ORIGINAL ARTICLE

Combination of areola and rolling massage techniques on breast milk production in post-partum mothers, City of Lampung, Indonesia

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ABSTRACT

Postpartum mothers with low breast milk production tend not to provide sufficient breast milk to their babies, which causes various health problems. This study aimed to analyze the effects of areola massage and rolling massage techniques on breast milk production in postpartum mothers. The research was quantitative and used a quasi-experimental design with a post-test-only design. The study was conducted at the Panjang Health Center for the control group and Sumbersari Bantul Metro Health Center for the Intervention group. The study utilized purposive sampling was used to divide the 60 postpartum mothers into two groups, and data were collected through a questionnaire. A t-test was used for statistical analysis. The average time for the initiation of milk flow after delivery in the intervention group was 288.07 minutes, while the control group had an average discharge time of 1043.47 minutes, with the fastest and longest times being 180 and 2090 minutes respectively. There was a significant difference in breast milk production between the intervention and control (0.000). There were also differences in milk ejection time between the intervention and control groups, based on the length of time spent (≤ 12 and > 12 h) with a p-value of 0.000. In conclusion, the intervention significantly affected breast milk production and ejection time post-delivery, considering the significance of adequate care and support for breastfeeding mothers to enhance infant breastfeeding quality. The recommendation was to provide additional support and resources to breastfeeding mothers to improve milk production and ejection time. This could have included access to lactation consultants and breastfeeding education.

Key words:
areola massage, rolling massage, breast milk, ejection time, production

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INTRODUCTION

Breast milk plays an important role in saving the lives of both Indonesian babies and children. Based on the assumption that the population is 219 million, exclusive breastfeeding can reduce the infant mortality rate by up to 13% from a total birth rate of 22/1000 live births, so the number of babies that will be saved is 30 thousand babies.[1] Although the benefits of exclusive breastfeeding to help the growth and development of children are widely known, mothers' awareness of exclusive breastfeeding in Indonesia is only 14 percent, and breast milk is only given until the baby is four months old.[2] Babies who were fed formula milk were more likely to die in the first month of birth, and this chance was 25 times higher than babies who were exclusively breastfed by their mothers.[3]

Breast milk is necessary for the growth and development of children's intelligence, and full-term babies who are exclusively given breast milk will have a higher IQ of up to 12.9 points compared to full-term babies who are not given breast milk.[4] Babies who are breastfed tend to be more alert, confident, and stable than those who are not breastfed. Breast milk contains essential nutrients and antibodies that help to protect babies from infections and diseases.[5,6] It also promotes bonding between the mother and child, leading to better emotional development. Breastfeeding also helps to reduce the risk of certain health conditions later in life, such as obesity, diabetes, and asthma. It is recommended by healthcare professionals as the best source of nutrition for infants up to six months of age.[7]

With breast milk, babies are eight times less likely to suffer from issues related to blood, spleen, nerves, and diarrhea.[8,9] The ability of the baby's intestines to absorb food was adjusted by the creator according to the composition of the mother's breast milk. Children who do not receive breast milk are more likely to develop chronic diseases such as cancer, heart disease, hypertension, and diabetes as adults, and the possibility of children suffering from malnutrition and obesity is also higher.[10,11]

The behavior of breastfeeding mothers is influenced by their education level, parity status, and the close relationship between the mother and her baby. Mothers with higher educational levels are more likely to breastfeed exclusively, whereas mothers with more children are less likely to do so.[12] A strong bond between mother and baby was found to positively impact breastfeeding practices. Rolling massage is one way to stimulate oxytocin through sensory nerves by massaging the vertebrae.[13] Many mothers practice nipple and areola care, but few mothers perform areola massage. Areola massage can stimulate oxytocin function to facilitate the flow of breast milk.[14]

One of the techniques for enhancing breast milk production in postpartum mothers is rolling massage. This technique has many advantages for infants. One helpful breast care treatment is rolling and areolar massage, which stimulates the pituitary gland to release prolactin and oxytocin. A holistic method called "areola and rolling massage" can improve the quality of nursing by encouraging the release of oxytocin and milk production.[15] For the best outcomes, a mother can easily add this easy-to-use and reasonably priced approach to her breastfeeding practice.

According to research conducted by Rahayu and Umaroh (2022) in Indonesia, rolling massage and ST-18 acupressure have an effect on breast milk production.[16] Other studies have also found that another massage technique, Acupoint-Tuina therapy, which originates from ancient Chinese techniques, increases breast milk

production and encourages other physiological changes that improve nursing in the early postpartum period.[17] Another study published in a Malaysian journal showed that the combination of lactation massage and breast care affects breastfeeding adequacy.[18]

In 2021, babies in Lampung Province received exclusive breastfeeding, reaching 74.93 percent, increasing to 76.76 percent by 2022, and decreasing slightly to 76.20 percent by 2023. The decline in 2023 by 0.56 percent should be a concern.[19] This trend indicates the need for further efforts to improve the practice of exclusive breastfeeding in Lampung Province, so that this figure can continue to increase and achieve a more optimal target.

