Observasi: Jurnal Publikasi Ilmu Psikologi
Volume. 4 Nomor. 1 Februari 2026
E-ISSN .: 3031-0156; P-ISSN .: 3031-0164, Hal 258-276
DOI: https://doi.org/10.61132/observasi.v4i1.2158
Tersedia: https://journal.arikesi.or.id/index.php/Obsesrvasi

The Effect of Rolling Massage on Breast Milk Production in Breastfeeding Mothers at Tidore City Hospital

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Abstract, Breast milk is the optimal source of nutrition for infants, and adequate milk production is essential to support infant growth and development. However, many breastfeeding mothers experience difficulties in milk production, particularly during the early postpartum period. Rolling massage is a non-pharmacological intervention that is believed to stimulate the release of oxytocin and prolactin hormones, thereby enhancing breast milk production. This study aimed to determine the effect of rolling massage on breast milk production in breastfeeding mothers at Tidore City Hospital.This research employed a pre-experimental design with a one-group pretest–posttest approach. A total of 30 breastfeeding mothers were selected as the sample using purposive sampling techniques. Breast milk production was assessed before and after the implementation of rolling massage. The intervention was performed according to standardized procedures. Data were analyzed using the Wilcoxon signed-rank test to evaluate differences in breast milk production before and after the intervention.The results showed a significant increase in breast milk production after the rolling massage intervention. Statistical analysis using the Wilcoxon signed-rank test revealed a p-value of 0.000 ($p < 0.05$), indicating a significant effect of rolling massage on breast milk production in breastfeeding mothers.In conclusion, rolling massage has a significant positive effect on increasing breast milk production among breastfeeding mothers. This intervention can be recommended as a simple, safe, and effective complementary therapy to support successful breastfeeding, particularly in the early postpartum period.

Keywords: Breastfeeding Mothers, Breast Milk Production, Non-Pharmacological Intervention, Postpartum, Rolling Massage.

1. INTRODUCTION

Breast milk is the most ideal and complete nutrition for infants because it contains all the essential nutrients needed for optimal growth and development during the early stages of life (Kemenkes RI, 2023). Exclusive breastfeeding for the first six months is strongly recommended to reduce infant morbidity and mortality (WHO Indonesia, 2022). Despite these recommendations, many breastfeeding mothers experience difficulties related to insufficient breast milk production, especially in the early postpartum period (Sari & Wulandari, 2023). Low milk production can lead to early supplementation with formula milk, which may negatively affect exclusive breastfeeding success (Rahmawati et al., 2023). Several factors influence breast milk production, including hormonal balance, maternal nutrition, psychological condition, and breastfeeding techniques (Putri & Suryani, 2024). Stress, fatigue, and anxiety are common conditions experienced by postpartum mothers and are known to inhibit the release of oxytocin, a hormone essential for milk ejection (Hidayati & Prasetyo, 2023). Insufficient stimulation of the breasts may also reduce prolactin secretion, which is

Naskah Masuk: 27 Desember 2025; Revisi: 17 Januari 2026; Diterima: 25 Februari 2026; Terbit: 28 Februari 2026

crucial for milk synthesis (Anggraini & Nugroho, 2025). Non-pharmacological interventions are increasingly promoted to support lactation due to their safety and minimal side effects (Lestari & Pranoto, 2023). One such intervention is rolling massage, which focuses on stimulation along the spine to promote relaxation and hormonal release (Fitriani & Kurniawan, 2023). Rolling massage is believed to activate parasympathetic nerves, enhancing oxytocin release and facilitating milk flow (Sulastri & Rahman, 2024). This technique is simple, cost-effective, and can be performed by healthcare providers or family members (Widjaja & Hartono, 2023). Studies in Indonesia have shown promising results regarding the effectiveness of rolling massage in increasing breast milk volume (Ramadhani et al., 2024). Postpartum care that integrates physical and psychological support is essential for breastfeeding success (Kurniasih & Dewi, 2023). Hospitals play a crucial role in implementing breastfeeding support interventions during the postpartum period (Putri & Suryani, 2024). The lack of breastfeeding support services may contribute to low exclusive breastfeeding rates (Rahmawati et al., 2023). Therefore, exploring effective and feasible interventions such as rolling massage is essential to enhance lactation outcomes (Sari & Wulandari, 2023). Rolling massage not only stimulates milk production but also promotes maternal relaxation and comfort (Anggraini & Nugroho, 2025). Relaxed mothers are more likely to experience effective milk let-down reflexes (Hidayati & Prasetyo, 2023). Supporting breastfeeding mothers through non-invasive interventions aligns with holistic maternal care principles (Lestari & Pranoto, 2023). Consequently, research on rolling massage is relevant to improving breastfeeding practices in hospital settings (Fitriani & Kurniawan, 2023).

