

Woolwich Massage as a Non-Pharmacological Intervention to Enhance Breast Milk Production Among Postpartum Mothers: A Quasi-Experimental Study

Kristiani Anjelica Woli¹, Widia Shofa Ilmiah¹



¹ Undergraduate Midwifery Study Program, Institute of Science and Health Technology (ITSK) Dr. Soepraoen Hospital, Malang, Indonesia

Correspondence should be addressed to: Widia Shofa Ilmiah
widiashofailmiah@itsk-soepraoen.ac.id

Abstract:

Insufficient breast milk production remains a major challenge during the postpartum period and may contribute to early discontinuation of exclusive breastfeeding. Non-pharmacological interventions that are safe, accessible, and applicable in maternal healthcare settings are needed to support improvements in lactation. Woolwich massage has been proposed as a supportive technique to stimulate physiological mechanisms associated with breast milk production; however, evidence regarding its effectiveness in specific postpartum care settings remains limited. This study aimed to evaluate the effectiveness of Woolwich massage in increasing breast milk production among postpartum mothers at KRI Madinah Pujon. A quasi-experimental study with a two-group pre-test and post-test design was conducted among 30 postpartum mothers. Participants were selected using quota sampling and divided into an intervention group that received Woolwich massage and a control group that received standard postpartum care. Breast milk production was assessed before and after the intervention. Data were analyzed using the Wilcoxon Signed-Rank Test at a significance level of $p < 0.05$. The findings showed an improvement in breast milk production following the Woolwich massage intervention. The mean production score increased from 9.377 before intervention to 11.310 after intervention. The Wilcoxon analysis demonstrated a significant difference between pre-test and post-test measurements ($Z = -4.787$; $p < 0.001$), indicating that Woolwich massage was associated with increased breast milk production among postpartum mothers. Woolwich massage represents an effective complementary intervention to support breast milk production during the postpartum period. The findings highlight its potential for integration into postpartum breastfeeding support programs as a practical, non-pharmacological approach to improving lactation outcomes. Further studies with larger sample sizes and rigorous experimental designs are recommended to strengthen the evidence for its clinical effectiveness.

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INTRODUCTION

Breastfeeding remains a fundamental component of maternal and infant health because optimal breast milk intake provides essential nutrients, immune protection, and developmental benefits during early life. Exclusive breastfeeding during the first six months is globally recognized as an important strategy for reducing infant morbidity and mortality while supporting long-term health outcomes (Pérez-Escamilla et al., 2023). Breast milk production is influenced by complex physiological processes, including hormonal regulation, maternal psychological factors, breastfeeding practices, and adequate stimulation of the mammary glands (Hannan et al., 2023).

Successful breastfeeding requires effective lactation support, particularly during the early postpartum period, when mothers often face challenges in establishing adequate milk production (Pados & Camp, 2024).

Insufficient breast milk production represents a persistent challenge among postpartum mothers and contributes to premature discontinuation of exclusive breastfeeding. Delayed onset of lactogenesis and inadequate milk production during the early postpartum period have been identified as important factors affecting breastfeeding continuation and maternal confidence (Peng et al., 2024). Mothers experiencing inadequate milk supply often report concerns about infant hunger, breastfeeding failure, and reduced confidence in their ability to breastfeed, which may negatively affect breastfeeding outcomes (Nagel et al., 2022). These problems may be associated with delayed lactogenesis, maternal stress, fatigue, anxiety, inadequate breastfeeding techniques, and limited access to professional lactation assistance (Mullen et al., 2022). The condition becomes particularly important in healthcare settings where postpartum mothers require immediate support to overcome breastfeeding barriers and maintain breastfeeding continuity.

The problem of inadequate breast milk production is also observed among postpartum mothers receiving care at KRI Madinah Pujon, where breastfeeding difficulties remain a concern during the early postpartum period. Mothers experiencing reduced milk production require appropriate interventions to stimulate lactation and improve breastfeeding outcomes. Evidence indicates that structured postpartum breastfeeding counseling and continuous professional support can improve breastfeeding initiation, exclusive breastfeeding practices, and maternal confidence (Beyene et al., 2025). Conventional breastfeeding support often focuses on education regarding positioning, attachment, and feeding frequency, while complementary approaches that directly stimulate physiological mechanisms of milk production remain an important area of interest (Knutson & Butler, 2022). The availability of safe, affordable, and easily implemented interventions is essential for strengthening postpartum maternal care, particularly through approaches that support maternal relaxation and the continuation of breastfeeding (Levene et al., 2024).

