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The Effectiveness of a Combined Loving Lactation Massage and Conventional Technique in Accelerating the Onset of Lactogenesis II among Postpartum Mothers: A Quasi-Experimental Study

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ABSTRACT

Background & aim: Postpartum mothers frequently experience a delayed onset of lactogenesis II, which usually stems from hormonal, psychological, or physical factors. Delays in lactogenesis II can negatively affect the success of exclusive breastfeeding. This study aimed to evaluate the effectiveness of a combined intervention involving Loving Lactation Massage (LLM) and conventional breast massage techniques in accelerating the onset of lactogenesis II.

Methods: A quasi-experimental study with a post-test-only non-equivalent groups design was conducted from October to December 2022 at an independent midwifery practice in Pontianak, Indonesia. Sixty postpartum mothers were divided into two groups of 30: the treatment group received a combination of LLM and conventional breast massage techniques, while the control group received only the conventional techniques. The onset of lactogenesis was recorded within 72 hours postpartum using a validated observation sheet and quantified in hours. Data were analyzed using the Mann-Whitney test due to non-normal distribution.

Results: The treatment group experienced a significantly earlier onset of lactogenesis II (26.27 ± 6.76 hours) compared to the control group (43.26 ± 7.43 hours) (P value < 0.001). Maternal comfort was also rated higher in the treatment group.

Conclusion: The combined intervention of LLM and conventional breast massage methods significantly accelerates the onset of lactogenesis II compared to using conventional methods alone. This approach is recommended for postpartum lactation support, particularly in cases of delayed lactogenesis.

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Introduction

The postpartum period is a critical window in which mothers face substantial physiological and psychological changes, especially regarding the initiation of breastfeeding. One of the key challenges is the delayed onset of lactogenesis II, defined as the stage of copious milk secretion that typically begins between 48 and 72 hours after birth. This hormonally driven phase marks the transition from colostrum to mature milk production. Its timely onset is essential for supporting exclusive breastfeeding, as recommended by the World Health Organization for the first six months of an infant's life (1-2). According to research conducted by Peng, Zhuang, and Huang (2024), the most common problem faced by postpartum mothers is a

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delayed onset of lactogenesis II, leading to a decreased milk volume in the early days after birth. This delay often results from a combination of physiological, psychological and environmental factors, including maternal stress levels, hormonal patterns and previous breastfeeding experience. If not effectively addressed, it can affect the frequency and success of exclusive breastfeeding in infants (3).

Delayed lactogenesis II is influenced by multiple factors, including maternal stress, hormonal dysregulation (particularly oxytocin and prolactin), type of delivery, and parity (4-5). Elevated stress levels, for instance, have been shown to inhibit the secretion of oxytocin, which is important for milk ejection, thus impairing milk production. This physiological delay can undermine maternal confidence and significantly reduce the chances of exclusive breastfeeding. Hence, the need for effective, non-pharmacological interventions that support the hormonal and emotional readiness of postpartum mothers is urgent and clinically relevant (5).

Non-pharmacological interventions have gained attention as complementary approaches to support the lactation process, particularly during the sensitive period of lactogenesis II. One of the most promising techniques is Loving Lactation Massage (LLM). This gentle massage method is applied to the chest and upper back of postpartum mothers to enhance relaxation and stimulate the release of oxytocin, a key hormone involved in the milk ejection reflex. LLM is designed not only to reduce muscle tension and promote emotional comfort but also to improve blood flow around the breast tissue, which contributes to milk flow initiation (6-7). In contrast, conventional lactation techniques focus on physical stimulation around the areola and nipple, applying pressure to clear blocked ducts and promote milk drainage (8-9).

Non-pharmacological approaches are increasingly used as supportive interventions to accelerate the lactation process, especially during the sensitive period of phase II lactogenesis. One promising technique is LLM, a gentle massage performed on the chest and upper back of the postpartum mother to enhance relaxation and stimulate the release of oxytocin, a hormone crucial for the milk ejection reflex. This technique aims not only to reduce muscle tension and provide emotional comfort but also to improve blood flow around the breast tissue, thereby facilitating milk ejection (8,9). In contrast, conventional methods focus on physical stimulation around the areola and nipple by applying gentle pressure to prevent milk duct blockages and facilitate milk flow (10).