Breastfeeding difficulties remain a significant public health concern in Indonesia due to their impact on infant nutrition and development (Kemenkes RI, 2023). Data indicate that exclusive breastfeeding coverage has not yet reached national targets in several regions, including eastern Indonesia (Rahmawati et al., 2023). One of the main reasons cited by mothers for discontinuing breastfeeding is the perception of insufficient milk supply (Putri & Suryani, 2024). This perception often arises from delayed milk production or inadequate milk flow during the early postpartum period (Sari & Wulandari, 2023). Physiologically, milk production depends on effective stimulation of prolactin and oxytocin hormones (Hidayati & Prasetyo, 2023). Psychological stress can suppress these hormones, leading to decreased milk output (Anggraini & Nugroho, 2025). Hospital environments may inadvertently contribute to maternal stress due to unfamiliar settings and limited family support (Lestari & Pranoto, 2023). Interventions that promote relaxation and comfort are therefore essential during postpartum care (Fitriani & Kurniawan, 2023). Rolling massage has been identified as a method that helps

reduce stress and stimulate hormonal balance (Sulastri & Rahman, 2024). This technique involves gentle massage along the vertebral column, which is believed to stimulate nerve pathways connected to oxytocin release (Widjaja & Hartono, 2023). Research suggests that tactile stimulation can enhance the milk ejection reflex (Ramadhani et al., 2024). Rolling massage is easy to perform and does not require specialized equipment (Kurniasih & Dewi, 2023). Its simplicity makes it suitable for implementation in hospital postpartum wards (Putri & Suryani, 2024). Midwives play a key role in teaching and applying rolling massage techniques to breastfeeding mothers (Rahmawati et al., 2023). Incorporating rolling massage into routine postpartum care may improve breastfeeding outcomes (Sari & Wulandari, 2023). Maternal satisfaction with breastfeeding support services increases when non-pharmacological interventions are provided (Anggraini & Nugroho, 2025). Furthermore, rolling massage fosters bonding between mother and caregiver (Hidayati & Prasetyo, 2023). Family involvement in performing massage may further enhance emotional support (Lestari & Pranoto, 2023). Strengthening breastfeeding support programs requires evidence-based interventions (Fitriani & Kurniawan, 2023). Therefore, examining the effectiveness of rolling massage in clinical settings is highly relevant.

Rolling massage has gained attention in maternal care due to its physiological and psychological benefits (Sulastri & Rahman, 2024). The technique stimulates sensory receptors along the spine, which are connected to the central nervous system (Widjaja & Hartono, 2023). Activation of these receptors promotes relaxation and enhances oxytocin secretion (Ramadhani et al., 2024). Oxytocin plays a crucial role in milk ejection by contracting myoepithelial cells in the mammary glands (Kurniasih & Dewi, 2023). Increased oxytocin levels facilitate smoother milk flow and reduce breastfeeding difficulties (Putri & Suryani, 2024). Additionally, rolling massage may reduce muscle tension and fatigue in postpartum mothers (Rahmawati et al., 2023). Reduced physical discomfort contributes to better breastfeeding posture and effectiveness (Sari & Wulandari, 2023). Psychological relaxation achieved through massage also alleviates anxiety and stress (Anggraini & Nugroho, 2025). Lower stress levels are associated with improved hormonal regulation and milk production (Hidayati & Prasetyo, 2023). Rolling massage aligns with holistic approaches to maternal care that address both physical and emotional needs (Lestari & Pranoto, 2023). Its non-invasive nature makes it safe for postpartum mothers (Fitriani & Kurniawan, 2023). Studies in Indonesia have reported increased breast milk volume following rolling massage interventions (Sulastri & Rahman, 2024). Such findings support its integration into postpartum care protocols (Widjaja & Hartono, 2023). Hospital-based interventions are critical for initiating successful breastfeeding

(Ramadhani et al., 2024). Early postpartum support can prevent breastfeeding problems and promote exclusive breastfeeding (Kurniasih & Dewi, 2023). Rolling massage can be implemented during hospital stays to maximize its benefits (Putri & Suryani, 2024). Training healthcare providers in massage techniques enhances service quality (Rahmawati et al., 2023). The availability of supportive interventions influences maternal confidence in breastfeeding (Sari & Wulandari, 2023). Increased confidence leads to sustained breastfeeding practices (Anggraini & Nugroho, 2025). Therefore, evaluating rolling massage effectiveness is essential for evidence-based maternal care.

The postpartum period is a critical phase that determines the success of breastfeeding initiation and continuation (Kemenkes RI, 2023). During this period, mothers experience significant physiological and psychological changes that can affect milk production (Putri & Suryani, 2024). Many postpartum mothers report feelings of anxiety, fatigue, and discomfort, especially after childbirth in hospital settings (Rahmawati et al., 2023). These conditions can interfere with the hormonal processes necessary for lactation (Hidayati & Prasetyo, 2023). Prolactin and oxytocin are the main hormones involved in milk production and ejection (Sari & Wulandari, 2023). When maternal stress increases, oxytocin release may be inhibited, leading to delayed milk flow (Anggraini & Nugroho, 2025). Delayed milk flow often causes mothers to believe that their milk supply is insufficient (Kurniasih & Dewi, 2023). This perception can result in early supplementation and discontinuation of exclusive breastfeeding (Putri & Suryani, 2024). Therefore, interventions that promote relaxation and hormonal balance are crucial in postpartum care (Fitriani & Kurniawan, 2023). Rolling massage has been identified as a method that can support these needs effectively (Sulastri & Rahman, 2024). The massage stimulates nerve pathways associated with oxytocin secretion (Widjaja & Hartono, 2023). Improved oxytocin release facilitates milk ejection and increases breastfeeding comfort (Ramadhani et al., 2024). Comfortable breastfeeding experiences enhance maternal confidence (Rahmawati et al., 2023). Confident mothers are more likely to continue exclusive breastfeeding (Sari & Wulandari, 2023). Rolling massage also contributes to maternal well-being by reducing muscle tension (Anggraini & Nugroho, 2025). Reduced muscle tension allows mothers to breastfeed in more relaxed positions (Hidayati & Prasetyo, 2023). Postpartum care that integrates massage techniques reflects holistic maternal health principles (Lestari & Pranoto, 2023). Hospitals are ideal settings to implement such interventions (Putri & Suryani, 2024). The involvement of midwives in massage application enhances service effectiveness (Rahmawati et al., 2023). Thus, rolling massage is relevant to postpartum breastfeeding support.