This study aimed to analyze the effectiveness of a combination of areola massage and rolling massage on breast milk production in postpartum mothers. It is hoped that this research will provide useful information for midwives and health workers to provide optimal care for postpartum mothers. In addition, it is hoped that the results of this study will become the basis for developing other treatment methods that are more effective in increasing breast milk production in postpartum mothers.

METHOD

This type of research was quantitative and used a quasi-experimental design with a post-test-only design. In this study, the researchers compared two groups, where one group was given areola massage and rolling massage to postpartum mothers (better known as the intervention group), and the other group was not given treatment because it was a control (intervention according to the program at the Health Center).

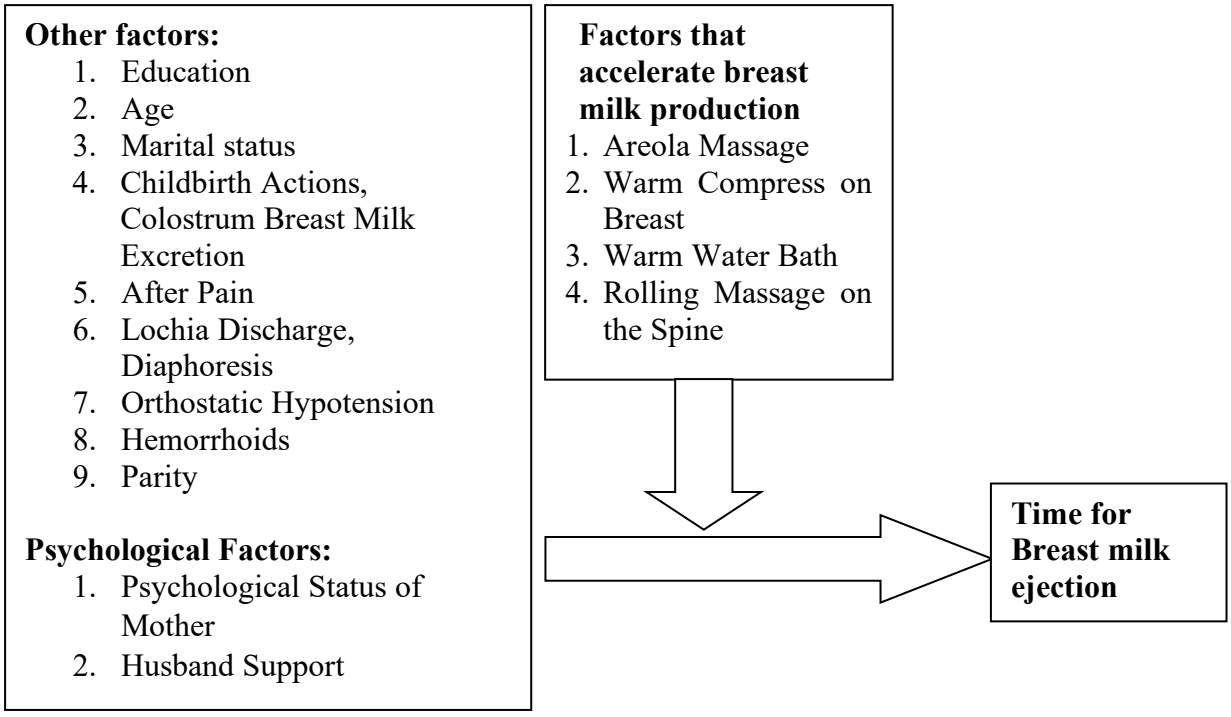


Figure 1. Research Framework

Assessment of the speed of breast milk production started from 2 (two) hours postpartum, precisely after areola massage and rolling massage in the intervention group. Rolling and areola massages were performed 2 (two) postpartum and repeated

every two hours until 12 postpartum. This assessment is based on the breasts starting to fill with breast milk 2 (two) hours post-partum, because before that time, the breasts were still soft when palpated.[20] Researchers carried out the intervention within 12 h postpartum, assessing the speed of breast milk production until the milk was produced, both in the intervention and control groups. This is done because breast milk comes out smoothly on average after 2 (two) –3 (three) days or 48-72 hours post-partum.[21]

The study was conducted at the Panjang Health Center for the control group and Sumbersari Bantul Metro Health Center for the Intervention group. These research locations were chosen because the health center supports breastfeeding and implements group care. Under the auspices of health services, both health centers have the same policies, the facilities available are almost the same, and the average number of mothers with normal deliveries is comparable. The study was conducted between December 2023 and May 2024.

The sampling technique used in this study was purposive sampling. The samples in this study were post-partum mothers who were treated in the postpartum ward of the Panjang Health Center as the intervention group and post-partum mothers who were treated in the postpartum ward of the Sumbersari Health Center Bantul Metro as the control group. Participants met the following inclusion criteria, namely post-partum mothers with spontaneous labor, mothers who were treated for 2 (two) days in the post-partum room, mothers who were willing to undergo areola massage and rolling massage two hours post-partum, mothers with term babies weighing 2500-4000 grams, who were physically healthy, born spontaneously and showed standard sucking reflex, mothers with babies rooming in with them, and those mothers with protruding nipples.