Although both techniques have been proven effective individually, research on combining the two remains very limited. Most previous studies have only evaluated LLM or conventional methods separately, without exploring the potential added benefits of combining them. A clinical trial by Munsittikul et al. (2022) showed that integrated breast massage is more effective in addressing lactation issues, such as blocked milk ducts, compared to traditional massage (11). However, to date, few studies have specifically examined the effectiveness of combining LLM methods and conventional techniques in accelerating lactogenesis II, particularly in primary midwifery services, such as Independent Midwifery Practice (PMB) in Indonesia. This gap highlights the need for further exploration of holistic intervention strategies that can strengthen the physiological and psychological readiness of breastfeeding mothers from the early stages.

By integrating the hormonal benefits of LLM massage and the mechanical advantages of the conventional techniques, this approach is expected to serve as a more comprehensive and practical non-pharmacological strategy in supporting successful breastfeeding initiation, particularly among mothers experiencing delayed breast milk production. Therefore, this study aimed to evaluate the effectiveness of combining the Loving Lactation Massage method with conventional breast massage techniques in accelerating the onset of lactogenesis II in postpartum mothers.

Materials and Methods

This study used a quasi-experimental study with a post-test-only non-equivalent control group design to examine the effectiveness of combining the LLM method with conventional breast massage techniques in accelerating the onset of lactogenesis II in postpartum mothers. The posttest-only control group design was employed due to logistical constraints and ethical

considerations in the primary midwifery care setting, where frequent early postpartum assessments could interfere with maternal rest and bonding. Although this design lacks baseline data, it is considered appropriate for field-based intervention studies where participant allocation is controlled and outcomes are clearly defined (12). So, random assignment was not applied; participants were allocated into groups based on their order of arrival and eligibility.

The study was conducted from October to December 2022 at an Independent Midwifery Practice (PMB) in Pontianak City. A total of 60 postpartum mothers who met the inclusion criteria were involved in this study and were divided into two groups based on their order of arrival and compliance with the inclusion and exclusion criteria. The first group received an intervention consisting of a LLM techniques combined with conventional breast massage methods, while the second group only received conventional methods commonly used in standard midwifery practice.

The population in this study consisted of all postpartum mothers who gave birth at a private midwifery practice in Pontianak City, Indonesia from October to December 2022. The sampling technique was convenient, taking into account inclusion and exclusion criteria. Inclusion criteria included postpartum mothers who were willing to participate throughout the entire intervention series, with no breast anatomical abnormalities, and taking no medications that might affect breast milk production. Mothers with a history of allergy to massage oil or those experiencing severe postpartum complications requiring special care were excluded.

The sample size was determined using G*Power software version 3.1.9.7 for an independent samples t-test, with a test power of 0.80, a significance level of 0.05, and an effect size of 0.8 (large effect), based on previous studies on lactation massage (13-14). The calculation results indicated that the minimum sample size required was 26 individuals per group. To anticipate the potential subject loss during the intervention, the researchers set 30 participants in each of the treatment and control groups, resulting in a total sample size of 60 individuals.

In this study, the treatment group received an intervention combining LLM techniques with conventional methods. LLM is a gentle massage technique targeting the chest and upper back to promote relaxation and stimulate the release of oxytocin, thereby accelerating breast milk production. Meanwhile, the conventional breast massage involves applying light pressure around the areola and nipple to help clear blocked milk ducts and improve milk flow. This combination of techniques was performed by trained healthcare professionals following the protocol established by the researchers. It was carried out twice daily, with each session lasting 15 to 20 minutes, for three consecutive days, starting within the first 24 hours postpartum. The control group only received a conventional massage following the standard PMB procedures. The researchers supervised the entire intervention process to ensure consistency and procedural compliance.

The primary outcome of this study was the onset of lactogenesis II, defined as the number of hours from delivery until mothers start producing copious milk secretion. Trained healthcare workers directly observed the process within the first 72 hours postpartum. The onset of lactogenesis II was confirmed using standardized observation criteria, including breast fullness, engorgement, and visible milk expression. The observations were recorded on a structured sheet that had been validated in the preliminary phase of the study.

Demographic characteristics of participants, such as age, parity, educational level, and employment status, were collected through participant enrollment forms completed during recruitment. All measurement instruments were applied consistently across both intervention and control groups, with close supervision from researchers to ensure standardization of data collection.