Rolling massage is considered a complementary therapy that enhances conventional postpartum care (Fitriani & Kurniawan, 2023). Complementary therapies are increasingly accepted in maternal health services in Indonesia (Kemenkes RI, 2023). These therapies aim to support natural physiological processes without pharmacological intervention (Sari & Wulandari, 2023). Rolling massage focuses on gentle, rhythmic movements along the spinal area (Sulastri & Rahman, 2024). This stimulation activates parasympathetic nervous responses (Widjaja & Hartono, 2023). Parasympathetic activation promotes relaxation and emotional stability (Hidayati & Prasetyo, 2023). Emotional stability is essential for effective breastfeeding (Anggraini & Nugroho, 2025). Mothers who feel calm tend to have better milk let-down reflexes (Kurniasih & Dewi, 2023). Rolling massage also encourages bonding between the mother and healthcare provider (Putri & Suryani, 2024). Strong emotional support contributes to breastfeeding success (Rahmawati et al., 2023). Research indicates that tactile stimulation positively affects maternal hormone levels (Ramadhani et al., 2024). Increased oxytocin levels result in smoother milk flow (Sari & Wulandari, 2023). Smooth milk flow reduces infant frustration during feeding (Anggraini & Nugroho, 2025). Reduced infant frustration improves feeding efficiency (Hidayati & Prasetyo, 2023). Efficient feeding further stimulates milk production through demand-supply mechanisms (Kurniasih & Dewi, 2023). Rolling massage is easy to learn and apply (Fitriani & Kurniawan, 2023). Its practicality makes it suitable for routine hospital use (Putri & Suryani, 2024). Training programs for midwives can include massage techniques (Rahmawati et al., 2023). Integrating rolling massage into postpartum protocols enhances care quality (Sulastri & Rahman, 2024). Therefore, rolling massage is a promising intervention in breastfeeding support.

Tidore City Hospital serves as an important referral center for maternal and child health services (Kemenkes RI, 2023). The hospital accommodates postpartum mothers from various socio-economic backgrounds (Putri & Suryani, 2024). Differences in education and knowledge levels may influence breastfeeding practices (Rahmawati et al., 2023). Mothers with limited breastfeeding knowledge may feel insecure about milk production (Sari & Wulandari, 2023). Insecurity can exacerbate stress and hinder lactation (Hidayati & Prasetyo, 2023). Hospital-based education and support are essential to address these issues (Anggraini & Nugroho, 2025). Rolling massage can be introduced as part of breastfeeding counseling (Kurniasih & Dewi, 2023). Counseling combined with practical interventions improves maternal understanding (Putri & Suryani, 2024). Mothers who receive hands-on support feel more confident (Rahmawati et al., 2023). Confidence positively affects breastfeeding outcomes (Sari & Wulandari, 2023). The implementation of rolling massage can strengthen lactation

management services (Fitriani & Kurniawan, 2023). Consistent application ensures optimal benefits (Sulastri & Rahman, 2024). Monitoring milk production outcomes is necessary to evaluate effectiveness (Widjaja & Hartono, 2023). Research conducted in hospital settings provides strong clinical evidence (Ramadhani et al., 2024). Evidence-based practice improves healthcare quality (Kurniasih & Dewi, 2023). Hospital policies can support the use of complementary therapies (Putri & Suryani, 2024). Supportive policies encourage healthcare providers to innovate (Rahmawati et al., 2023). Rolling massage aligns with mother-friendly hospital initiatives (Sari & Wulandari, 2023). Mother-friendly initiatives promote exclusive breastfeeding (Anggraini & Nugroho, 2025). Thus, research at Tidore City Hospital is highly relevant.

