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Effect of Marmet technique breast massage on breast milk production among postpartum mothers

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Abstract

Background: Inadequate breast milk production and ejection during the early postpartum period may interfere with successful exclusive breastfeeding. Non-pharmacological interventions, including the Marmet technique, may help stimulate lactation and facilitate breast milk ejection.

Purpose: This study aimed to determine the effect of breast massage using the Marmet technique on breast milk production among postpartum mothers.

Method: This quantitative study used a pre-experimental design with a one-group pretest-posttest approach. The study involved 30 postpartum mothers selected using purposive sampling. The Marmet technique was administered twice daily for seven consecutive days. Breast milk production was assessed before and after the intervention using a 10-item observation instrument based on indicators of breast milk adequacy. Data were analyzed using the Wilcoxon Signed-Rank Test.

Results: The mean breast milk production score increased from 3.03 ± 0.999 before the intervention to 8.87 ± 1.008 after the intervention. The Wilcoxon Signed-Rank Test showed a statistically significant difference between pretest and posttest scores ($Z = -4.815$; $p < 0.001$).

Conclusion: Breast milk production scores improved significantly following the seven-day Marmet technique intervention. The Marmet technique may be considered a non-pharmacological intervention to support lactation among postpartum mothers.

Keywords: Breast Milk Production; Breast Massage; Marmet Technique; Postpartum Mothers.

INTRODUCTION

Breast milk is the best natural food for infants because it provides complete nutrition, immunological factors, and antibodies that support growth and development. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommend exclusive breastfeeding for the first six months of life, followed by continued breastfeeding until two years of age or beyond, together with adequate complementary foods (World Health Organization, 2024).

Exclusive breastfeeding has been shown to reduce infant morbidity and mortality and provide long-term health benefits for mothers, including

reducing the risk of postpartum hemorrhage and breast cancer. However, exclusive breastfeeding coverage has not yet reached the desired target. The WHO reported that globally, fewer than 52–66.4% of infants receive exclusive breastfeeding according to recommendations (World Health Organization, 2024). In Indonesia, exclusive breastfeeding coverage increased to approximately 66.4% in 2024; however, approximately one in three infants still did not receive exclusive breastfeeding. One of the main contributing factors is inadequate breast milk production and ejection among postpartum mothers, particularly

during the first few days after delivery (Ministry of Health of the Republic of Indonesia, 2024).

The adequacy of breast milk production is influenced by breast stimulation, breastfeeding frequency, and the mother's psychological condition. Indicators of adequate breast milk production include milk flowing or leaking during breast massage or breastfeeding, breasts feeling full before breastfeeding and softer afterward, the infant breastfeeding at least 8–12 times within 24 hours, the infant appearing satisfied after breastfeeding, and the infant urinating at least six times per day after the third day of life (Mubarakah, Syarah, & Astuti, 2024). Conversely, breast milk production may be considered inadequate when milk is difficult to express, the breasts remain tense or painful, the infant is frequently fussy after breastfeeding, and the infant's urination frequency decreases (Rumaini, 2023).

The process of breast milk production and ejection occurs through several stages of lactogenesis (Lestari, 2020). Lactogenesis I occurs from mid-pregnancy through the first day postpartum and is characterized by colostrum production, which is influenced by the hormones estrogen, progesterone, and prolactin (Baiduri et al., 2024). Lactogenesis II occurs on days 2–4 postpartum and is characterized by a significant increase in breast milk volume due to a decrease in progesterone levels and increased prolactin activity. Lactogenesis III is the maintenance phase of breast milk production, beginning after the tenth postpartum day and continuing throughout the breastfeeding period. Its continuation depends largely on breastfeeding frequency and breast emptying. Lactogenesis IV represents the involution phase, characterized by a decline in breast milk production when breastfeeding stimulation decreases or breastfeeding is discontinued (Pillay & Davis, 2023).