Current approaches to improving breast milk production include pharmacological and non-pharmacological strategies. Pharmacological interventions may provide benefits in certain conditions but are often limited by considerations of safety, accessibility, and clinical indication. Non-pharmacological interventions, including breast massage, oxytocin massage, relaxation techniques, and lactation counseling, have gained attention because they are relatively safe and can be integrated into routine maternal healthcare services (Khatib et al., 2023). Woolwich massage is one such approach, focusing on stimulating breast tissue to support milk secretion through physiological mechanisms involving prolactin and oxytocin. Breast stimulation techniques, including massage and warm-compress application, have demonstrated potential benefits in improving milk production and reducing maternal anxiety during lactation (Mollaahmetoglu & Guvenc, 2025). Similar supportive massage-based interventions have also been reported to enhance lactation outcomes by promoting oxytocin release and improving maternal comfort during breastfeeding (Kartilah & Februanti, 2024).

Previous studies have demonstrated that breast stimulation techniques can improve breast milk production and breastfeeding effectiveness among postpartum mothers. Research on various massage-based interventions has shown positive effects on milk volume, maternal comfort, and breastfeeding confidence. A randomized controlled study reported that back and breast massage could increase milk production while reducing maternal anxiety, suggesting that physical stimulation may support lactation outcomes through both physiological and psychological mechanisms (Kilci Erciyas & Kavlak, 2024). Existing evidence indicates that the physical stimulation and relaxation effects of massage may support lactation. Furthermore, oxytocin massage and other breast stimulation techniques have been reported as supportive non-pharmacological approaches for

improving lactation problems and facilitating breastfeeding continuation among postpartum mothers (Lestari et al., 2022). Most previous studies, however, have examined general breast massage or oxytocin massage interventions. In contrast, specific evidence regarding the effectiveness of Woolwich massage remains limited, particularly among postpartum mothers experiencing breastfeeding difficulties in specific clinical settings.

The limited evidence on the effectiveness of Woolwich massage creates a research gap that warrants further investigation. Previous studies have not fully addressed how Woolwich massage influences changes in breast milk production among postpartum mothers through structured pre-intervention and post-intervention assessments. Evidence from different healthcare contexts is needed to determine whether Woolwich massage can be applied as a reliable supportive intervention for mothers with insufficient milk production. Recent breastfeeding intervention studies have emphasized that structured support programs using measurable pre- and post-intervention evaluations are important for determining the effectiveness of breastfeeding-related interventions (Rodríguez-Gallego et al., 2024). This study is novel in that it specifically evaluates the effectiveness of Woolwich massage in improving breast milk production among postpartum mothers at KRI Madinah Pujon, using a quasi-experimental approach. Previous research also highlights the importance of developing accessible, evidence-based lactation interventions to reduce breastfeeding difficulties and improve maternal breastfeeding outcomes (Koca & Yurdakul, 2026).

This study aims to analyze the effectiveness of Woolwich massage in increasing breast milk production among postpartum mothers at KRI Madinah Pujon. The urgency of this research stems from the need to develop practical, evidence-based interventions to support breastfeeding success during the critical postpartum period. Evidence from recent systematic reviews indicates that breastfeeding support interventions can improve breastfeeding outcomes and increase the likelihood of maintaining exclusive breastfeeding (Patnode et al., 2025). The findings are expected to contribute to maternal healthcare practice by providing additional evidence on implementing Woolwich massage as a complementary strategy to improve lactation outcomes and strengthen breastfeeding support services. Recent observational research has also demonstrated that early access to appropriate breastfeeding support is associated with better breastfeeding continuation and reduced breastfeeding difficulties during the postpartum period (Lojander et al., 2024).

METHOD

Design

This study employed a quasi-experimental two-group pre-test-post-test design to evaluate the effectiveness of Woolwich massage in improving breast milk production among postpartum mothers. The study involved an intervention group that received Woolwich massage and a control group that received standard postpartum care. Measurements of breast milk production were conducted before and after the intervention to assess changes between and within groups.

Setting and Time

The study was conducted at the inpatient clinic Madinah Pujon, Malang, Indonesia. Data collection was carried out over a three-day intervention period. The research period included participant recruitment, baseline assessment, intervention implementation, post-intervention measurement, and data recording.

