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The Effectiveness of Oxytocin Massage Using Lemongrass Oil on Breast Milk Production in Post Partum Mother

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ABSTRACT
Exclusive breastfeeding coverage in Indonesia remains at 63.9%, below the SDGs target 80%, largely due to non-optimal breast milk production. Non-pharmacological methods, such as oxytocin massage, may enhance milk production, and its effectiveness can be increased with lemongrass of oxytocin massage with lemongrass oil on breast milk production in postpartum women. This study was conducted in Tilongkabila subdistrict, Bone Bolango, using a quasi-experimental pretest–posttest design with a control group method, involving 24 postpartum women selected purposively and divided into an intervention group and a control group. The intervention was carried out for five consecutive days, involving measurement of breast milk volume using a manual pump and a self-report questionnaire for mothers. The Mann-Whitney analysis showed a significant increase in breast milk volume in the intervention group compared to the control group ($p < 0.05$). Mothers received oxytocin massage using lemongrass oil demonstrated greater and more consistent milk production, alongside improved relaxation and comfort. It can be concluded that oxytocin massage using lemongrass oil is effective in increasing breast milk production in postpartum women and can be recommended as a simple, affordable, and safe complementary therapy to support the success of the exclusive breastfeeding program.

Keywords: Breast Milk Production, Lemongrass Oil, Oxytocin Massage, Postpartum Mothers

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INTRODUCTION

Breast milk is a liquid that comes from the secretion of breast glands containing a solution of protein, lactose and organic salts (Pratamaningtyas et al., 2020). The many nutrients contained in breast milk can form immunoglobin which plays an important role in fighting bacteria, viruses, fungi, and parasites and there are essential fatty acids that can help the formation of children's brains (Nurita, 2022). Malnutrition due to not getting breast milk can affect cognitive development, morbidity and mortality of infants which can result in growth fattering (failure to grow) which disrupts growth and development such as children's height that is not in accordance with age or what is often called stunting (Hidayah & Anggraini, 2023).

Exclusive breastfeeding rates still have not reached the ideal target globally and nationally. Based on reports from WHO and UNICEF in 2022 there are around 80% of babies who get breast milk at the beginning of birth, but only 43.8% get exclusive breastfeeding in the first six months (WHO, 2022). The exclusive breastfeeding rate in Indonesia in 2023 was 63.9%, which exceeded the national target of 50% in 2023 but still did not meet the Sustainable Development Goals (SDGs) target of 80% (Kementrian Kesehatan, 2023). Meanwhile, Gorontalo province is one of the provinces that has not yet reached the national target of 2023 with a percentage of exclusive breastfeeding achievement of 36.6%. Exclusive breastfeeding coverage in Gorontalo Province varies by district and city. Gorontalo City has the highest exclusive breastfeeding coverage (57.4%), followed by Boalemo District (43.6%), Gorontalo District (39.9%), Pohuwato District (34.4%), Bone Bolango District (16.8%) and finally North Gorontalo District (14.7%) (Dinas Kesehatan Provinsi Gorontalo, 2023).

Breast milk production in postpartum mothers can be influenced by several demographic and obstetric factors, including the mother's age, education, occupation, parity, and gestational age at delivery. Based on lactation theory, the hormones prolactin and oxytocin, which are triggered by stimulation of the breasts and the baby, will increase after delivery and are influenced by the mother's physical and psychological condition (Leiwakabessy & Azriani, 2020).

The factor causing the low coverage of exclusive breastfeeding is insufficient breast milk production which is influenced by various factors, one of which is maternal psychological disorders that can affect the production of prolactin and oxytocin hormones. Both hormones, if not produced optimally, will affect the breastfeeding

reflex which results in non-optimal breast milk production (Delvina et al., 2022).

The hormone oxytocin is produced at the back of the pituitary gland which is produced by stimulation either from the baby's suction or from external stimuli such as massage. Oxytocin hormone plays an important role in the let-down reflex or the process of releasing breast milk because this hormone is formed faster than prolactin hormone so that the alveolus filling is faster. Based on the results of previous studies, psychological conditions, especially anxiety in breastfeeding mothers, can affect milk production so that the concentration of oxytocin in the blood is also affected (Walter et al., 2021).

There are several ways that can overcome the lack of breast milk production, one of which is with non-pharmacological therapies such as oxytocin massage whose success can be supported by the provision of aroma therapy. The use of aroma therapy is not only by inhalation but can also be used as a massage spread (Jania et al., 2022).