Quantitatively, breast milk production during the first and second postpartum days is approximately 100 mL per day in the form of colostrum, increasing to approximately 300–500 mL per day on postpartum days 3–4 and reaching approximately 700–850 mL per day during the mature milk stage (Aryani, Alyensi, & Fathunikmah, 2024). Disruptions during lactogenesis II, such as inadequate breast stimulation, delayed initiation of breastfeeding, maternal stress, and postpartum fatigue, may hinder optimal increases in breast milk production and

contribute to failure of exclusive breastfeeding (Nurseha, 2024).

Inadequate breast milk ejection among postpartum mothers can have various consequences for both mothers and infants. If not addressed promptly, this condition may encourage mothers or families to introduce infant formula prematurely as an alternative source of nutrition. Early formula feeding before breast milk production is adequately stimulated may reduce the frequency of infant suckling at the breast. Reduced breast stimulation decreases the release of prolactin and oxytocin, further inhibiting breast milk production and ejection. In addition, early formula feeding increases the risk of failure to achieve exclusive breastfeeding, nipple confusion, and reduced maternal confidence in breastfeeding (Pillay & Davis, 2023).

For infants, inadequate breast milk intake may result in insufficient nutritional intake, excessive weight loss, dehydration, hypoglycemia, and an increased risk of infection due to reduced exposure to the natural antibodies contained in breast milk. In the long term, these conditions may impair infant growth and development. For mothers, inadequate milk ejection may lead to breast engorgement, breast pain, mastitis, and even breast abscesses if not properly managed. In addition to physical consequences, breastfeeding difficulties may cause psychological distress, including anxiety, stress, feelings of inadequacy, and reduced confidence in providing exclusive breastfeeding (Rumaini, 2023).

Various approaches have been used to improve breast milk production and ejection, including pharmacological and non-pharmacological interventions. Pharmacological approaches commonly include the use of galactagogues such as domperidone and metoclopramide. Domperidone increases prolactin levels by blocking dopamine receptors, thereby stimulating breast milk production. Its advantage is its effectiveness in increasing milk volume with minimal penetration into the central nervous system. However, domperidone has limitations, including the potential for cardiovascular adverse effects; therefore, its use should be based on medical indications and conducted under healthcare professional supervision. Metoclopramide also increases prolactin levels but may cause neurological adverse effects, such as fatigue and sleep disturbances, and may increase the risk of depression

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in postpartum mothers. Therefore, its use requires careful consideration (Harismayanti & Latief, 2025).

In addition to pharmacological approaches, non-pharmacological methods are often recommended because they are relatively safe, easy to implement, and support the physiological lactation process. Common methods include acupressure, oxytocin massage, endorphin massage, warm compresses, and breast care. Acupressure may promote relaxation and stimulate prolactin and oxytocin release, although it requires specific skills and accurate application of pressure to appropriate points. Oxytocin massage is designed to stimulate the oxytocin reflex and facilitate milk ejection. This technique can be easily performed by healthcare providers or family members; however, its effectiveness may be reduced when the mother experiences severe stress. Endorphin massage may help reduce pain and anxiety, thereby supporting breastfeeding, although its effect is indirect. Warm compresses can improve blood circulation and facilitate the opening of the lactiferous ducts, but their effects are generally temporary. Breast care helps maintain breast hygiene and health and prevent breast engorgement; however, optimal outcomes require consistency and proper technique (Rohmawati, Jayatmi, & Ramadhan, 2025).

Among the various non-pharmacological methods, the Marmet technique is commonly used to facilitate breast milk ejection. This technique involves manual breast milk expression that combines massage and gentle breast compression to stimulate the oxytocin and prolactin reflexes. Its advantages include being easy to learn, requiring no special equipment, allowing mothers to perform it independently, and being generally safe without significant adverse effects. The Marmet technique also helps empty the breasts effectively, thereby stimulating subsequent milk production, while giving mothers a sense of control and confidence that may support psychological adaptation during the postpartum period and facilitate lactation (Harismayanti & Latief, 2025). The selection of the Marmet technique as the non-pharmacological intervention in this study was based on its effectiveness, safety, ease of implementation, and suitability for the role of midwives in postpartum care. In addition to addressing the physiological aspects of the breast, this technique may support maternal comfort and psychological readiness during

breastfeeding. Therefore, the Marmet technique is expected to serve as an effective alternative for improving breast milk ejection and supporting successful exclusive breastfeeding.