The sample was measured using the Slovin formula with a margin of error of 5%. The number of participants required for this study was 30 in the intervention group and 30 in the control group. Data collection for the control group was conducted in the postpartum room at the Panjang Health Center, whereas that for the intervention group was conducted in the postpartum room at the Sumbersari Bantul Metro Health Center.

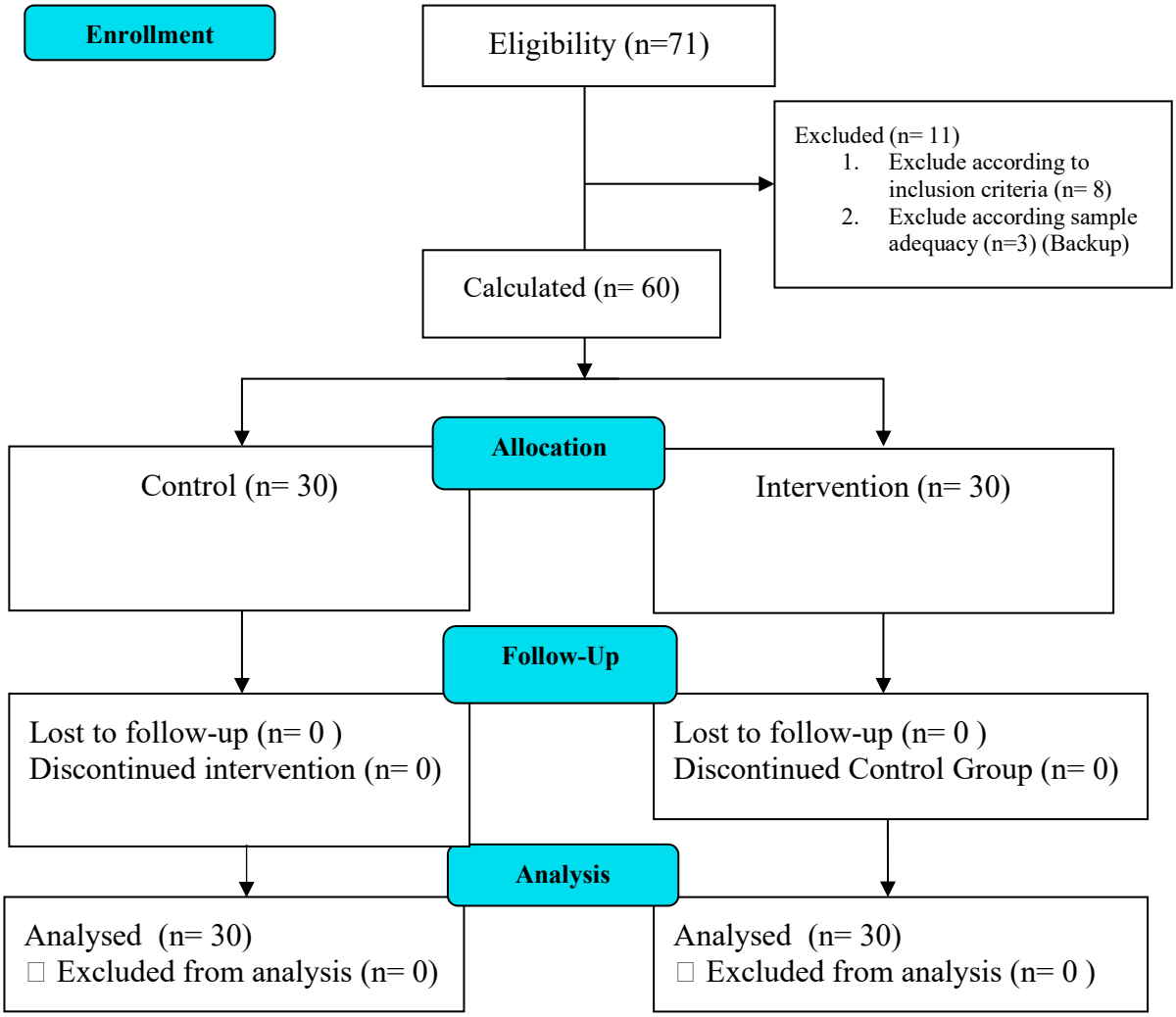


Figure 2. Sampling Frame [22]

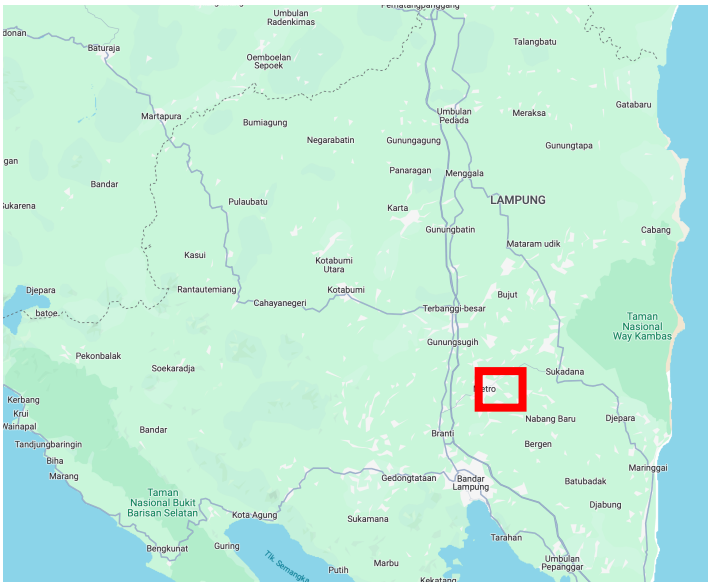
Data were collected using an instrument in the form of a questionnaire containing information on the respondents' characteristics, including the mother's age, parity, and objective data on the speed of breast milk production. The assessment was conducted by observing the time taken for the first milk to come out after the intervention, measured in minutes per hour. This instrument is valid for the intervention and control groups; in the intervention group, an intervention schedule was added every 2 (two) hours, whereas in the control group, no such schedule was provided.