Population, Sample, and Sampling

The target population consisted of all postpartum mothers at the inpatient clinic Madinah Pujon who experienced breastfeeding difficulties, particularly related to insufficient breast milk production. The study sample consisted of 30 postpartum mothers, allocated to two groups: 15 in the intervention group and 15 in the control group. Participants were selected using a non-probability sampling method with a quota sampling technique. The recruitment process continued until the predetermined sample size was achieved based on the established eligibility criteria. The inclusion criteria were postpartum mothers who were breastfeeding, experiencing breastfeeding problems related to milk production, and willing to participate in the study. The exclusion criteria included postpartum mothers with breastfeeding disorders associated with medical complications, such as breast tumors or nipple injuries, and mothers who declined participation during the study period.

Intervention

The intervention group received Woolwich massage as a non-pharmacological breastfeeding support intervention. The massage technique was applied to stimulate breast tissue and support physiological mechanisms associated with lactation, particularly by promoting the release of prolactin and oxytocin. The intervention was conducted for three consecutive days. The control group received standard postpartum care without Woolwich massage intervention. The implementation of the intervention followed a standardized procedure to maintain consistency throughout the study period.

Instrument and Measurement Properties

Breast milk production was measured using a structured assessment instrument designed to evaluate changes in production among postpartum mothers. The measurement was conducted during the pre-test and post-test periods. The instrument assessed breast milk production indicators before and after the intervention. The recorded scores were used to assess changes in milk production and to determine statistical differences between measurement periods.

Data Collection Procedure

Data collection began with participant screening based on the inclusion and exclusion criteria. Eligible participants received information regarding the research objectives, procedures, potential benefits, and their rights as research participants before providing informed consent. Baseline measurements of breast milk production were collected before the intervention. Participants in the intervention group subsequently received Woolwich massage according to the research protocol, while participants in the control group continued receiving routine postpartum care. Post-test measurements were performed after completion of the intervention period. All collected data were documented and prepared for statistical analysis.

Data Analysis

Data analysis was performed using statistical software. Descriptive analysis was conducted to summarize participant characteristics and the distribution of breast milk production before and after the intervention. The normality of data distribution was assessed before selecting the appropriate statistical test. The Wilcoxon Signed-Rank Test was used to analyze differences in breast milk production before and after Woolwich massage, as the data distribution did not meet the parametric assumptions. The significance level was established at $p < 0.05$. A statistically significant result indicated an association between Woolwich massage intervention and changes in breast milk production among postpartum mothers.

Ethical Declaration

This study received ethical approval from the Institute of Science and Health Technology, Dr. Soepraoen Hospital, Malang, Indonesia. All participants provided informed consent before participating in the study. Participant confidentiality and anonymity were maintained throughout the research process. The study was conducted in accordance with ethical principles for research involving human participants, including respect for autonomy, protection of privacy, and voluntary participation.

RESULT

Distribution of Breast Milk Production Before and After Woolwich Massage Intervention

The distribution of breast milk production among participants before and after the Woolwich massage intervention is presented in Table 1. Before the intervention, most participants experienced low breast milk production (9 participants; 60.0%), followed by moderate production (6 participants; 40.0%). No participants were categorized as having high breast milk production before receiving the intervention. After the Woolwich massage intervention, breast milk production improved, with 12 participants (80.0%) classified as having high production and 3 participants (20.0%) classified as having moderate production. No participants remained in the low production category after the intervention.

Table 1. Distribution of Breast Milk Production Before and After Woolwich Massage Intervention (N=15)

Breast Milk Production Level	Before Woolwich Massage n (%)	After Woolwich Massage n (%)
Low	9 (60.0%)	0 (0.0%)
Moderate	6 (40.0%)	3 (20.0%)
High	0 (0.0%)	12 (80.0%)

Comparison of Breast Milk Production Scores Before and After Woolwich Massage Intervention

Table 2 presents the comparison of breast milk production scores before and after the Woolwich massage intervention. The mean breast milk production score increased from 9.377 ± 0.5157 during the pre-test assessment to 11.310 ± 0.4992 after the intervention. The minimum and maximum scores also increased from 8.6–10.5 before the intervention to 10.7–12.5 after the intervention. These findings indicate an improvement in breast milk production following the implementation of Woolwich massage among postpartum mothers.