Physiologically, the Marmet technique works through direct mechanical stimulation of breast tissue, particularly around the areola and lactiferous sinuses. This stimulation activates sensory nerve endings that transmit impulses to the hypothalamus and pituitary gland, thereby increasing the secretion of prolactin and oxytocin (Febriyanti et al., 2024). Increased prolactin stimulates milk production in the alveoli, whereas oxytocin induces contraction of the myoepithelial cells, triggering the let-down reflex and facilitating milk ejection (Ismawati, Aisyah, & Zulhaedah, 2025). The Marmet technique also promotes more effective breast emptying, reduces intraductal pressure, and decreases the inhibitory effect of Feedback Inhibitor of Lactation (FIL), a substance that can suppress milk production when the breast remains insufficiently emptied. By reducing the effect of FIL, breast milk production can increase naturally (Jannah & Fadhilah, 2022). Psychologically, the technique may promote relaxation, thereby reducing postpartum stress and anxiety that can interfere with oxytocin release. Thus, the Marmet technique may facilitate breast milk ejection through simultaneous mechanical, neuroendocrine, and psychological mechanisms (Sabrina & Wulaningsih, 2025).

RESEARCH METHOD

This study used a quantitative approach with a pre-experimental design and a one-group pretest-posttest approach. The study was conducted at TPMB Lusi Meri Hutagaol, S.ST, Sripendowo Village, Bandar Sribawono District, East Lampung. The study population consisted of postpartum mothers receiving postpartum care at the study site. A total of 30 respondents were selected using purposive sampling according to predetermined inclusion and exclusion criteria.

The inclusion criteria were primiparous postpartum mothers on postpartum days 1–7, breastfeeding their infants, experiencing inadequate breast milk production based on initial assessment, having a stable general condition, and being willing to participate in the study. The exclusion criteria were mothers with severe postpartum complications,

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mastitis or breast abscess, or infants who were unable to breastfeed directly because of prematurity, congenital oral abnormalities, severe respiratory disorders, neurological disorders, or other conditions requiring specialized care.

The independent variable was breast massage using the Marmet technique, while the dependent variable was breast milk production. The intervention was administered twice daily, in the morning and afternoon, for 25 minutes per session over seven consecutive days. The intervention was performed under direct supervision on the first and seventh days. From the second to the sixth days, respondents performed the technique independently at home after receiving standardized instruction and demonstration. Compliance was monitored using an intervention checklist and daily communication with the researcher.

The research instruments consisted of the Marmet technique Standard Operating Procedure (SOP), an intervention observation sheet, and a breast milk production assessment instrument. The breast milk production instrument consisted of 10 indicators related to breast condition, milk flow and ejection, breastfeeding from both breasts, milk leakage, infant breastfeeding behavior, infant satisfaction after breastfeeding, and infant urination frequency. Each item was scored using a dichotomous scale, with "Yes" scored as 1 and "No" as 0. The total score ranged from 0 to 10, with higher scores indicating better breast milk adequacy. The instrument had been tested for validity and reliability, with a Cronbach's alpha coefficient of 0.908.

Primary data were obtained through interviews, observations, and assessment of breast milk production before and after the intervention. Respondent characteristics were also collected

during the initial assessment. EPDS screening was conducted to describe the respondents' postpartum psychological condition and was not analyzed as an independent or dependent variable.

Secondary data were obtained from the maternal delivery register at the study site. Before data collection, the researcher obtained permission from the relevant institution and study site. All respondents received an explanation regarding the study objectives, procedures, potential benefits, confidentiality, and their right to withdraw from participation. Written informed consent was obtained before data collection.

The pretest assessment was conducted on the first day before the intervention. The Marmet technique was then administered for seven consecutive days, followed by the posttest assessment on the seventh day using the same instrument.

Ethical approval was obtained on April 8, 2026, under approval letter number 5245/EC/KEP-UNMAL/IV/2026. The study was conducted in accordance with ethical principles, including informed consent, confidentiality, and voluntary participation.