Health workers who participated in data collection participated in this study. Even though researchers carry out the first intervention and subsequent re-intervention, when assessing the timing of breast milk expression on the first and second days based on instrument observation guidelines, other people are needed, namely, health workers who practice at the time. This approach was implemented to ensure the validity of the success of areolar massage and rolling massage techniques.

Data in numerical form, namely maternal age and parity, were presented in the form of a central tendency distribution: mean, median, mode, minimum, and maximum values. Categorical data were presented by calculating the frequency

distributions and percentages. To assess the effect of a combination of areola massage and rolling massage on the spine on breastfeeding in postpartum mothers, a chi-square test was carried out to determine differences in milk ejection time in the intervention and control groups, based on the length of time spent (≤ 12 hours and > 12 hours) using the independent T test. The analysis program we use is SPSS version 26.

A



B

Figure 3. Research area A (Indonesia as a whole), B (Specific Location)

RESULTS

Respondent Demographics

The demographic data of the respondents suggested that the majority of mothers in the study were in their late twenties to mid-thirties, had high school education, worked as housewives, and had multiple children. Additionally, there was no significant difference between the intervention and control groups, indicating that the groups were well-matched for comparison purposes.

Table 1. Respondent Characteristics

Characteristics	Frequency	%	P-Value homogeneity of intervention and control samples
Mother's age			
17–25 years	11	18.3	
26–35 years	34	56.7	0.784
36–45 years	15	25.0	
Education			
Elementary School	5	8.3	
Junior High School	12	20.0	0.526
Senior High School	34	56.7	
Bachelor Degree	9	15.0	
Job			
Housewife	23	38.3	
Farmer	12	20.0	
Fields	3	5.0	0.299
Honour	5	8.3	
Government Employees	7	11.7	
Private	10	16.7	
Parity			
Primipara	24	40.0	
Multiparous	26	43.0	0.078
Grandemultiparous	10	17.0	

Independent T-Test

According to Table 2, it is seen that in the intervention group, the average milk flow was 288.70 minutes after delivery with a standard deviation of 120.129 min, while the fastest time recorded was 130 min and the longest was 540 min. In the control group, the average milk discharge was 1043.47 minutes after the mother gave birth with a standard deviation of 574.018 min, while the fastest time for expressing milk was 180 min and the longest was 2090 min. It can be said that the intervention group had a significantly shorter time to milk flow than the control group. This suggests that the intervention may have a positive effect on milk production and lactation initiation.

Table 2. Length of time for expressing breast milk in minutes

Technique	Mean Median	Elementary School	Min-Max
Areola massage and rolling massage (Intervention group)	288.70 253, 50	120,129	130 – 540
Health Center Program (Control Group)	1043.47 1110.00	574,018	180- 2090

As shown in Table 3, in the intervention group, all postpartum mothers initiated breastfeeding in ≤12 h post-partum, with 30 (100%) out of 30 respondents. In the control group, 13 (13) respondents (43.3%)initiated breastfeeding in ≤12 h post-partum. It can be concluded that early initiation of breastfeeding was significantly higher in the intervention group compared to the control group. This finding suggests that the intervention had a positive impact

on promoting early breastfeeding practices among postpartum mothers.

Table 3. The duration of breastfeeding in the intervention group and control group (group ≤ 12 hours and >12 hours postpartum (group ≤ 12 hours and >12 hours postpartum

Group	Milk Production Time	Total	Percentage
Intervention	≤ 12 hours postpartum	30	100.0
	> 12 hours post-partum	0	100.0
Control	≤ 12 hours postpartum	13	43.3
	> 12 hours post-partum	17	56.7
Total		**60**	**100.0**

According to Table 4, the average time for expressing breast milk among mothers who received areola massage and rolling massage interventions was 288.70 minutes with a standard deviation of 120.129, while for mothers using the health center program (control group), the average time for expressing breast milk was 1043.47 minutes with a standard deviation of 574.018 min. The statistical test result was P = 0.000.

Table 4. Effect of the combination of areola massage and rolling massage on breastfeeding among postpartum mothers.

Technique	Mean	elementary school	S.E	P value	N
Areola massage and rolling massage	288.70	120,129	21,932	0,000	30
Health Center Program	1043.47	574,018	104,801		30

Independent T-Test

The results of the analysis in Table 5 show that there were differences in the breastfeeding speed between postpartum mothers in the intervention group who received areola massage and rolling massage and those in the control group who were not given these interventions(p = 0.000). In other words, there was a significant difference in the rate of breast milk expression between the intervention and rolling massage groups and between the rolling massage groups. This finding showed that the intervention group had a 4.302 times greater chance of expressing milk in less than or equal to 12 h postpartum (95% CI) =(2.192–8.476)) compared to the control group.