The data obtained in this study were analysed using IBM SPSS Statistics version 25.0. Descriptive statistics were used to present the characteristics of respondents, while inferential statistical tests were used to compare changes in the onset of lactogenesis II between two groups. An independent t-test was used to compare outcomes between the treatment and control groups. The significance level was set at $p < 0.05$.

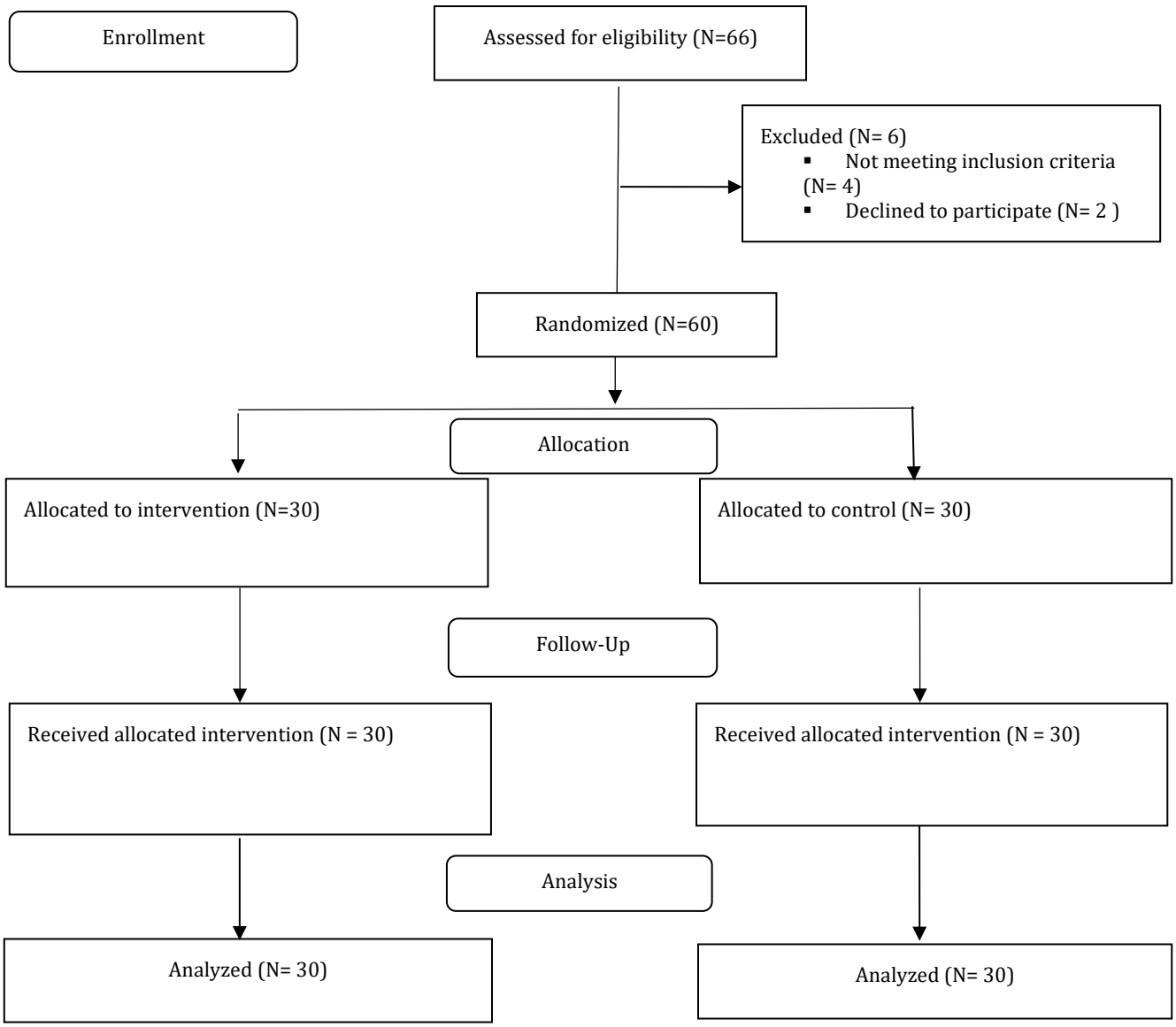

Figure 1. CONSORT Flowchart of the study

Although the main variable observed was the time of Lactogenesis II onset, survival analyses such as the log-rank test were not used in this study. Instead, analyses were performed using the Mann-Whitney test due to the non-normal data distribution and limited sample size.