Several Indonesian studies have examined non-pharmacological methods to improve breast milk production (Fitriani & Kurniawan, 2023). These studies emphasize the importance of relaxation techniques (Sulastri & Rahman, 2024). Massage therapy is one of the most commonly studied interventions (Widjaja & Hartono, 2023). Rolling massage specifically targets spinal nerves associated with lactation hormones (Ramadhani et al., 2024). Compared to other massage techniques, rolling massage is simpler and less time-consuming (Kurniasih & Dewi, 2023). Its simplicity increases feasibility in busy hospital environments (Putri & Suryani, 2024). Midwives can perform rolling massage during routine postpartum checks (Rahmawati et al., 2023). Consistent application enhances hormonal response (Sari & Wulandari, 2023). Hormonal response directly affects milk synthesis and ejection (Anggraini & Nugroho, 2025). Mothers who experience increased milk flow feel more satisfied (Hidayati & Prasetyo, 2023). Satisfaction reinforces motivation to breastfeed (Kurniasih & Dewi, 2023). Motivation is a key factor in exclusive breastfeeding success (Putri & Suryani, 2024). Rolling massage also supports maternal mental health (Rahmawati et al., 2023). Improved mental health positively influences caregiving behaviors (Sari & Wulandari, 2023). Caregiving behaviors impact infant growth and development (Anggraini & Nugroho, 2025). Therefore, interventions that support both mother and infant are valuable (Hidayati & Prasetyo, 2023). Rolling massage meets these criteria effectively (Fitriani & Kurniawan, 2023). Research findings support its broader application (Sulastri & Rahman, 2024). Clinical evidence strengthens policy recommendations (Widjaja & Hartono, 2023). Thus, rolling massage warrants further investigation.

Breast milk production is influenced by a complex interaction of biological and psychological factors (Kemenkes RI, 2023). Hormonal balance plays a central role in lactation (Putri & Suryani, 2024). Psychological stress disrupts this balance (Rahmawati et al., 2023). Stress reduction is therefore a primary target in breastfeeding interventions (Sari & Wulandari,

2023). Rolling massage contributes to stress reduction through tactile stimulation (Hidayati & Prasetyo, 2023). Tactile stimulation triggers endorphin release (Anggraini & Nugroho, 2025). Endorphins promote feelings of comfort and relaxation (Kurniasih & Dewi, 2023). Relaxed mothers experience better milk let-down (Putri & Suryani, 2024). Improved let-down increases milk availability for infants (Rahmawati et al., 2023). Adequate milk intake supports infant nutritional status (Sari & Wulandari, 2023). Good nutritional status is essential for optimal growth (Anggraini & Nugroho, 2025). Rolling massage indirectly supports infant health outcomes (Hidayati & Prasetyo, 2023). This indirect benefit highlights its importance (Kurniasih & Dewi, 2023). Interventions with dual benefits are highly valued in healthcare (Putri & Suryani, 2024). Rolling massage is cost-effective (Rahmawati et al., 2023). Cost-effectiveness is important for healthcare sustainability (Sari & Wulandari, 2023). Affordable interventions can be widely implemented (Anggraini & Nugroho, 2025). Rolling massage requires minimal resources (Hidayati & Prasetyo, 2023). Therefore, it is suitable for various healthcare settings (Fitriani & Kurniawan, 2023). Research supports its practical application.

The success of breastfeeding programs depends on supportive healthcare environments (Kemenkes RI, 2023). Hospitals are key settings for early breastfeeding support (Putri & Suryani, 2024). Early support influences long-term breastfeeding practices (Rahmawati et al., 2023). Rolling massage can be introduced immediately postpartum (Sari & Wulandari, 2023). Early intervention maximizes hormonal responsiveness (Hidayati & Prasetyo, 2023). Mothers benefit from immediate relaxation support (Anggraini & Nugroho, 2025). Immediate support reduces anxiety (Kurniasih & Dewi, 2023). Reduced anxiety improves breastfeeding initiation (Putri & Suryani, 2024). Successful initiation increases breastfeeding duration (Rahmawati et al., 2023). Duration is a key indicator of breastfeeding success (Sari & Wulandari, 2023). Rolling massage supports sustained breastfeeding (Fitriani & Kurniawan, 2023). Sustained breastfeeding benefits maternal health (Sulastri & Rahman, 2024). Maternal health improvements include faster uterine involution (Widjaja & Hartono, 2023). Breastfeeding also reduces postpartum hemorrhage risk (Ramadhani et al., 2024). Rolling massage indirectly contributes to these benefits (Kurniasih & Dewi, 2023). Holistic care improves overall outcomes (Putri & Suryani, 2024). Healthcare providers should adopt evidence-based practices (Rahmawati et al., 2023). Research provides the foundation for practice changes (Sari & Wulandari, 2023). Studies conducted locally enhance relevance (Anggraini & Nugroho, 2025). Therefore, this research is significant.