Table 5. Differences in milk ejection time in the intervention group and in the control group, based on the length of time spent (≤ 12 hours and > 12 hours)

Time to Express Breast Milk	Group				Total		P value	OR 95% CI
	intervention		Controls					
	N	%	n	%	N	%		
≤ 12 Hours post-partum	30	69.8	13	30.2	43	100	0,000	4,302
> 12 Hours post-partum	0	0.0	17	100	17	100		(2,192- 8,476)
Total	**30**	**100**	**22**	**100**	**44**	**100**		

Independent T-Test

DISCUSSION

As shown in Table 1, there were no significant differences in respondent characteristics between the intervention and control groups. This shows that the samples in the two groups were homogeneous based on the characteristics of the mothers who were respondents in this study. Thus, the research results can be interpreted more accurately because other factors that can influence the results were minimized.

Based on Table 2, it is known that in the intervention group, the average time to initiate breast milk flow was 288.70 minutes after giving birth with a standard deviation of 120.129 min, while the fastest time was 130 min and the longest time was 540 min. In the control group, the average time for expressing breast milk was 1043.47 minutes after the mother had given birth, with a standard deviation of 574.018 min, while the fastest time to express breast milk was 180 min and the longest was 2090 min. These findings indicate that the intervention group had a significantly shorter time to initiate breast-milk flow than the control group. Variations in the timing of breast milk production highlight the importance of individualized care for postpartum mothers.[23,24] Individualized care for postpartum mothers can help optimize breast milk expression times and improve overall breastfeeding outcomes.[25] This research was also supported by other studies stating that breastfeeding support groups, a group intervention led by midwives designed to support breastfeeding during the postpartum period, were proven to be effective in maintaining exclusive breastfeeding up to six months postpartum. Additionally, the intervention improved perceived breastfeeding self-efficacy, which is a modifiable factor; therefore, the effectiveness of this intervention was mediated by higher self-efficacy scores among women who attended the support groups.[26]

By providing tailored support and interventions, healthcare providers can help mothers achieve more efficient milk flow and a better breastfeeding experience.[27,28] Furthermore, personalized care can address underlying problems or concerns that may affect breast milk expression. This approach can increase the confidence and satisfaction of new mothers as they navigate their breastfeeding journey.[29]

Areola massage was performed by circular massage using both thumb fingers in the lactiferous sinus area, exactly 1-1.5 cm outside the mammary areola for 15 min, which stimulated nerve cells in the breast, sending signals to the hypothalamus, and in response the anterior pituitary gland secretes prolactin, into the bloodstream, which then acts on the myoepithelial cells of the breast to produce milk. The benefits of massaging include increased milk production, enhanced milk secretion, and prevention of breast inflammation and mastitis. Another study stated that using Woolwich massage is intended to trigger stimulation of myoepithelial cells around the mammary glands, then the stimulation reaches the hypothalamus and can trigger the anterior pituitary gland to produce prolactin.[30] Postpartum mothers are advised to provide breast milk to their babies because it has been proven to be a vital nutritional source. Lactose found in breast milk can increase the absorption of calcium and iron, and promote the growth of lactobacilli.[31]

Low milk production and ejection in the first few days after giving birth are obstacles to early breastfeeding.[32] Mothers who do not initiate breastfeeding their babies within the first few days after childbirth often experience anxiety and fear about their lack of breast milk production and their knowledge about the breastfeeding process.[33] The decrease in breast milk production in the first days after giving birth is related to the lack of stimulation of the hormones prolactin and oxytocin. Breast

milk production decreases if the baby's sucking stimulation decreases.[24] Decreased sucking by the baby also reduces the stimulation of prolactin and oxytocin, which play a role in the production and release of breast milk.[34]

As shown in Table 3, in the intervention group, all postpartum mothers had initiated breastfeeding in ≤12 h post-partum, with 30 (100%) out of 30 respondents. In the control group, only 13 (13) respondents (43.3%) initiated breastfeeding in ≤ 12 h postpartum. These findings suggest that the intervention group had a significantly higher rate of early breastfeeding initiation than the control group. Early breastfeeding initiation has been linked to numerous benefits for both mothers and infants, including improved bonding and increased milk production.[35,36] Furthermore, early initiation of breastfeeding reduces the risk of postpartum complications and improves the overall maternal and infant health outcomes.[37] These results highlight the importance of promoting and supporting early initiation of breastfeeding in postpartum care. It is crucial for health care providers to prioritize education and support for new mothers to ensure successful early breastfeeding initiation. By implementing evidence-based strategies, health care professionals can help improve maternal and infant health outcomes during the postpartum period.

Psychologically, mothers who are ready to breastfeed will have a psychological-emotional bond with their baby and will stimulate the release of endorphins, which are calming substances that flow into the mother's bloodstream, causing a vasodilation response that increases the smooth flow of the body's blood so that the body becomes relaxed and calm. This process also stimulates the release of the hormone oxytocin, which plays a role in the release of breast milk, and is called the let-down reflex [38]. Regarding psychological readiness, at the beginning of breastfeeding, a mother must have confidence in breastfeeding her baby and believe that breast milk is the best food for her baby [39].

