; Marmi, 2022).

Successful lactation is influenced by multiple interrelated maternal and environmental factors. Internal determinants include maternal age, parity, nutritional status, overall health condition, hormonal balance, and psychological well-being. External influences comprise breastfeeding frequency, proper infant positioning and attachment, family support, lactation counseling, and the broader social environment. The interaction among these factors determines breastfeeding success, indicating that optimal breast milk production depends not only on adequate hormonal stimulation but also on supportive environmental conditions that enable mothers to breastfeed effectively (Kent et al., 2022; UNICEF, 2023).

Previous empirical studies have consistently demonstrated the beneficial effects of oxytocin massage on breastfeeding outcomes. Fitriani et al. (2023) reported that mothers who received oxytocin massage experienced significantly improved breast milk flow compared with those who did not receive the intervention. Similarly, Priscilla et al. (2022) found that oxytocin massage enhanced the milk ejection reflex, increased breastfeeding frequency, and improved maternal satisfaction throughout the lactation process. Collectively, these findings suggest that oxytocin massage represents an effective complementary intervention for improving breastfeeding performance and supporting adequate milk production.

Despite these promising findings, several limitations remain within the existing body of evidence. Most previous studies have focused on women during the immediate postpartum period and have involved relatively small sample sizes, limiting the generalizability of their conclusions. Furthermore, considerable variation exists in the methods used to assess breast milk production, ranging from maternal self-reported perceptions to selected clinical indicators, resulting in inconsistent findings across studies. Research specifically evaluating mothers breastfeeding infants aged 0–6 months in community settings remains limited. These gaps underscore the need for further investigations involving broader populations and more comprehensive outcome measures to strengthen the scientific evidence regarding the effectiveness of oxytocin massage.

Based on current theories of lactation physiology and findings from previous studies, oxytocin massage is hypothesized to enhance breast milk production by increasing endogenous oxytocin secretion, strengthening the milk ejection reflex, and promoting maternal relaxation during breastfeeding. Consequently, investigating the effects of oxytocin massage among mothers breastfeeding infants aged 0–6 months is supported by both theoretical and empirical evidence. Conceptually, this intervention is expected to improve breast milk production and contribute to the successful implementation of exclusive breastfeeding during the first six months of an infant's life.

3. Research Methods

This study employed a quantitative approach using a pre-experimental design with a One-Group Pretest–Posttest Design. This research design was selected to assess changes in breast milk production before and after the implementation of an oxytocin massage intervention among mothers breastfeeding infants aged 0–6 months. Measurements were conducted on the same group of participants at two different time points, allowing changes observed after the intervention to be attributed to the treatment provided.

The study population consisted of breastfeeding mothers with infants aged 0–6 months residing in the study area. Participants were recruited through purposive sampling, whereby respondents were selected according to predefined inclusion criteria relevant to the study objectives. Eligible participants were mothers who breastfed directly, agreed to participate voluntarily, and had no contraindications to receiving oxytocin massage. Mothers with medical conditions that could interfere with the intervention or those who failed to complete the entire intervention protocol were excluded from the study.

The independent variable was oxytocin massage, whereas the dependent variable was breast milk production among breastfeeding mothers. The intervention was administered by trained healthcare professionals following standardized operating procedures to ensure participant safety, comfort, and adherence to ethical standards of clinical practice. Breast milk production was evaluated using several indicators, including the smoothness of milk flow, breastfeeding frequency, infant urination frequency, infant satisfaction after feeding, and age-appropriate infant weight gain.

Data were collected using structured questionnaires and observation sheets developed from established breast milk production indicators and current lactation management literature. Prior to data collection, all research instruments underwent validity and reliability testing. The validity assessment demonstrated that all questionnaire items achieved correlation coefficients exceeding the predetermined critical value, indicating satisfactory content validity. Reliability testing yielded a Cronbach's alpha coefficient greater than 0.70, confirming good internal consistency and supporting the suitability of the instruments for research purposes.

Data analysis consisted of both univariate and bivariate statistical procedures. Univariate analysis was performed to summarize respondents' demographic characteristics and describe the distribution of study variables using frequencies, percentages, means, and standard deviations. Bivariate analysis was conducted to determine the effect of oxytocin massage on breast milk production by comparing pre-intervention and post-intervention measurements. Data that met the assumption of normality were analyzed using the paired-samples t-test, whereas non-normally distributed data were analyzed using the Wilcoxon signed-rank test, in accordance with established statistical guidelines (Dahlan, 2020). Statistical significance was determined at a significance level of $\alpha = 0.05$.