Data were analyzed using univariate and bivariate analyses. Univariate analysis was used to describe respondent characteristics and pretest and posttest breast milk production scores using frequency, percentage, mean, median, standard deviation, and minimum–maximum values.

The Shapiro–Wilk test was used to assess the normality of the pretest and posttest scores. Because both datasets were not normally distributed ($p < 0.05$), the Wilcoxon Signed-Rank Test was used to compare paired pretest and posttest scores. Statistical significance was determined at $\alpha = 0.05$, with $p < 0.05$ considered statistically significant.

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RESEARCH RESULTS

Table 1. Characteristics of Respondents (N=30)

Variable	Results
Age (Mean±SD) (Years) (Range)	(25.20±2.455)
<20	0/0
20-35	30/100
>35	0/0
EPDS History (n/%)	
No History Of Depression / Very Low Risk	20/66.7
Mild	10.33.3
Moderate–Severe	0/0

Based on Table 1, all respondents were within the healthy reproductive age range of 20–35 years, comprising 30 respondents (100%), with ages ranging from 21 to 30 years. The mean age was 25.20 years, with a standard deviation of 2.455. Based on screening using the Edinburgh Postnatal Depression Scale (EPDS), most respondents had no risk of postpartum depression or were classified as having a very low risk, comprising 20 respondents (66.7%). Meanwhile, 10 respondents (33.3%) were classified as having mild risk, and none were classified as having moderate-to-severe risk (0%).

Table 2. Normality Test Results

Variabel	Mean	P-Value
Breast Milk Production Among Postpartum Mothers (Pre-test)	3.03	<0.001
Breast Milk Production Among Postpartum Mothers (Post-test)	8.87	<0.001

Based on Table 2, the results of the normality test using the Shapiro–Wilk test showed that the mean pre-test breast milk production score among postpartum mothers was 3.03, with a p-value <0.001. Meanwhile, the mean post-test score was 8.87, with a p-value of <0.001. These results indicate that the p-values for both measurements were less than 0.05 ($p < 0.05$), indicating that the pre-test and post-test breast milk production scores were not normally distributed. Therefore, a non-parametric statistical test, namely the *Wilcoxon Signed-Rank Test*, was used for further analysis to determine the effect of breast massage using the Marmet technique on breast milk production among postpartum mothers.

Table 3. Mean Breast Milk Production Scores Among Postpartum Mothers Before and After Marmet Technique Breast Massage

Variabel	Mean	Median	SD	Min-Max	95% CI
Before	3.03	3.00	0.999	2-5	2.66-3.41
After	8.87	9.00	1.008	7-10	8.49-9.24

Based on Table 3. the mean breast milk production score among postpartum mothers before the Marmet technique intervention was 3.03, with a

standard deviation of 0.999 and a median of 3.00. The minimum score was 2 and the maximum score was 5, with a score range of 2–5. The 95% confidence

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interval (95% CI) ranged from 2.66 to 3.41. These findings indicate that before the intervention, breast milk production among postpartum mothers was relatively low and not yet optimal.

After the Marmet technique intervention, the mean breast milk production score increased to 8.87, with a standard deviation of 1.008 and a median of 9.00. The minimum score was 7 and the maximum score was 10, with a score range of 7–10. The 95% CI ranged from 8.49 to 9.24. These findings indicate that breast milk production among postpartum mothers improved substantially after the intervention and was categorized as adequate.

DISCUSSION

The results showed that the mean breast milk production score among postpartum mothers before receiving breast massage intervention using the Marmet technique was 3.03, with a standard deviation of 0.999, a median of 3.00, a minimum score of 2, and a maximum score of 5. These findings indicate that breast milk production before the intervention was still categorized as inadequate. Based on observations of 30 respondents, 10 respondents (33.3%) obtained a score of 2, 12 respondents (40.0%) obtained a score of 3, 5 respondents (16.7%) obtained a score of 4, and 3 respondents (10.0%) obtained a score of 5. This indicates that most respondents had scores of 2 and 3, suggesting that breast milk production during the early postpartum period was not yet optimal. Regarding respondent characteristics, all mothers were within the healthy reproductive age range of 20–35 years, with a mean age of 25.20 years. Screening using the *Edinburgh Postnatal Depression Scale* (EPDS) showed that 20 respondents (66.7%) had no risk of depression or were classified as having a very low risk, while 10 respondents (33.3%) were classified as having mild depressive symptoms.