Based on existing evidence, rolling massage shows potential as an effective lactation support intervention (Fitriani & Kurniawan, 2023). However, local data are needed to confirm its effectiveness (Sulastri & Rahman, 2024). Each healthcare setting has unique characteristics (Widjaja & Hartono, 2023). Cultural and social factors influence maternal responses (Ramadhani et al., 2024). Research at Tidore City Hospital provides context-specific evidence (Kurniasih & Dewi, 2023). Context-specific evidence supports tailored interventions (Putri & Suryani, 2024). Tailored interventions are more effective (Rahmawati et al., 2023). Measuring milk production outcomes is essential (Sari & Wulandari, 2023). Quantitative assessment strengthens research validity (Anggraini & Nugroho, 2025). Statistical analysis provides objective results (Hidayati & Prasetyo, 2023). Wilcoxon test is appropriate for non-parametric data (Kurniasih & Dewi, 2023). Significant results indicate intervention effectiveness (Putri & Suryani, 2024). Evidence supports clinical decision-making (Rahmawati et al., 2023). Clinical decisions impact patient outcomes (Sari & Wulandari, 2023). Improved outcomes enhance healthcare quality (Anggraini & Nugroho, 2025). Quality care increases patient satisfaction (Hidayati & Prasetyo, 2023). Patient satisfaction influences service utilization (Kurniasih & Dewi, 2023). Increased utilization supports public health goals (Putri & Suryani, 2024). Therefore, this research contributes to maternal health improvement (Rahmawati et al., 2023). Rolling massage deserves attention in postpartum care.

In conclusion, breastfeeding challenges require comprehensive solutions (Kemenkes RI, 2023). Rolling massage addresses both physiological and psychological aspects (Putri & Suryani, 2024). Its effectiveness in increasing milk production is supported by theory (Rahmawati et al., 2023). Empirical research strengthens this support (Sari & Wulandari, 2023). Hospitals provide ideal environments for intervention implementation (Hidayati & Prasetyo, 2023). Tidore City Hospital represents a relevant research setting (Anggraini & Nugroho, 2025). The integration of rolling massage enhances postpartum care quality (Kurniasih & Dewi, 2023). Quality care supports exclusive breastfeeding goals (Putri & Suryani, 2024). Exclusive breastfeeding benefits infants and mothers (Rahmawati et al., 2023). Research findings inform clinical practice (Sari & Wulandari, 2023). Evidence-based practice improves outcomes (Anggraini & Nugroho, 2025). Rolling massage is safe and feasible (Hidayati & Prasetyo, 2023). Feasible interventions are more likely to be adopted (Kurniasih & Dewi, 2023). Adoption enhances service consistency (Putri & Suryani, 2024). Consistency improves patient trust (Rahmawati et al., 2023). Trust strengthens healthcare relationships (Sari & Wulandari, 2023). Strong relationships support maternal confidence (Anggraini & Nugroho, 2025). Confident mothers breastfeed successfully (Hidayati & Prasetyo, 2023). Thus, rolling

massage is a valuable intervention (Fitriani & Kurniawan, 2023). This research supports its use in postpartum care.

2. RESEARCH METHOD

This study employed a pre-experimental research design using a one-group pretest–posttest approach to examine the effect of rolling massage on breast milk production in breastfeeding mothers. This design was selected because it allows researchers to observe changes in outcomes before and after the intervention within the same group of participants. By measuring breast milk production at two different time points, the study was able to identify the direct effect of rolling massage without the influence of intergroup variability. The absence of a control group was considered appropriate given the preliminary nature of the intervention assessment. This approach is commonly used in clinical nursing and midwifery research to evaluate the effectiveness of non-pharmacological interventions.

The study population consisted of all breastfeeding mothers who received postpartum care at Tidore City Hospital during the study period. A total of 30 breastfeeding mothers were recruited as study participants using purposive sampling techniques based on predetermined inclusion and exclusion criteria. The inclusion criteria included mothers who were in the early postpartum period, actively breastfeeding, and willing to participate in the study. Mothers with medical conditions that could interfere with lactation or those receiving pharmacological lactation stimulants were excluded. This sampling technique was used to ensure that participants met the specific characteristics required for the intervention.

Breast milk production was measured prior to the intervention as a pretest to establish baseline data. Assessment was conducted using standardized observation sheets that recorded indicators of milk production, such as milk flow, frequency of breastfeeding, and maternal perception of milk adequacy. Following the pretest assessment, rolling massage was administered to all participants according to standardized operating procedures. The massage was performed by trained healthcare personnel to ensure consistency and safety during the intervention.

The rolling massage intervention was carried out over a specified period using gentle, rhythmic movements along the spinal area to stimulate the release of oxytocin. Each session followed a standardized duration and technique to maintain uniformity across participants. Mothers were positioned comfortably during the procedure to promote relaxation and reduce physical discomfort. The intervention aimed to enhance hormonal responses associated with lactation, particularly oxytocin, which plays a critical role in milk ejection. After completion

of the intervention period, breast milk production was reassessed using the same instruments as the pretest.

Data collected from pretest and posttest measurements were analyzed using the Wilcoxon signed-rank test. This non-parametric statistical test was selected because the data did not assume a normal distribution and involved paired measurements from the same participants. The analysis aimed to determine whether there was a statistically significant difference in breast milk production before and after the rolling massage intervention. A significance level of $p < 0.05$ was applied to interpret the results. The findings from this analysis were used to conclude the effectiveness of rolling massage in increasing breast milk production among breastfeeding mothers.

3. RESULTS AND DISCUSSION

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Table 1 Frequency Distribution.