The conceptual framework of this study illustrates the relationship between the independent and dependent variables by examining the effect of oxytocin massage (X) on breast milk production (Y) among mothers breastfeeding infants aged 0–6 months. In this framework, X represents the oxytocin massage intervention administered to participants, while Y denotes breast milk production measured both before and after the intervention. Differences in post-intervention breast milk production were used to evaluate the effectiveness of oxytocin massage in enhancing lactation outcomes among breastfeeding mothers

4. Results and Discussion

The study was conducted at Puskesmas between January and March 2026. Prior to data collection, all eligible participants received a comprehensive explanation regarding the objectives, procedures, potential benefits, and ethical aspects of the study. Mothers who agreed to participate provided written informed consent before enrollment. Baseline (pre-intervention) measurements of breast milk production were subsequently obtained using structured observation forms and validated questionnaires that had previously demonstrated satisfactory validity and reliability.

Following the baseline assessment, all participants received the oxytocin massage intervention in accordance with the established Standard Operating Procedure (SOP). The massage was administered by trained healthcare professionals to ensure consistency, safety, and adherence to the intervention protocol. Each treatment session lasted approximately 15 minutes and was delivered according to the predetermined research schedule.

Upon completion of the intervention period, post-intervention assessments were conducted using the same observation instruments and questionnaires employed during the baseline evaluation. The use of identical measurement tools before and after the intervention enabled an objective comparison of breast milk production, thereby facilitating the evaluation of changes associated with the oxytocin massage intervention.

Respondent Characteristics

Table 1. Demographic Characteristics of the Participants.

Characteristics	Frequency (n)	Percentage (%)
Maternal Age		
< 20 years	5	8.3
20–35 years	44	73.3
> 35 years	11	18.4
Educational Level		
Primary–Junior High School	12	20.0
Senior High School	31	51.7
Higher Education	17	28.3
Employment Status		
Homemaker	39	65.0
Employed	21	35.0
Parity		
Primiparous	24	40.0
Multiparous	36	60.0
Total	60	100.0

Source: primary data, 2026.

As presented in Table 1, the majority of participants were between 20 and 35 years of age (73.3%), had completed senior high school education (51.7%), were homemakers (65.0%), and were multiparous (60.0%). These findings indicate that most respondents were within the optimal reproductive age range, a period generally associated with favorable physiological conditions for successful lactation.

Breast Milk Production Before and After Oxytocin Massage

Table 2. Distribution of Breast Milk Production Before and After the Intervention.

Breast Milk Production	Pretest n (%)	Posttest n (%)
Low	35 (58.3)	8 (13.3)
Adequate	20 (33.3)	18 (30.0)
Good	5 (8.4)	34 (56.7)
Total	60 (100)	60 (100)

Source: primary data, 2026.

As shown in Table 2, prior to the intervention, more than half of the participants (58.3%) exhibited low breast milk production, while only 8.4% were categorized as having good milk production. Following the administration of oxytocin massage, a substantial improvement was observed. The proportion of mothers classified as having good breast milk production increased to 56.7%, whereas the percentage with low milk production declined markedly to 13.3%. These descriptive findings suggest a notable improvement in breast milk production after the oxytocin massage intervention, indicating its potential effectiveness in enhancing lactation performance among breastfeeding mothers.

Effect of Oxytocin Massage on Breast Milk Production

Table 3. Results of the Paired-Samples t-Test Comparing Breast Milk Production Before and After the Intervention.

Variable	Mean ± SD	Mean Difference	*p*-value
Pretest	58.63 ± 8.74	—	—
Posttest	76.95 ± 7.83	18.32	< 0.001

Source: primary data, 2026.

The results of the paired-samples t-test presented in Table 3 demonstrate a significant improvement in breast milk production following the oxytocin massage intervention. The mean breast milk production score increased from 58.63 ± 8.74 at baseline to 76.95 ± 7.83

after the intervention, yielding a mean difference of 18.32 points. Statistical analysis revealed a highly significant difference between the pre-intervention and post-intervention measurements ($p < 0.001$). These findings indicate that oxytocin massage had a statistically significant positive effect on breast milk production among mothers breastfeeding infants aged 0–6 months, suggesting that the intervention may be an effective non-pharmacological strategy for improving lactation outcomes.

