



Antenatal Rolling Back Massage Combined with Breast Care: Effect on Postpartum Breast Milk Output

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Abstract

Breastfeeding problems often emerge during the antenatal period, with many mothers experiencing delayed or insufficient breast milk output during the first to third days postpartum. Inadequate breast care and the absence of rolling back massage during pregnancy are known to negatively affect breastfeeding outcomes. This study aimed to determine the effect of combining rolling back massage with breast care during the third trimester of pregnancy on postpartum breast milk output. A quasi-experimental study with a two-group posttest-only control group design was conducted at Klinik Aminah Amin Rianta 1 from April 1 to May 31, 2024. A total of 36 third-trimester pregnant women (≥ 36 weeks' gestation) were recruited using accidental sampling (18 per group). The treatment group received rolling back massage (along the spine from the cervical region to costa 5–6, twice during the third trimester) in addition to breast care, while the control group received breast care only. Breast milk output was assessed on the first to third postpartum day and categorized dichotomously as 'present' or 'absent' using a standardized observation checklist. Fisher's Exact Test was used for analysis. The treatment group demonstrated markedly higher breast milk output (94.4%) compared with the control group (61.1%). A statistically significant effect was confirmed ($p = 0.041$, $p < \alpha = 0.05$). The combination of rolling back massage and breast care during the third trimester significantly improves postpartum breast milk output. Integration of both interventions into antenatal care is recommended, with the caveat that future randomized studies with larger samples are needed to confirm generalizability.

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1. INTRODUCTION

Breast milk (ASI) is the optimal source of nutrition for infants aged 0–6 months and should be continued until the child reaches two years of age. Breastfeeding confers nutritional, immunological, and psychological benefits (Arianti, 2017). Exclusive breastfeeding has been estimated to prevent 823,000 deaths among children under five years annually in developing countries, while reducing the incidence of infectious diseases such as diarrhea and respiratory tract infections, providing protection against chronic disease in adulthood, and improving cognitive development (Ministry of Health of the Republic of Indonesia, 2022).

Globally, the prevalence of exclusive breastfeeding in the first six months of life increased by approximately 10% over the past decade, reaching 48% in 2023 and approaching the World Health Organization (WHO) target of 50% by 2025 (UNICEF, 2023). In Indonesia, exclusive breastfeeding coverage reached 73.97% in 2023 (BPS, 2023), with East Kalimantan Province reporting a coverage of 77.7%. In Samarinda City, coverage was 66% in 2021 (Pertiwi, 2022). Klinik Aminah Amin Rianta 1 consistently achieved 100% exclusive breastfeeding coverage during the study period, underpinned by active support programs for mothers and infants.

Government commitment to exclusive breastfeeding is codified in Law No. 17 of 2023. The Ministry of Health Strategic Plan 2020–2024 targets exclusive breastfeeding coverage of at least 69% among infants under six months by 2024 (Ministry of Health of the Republic of Indonesia, 2020). Despite these commitments, several barriers hinder exclusive breastfeeding, including limited community outreach, inadequate skills among healthcare workers, insufficient antenatal breast care, early prelacteal feeding, lack of family support, and suboptimal physiological preparation of the breast (Adam, Losu, & Kanter, 2018; Afriyani, Savitri, & Sa'adah, 2018; Reni, 2023). Many mothers encounter difficulties in the first days postpartum, particularly delayed or absent breast milk output (Fatmawati, Syaiful, & Wulansari, 2019; Gemilang, 2020). This is often accompanied by maternal anxiety arising from a misunderstanding that colostrum, though produced in small quantities, fully meets the newborn's nutritional needs in the first 24–48 hours.

Breast milk production begins physiologically during pregnancy. Lactogenesis I (cytological differentiation of alveolar cells and colostrum production) commences at approximately 16 weeks' gestation, while Lactogenesis II (onset of copious milk secretion) occurs 30–72 hours postpartum (King et al., 2019). Factors influencing the timing and adequacy of early milk output include breast care during the antenatal period, psychological condition, nutritional intake, parity, and age (Reni, 2023).