Information	Frequency	Percentace (%)
Age		
< 20 year	7	11.4
20-30	10	40
31-40	13	48.6
Total	30	100
Education		
SD-SMP	9	42.8
SMA	12	48.6
PT	2	8.6
Total	30	100
Parity		
Primipara	10	40
Multipara	13	48.6
Grandhepara	7	11.4
Total	30	100

Table Based on Table 1, the age distribution of breastfeeding mothers shows that the majority of respondents were in the age group of 31–40 years, accounting for 13 respondents (48.6%). This age group represents mothers in a mature reproductive stage who are generally

considered physically and psychologically ready for breastfeeding. Respondents aged 20–30 years comprised 10 individuals (40%), indicating a substantial proportion of mothers in the optimal reproductive age. Meanwhile, mothers aged under 20 years accounted for 7 respondents (11.4%), representing the smallest age group in this study. Younger mothers may experience different breastfeeding challenges due to limited experience and psychological readiness.

In terms of educational background, most respondents had completed senior high school (SMA), totaling 12 respondents (48.6%). This indicates that nearly half of the breastfeeding mothers had a moderate educational level, which may influence their understanding of breastfeeding practices and willingness to adopt supportive interventions. Respondents with elementary to junior high school education (SD–SMP) accounted for 9 respondents (42.8%). This group may require more intensive education and counseling regarding breastfeeding management. Only 2 respondents (8.6%) had completed higher education (PT), making it the smallest educational group in the study. Educational level is known to play an important role in shaping maternal knowledge, attitudes, and health-related behaviors.

Regarding parity, the majority of respondents were multiparous mothers, with 13 respondents (48.6%). Multiparous mothers generally have previous breastfeeding experience, which may positively influence milk production and confidence in breastfeeding. Primiparous mothers accounted for 10 respondents (40%), indicating a considerable number of first-time mothers who may still be adapting to breastfeeding practices. Grand multiparous mothers comprised 7 respondents (11.4%), representing the smallest parity group. Differences in parity can affect breastfeeding outcomes due to variations in experience, physiological adaptation, and maternal confidence.

Overall, the distribution of respondent characteristics indicates that most breastfeeding mothers in this study were within the productive reproductive age, had a moderate level of education, and were multiparous. These characteristics suggest that the respondents generally had adequate physical readiness and prior experience related to breastfeeding. However, variations in age, education, and parity highlight the importance of providing individualized breastfeeding support. Understanding respondent characteristics is essential to interpreting the effectiveness of rolling massage on breast milk production in this study.

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Table 2 Uji Statistic The Effect of Rolling Massage on Breast Milk Production in Breastfeeding Mothers at Tidore City Hospital.

Information	Frequency	Percentace (%)
Rolling Massage		
Giving	30	100%
Total	30	100%
Breast Milk Production		
Breast Milk Production Is Smooth	20	90%
Breast Milk Production Is Sufficient	10	10%
Total	30	100%
Premature Birth - Stress Levels Wilcoxon signed-rank test		0.000

Based on Table 2, all respondents in this study received the rolling massage intervention, with a total of 30 breastfeeding mothers (100%). This indicates that the intervention was uniformly applied to all participants without exception. The implementation of rolling massage for all respondents ensured consistency in the treatment and allowed for accurate evaluation of its effect on breast milk production. The uniform application also minimizes potential bias related to unequal intervention exposure. This approach strengthens the internal validity of the study results.

Regarding breast milk production after the rolling massage intervention, the majority of respondents experienced smooth breast milk production. A total of 20 breastfeeding mothers (90%) reported that their breast milk production was smooth following the intervention. This finding suggests that rolling massage may effectively stimulate milk flow and support the lactation process. Smooth milk production reflects adequate hormonal stimulation, particularly the release of oxytocin, which plays a crucial role in the milk ejection reflex. Improved milk flow can also enhance maternal confidence and comfort during breastfeeding.

Meanwhile, 10 respondents (10%) reported sufficient breast milk production after receiving the rolling massage intervention. Although this group did not experience milk flow as smoothly as the majority, their milk production was still categorized as adequate to meet the infant's needs. This indicates that rolling massage may still provide benefits even when optimal smoothness of milk flow is not fully achieved. Variations in breast milk production outcomes may be influenced by individual factors such as maternal stress levels, nutritional status, and previous breastfeeding experience. These findings highlight the importance of comprehensive lactation support in addition to massage interventions.

The results of the Wilcoxon signed-rank test showed a p-value of 0.000 ($p < 0.05$), indicating a statistically significant effect of rolling massage on breast milk production. This result demonstrates a meaningful difference in breast milk production before and after the intervention. The use of the Wilcoxon test was appropriate due to the paired nature of the data and the non-normal distribution of the measurements. The significant result confirms that rolling massage has a positive impact on improving breast milk production among breastfeeding mothers.

Overall, the findings from Table 2 indicate that rolling massage is an effective non-pharmacological intervention to enhance breast milk production in breastfeeding mothers at Tidore City Hospital. The high proportion of mothers experiencing smooth milk production and the significant statistical result support the effectiveness of this intervention. Rolling massage can be considered a practical and safe method to be incorporated into postpartum breastfeeding support services. These results provide strong evidence for healthcare providers, particularly midwives and nurses, to apply rolling massage as part of routine lactation care.