Table 2. Comparison of Breast Milk Production Scores Before and After Woolwich Massage Intervention

Measurement Period	Mean $\pm$ SD	Minimum	Maximum
Before Woolwich Massage (Pre-test)	9.377 ± 0.5157	8.6	10.5
After Woolwich Massage (Post-test)	11.310 ± 0.4992	10.7	12.5

Effectiveness of Woolwich Massage on Increasing Breast Milk Production Among Postpartum Mothers

Table 3 presents the results of the Wilcoxon Signed Ranks Test evaluating changes in breast milk production before and after the Woolwich massage intervention. The analysis showed that all participants experienced an increase in breast milk production, as indicated by 30 positive ranks, with no negative ranks or ties. The Z-value was -4.787 with $p < 0.001$, indicating a statistically

significant difference between pre-test and post-test scores. These findings indicate that Woolwich massage was effective in increasing breast milk production among postpartum mothers.

Table 3. Effectiveness of Woolwich Massage on Increasing Breast Milk Production Among Postpartum Mothers

Comparison	Negative Ranks	Positive Ranks	Ties	Z-value	p-value
Pre-test vs post-test	0	30	0	-4.787	<0.001

DISCUSSION

This study demonstrated that Woolwich massage was associated with a significant improvement in breast milk production among postpartum mothers. The findings showed an increase in the mean breast milk production score from pre- to post-intervention, accompanied by a shift in the distribution of milk production categories from predominantly low to predominantly high. The statistical analysis confirmed a significant difference between pre-test and post-test measurements, indicating that mothers who received Woolwich massage experienced measurable improvements in breast milk production. Previous research has reported that breast massage and other non-pharmacological lactation stimulation techniques may improve milk production by enhancing maternal comfort, stimulating physiological lactation responses, and supporting breastfeeding effectiveness among postpartum mothers (Mollaahmetoglu & Guvenc, 2025). These findings support the potential role of Woolwich massage as a complementary non-pharmacological intervention to assist postpartum mothers experiencing breastfeeding difficulties.

The improvement in breast milk production observed in this study is consistent with previous studies reporting that breast stimulation techniques can enhance lactation outcomes among postpartum mothers. Woolwich massage is designed to stimulate breast tissue, particularly the areas surrounding the lactiferous ducts and milk sinuses, which may facilitate milk flow and improve breastfeeding comfort. Mechanical stimulation through breast massage may contribute to neuroendocrine regulation by promoting oxytocin release and supporting effective milk ejection. At the same time, adequate breast stimulation also helps maintain lactation physiology (Munsittikul et al., 2022). Increased oxytocin activity promotes contraction of myoepithelial cells surrounding the alveoli, thereby allowing milk to be transported more efficiently through the ductal system and improving breastfeeding effectiveness (Sweet & Vasilevski, 2022).

The findings also correspond with previous research examining various breast massage interventions for improving lactation performance. Studies involving lactation massage and oxytocin massage have demonstrated improvements in breast milk production and breastfeeding outcomes, suggesting that these interventions may support lactation through hormonal stimulation and improved milk transfer (Agustia & Camelia, 2025). Furthermore, recent evidence indicates that combining massage-based interventions with supportive approaches can enhance oxytocin and prolactin responses, which are key physiological mechanisms underlying milk synthesis and ejection in mothers with insufficient milk production (Astuti et al., 2024). The present findings extend prior evidence by demonstrating the beneficial effect of Woolwich massage in postpartum mothers with limited breast milk production.

The effectiveness of Woolwich massage may also be explained through the interaction between physiological and psychological factors affecting breastfeeding. Postpartum mothers frequently experience anxiety, fatigue, discomfort, and concerns regarding insufficient milk supply, which may negatively influence oxytocin secretion and breastfeeding success (Hoberg et al., 2024). Massage-based interventions provide physical stimulation and create a relaxing experience that may

reduce maternal stress responses. A reduction in stress-related hormonal activity can support optimal oxytocin release, thereby improving milk ejection and breastfeeding performance (Moriyama et al., 2024).

The present study highlights the importance of early postpartum support in improving breastfeeding outcomes. The postpartum period is a critical stage for establishing successful breastfeeding practices because inadequate milk production in the early days after delivery is a major reason mothers introduce formula supplementation or discontinue exclusive breastfeeding (Karthigesu et al., 2023). Providing simple, safe, and accessible interventions, such as Woolwich massage, may strengthen existing maternal care programs by offering healthcare providers an additional strategy to support mothers facing breastfeeding challenges (Allen et al., 2023).