Antenatal breast care, including nipple preparation, breast massage, and targeted exercise, is recognized as a modifiable strategy to promote timely lactogenesis and smooth milk flow. Rolling back massage, involving circular massage of the spine from the cervical region to costa 5–6, is thought to stimulate the posterior pituitary gland via parasympathetic nerve pathways, increasing oxytocin secretion and activating the let-down reflex (Mayangsari, 2019; Syukur & Purwanti, 2020; Siregar, 2023). Breast care, conversely, directly stimulates prolactin release through breast tissue manipulation (Harefa et al., 2019). The theoretical complementarity of these mechanisms suggests that combining both interventions may yield additive or synergistic benefits in promoting breast milk output, beyond what either intervention achieves individually (Manuella, 2017; Mayangsari & Hidayati, 2020; Widiastuti & Jati, 2020).

Although several studies have examined either breast care or rolling back massage individually, evidence on their combined effect when administered during the third trimester remains limited (Sari, 2017). Prior research by Rehulina et al. (2020) examined the combination in postpartum women, and Dayen et al. (2023) found rolling massage and breast care to be the most dominant factor in multivariate analysis of postpartum milk output (odds ratio 51.6). However, no study has specifically focused

on initiating the combined intervention during the antenatal third trimester at gestational ages ≥ 36 weeks. This study therefore aimed to determine the effect of the combination of rolling back massage and breast care during the third trimester of pregnancy on postpartum breast milk output at Klinik Aminah Amin Rianta 1.

2. METHOD

This study employed a quasi-experimental design using a two-group posttest-only control group approach. The study was conducted at Aminah Amin Rianta 1 Clinic, Samarinda, East Kalimantan, Indonesia, from April to May 2024. The target population consisted of all third-trimester pregnant women who attended Aminah Amin Rianta 1 Clinic during the period of January to December 2023. Participants were recruited using an accidental sampling technique. A total of 36 pregnant women were enrolled, with 18 participants assigned to the intervention group and 18 to the control group. No a priori sample size calculation was performed, which constitutes a methodological limitation because the achieved sample size may have been insufficient to detect smaller effect sizes with adequate statistical power. Future studies are recommended to determine sample size based on an expected effect size, desired statistical power, and significance level. In addition, the use of accidental sampling may limit the representativeness of the sample and reduce the generalizability of the findings.

The inclusion criteria were: (1) singleton pregnancy with a gestational age of at least 36 weeks; (2) intention to deliver at Aminah Amin Rianta 1 Clinic; (3) absence of contraindications to massage or breast care; and (4) willingness to provide written informed consent. The exclusion criteria included: (1) multiple pregnancy; (2) known breast abnormalities, such as inverted nipples requiring surgical correction or breast abscess; (3) history of breast surgery; (4) severe psychiatric disorders; and (5) current use of antihypertensive or galactagogue medications.

Participants in the intervention group received a combination of rolling back massage and breast care, whereas those in the control group received breast care alone. The interventions were initiated at 36 weeks of gestation or later and were administered twice during the third trimester before delivery, with an interval of approximately two weeks between sessions. All procedures were performed by trained midwives according to standardized operating procedures.

The rolling back massage consisted of circular massage movements along the vertebral column from the cervical region to the fifth and sixth costal levels corresponding to the scapular area. The massage was performed bilaterally for approximately 10 minutes during each session. Breast care included breast massage from the base of the breast toward the nipple using baby oil, application of warm and cold compresses, and nipple preparation exercises. The total duration of breast care was approximately 20 minutes per session. Participants and their accompanying family members were also instructed on the procedures to facilitate home-based practice.

The primary outcome was postpartum breast milk production assessed during the first three days after delivery. Breast milk production was categorized as either present or absent. Milk production was considered present when milk could be expressed from either breast, either through spontaneous leakage or manual expression. Outcome assessment was performed by the attending midwife using a standardized observation checklist. To minimize assessment bias, the outcome assessor was not informed of participants' group allocation.

Data collection instruments included a participant demographic questionnaire, standardized operating procedures for rolling back massage and breast care, a structured observation checklist for breast milk production, and a measuring container when quantification was necessary. Additional information, including parity, gestational age, and mode of delivery, was obtained from medical records.

Descriptive statistics were used to summarize participant characteristics and outcome distributions. Because the outcome variable was dichotomous and the

sample size was relatively small, Fisher's Exact Test was employed to examine the association between intervention group and breast milk production. Statistical significance was established at a p-value of less than 0.05. Data analysis was performed using SPSS version 26.

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of Poltekkes Kemenkes Kalimantan Timur (Approval No. DP.04.03/F.XXXIV.27/492/2025). Written informed consent was obtained from all participants prior to enrollment. Participant confidentiality and anonymity were maintained throughout the study.