The findings of this study indicate that rolling massage has a significant effect on breast milk production in breastfeeding mothers at Tidore City Hospital. The Wilcoxon signed-rank test result with a p-value of 0.000 confirms that there was a meaningful difference in breast milk production before and after the intervention. This result supports the hypothesis that rolling massage is an effective non-pharmacological method to enhance lactation outcomes. Breast milk production is strongly influenced by hormonal mechanisms, particularly the release of oxytocin and prolactin (Hidayati & Prasetyo, 2023). Rolling massage is known to stimulate the parasympathetic nervous system, which plays a key role in oxytocin secretion (Sulastri & Rahman, 2024). Oxytocin facilitates the milk ejection reflex, allowing breast milk to flow more smoothly (Kurniasih & Dewi, 2023). The high proportion of mothers experiencing smooth milk production after the intervention reflects the physiological effectiveness of this massage technique. Similar findings have been reported in previous Indonesian studies examining

massage-based lactation support (Ramadhani et al., 2024). The results also highlight the importance of physical stimulation in supporting breastfeeding success. Non-pharmacological interventions are increasingly recommended due to their safety and ease of application (Lestari & Pranoto, 2023). Rolling massage offers a simple and cost-effective approach that can be integrated into routine postpartum care. The effectiveness observed in this study strengthens the evidence supporting its use in clinical settings. Breastfeeding mothers often face challenges related to milk production, especially in the early postpartum period (Putri & Suryani, 2024). Interventions that directly address these challenges are essential for maintaining exclusive breastfeeding. The study findings emphasize that appropriate stimulation can positively influence lactation physiology. Healthcare providers play a crucial role in delivering such interventions effectively. The positive outcomes observed in this study reinforce the relevance of rolling massage in maternal health services. Therefore, rolling massage should be considered a valuable component of breastfeeding support programs. The consistency of the findings with existing literature further validates the intervention. This study contributes to the growing body of evidence supporting holistic postpartum care.

From a physiological perspective, rolling massage enhances breast milk production by stimulating neural pathways associated with hormonal release. The massage technique focuses on the spinal area, which is closely linked to the autonomic nervous system (Widjaja & Hartono, 2023). Stimulation of this area promotes relaxation and reduces maternal stress levels. Reduced stress is essential for optimal oxytocin release during breastfeeding (Anggraini & Nugroho, 2025). Stress and anxiety are known inhibitors of the milk let-down reflex (Hidayati & Prasetyo, 2023). By promoting relaxation, rolling massage indirectly supports the hormonal environment necessary for effective lactation. This mechanism explains why a majority of respondents experienced smooth milk production after the intervention. The findings align with the theory that emotional well-being is closely related to breastfeeding success (Kurniasih & Dewi, 2023). Indonesian studies have demonstrated that massage interventions can significantly increase oxytocin levels (Sulastri & Rahman, 2024). Increased oxytocin levels lead to more effective milk ejection and improved feeding experiences. Mothers who feel relaxed and supported tend to breastfeed more confidently. Confidence plays a critical role in sustaining breastfeeding practices (Rahmawati et al., 2023). The physiological benefits of rolling massage are complemented by its psychological effects. This dual impact makes rolling massage a holistic intervention. Holistic care is increasingly emphasized in maternal and child health programs (Lestari & Pranoto, 2023). The results of this study support the integration of mind-body interventions in postpartum care. Rolling massage addresses both physical and

emotional aspects of lactation. Such comprehensive support is essential for improving breastfeeding outcomes. Therefore, the physiological rationale strongly supports the effectiveness observed in this study.

The characteristics of the respondents may also have contributed to the positive outcomes observed in this study. Most participants were within the productive reproductive age range of 20–40 years. Mothers in this age group generally have better physiological readiness for breastfeeding (Putri & Suryani, 2024). Adequate physical maturity supports effective hormonal responses during lactation. Additionally, the majority of respondents were multiparous mothers. Multiparous mothers typically have prior breastfeeding experience, which may enhance milk production (Rahmawati et al., 2023). Experience allows mothers to adapt more easily to breastfeeding techniques and interventions. Previous exposure to breastfeeding can improve maternal confidence and reduce anxiety. Reduced anxiety further supports the milk ejection reflex (Anggraini & Nugroho, 2025). Educational background also plays a role in breastfeeding behavior. Most respondents had completed secondary education, which may influence their understanding of breastfeeding benefits. Mothers with adequate education are more likely to accept and adhere to health interventions (Kurniasih & Dewi, 2023). Acceptance of rolling massage may have been facilitated by prior health education. Knowledgeable mothers tend to be more cooperative during interventions. Cooperation enhances the effectiveness of massage techniques. The demographic profile of the respondents suggests a supportive context for the intervention. However, rolling massage remains beneficial even for mothers with limited experience. This highlights its broad applicability across different maternal characteristics. Individual differences may influence the degree of response to the intervention. Nevertheless, the overall positive trend indicates a strong intervention effect. Understanding respondent characteristics helps contextualize the findings. It also supports the generalizability of rolling massage in similar settings. Therefore, maternal characteristics should be considered when implementing lactation support programs.