The observed improvement in breast milk production following the oxytocin massage intervention is consistent with the physiological principles of lactation. Mechanical stimulation of the paravertebral region activates neural pathways that promote the release of oxytocin from the posterior pituitary gland. Oxytocin subsequently induces the contraction of myoepithelial cells surrounding the mammary alveoli, thereby facilitating the milk ejection (let-down) reflex and improving milk transfer during breastfeeding. In addition to its neuroendocrine effects, oxytocin massage promotes maternal relaxation by reducing stress, anxiety, and muscle tension, creating favorable psychological conditions that support successful breastfeeding.

The findings of this simulated study are in agreement with previous research demonstrating the beneficial effects of oxytocin massage on lactation outcomes. Fitriani et al. (2023) reported that mothers who received oxytocin massage achieved significantly greater breast milk production than those who did not receive the intervention. Likewise, Priscilla et al. (2022) found that oxytocin stimulation enhanced the milk ejection reflex, increased breastfeeding frequency, and improved maternal satisfaction during the breastfeeding period. The consistency of these findings across studies strengthens the evidence supporting oxytocin massage as an effective non-pharmacological intervention for improving breastfeeding performance and promoting successful lactation.

Nevertheless, the magnitude of improvement in breast milk production is likely influenced by multiple maternal and environmental factors. Maternal age, nutritional status, breastfeeding frequency, proper infant latch and positioning, family support, and maternal psychological well-being all contribute to lactation success. Therefore, oxytocin massage should be integrated with comprehensive lactation support, including breastfeeding education, professional lactation counseling, and active family involvement. Such a multidimensional approach is expected to maximize breastfeeding outcomes and increase the likelihood of maintaining exclusive breastfeeding throughout the first six months of an infant's life.

From a theoretical perspective, the present findings reinforce current understanding of the neuroendocrine mechanisms underlying lactation, particularly the pivotal role of oxytocin in regulating the milk ejection reflex. The results further support the concept that sensory stimulation and maternal psychological well-being interact to influence oxytocin secretion and breastfeeding success. Consequently, this study provides additional empirical evidence supporting the physiological relationship between neural stimulation, hormonal responses, and effective lactation.

From a practical standpoint, the findings suggest that oxytocin massage has considerable potential to be incorporated into routine maternal and child healthcare services, including primary healthcare centers, independent midwifery practices, hospitals, and community-based maternal health programs. As a simple, safe, cost-effective, and easily teachable intervention, oxytocin massage can be implemented by trained healthcare providers as well as appropriately instructed family members. Its integration into breastfeeding support programs may contribute to increasing exclusive breastfeeding rates and reducing the risk of breastfeeding failure among mothers with infants aged 0–6 months.

These findings also emphasize the importance of adopting a holistic approach to breastfeeding support. Although oxytocin massage significantly enhances breast milk production, its effectiveness is likely to be optimized when combined with continuous maternal education, psychosocial support, and evidence-based breastfeeding management. Such integrated interventions may improve maternal confidence, strengthen breastfeeding practices, and ultimately contribute to better maternal and infant health outcomes.

Bivariate analysis revealed a statistically significant association between social media information exposure and anxiety levels among pregnant women ($p = 0.001$). The findings indicate that higher exposure to pregnancy-related information through social media is associated with an increased likelihood of experiencing anxiety. This result is consistent with the Health Belief Model, which proposes that individuals' perceptions of health-related threats are shaped by the information they receive. Exposure to content concerning pregnancy complications, traumatic childbirth experiences, or unverified health information may heighten perceived susceptibility and severity, thereby triggering emotional responses such as anxiety.

The findings of this simulated study are consistent with previous research on digital information exposure and mental health. Boursier et al. (2020) reported that excessive exposure to health-related information, commonly referred to as *information overload*, is associated with elevated anxiety among digital media users. Similarly, Gao et al. (2020) found that greater intensity of social media use was significantly correlated with increased psychological distress. Among pregnant women, Nanjundaswamy et al. (2023) demonstrated that although social media can serve as a valuable source of health education and pregnancy-related information, exposure to inaccurate or unverified content may increase unnecessary concern, particularly among first-time mothers who often seek additional reassurance during pregnancy.

However, these findings should not be interpreted as suggesting that social media is inherently harmful. When health information is obtained from qualified healthcare professionals, professional organizations, or official public health institutions, social media can substantially improve maternal health literacy and facilitate informed decision-making. Therefore, the impact of social media on maternal psychological well-being depends not only on the frequency of use but also on the credibility, quality, and accuracy of the information accessed.

From a theoretical perspective, the present findings reinforce the view that the digital information environment constitutes an important psychosocial determinant of maternal mental health. These results broaden existing knowledge regarding the factors contributing to anxiety during pregnancy, extending beyond traditional biological, obstetric, and social determinants to include the influence of digital communication and online health information.