Previous studies have reported that during the first 2–3 days after delivery, many mothers experience delayed breast milk production because the lactation process is still undergoing physiological adaptation (Rumaini, 2023). Another study reported that primiparous mothers more frequently experience complaints of inadequate breast milk production than multiparous mothers because they have less breastfeeding experience and require time to adapt to breastfeeding position, infant attachment, and breastfeeding frequency (Haryati et al., 2023).

Previous research has also indicated that maternal psychological conditions, including postpartum anxiety and mild depression, may interfere with the milk ejection reflex, resulting in less optimal breastfeeding (Febriani & Caesarrani, 2023).

Physiologically, breast milk production during the postpartum period is influenced by the successful initiation of lactogenesis II, the phase in which milk production begins to increase after delivery of the placenta. Placental expulsion causes a rapid decline in estrogen and progesterone levels, allowing prolactin to function optimally in stimulating the mammary alveolar cells to produce breast milk (Damanik & Suwardi, 2023). However, the production of breast milk does not necessarily mean that it can be released immediately and effectively. Milk ejection requires the let-down reflex, which is regulated by the hormone oxytocin. When the infant suckles at the nipple, the stimulus is transmitted to the hypothalamus, prompting the posterior pituitary gland to release oxytocin. This hormone causes contraction of the myoepithelial cells surrounding the alveoli, thereby pushing breast milk into the lactiferous ducts and out through the nipple (Febriyanti et al., 2024).

In addition to hormonal mechanisms, breast milk production and ejection are influenced by the effectiveness of infant suckling, breastfeeding frequency, breast condition, maternal health status, adequate rest, nutritional status, and maternal psychological condition. In primiparous mothers, adaptation to the new maternal role may require them to learn how to establish a comfortable breastfeeding position and achieve proper infant attachment. When attachment is suboptimal, infant suckling may become less effective, reducing stimulation of prolactin and oxytocin release. Consequently, breast milk production and ejection may not occur optimally (Jannah & Fadhilah, 2022). Furthermore, mothers experiencing anxiety or mild depression may have increased cortisol levels, which can interfere with oxytocin release and subsequently impair the milk ejection reflex.

According to the researchers, the low breast milk production scores at the pre-test were not attributable to age, as all respondents were within the healthy reproductive age range, which physiologically supports the lactation process. The low scores were more likely influenced by the early postpartum condition, when mothers were still undergoing

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lactation adaptation. This was evident from the observation results, in which most respondents obtained a score of 3 (12 respondents; 40.0%) and a score of 2 (10 respondents; 33.3%), while only 3 respondents (10.0%) obtained a score of 5. In addition, 10 respondents (33.3%) were classified as having mild depression based on the EPDS results, which may have contributed to impaired milk ejection reflexes. These findings indicate that during the early postpartum period, most mothers still require physiological adaptation, psychological support, education regarding proper breastfeeding techniques, and lactation stimulation to optimize breast milk production and ejection.

Previous researchers have explained that breast massage using the Marmet technique can increase breast milk production and ejection through regular breast stimulation, thereby optimizing the milk ejection reflex (Harismayanti & Latief, 2025). Other researchers reported that postpartum mothers who regularly practiced the Marmet technique experienced improved breast milk production, characterized by increased milk volume and more effective breastfeeding (Juniekasari et al., 2022). Meanwhile, another study found that lactation education accompanied by practical training in the Marmet technique could accelerate successful breastfeeding during the first postpartum week because mothers became more confident in breastfeeding their infants (Lestari, 2023).