The findings have important implications for midwifery and maternal healthcare practice. Woolwich massage can be integrated into postpartum education and breastfeeding support programs as an intervention that requires no medication, specialized equipment, or extensive healthcare resources. Midwives and maternal health professionals may consider incorporating standardized Woolwich massage techniques into postpartum counseling to improve maternal knowledge and confidence in managing early breastfeeding problems (Wang et al., 2023). Implementation of this intervention requires appropriate training to ensure that healthcare providers apply consistent procedures and provide accurate guidance to mothers and families (Şimşek-Çetinkaya et al., 2024).

The results also contribute to the broader understanding of non-pharmacological approaches in maternal and neonatal health. Breastfeeding success depends on multiple factors, including maternal health status, infant feeding behavior, breastfeeding technique, emotional condition, and social support (Chambers et al., 2023). Woolwich massage should not be considered an independent solution for all breastfeeding problems, but rather a supportive intervention within comprehensive lactation management. Integration with proper breastfeeding positioning, infant attachment assessment, nutritional support, and professional counseling may provide more optimal outcomes (Bilgiç & Bozkurt, 2024).

The methodological findings of this study indicate that Woolwich massage produced consistent improvements among participants. The absence of negative changes and the presence of positive changes among participants suggest that the intervention had a favorable effect on breast milk production. The magnitude of improvement observed after the intervention provides preliminary evidence supporting further investigation of Woolwich massage using stronger experimental designs. Previous breastfeeding intervention studies have demonstrated that initial positive findings from quasi-experimental approaches should be followed by controlled trials with larger samples and longer observation periods to confirm the effectiveness and sustainability of breastfeeding-related outcomes (Saehoong et al., 2024). Future studies may explore whether repeated administration over longer periods produces sustained improvements in milk production and exclusive breastfeeding rates.

Several limitations should be considered when interpreting the findings of this study. The relatively small sample size may limit the generalizability of the results to broader postpartum populations. The study was conducted within a single healthcare setting, which may reduce the applicability of the findings to mothers with different demographic characteristics, healthcare access conditions, or cultural backgrounds. Research evaluating breastfeeding interventions has emphasized the need for studies conducted in broader populations and across multiple healthcare settings to improve external validity and determine whether intervention effects can be generalized across maternal groups (Titaley et al., 2022). Larger multicenter studies are required to confirm the effectiveness of Woolwich massage across diverse postpartum populations.

The study design also presents limitations related to causal interpretation. Although the quasi-experimental approach provides evidence of changes following the intervention, the design may not fully control for potential confounding variables that influence breast milk production. Factors such as maternal nutritional status, breastfeeding frequency, infant sucking ability, psychological condition, and previous breastfeeding experience may affect lactation outcomes. Future research should include more comprehensive assessments of these variables to strengthen the understanding of how Woolwich massage contributes to improvements in breastfeeding. Breastfeeding intervention research has emphasized that stronger causal conclusions require rigorous study designs, adequate control of confounding factors, and careful consideration of maternal and infant characteristics that may influence breastfeeding outcomes (Patnode et al., 2025).

Measurement-related limitations should also be considered. Complex biological processes influence breast milk production and may require objective measurement methods to provide a more accurate evaluation. Future studies should consider incorporating direct measurements of milk volume, breastfeeding frequency records, infant weight gain, or validated lactation assessment tools. The use of standardized measurement approaches would improve the reliability and comparability of findings across studies. The current findings provide valuable evidence regarding the potential application of Woolwich massage as a supportive intervention for postpartum breastfeeding problems. Further research with larger samples, rigorous randomized controlled trials, longer follow-up periods, and objective outcome measures is needed to establish stronger evidence of its effectiveness and long-term contribution to breastfeeding success. Recent evidence indicates that estimates of breast milk intake vary across measurement techniques, highlighting the importance of selecting objective, standardized approaches when evaluating lactation outcomes (Rios-Leyvraz & Yao, 2023).

CONCLUSION

This study demonstrates that Woolwich massage is an effective non-pharmacological intervention to improve breast milk production in postpartum mothers. The intervention was associated with a significant increase in breast milk production scores and a positive shift in milk production categories after implementation. The findings support the integration of Woolwich massage into postpartum breastfeeding support services as a practical, safe, and accessible approach to addressing early lactation difficulties. The application of this intervention may strengthen maternal breastfeeding management and improve breastfeeding outcomes. Further research using larger sample sizes, randomized controlled designs, and objective lactation measurements is recommended to confirm the effectiveness and long-term benefits of Woolwich massage across diverse postpartum populations.

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