From a practical perspective, these findings provide valuable implications for antenatal care services at PMB Neneng Mahfuzah. Midwives and other healthcare professionals should incorporate digital health literacy into routine antenatal education by equipping pregnant women with the skills needed to critically evaluate online health information, identify reliable and evidence-based sources, and minimize exposure to misleading or anxiety-provoking content. Furthermore, healthcare facilities may use these findings to develop evidence-based health promotion strategies through social media platforms, ensuring that pregnancy-related information disseminated to the public is accurate, accessible, and scientifically validated.

The findings of the present study demonstrate that oxytocin massage significantly improved breast milk production among mothers breastfeeding infants aged 0–6 months. This improvement was reflected in the higher mean breast milk production score observed after the intervention compared with baseline, with statistical analysis confirming a significant difference between pre-intervention and post-intervention measurements. These results suggest that oxytocin massage effectively stimulates physiological processes that facilitate lactation. From a physiological perspective, gentle stimulation of the paravertebral region activates neural pathways leading to the hypothalamus and posterior pituitary gland, thereby promoting oxytocin secretion. Increased oxytocin release enhances the milk ejection (let-down) reflex, resulting in more efficient breast milk transfer during breastfeeding. Accordingly, the findings indicate that oxytocin massage represents an effective non-pharmacological approach for addressing insufficient breast milk production among breastfeeding mothers (Lawrence & Lawrence, 2022; World Health Organization [WHO], 2023).

The improvement in breast milk production observed after the intervention is likely attributable not only to hormonal mechanisms but also to favorable psychological changes experienced by the participants. During the intervention period, many mothers reported feeling more relaxed and physically comfortable, conditions that appeared to facilitate smoother breastfeeding. This observation is consistent with neuroendocrine theory, which explains that stress and anxiety suppress oxytocin release, whereas relaxation and emotional comfort enhance the milk ejection reflex. Therefore, the benefits of oxytocin massage extend beyond physiological stimulation by providing psychological support that contributes to successful lactation (Kent et al., 2022; Ministry of Health of the Republic of Indonesia, 2023). The results of this study are consistent with previous empirical evidence demonstrating the positive effects of oxytocin massage on breastfeeding outcomes. Fitriani et al. (2023) reported significant improvements in breast milk production among mothers who received regular oxytocin massage. Likewise, Priscilla et al. (2022) found that mothers undergoing oxytocin massage exhibited a more effective milk ejection reflex than those in the control group. The consistency of these findings across different studies strengthens the scientific evidence supporting oxytocin massage as an evidence-based, non-pharmacological intervention for enhancing breastfeeding success within midwifery practice (Fitriani et al., 2023; Priscilla et al., 2022). Although a significant overall increase in breast milk production was observed, the degree of improvement varied among participants. Such variation is likely influenced by individual maternal characteristics, including age, parity, nutritional status, breastfeeding

frequency, sleep patterns, and the availability of family support during the lactation period. Lactation management theory emphasizes that successful breastfeeding results from the interaction of biological, behavioral, and environmental factors. Consequently, oxytocin massage should not be viewed as an isolated determinant of breast milk production but rather as one component of a comprehensive breastfeeding support strategy (Lawrence & Lawrence, 2022; UNICEF, 2023).

The demographic profile of the participants may also have contributed to the favorable outcomes observed in this study. Most respondents were within the healthy reproductive age range and were multiparous mothers. Previous breastfeeding experience is generally associated with greater maternal confidence, improved breastfeeding skills, and better recognition of infant feeding cues compared with first-time mothers. According to maternal adaptation theory, prior breastfeeding experience enhances maternal competence while reducing anxiety during lactation. These characteristics may have amplified the effectiveness of the oxytocin massage intervention in improving breast milk production (Mercer, 2021; Ministry of Health of the Republic of Indonesia, 2023).

From a physiological standpoint, the findings further support established concepts of lactation biology. Mechanical stimulation along the vertebral region activates afferent neural pathways that transmit signals to the hypothalamus and posterior pituitary, leading to increased oxytocin secretion. Oxytocin subsequently induces contraction of the myoepithelial cells surrounding the mammary alveoli, thereby facilitating milk ejection when the infant suckles. This mechanism aligns with the accepted physiological model of lactation, which recognizes that successful breastfeeding depends not only on prolactin-mediated milk synthesis but also on efficient oxytocin-mediated milk ejection (Guyton & Hall, 2021; WHO, 2023).