Results

Sixty postpartum mothers successfully participated fully in this study, with an even distribution between the intervention (N=30) and the control group (N=30) (Figure 1). The demographic characteristics of the respondents included age, parity, educational level, and employment status. The analysis indicates that the majority of respondents in both groups were less than 20 years or greater than 35 years, accounting for 90.0% in the intervention and 93.3% in the control group. This age range is categorized as high-risk reproductive age. In

terms of parity, most respondents were multiparous, with 63.3% in the intervention group and 70.0% in the control group, indicating that most mothers had previous childbirth experience. Regarding education, the majority of respondents had a secondary educational level, with 70.0% in the intervention group and 63.3% in the control group, while a small proportion had primary or higher education. Employment status showed that the majority of respondents in both groups were unemployed, with 83.3% in the intervention group and 76.7% in the control group (Table 1). All these demographic data indicate that basic equivalence between the two groups before the intervention was administered (Table 1).

Table 1. Frequency distribution of demographic characteristics of study participants

Characteristics	Intervention Group (n=30)	Control Group (n=30)
Age		
<20 or >35 years	27 (90.0%)	28 (93.3%)
20–35 years	3 (10.0%)	2 (6.7%)
Parity		
Primipara	10 (33.3%)	9 (30.0%)
Multipara	19 (63.3%)	21 (70.0%)
Grandemultipara (P>5)	1 (3.3%)	0 (0%)
Education		
Primary	2 (6.7%)	3 (10.0%)
Intermediate	21 (70.0%)	19 (63.3%)
High	7 (23.3%)	8 (26.7%)
Occupation		
Unemployed	25 (83.3%)	23 (76.7%)
Employed	5 (16.7%)	7 (23.3%)

Table 2 compares the onset of lactogenesis II between the group that received the combination of LLM and conventional methods and the group that only received conventional methods. The results revealed that the group that received both LLM and the conventional method had a faster onset of lactogenesis II, with an average of 26.27 hours (±6.76), compared to the group that only received the conventional method, with an average of 43.26 hours (±43.26). A p-value of <0.001 indicates a statistically significant difference between the two groups. This suggests that the combination of LLM and conventional methods significantly accelerates the onset of lactogenesis II in postpartum mothers (Table 2).

Table 2. Comparison of onset of lactogenesis II mean among two groups of combined LLLM alongside the conventional massage and the conventional massage alone

Type of treatment	N	Onset of Lactogenesis II		P-Value
		Mean (± SD)	Median (Min-Max)	
Combination of LLM and Conventional Massage	30	26.27 (±6.76)	27.17 (13.83-40.92)	< 0.001
Conventional Massage	30	43.26 (±43.26)	38.17 (24.33-78.43)	

Discussion

The results of this study showed that the combination of LLM and conventional breast massage can significantly accelerate the onset of lactogenesis II in postpartum mothers. On average, mothers who received a combination of both loving and conventional massage methods experienced earlier milk production compared to those who only received the conventional method. This is consistent with results reported by Lestari et al. (2022), which demonstrated that massage using the LLM method can increase relaxation and stimulate the release of oxytocin, a vital hormone for the lactogenesis process (15). This hormone, released during massage, plays a role in the contraction of myoepithelial cells around the alveoli of the mammary glands, which causes breast milk to be pushed out more effectively (16-17).

In addition, physical stimulation performed using conventional techniques on the areola and nipple areas also helps open blocked milk ducts and strengthen the milk ejection reflex. These results are consistent with findings by Munsittikul et al. (2022), who reported that applying integrated breast massage (combining traditional techniques and relaxation) is more effective than using traditional massage alone in addressing lactation issues such as blocked ducts (11). This combined method demonstrates higher effectiveness compared to using a single massage method, which is consistent with the findings of Ginting et al., who observed that synergistic effects can occur when physical and

psychological approaches are combined to support breast milk production (18).