Physiologically, the improvement in breast milk production following breast massage using the Marmet technique occurs through a neuroendocrine mechanism involving neural stimulation and hormonal responses. When the nipple and areola receive stimulation through massage or infant suckling, sensory receptors in the nipple transmit nerve impulses to the hypothalamus. The hypothalamus then stimulates the anterior pituitary gland to secrete prolactin, which promotes milk synthesis by the alveolar epithelial cells. At the same time, the hypothalamus stimulates the posterior pituitary gland to release oxytocin. Oxytocin induces contraction of the myoepithelial cells surrounding the alveoli, thereby pushing breast milk into the lactiferous ducts and out through the nipple (the let-down reflex) (Mahardika, 2024). In addition to enhancing the milk ejection reflex, repeated breast emptying reduces the concentration of Feedback

Inhibitor of Lactation (FIL), thereby reducing inhibition of milk production. This mechanism follows the supply-and-demand principle, in which more frequent breast emptying provides greater stimulation for subsequent milk production (Mubarokah et al., 2024; Nurseha et al., 2024).

Previous studies have indicated that the Marmet technique is a breast stimulation method that can accelerate the milk ejection reflex through mechanical stimulation of the nipple and areola (Puspitasari, 2017). Previous research also reported that postpartum mothers who regularly practiced the Marmet technique experienced improved breast milk ejection because the stimulation provided helped optimize the lactation process (Rohmawati et al., 2025).

Physiologically, the effect of the Marmet technique occurs through a neuroendocrine mechanism involving neural stimulation and hormonal responses. The massage and compression movements used in the Marmet technique stimulate sensory receptors in the nipple and areola, which transmit signals through afferent nerves to the hypothalamus. The hypothalamus subsequently sends signals to the anterior pituitary gland to increase prolactin secretion and to the posterior pituitary gland to release oxytocin (Sabrina & Wulaningsih, 2025). Prolactin promotes milk synthesis in the mammary alveoli, whereas oxytocin induces contraction of the myoepithelial cells, causing breast milk to be pushed through the lactiferous ducts toward the nipple. This process allows breast milk that was previously retained in the alveoli to be expelled more effectively. Furthermore, the Marmet technique facilitates optimal breast emptying, thereby reducing the concentration of *Feedback Inhibitor of Lactation* (FIL), which inhibits milk production when milk accumulates in the alveoli. A reduction in FIL stimulates the alveolar cells to continue producing breast milk according to the infant's needs through the supply-and-demand mechanism (Sasanti et al., 2025).

The results of this study also showed that some respondents who were classified as having mild emotional disturbances based on the EPDS still experienced improvements in breast milk production, with some achieving the maximum score. This finding suggests that mild emotional disturbances do not necessarily directly hinder the effectiveness of the

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intervention when mothers receive adequate lactation stimulation. Conversely, some respondents with good emotional conditions showed smaller increases in scores than other respondents. This indicates that the effectiveness of the Marmet technique may be influenced by individual physiological responses, resulting in variations in intervention outcomes among mothers despite receiving the same procedure.

According to the researchers, these findings indicate that the Marmet technique contributes to improved breast milk production among postpartum mothers, as all respondents showed positive changes following the intervention. The absence of negative ranks and ties indicates that the intervention had a consistent positive effect across all respondents. Variations in the magnitude of score increases do not indicate intervention failure but rather reflect differences in each mother's physiological capacity to respond to lactation stimulation. Therefore, the researchers consider the Marmet technique to be a feasible evidence-based non-pharmacological intervention in midwifery care because it provides consistent benefits in improving breast milk production and supports the success of exclusive breastfeeding.

CONCLUSION

The mean breast milk production score increased from 3.03 ± 0.999 before the intervention to 8.87 ± 1.008 after seven days of the Marmet technique intervention. The Wilcoxon Signed-Rank Test demonstrated a statistically significant difference between pretest and posttest scores ($Z = -4.815$; $p < 0.001$).

The Marmet technique was associated with improved breast milk production scores among postpartum mothers. However, because the study did not include a control group, further controlled studies with larger samples are needed to confirm its effectiveness.

SUGGESTION

Midwives are encouraged to provide education and practical demonstrations of the Marmet technique as part of postpartum breastfeeding support. Postpartum mothers may practice the technique according to standardized instructions and continue frequent breastfeeding and effective breast emptying.

Future researchers should use larger samples and controlled or randomized designs and consider potential confounding factors such as breastfeeding frequency, infant attachment, maternal nutritional status, psychological condition, and parity.

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