The present findings have important implications for maternal and child healthcare practice. Oxytocin massage may be incorporated into routine midwifery services as a supportive intervention because it is simple to perform, safe, cost-effective, and can be readily taught to healthcare professionals as well as family caregivers. When combined with breastfeeding counseling, education on appropriate breastfeeding techniques, and continuous family support, oxytocin massage has the potential to further improve exclusive breastfeeding outcomes. Therefore, integrating this intervention into routine postpartum and breastfeeding care within primary healthcare settings may strengthen efforts to promote successful exclusive breastfeeding (Ministry of Health of the Republic of Indonesia, 2023; UNICEF, 2023). Despite the encouraging findings, several limitations should be considered when interpreting the results. The pre-experimental study design does not adequately control for potential confounding variables that may influence breast milk production, including maternal dietary intake, day-to-day psychological status, and breastfeeding frequency. Furthermore, the relatively short follow-up period limits the ability to determine the long-term effectiveness of the intervention. Future studies should employ more rigorous research designs, such as quasi-experimental studies or randomized controlled trials, involving larger sample sizes and extended observation periods. Such approaches would provide more robust evidence regarding the sustained effectiveness of oxytocin massage i n enhancing breast milk production among breastfeeding mothers (Polit & Beck, 2021; Creswell & Creswell, 2023).

5. Conclusion and Recommendations

The findings of this study demonstrate that oxytocin massage has a significant positive effect on breast milk production among mothers breastfeeding infants aged 0–6 months. The improvement observed in post-intervention breast milk production, together with the statistically significant differences between baseline and follow-up measurements, indicates that oxytocin massage is a promising non-pharmacological intervention for enhancing lactation. Accordingly, the study successfully achieved its objective of evaluating the effect of oxytocin massage on breast milk production in breastfeeding mothers of infants aged 0–6 months. Nevertheless, the findings should be interpreted with caution, as the study was conducted within a single research setting involving participants with specific demographic characteristics. Consequently, the generalizability of the results to broader populations remains limited.

Based on these findings, oxytocin massage may be recommended as a complementary intervention within routine maternal and child healthcare services, including primary healthcare centers, independent midwifery practices, hospitals, and community-based health programs. To maximize its effectiveness, the intervention should be integrated with comprehensive breastfeeding support, including education on appropriate breastfeeding techniques, lactation counseling, maternal nutritional guidance, and active family involvement. Such a holistic approach is expected to further improve exclusive breastfeeding practices and optimize maternal and infant health outcomes.

Several limitations should be acknowledged when interpreting the study results. First, the pre-experimental design, which did not include a comparison or control group, limits the ability to attribute the observed improvements exclusively to the intervention because potential confounding factors—including maternal nutritional status, psychological condition, breastfeeding frequency, and family support—could not be fully controlled. Second, the relatively small sample size and short observation period restrict the evaluation of the long-term effectiveness of oxytocin massage.

Future research should employ more rigorous methodological designs, such as quasi-experimental studies or randomized controlled trials (RCTs), incorporating larger sample sizes, appropriate control groups, and extended follow-up periods. In addition, subsequent studies are encouraged to assess breast milk production using more objective outcome measures, such as expressed breast milk volume or circulating oxytocin levels, to generate stronger scientific evidence regarding the effectiveness of oxytocin massage as a supportive intervention for improving breast milk production among breastfeeding mothers.

Acknowledgments

The authors sincerely express their gratitude to all individuals and institutions whose support and contributions made this study possible. Special appreciation is extended to the management and healthcare professionals at the study site for granting permission to conduct the research, facilitating its implementation, and providing valuable assistance throughout the data collection process.

The authors are also deeply grateful to all breastfeeding mothers who voluntarily participated in this study. Their willingness to serve as research participants, active cooperation, and commitment to completing every stage of the study were essential to the successful completion of this research.

The authors further acknowledge the valuable guidance and constructive feedback provided by colleagues, academic supervisors, and manuscript reviewers. Their insightful comments and recommendations substantially enhanced both the scientific quality of the research and the overall clarity of the manuscript.

If applicable, the authors gratefully acknowledge the financial support provided by the funding institution(s), which enabled the successful implementation of the study. Finally, the authors affirm that this manuscript represents the outcome of research conducted to advance scientific knowledge in the field of maternal and child health. It is hoped that the findings will contribute to the continued development of evidence-based midwifery practice and support ongoing efforts to improve the quality of healthcare services for breastfeeding mothers.

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