According to Table 4, the average time for expressing breast milk among mothers with areola massage and rolling massage interventions was 288.70 minutes with a standard deviation of 120.129, while for mothers using the Health center program (control group), the average time for expressing breast milk was 1043.47 minutes with a standard deviation of 574.018 min. The statistical test result was P = 0.000. This indicated a significant difference in the average time for breast milk expression between the intervention and control groups. Areola massage and rolling massage interventions were more effective than the health center program in reducing the time required to express breast milk. Mothers who participated in the areola massage and rolling massage interventions spent significantly less time expressing breast milk than those in the health center program. This suggests that these specific interventions may be more efficient in helping mothers express milk more quickly. Other studies have shown that massage can hasten the onset of lactation by stating that lactation massage has an effect on the onset of lactation. There is a difference in the onset of lactation between the moving lactation massage method and the conventional method. Treatment using the moving lactation massage method is more effective in stimulating the onset of lactation than the conventional method [40].

As shown in Table 5, there were significant differences in breastfeeding speed between the areola massage and rolling massage intervention groups for postpartum mothers and the control group without these interventions (p = 0.000). The intervention group had a 4.302 times greater chance of expressing milk in less than or

equal to 12 hours postpartum compared to the control group. This finding suggests that implementing areola or rolling massage could potentially improve breastfeeding outcomes for postpartum mothers, in terms of the speed of milk expression.

The assessment of breast milk production can be based on several factors, including signs of adequacy of breast milk for infants [41]. Researchers believe that postpartum mothers who are given areola massage and rolling massage have a six times higher chance of expressing milk in ≤ 12 h postpartum compared to postpartum mothers who are not given these interventions. Postpartum mothers often experience fatigue after the delivery process, which affects oxytocin concentration. Massage on the back area, also known as rolling massage, is one way to stimulate the release of the hormone oxytocin to increase its levels. This type of massage provides comfort to breastfeeding mothers after giving birth and can help increase their milk production. Back-roll massage can affect prolactin levels, which function as a stimulant for milk production in mothers during breastfeeding. This action can also help the mother to relax and facilitate the flow of nerves and milk ducts in both breasts.

RECOMMENDATION

Healthcare providers should implement similar interventions in their practices to improve breastfeeding outcomes for both mothers and infants. Additionally, continued research in this area could help refine and optimize these interventions for maximum effectiveness. Overall, it is important for healthcare providers to recognize the potential benefits of these interventions and incorporate them into their care plans for breastfeeding mothers. By addressing both individual and systemic factors, healthcare providers can support breastfeeding success and improve infant health outcomes.

CONCLUSION

There was a significant difference between postpartum mothers who received areola massage and rolling massage interventions and mothers who did not receive the intervention in terms of the speed of breast milk production after giving birth ($p = 0.016$, $\alpha = 0.05$). Postpartum mothers who were given areola massage and rolling massage interventions had a 6 (six) times greater chance of breast milk production in less than or equal to 12 hours postpartum than mothers who were not given the intervention. The average breast milk production in mothers who were given the intervention was 734 min, and that in mothers who were not given the intervention was 1187 min. Meanwhile, the speed of breast milk production was less than or equal to 12 h postpartum in the intervention (68.2 %) and control (27.3 %) groups. Suggestions for future research include exploring the long-term effects of these interventions on breastfeeding success and infant health. Additionally, consideration of factors such as maternal stress levels and breastfeeding support systems may provide a more comprehensive understanding of the impact of these interventions.

ETHICAL CLEARANCE

Ethical research due diligence was conducted at KEPK Poltekkes Kemenkes Tanjungkarang with an ethical letter (EC/NOV/204/2023).

REFERENCES

1. Gayatri M. Exclusive Breastfeeding Practice in Indonesia: A Population-Based Study. Korean J Fam Med. 2021;42(5):395–402. doi: 10.4082/ kjfm.20.0131