This study shows that the combination of these two different approaches is more effective than a single technique in accelerating lactogenesis II. Previous studies have explored LLM and conventional methods separately. For example, the study by Utami and Rohuna (2021) found that conventional methods that focus on physical pressure can help resolve milk duct obstruction. However, this method is considered less effective at promoting a relaxing effect, which is important in the release of oxytocin (6). By combining LLM based on relaxation with conventional methods, this study seeks to overcome the limitations of each method, creating a holistic approach that is not only physically effective but also supports the mental health of postpartum women (19). This study also provides further evidence that non-pharmacological interventions based on a holistic approach like this can be highly effective in accelerating the onset of lactogenesis II and supporting exclusive breastfeeding.

Although this study provides strong evidence of the effectiveness of combining LLM with conventional methods in accelerating lactogenesis II, there are several limitations that need to be considered. First, this study was conducted at a single location, specifically at the PMB in Pontianak City, so the results may not be generalizable to a broader population with different socio-cultural conditions or healthcare systems. Another limitation was the use of a post-test-only nonequivalent groups design, which lacks randomization and pre-test baseline measurement. This may increase the risk of selection bias that could affect the internal validity of the results and reduce the ability to establish strong causal inferences compared to a randomized controlled trial. Also, the measurement tool for maternal comfort and perception relied on a subjective questionnaire that could be influenced by perceptual biases and participants' knowledge, despite initial validation. Additionally, quantitative data for these variables were not included in the final analysis due to instrument inconsistency and limited validation of scale.. Finally, the statistical analysis did not utilize a survival analysis approach, such as the log-rank test, which is actually more ideal for analyzing time-based variables like lactation onset.

Despite these limitations, this study has several strengths, including the use of a combination of interventions that simultaneously integrate the physical and

psychological aspects of postpartum mothers, as well as the application of a design that is relevant and realistic to midwifery practice in the community. The findings of this study have important clinical implications, particularly for midwives and lactation counsellors, in adopting a structured, non-pharmacological, massage-based approach to effectively support early breastfeeding initiation. The combined massage techniques can be recommended as part of standard practice in postpartum maternal health care. This study also highlights the importance of a holistic approach in supporting postpartum maternal health, which can serve as a reference for healthcare professionals in designing more comprehensive interventions (20). This study emphasizes lactogenesis onset as the primary endpoint to maintain clarity and analytical focus.

For future research, it is recommended to conduct a randomized controlled trial with a wider geographical coverage and a more diverse population, as well as the application of advanced analyses such as survival analysis. In addition, a multimodal approach combining LLM with other interventions, such as aromatherapy or relaxation music, could be explored to assess synergistic effects on long-term breastfeeding success.

Conclusion

This study demonstrated that combining LLM with conventional breast massage significantly accelerates the onset of lactogenesis II in postpartum mothers compared to using conventional massage alone. The earlier onset of lactation observed in the treatment group highlights the effectiveness of integrating physical stimulation with massage techniques in supporting successful breastfeeding initiation. These findings have practical implications for maternal and child health services; its incorporation into postpartum care programs can enhance early breastfeeding outcomes, especially among mothers experiencing delayed lactation.

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical approval

This study was conducted in accordance with the principles of research ethics as outlined in the Declaration of Helsinki. All participants were given a full explanation of the objectives, procedures, potential risks, and benefits of this study. Written informed consent was obtained from each participant prior to data collection. Participants were given the full right to withdraw from the study at any time without facing any consequences. The confidentiality and anonymity of data were strictly maintained, and all personal information was stored securely and used solely for research purposes. All research procedures, including data collection and participant protection, followed the applicable national and institutional ethical guidelines for research involving human subjects.

Code of Ethics

This study was approved by the Health Research Ethics Committee of Politeknik Kesehatan Kemenkes Pontianak, with registration number of 31/KEPK-PK.PKP/II/2022.

Use of Artificial Intelligence (AI)

Artificial Intelligence including ChatGPT from OpenAI, was used by the authors to assist in editing sentence structure and rewriting certain parts of the manuscript, without changing the substance of the data or the results of the analysis. All data analysis and interpretation were carried out, independently, by the research team.

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Authors' contribution

DFD designed the study, developed the intervention protocol, led the fieldwork, finalized the manuscript and managed the correspondence. DR was responsible for coordinating data collection and monitoring intervention compliance. JFP performed statistical analysis and interpreted the results. JJP managed the preparation of the initial manuscript and reference processing. SW provided scientific supervision and reviewed the entire manuscript. All authors read and approved the final version of the manuscript for publication.

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