3. RESULTS AND DISCUSSION

Table 1. Baseline Characteristics of Third-Trimester Pregnant Women (≥ 36 Weeks) at Klinik Aminah Amin Rianta 1, 2024.

Characteristics	Control Group (n=18)		Treatment Group (n=18)	
	n	%	n	%
Age				
20–35 Years	17	94.4	17	94.4
>35 Years	1	5.6	1	5.6
Education				
Basic (SD, SMP)	4	22.2	6	33.3
Secondary (SMA)	10	55.6	10	55.6
Higher Education	4	22.2	2	11.1
Occupation				
Housewife (IRT)	15	83.3	15	83.3
Private Sector	1	5.6	1	5.6
Self-Employed	1	5.6	1	5.6
Civil Servant (PNS)	1	5.6	0	0.0
Honorary Staff	0	0.0	1	5.6
Parity				
Primigravida	3	16.7	3	16.7
Multigravida	14	77.8	14	77.8
Grandemultigravida	1	5.6	1	5.6
Gestational Age				
36–36+6 Weeks	3	16.7	4	22.2
37–37+6 Weeks	5	27.8	6	33.3
38–38+6 Weeks	5	27.8	4	22.2
39–39+6 Weeks	5	27.8	3	16.7
40 Weeks	0	0.0	1	5.6
Total	18	100	18	100

As presented in Table 1, the two groups were broadly comparable in terms of baseline characteristics. In both groups, the majority of participants were aged 20–35 years (94.4%), had secondary education (55.6%), were housewives (83.3%), and were multigravida (77.8%). These balanced characteristics support the comparability of the groups, although without randomization this balance cannot be guaranteed to extend to unmeasured variables.

The predominance of multigravida participants (77.8%) in both groups is noteworthy, as multiparous mothers tend to achieve milk output more quickly due to prior breast tissue sensitization and breastfeeding experience (Kamilah et al., 2021). This characteristic may have contributed to the relatively favorable milk output rate observed even in the control group and should be considered a potential source of confounding.

Table 2. Breast Milk Output in the Control Group Before and After Breast Care, Klinik Aminah Amin Rianta 1, 2024.

Breast Milk Output	Before Intervention		After Intervention	
	n	%	n	%
Breast Milk Present	0	0.0	11	61.1
Breast Milk Absent	18	100.0	7	38.9
Total	18	100.0	18	100.0

Note: Pre–post data are presented for descriptive purposes only. The study employs a posttest-only control group design; the formal between-group comparison is conducted at posttest only (see Table 4). Pre-intervention data confirm baseline equivalence (0% in both groups) but are not used as the basis for inferential testing.

Table 2 shows that before the intervention, none of the control group participants had measurable breast milk output (n = 18, 100%), consistent with the physiological expectation that Lactogenesis II had not yet been initiated antenatally. Following breast care alone, 11 participants (61.1%) had breast milk present on the first to third postpartum day, indicating that breast care independently has a meaningful positive effect on milk output initiation by mechanically stimulating prolactin and oxytocin pathways (Harefa et al., 2019).

It is important to note that among the 11 control group participants with milk output, post-hoc interviews revealed that all had regularly consumed galactagogue-containing foods (moringa and katuk leaves) since the second trimester. These foods contain sterols and polyphenols known to stimulate prolactin secretion (Nasution, 2021; Miskiyah et al., 2024). Nutritional intake therefore constitutes an important confounding variable in this study. The relatively high milk output rate in the control group (61.1%) likely reflects a combined effect of breast care and dietary lactagogues, not breast care alone. Future studies should systematically assess and statistically control for galactagogue consumption.

Table 3. Breast Milk Output in the Treatment Group Before and After Rolling Back Massage and Breast Care, Klinik Aminah Amin Rianta 1, 2024.

Breast Milk Output	Before Intervention		After Intervention	
	n	%	n	%
Breast Milk Present	0	0.0	17	94.4
Breast Milk Absent	18	100.0	1	5.6
Total	18	100.0	18	100.0

Note: Pre–post data are presented for descriptive purposes only. The study employs a posttest-only control group design; the formal between-group comparison is conducted at posttest only (see Table 4). Pre-intervention data confirm baseline equivalence (0% in both groups) but are not used as the basis for inferential testing.