2. Hadi H, Fatimatasari F, Irwanti W, Kusuma C, Alfiana RD, Asshiddiqi MIN, et al. Exclusive Breastfeeding Protects Young Children from Stunting in a Low-Income Population: A Study from Eastern Indonesia. Nutrients. 2021;13(12):4264. doi: 10.3390/nu13124264
3. del Castillo-Hegyi C, Achilles J, Segrave-Daly BJ, Hafken L. Fatal Hypernatremic Dehydration in a Term Exclusively Breastfed Newborn. Children. 2022;9(9):1379. doi: 10.3390/children9091379
4. AlThuneyyan DA, AlGhamdi FF, AlZain RN, AlDhawyan ZS, Alhmly HF, Purayidathil TS, et al. The Effect of Breastfeeding on Intelligence Quotient and Social Intelligence Among Seven- to Nine-Year-Old Girls: A Pilot Study. Front Nutr. 2022;9:726042. doi: 10.3389/fnut.2022.726042
5. Sokou R, Parastatidou S, Iliodromiti Z, Lampropoulou K, Vrachnis D, Boutsikou T, et al. Knowledge Gaps and Current Evidence Regarding Breastfeeding Issues in Mothers with Chronic Diseases. Nutrients. 2023; 15(13):2822. doi: 10.3390/nu15132822
6. Modak A, Ronghe V, Gomase KP. The Psychological Benefits of Breastfeeding: Fostering Maternal Well-Being and Child Development. Cureus. 2023; 15(10):e46730. doi: 10.7759/cureus. 46730
7. Murphy S, Carter L, Al Shizawi T, Queally M, Brennan S, O'Neill S. Exploring the relationship between breastfeeding and the incidence of infant illnesses in Ireland: evidence from a nationally representative prospective cohort study. BMC Public Health. 2023;23(1):140. doi: 10.1186/s12889-023-15045-8
8. Gong QQ, Quan DD, Guo C, Zhang C, Zhang ZJ. Association between maternal breastfeeding and risk of systemic neoplasms of offspring. Ital J Pediatr. 2022;48(1):98. doi: 10.1186/s13052-022-01292-9
9. Abraham M, Lak MA, Gurz D, Nolasco FOM, Kondraju PK, Iqbal J. A Narrative Review of Breastfeeding and Its Correlation With Breast Cancer: Current Understanding and Outcomes. Cureus. 2023;15(8):e44081. doi: 10.7759/cureus.44081
10. A Assaf E, Al Sabbah H, Al-Jawadleh A. Analysis of the nutritional status in the Palestinian territory: a review study. Front Nutr. 2023;10:1206090. doi: 10.3389/fnut.2023.1206090
11. Mwene-Batu P, Bisimwa G, Ngaboyeka G, Dramaix M, Macq J, Hermans MP, et al. Severe acute malnutrition in childhood, chronic diseases, and human capital in adulthood in the Democratic Republic of Congo: the Lwiro Cohort Study. Am J Clin Nutr. 2021;114(1):70–79. doi: 10.1093/ajcn/nqab034
12. Laksono AD, Wulandari RD, Ibad M, Kusrini I. The effects of mother's education on achieving exclusive breastfeeding in Indonesia. BMC Public Health. 2021;21(1):14. doi: 10.1186/s12889-020-10018-7
13. Kerautret Y, Di Rienzo F, Eyssautier C, Guillot A. Selective Effects of Manual Massage and Foam Rolling on Perceived Recovery and Performance: Current Knowledge and Future Directions Toward Robotic Massages. Front Physiol. 2020;11:598898. doi: 10.3389/fphys.2020.598898
14. Sri Wahyuningsih, Hayati N, Musviro, Agustina R. Oxytocin Massage Stramlining Breast Milk: Literature Riview. NHSJ. 2022;2(4):367–73.
15. Darmawati D, Kamil H, Rosmaidar R, Wardani E, Fajri N, Jannah SR, et al. The Effectiveness of the Rolling Massage Technique on Breast Milk Adequacy for the Baby in the COVID-

19 Pandemic. Open Access Maced J Med Sci. 2022;10(G):435–9. doi: 10.3889/oamjms.2022.8882
16. Rahayu S, Umaroh U. Effect of rolling massage and ST-18 acupressure on breast milk production and decrease in fundal height. JNKI. 2022;10(2):142-150. doi: 10.21927/jnki.2022.10(2).142-150
17. Lu P, Ye Z qi, Qiu J, Wang X yu, Zheng J juan. Acupoint-tuina therapy promotes lactation in postpartum women with insufficient milk production who underwent caesarean sections. Medicine. 2019;98(35): e16456. doi: 10.1097/MD.0000000000016456
18. Rahmatul Ulya RU, Panduragan SL, Shentya Fitriana SF, Che Hassan H. The Effect of Lactation Massage Combination and Postpartum Breast Care Aged One to Three Days on the Experience of Adequate Breastfeeding. Malaysian Journal of Medicine and Health Sciences. 2023;19(s9):251–5.
19. Badan Pusat Statistik provinsi lampung. Bayi Umur 0-5 Bulan di Provinsi Lampung pada Tahun 2023 Mendapat ASI Eksklusif. 2024.
20. Kujawa-Myles S, Noel-Weiss J, Dunn S, Peterson WE, Cotterman KJ. Maternal intravenous fluids and postpartum breast changes: a pilot observational study. Int Breastfeed J. 2015;10:18. doi: 10.1186/s13006-015-0043-8
21. Shah R, Sabir S, Alhawaj AF. Physiology, Breast Milk. 2022 Sep 19. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan–. PMID: 30969612.
22. Falci SGM, Marques LS. CONSORT: when and how to use it. Dental Press J Orthod. 2015;20(3):13–5. doi: 10.1590/2176-9451.20.3.013-015.ebo
23. Asbury MR, Butcher J, Copeland JK, Unger S, Bando N, Comelli EM, et al. Mothers of Preterm Infants Have Individualized Breast Milk Microbiota that Changes Temporally Based on Maternal Characteristics. Cell Host Microbe. 2020;28(5):669-682.e4. doi: 10.1016/j.chom.2020.08.001
24. Nagel EM, Howland MA, Pando C, Stang J, Mason SM, Fields DA, et al. Maternal Psychological Distress and Lactation and Breastfeeding Outcomes: a Narrative Review. Clin Ther. 2022; 44(2):215–227. doi: 10.1016/j.clinthera.2021.11.007
25. Magalhães M, Havelaar AH, Varma DS, Cacho N, Sullivan S, Parker LA. Leveraging mHealth and a milk expression frequency biomarker during postpartum to prolong lactation among parents of critically ill infants: a pilot study. Journal of Perinatology. 2023; 43(5):616–623. doi: 10.1038/s41372-023-01639-y
26. Rodríguez-Gallego I, Corrales-Gutierrez I, Gomez-Baya D, Leon-Larios F. Effectiveness of a Postpartum Breastfeeding Support Group Intervention in Promoting Exclusive Breastfeeding and Perceived Self-Efficacy: A Multicentre Randomized Clinical Trial. Nutrients. 2024;16(7): 988. doi: 10.3390/nu16070988
27. Bengough T, Dawson S, Cheng H, McFadden A, Gavine A, Rees R, et al. Factors that influence women's engagement with breastfeeding support: A qualitative evidence synthesis. Matern Child Nutr. 2022; 18(4):e13405. doi: 10.1111/mcn.13405
28. Chang YS, Glaria AA, Davie P, Beake S, Bick D. Breastfeeding experiences and support for women who are overweight or obese: A mixed-methods systematic review. Matern Child Nutr. 2020;16(1):e12865. doi: 10.1111/mcn.12865
29. Dini Setiarsih, Rizki Amalia, Rizki Nurmalya Kardina. Exclusive breast milk by working mothers as a new habit: a literature review. Bali Medical Journal. 2023;12(1):665–8.