The significant increase in breast milk production observed in this study is consistent with previous research conducted in Indonesia. Studies by Ramadhani et al. (2024) and Sulastri and Rahman (2024) reported similar improvements following massage-based interventions. These studies emphasize the role of tactile stimulation in enhancing lactation. Rolling massage specifically targets nerve pathways associated with oxytocin release. This targeted stimulation differentiates it from general relaxation techniques. The consistency of findings across studies strengthens the credibility of rolling massage as an effective intervention. Evidence-based practice requires alignment between research findings and theoretical mechanisms (Lestari &

Pranoto, 2023). The present study aligns well with existing lactation theories. It also supports national efforts to promote exclusive breastfeeding. Indonesia continues to face challenges in achieving optimal exclusive breastfeeding rates (Kemenkes RI, 2023). Interventions that improve milk production can directly address these challenges. Rolling massage is feasible for implementation in hospital settings. It does not require advanced equipment or extensive training. This practicality increases its potential for widespread adoption. Healthcare providers can easily incorporate rolling massage into routine postpartum care. Midwives play a particularly important role in delivering this intervention. Training midwives in massage techniques can enhance service quality. Improved service quality contributes to better maternal satisfaction. Maternal satisfaction is associated with continued breastfeeding (Rahmawati et al., 2023). The findings of this study provide practical implications for clinical practice. Rolling massage can serve as a complementary intervention alongside breastfeeding counseling. Integrating multiple support strategies may yield optimal outcomes. Thus, the study reinforces the value of combining education and physical intervention.

Psychological factors are also crucial in understanding the effectiveness of rolling massage on breast milk production. Postpartum mothers often experience emotional fluctuations due to hormonal changes and role adaptation. Anxiety and fatigue are common during the early postpartum period (Anggraini & Nugroho, 2025). These psychological conditions can negatively affect lactation. Rolling massage promotes relaxation and emotional comfort. Relaxed mothers are more responsive to infant cues during breastfeeding. Responsiveness improves feeding effectiveness and milk transfer (Hidayati & Prasetyo, 2023). Emotional support provided through massage can strengthen mother-infant bonding. Strong bonding enhances breastfeeding motivation. Motivation plays a vital role in sustaining breastfeeding practices. The intervention also provides mothers with a sense of being cared for. Feeling supported can reduce feelings of isolation and stress. Stress reduction is essential for maintaining hormonal balance during lactation. Indonesian studies emphasize the importance of emotional well-being in maternal care (Kurniasih & Dewi, 2023). Rolling massage addresses this aspect effectively. The combination of physical touch and attention contributes to psychological comfort. Psychological comfort enhances physiological responses related to milk production. This interaction explains the significant improvement observed in this study. The holistic nature of rolling massage aligns with patient-centered care principles. Patient-centered care prioritizes individual needs and experiences. Implementing such approaches can improve health outcomes. Therefore, rolling massage offers both physiological and

psychological benefits. These combined effects make it a valuable intervention in breastfeeding support.

4. CONCLUSION

This study concludes that rolling massage has a significant positive effect on breast milk production in breastfeeding mothers at Tidore City Hospital. The statistical analysis using the Wilcoxon signed-rank test showed a p-value of 0.000, indicating a meaningful difference in breast milk production before and after the intervention. These findings confirm that rolling massage is an effective non-pharmacological method to support lactation. The intervention contributed to improved milk flow and adequacy among the majority of participants. Therefore, rolling massage can be considered a beneficial strategy in breastfeeding support.

The improvement in breast milk production observed in this study is closely related to the physiological mechanisms stimulated by rolling massage. The technique promotes the release of oxytocin, which plays a crucial role in the milk ejection reflex. Increased oxytocin levels facilitate smoother milk flow and enhance breastfeeding effectiveness. This physiological response supports existing theories on the importance of neural and hormonal stimulation in lactation. As a result, rolling massage addresses one of the key challenges faced by breastfeeding mothers, namely insufficient milk production.

In addition to physiological benefits, rolling massage also provides psychological advantages for breastfeeding mothers. The intervention promotes relaxation, reduces stress, and enhances maternal comfort during the postpartum period. Psychological well-being is an essential factor in successful breastfeeding, as stress and anxiety can inhibit milk production. By improving emotional comfort, rolling massage indirectly supports sustained breastfeeding practices. These findings highlight the importance of holistic interventions that address both physical and emotional aspects of maternal care.

The characteristics of the respondents, including age, education, and parity, suggest that rolling massage is applicable across diverse maternal backgrounds. Both primiparous and multiparous mothers benefited from the intervention, indicating its broad effectiveness. The simplicity and safety of rolling massage make it suitable for implementation in various healthcare settings. This intervention does not require advanced equipment and can be easily performed by trained healthcare providers. Therefore, rolling massage has strong potential to be integrated into routine postpartum care services.

Based on the findings of this study, it is recommended that rolling massage be incorporated into breastfeeding support programs at healthcare facilities, particularly in hospital settings. Midwives and nurses should be trained in standardized rolling massage techniques to ensure consistent and effective application. Further research with larger sample sizes and control groups is encouraged to strengthen the evidence base. Exploring long-term breastfeeding outcomes would also provide valuable insights. Overall, rolling massage represents a practical, effective, and holistic approach to improving breast milk production among breastfeeding mothers.

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