Table 3 demonstrates that following the combined intervention, 17 participants (94.4%) demonstrated breast milk output, with only one participant (5.6%) showing no output. The single participant without milk output reported significant psychological distress, inadequate sleep quality, and frequent nocturnal waking, all recognized inhibitors of oxytocin release and the let-down reflex (Jannah et al., 2022). This case underscores the multivariate nature of early lactation and suggests that even effective non-pharmacological interventions may be insufficient in isolation for individuals with significant psychosocial barriers.

Table 4. Between-Group Comparison of Postpartum Breast Milk Output, Klinik Aminah Amin Rianta 1, 2024.

Intervention Group	Breast Milk Output		Total	p-value
	Absent	Present		
Breast Care Only (Control)	7 (38.9%)	11 (61.1%)	18	0.041*
Rolling Massage + Breast Care (Treatment)	1 (5.6%)	17 (94.4%)	18	

Source: Primary Data, 2024 | *Fisher's Exact Test, significant at $p < 0.05$

Table 4 demonstrates a clinically and statistically meaningful difference between groups. In the control group (breast care only), 61.1% of participants had breast milk present postpartum, compared with 94.4% in the treatment group (rolling massage + breast care). Fisher's Exact Test yielded $p = 0.041$ ($< \alpha = 0.05$), confirming a statistically significant association between the combined intervention and breast milk output.

The observed between-group difference (94.4% vs. 61.1%, $\Delta = 33.3$ percentage points) suggests that rolling back massage contributes meaningfully beyond breast care alone. Mechanistically, rolling back massage activates parasympathetic nerve pathways along the spine, stimulating the hypothalamic–pituitary axis to release oxytocin, which triggers the milk ejection (let-down) reflex (Mayangsari, 2019). Simultaneously, massage increases serotonin and endorphin levels, reducing maternal stress and anxiety, both known suppressors of oxytocin release (Nasution et al., 2021). Breast care directly stimulates prolactin secretion via afferent nipple innervation (Harefa et al., 2019). The combination of these complementary mechanisms likely explains the superior outcomes observed in the treatment group.

These findings align with prior literature. Dayen et al. (2023) reported in multivariate logistic regression that rolling massage and breast care was the most dominant predictor of postpartum milk output (OR = 51.6), outperforming psychological and dietary factors. Rehulina et al. (2020) similarly demonstrated the combination's efficacy in facilitating the milk ejection reflex and preventing breast engorgement. The present study extends this evidence base by demonstrating benefit when the combined intervention is initiated during the third trimester rather than postpartum, suggesting that antenatal preparation may optimize physiological readiness for Lactogenesis II.

Several important limitations of this study must be acknowledged. First, the small sample size ($n = 18$ per group) and absence of an a priori sample size calculation limit statistical power and increase the risk of Type II error. The study may have been underpowered to detect smaller but clinically meaningful effect sizes. Second, accidental sampling introduces selection bias: participants self-selected into the study and may systematically differ from those who did not participate (e.g., higher motivation, better health literacy, greater access to antenatal care), which further reduces the external validity and generalizability of findings. Third, the absence of randomization means that unmeasured confounders, beyond the baseline characteristics presented, may have differed between groups and influenced results. Fourth, important confounding variables including galactagogue dietary intake (moringa and katuk leaves), psychological status, sleep quality, and delivery mode were not systematically controlled. Fifth, the pre–post structure of Tables 2 and 3 may appear inconsistent with the posttest-only design; these data are presented for descriptive and transparency purposes only, and all inferential comparisons are conducted at posttest between groups (Table 4). Sixth, the dichotomous outcome measure (present/absent) does not capture milk volume adequacy or duration of exclusive breastfeeding. Future research should address these limitations through randomized controlled designs, formal sample size calculations, larger samples, standardized control for confounders, and continuous outcome measures (e.g., 24-hour milk volume).

4. CONCLUSION

The combination of rolling back massage and breast care during the third trimester of pregnancy was associated with a greater increase in postpartum breast milk production compared with breast care alone. These findings suggest that integrating both interventions into routine antenatal care at the clinical level may help improve early lactation outcomes.

Nevertheless, the interpretation of these results should be approached with caution because of several methodological limitations, including the relatively small sample size, the absence of a prior sample size calculation, the non-randomized study design, the use of accidental sampling, and the lack of control for potential confounding factors such as dietary intake, psychological condition, and parity. Therefore, larger randomized controlled trials with adequate control of confounding variables are needed before these interventions can be recommended for widespread implementation. Future studies should also investigate the optimal timing, frequency, and duration of the combined intervention, as well as its effects on breast milk volume and the sustainability of exclusive breastfeeding.

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