30. Sumiatik. The Effect of Woolwich Massage on Breast Milk Production in Postpartum Mothers at the Marbau Health Center, Marbau District, Labuhan Batu Utara Regency in 2021. Science Midwifery. 2022;10(5):3622–31.
31. Lyons KE, Ryan CA, Dempsey EM, Ross RP, Stanton C. Breast Milk, a Source of Beneficial Microbes and Associated Benefits for Infant Health. Nutrients. 2020;12(4):1039. doi: 10.3390/nu12041039
32. Piccolo O, Kinshella MLW, Salimu S, Vidler M, Banda M, Dube Q, et al. Healthcare worker perspectives on mother's insufficient milk supply in Malawi. Int Breastfeed J. 2022;17(1): 14. doi: 10.1186/s13006-022-00460-1
33. Fei Y, Zhang ZY, Fu WN, Wang L, Mao J. Why do first-time mothers not intend to breastfeed? ——A qualitative exploratory study on the decision-making of non-initiation in Jingzhou, China. BMC Pregnancy Childbirth. 2022;22(1):183. doi: 10.1186/s12884-022-04494-5
34. Triansyah A, Stang, Indar, Indarty A, Tahir Muh, Sabir M, et al. The effect of oxytocin massage and breast care on the increased production of breast milk of breastfeeding mothers in the working area of the public health center of Lawanga of Poso District. Gac Sanit. 2021;35:S168–70. doi: 10.1016/ j.gaceta.2021.10.017
35. Shirima LJ, Mlay HL, Mkuwa S, Fabian A, Mushy SE, Ngalesoni FN, et al. Early Initiation of Breastfeeding and Associated Factors Among Women of Reproductive age in Simiyu Region, Tanzania. SAGE Open Nurs. 2023;9: 23779608231209142. doi: 10.1177/ 23779608231209142
36. Ulfa Y, Maruyama N, Igarashi Y, Horiuchi S. Early initiation of breastfeeding up to six months among mothers after cesarean section or vaginal birth: A scoping review. Heliyon. 2023;9(6):e16235. doi: 10.1016/j.heliyon.2023.e16235
37. Faraj K, Bouchefra S, El Ghouddany S, Elbaraka Y, Bour A. Early breastfeeding initiation: Exploring rates and determinants among postpartum women in Eastern Morocco. Sci Afr. 2023;21:e01883.
38. Deif R, Burch EM, Azar J, Yonis N, Abou Gabal M, El Kramani N, et al. Dysphoric Milk Ejection Reflex: The Psychoneurobiology of the Breast feeding Experience. Front Glob Womens Health. 2021;2:669826. doi: 10.3389/fgwh.2021.669826
39. Abdulahi M, Fretheim A, Argaw A, Magnus JH. Breastfeeding Education and Support to Improve Early Initiation and Exclusive Breastfeeding Practices and Infant Growth: A Cluster Randomized Controlled Trial from a Rural Ethiopian Setting. Nutrients. 2021;13(4):1204. doi: 10.3390/nu 13041204
40. Utami RB, Rohuna R. Loving Lactation of Massage Effectiveness to Accelerating Lactation Onset. Jurnal Kesehatan Masyarakat. 2021;17(1):58–66. doi: 10.15294/kemas.v17i1.25321
41. Namyalo H, Nankumbi J, Ngabirano TD. Perceived breast milk insufficiency: Prevalence and associated factors among women attending a young child clinic in Uganda. Int J Afr Nurs Sci. 2023; 19:100637. doi: 10.1016/j.ijans.2023. 100637