Oxytocin massage is a non-pharmacological intervention to help breastfeeding mothers feel relaxed and relieve discomfort by reducing epinephrine and non-epinephrine levels and stimulating the performance of endorphin hormone (Silviani et al., 2023). Lemongrass oil is an essential oil extracted from the leaves and stems of lemongrass plants through a vapor dilatation process and produces a therapeutic aroma in the form of essential (Khasanah et al., 2024). Lemongrass essential oil contains bioactive compounds that function as antidepressants, analgesic and anti-inflammatory which are very beneficial for postpartum women (Hartatie et al., 2020). The antidepressants contained in lemongrass can help reduce anxiety, fear and anxiety so that it can have an effect in improving blood circulation so that the combination of complementary methods between oxytocin massage and lemongrass oil is considered effective in helping breast milk production (Hartatie et al., 2020).

Other studies have shown that the magnesium and potassium content in lemongrass regulates muscle, heart, and nerve function. This is beneficial for increasing breast milk production and providing relaxation for nursing mothers, thereby improving the quality of life for postpartum mothers (Astuti et al., 2021).

A journal discussing the relationship between oxytocin massage and expressed milk production shows that oxytocin massage has a significant relationship with increased milk production in postpartum mothers on days 1-3. This massage helps stimulate the hormone oxytocin, which plays a role in increasing milk production and supporting the smooth process of breastfeeding. Support from family and

other breast care methods also play a role in increasing breastfeeding success. Thus, oxytocin massage can be one of the efforts to increase milk production and breastfeeding success in postpartum mothers (Rostiana et al., 2024).

Research on the effect of oxytocin massage with chamomile aromatherapy on breast milk production in postpartum women showed that the smooth production of breast milk after the intervention was 67.6% which was previously 17.6% (Umbarawati et al., 2024). A study evaluating the effectiveness of oxytocin massage on breast milk production in postpartum mothers stated that oxytocin massage can increase breast milk production by 1.54 ml every day (Yorita et al., 2023).

Based on the results of previous studies, it was found that the average volume of breast milk before the intervention combination of oxytocin massage and lavender aromatherapy was 7.38 cc, and after the intervention it was 78 cc in 5 day intervention (Nataria et al., 2024).

Several previous studies have proven the effectiveness of oxytocin massage in increasing milk production in postpartum mothers. Other studies have also shown that combining oxytocin massage with aromatherapy, such as chamomile and lavender, can increase milk flow. However, studies combining oxytocin massage with lemongrass (*Cymbopogon citratus*) aromatherapy are still very limited. In fact, lemongrass oil contains bioactive compounds with antidepressant, analgesic, and anti-inflammatory effects, as well as promoting relaxation and blood circulation, which theoretically could be more optimal in supporting milk production. Therefore, this study aims to fill this gap by examining the effectiveness of oxytocin massage using lemongrass oil on breast milk production in postpartum mothers, which has not been widely explored previously.

METHODE

This study was conducted in Tilongkabila District, Bone Bolango Regency, Gorontalo. Tilongkabila District has two community health centers (Puskesmas) and covers a working area consisting of 14 villages. Between January and March 2025, there were 37 postpartum mothers recorded in Tilongkabila District. This number was based on data from the two health centers, with 15 postpartum mothers from the Tilongkabila Health Center service area and 23 from the Toto Utara Health Center service area. During the same period, there were 76 infants aged under six months in Tilongkabila District, of whom only 7 (8.1%) were exclusively breastfed.

The method used in this research is *Quashi Experiment* with pretest-posttest research design with control group design. The

sampling technique used was non-probability sampling with purposive sampling method based in inclusion and exclusion criteria, with a total of 24 postpartum mother in Tilongkabila District divided into two group; 12 respondents in the intervention group and 12 respondents in the control group. The sample sixe was determined using the Slovin formula with a 10% error rate from a total population of 34 people. This number of respondents represented 70,5% of the population, which was considered sufficiently representative and met the minimum requirements for statistical analysis.

The inclusion criteria were postpartum women from day 4 to day 8, did not have medical conditions that could affect breast milk, were not taking breast milk facilitating drugs, had not received other types of complementary therapies to facilitate breast milk, did not have allergies to lemongrass and other oils. Exclusion criteria were postpartum women who took breast milk-enhancing drugs, had received complementary therapy to facilitate breast milk, and had a history of allergy to lemongrass or other oils.

Before the intervention was given, researchers conducted interviews and observed the volume of breast milk production using a questionnaire sheet. The points in the questionnaire included the release of milk from the nipple, the feeling of breast tension before breastfeeding, the frequency of breastfeeding the baby >8 times (20 - 40 minutes per breastfeeding), the frequency of the baby urinating >6 - 8 times, defecating >2 - 5 times, the baby sleeping or calm for 2 - 4 hours after breastfeeding. Breast milk production was said to be smooth if the questionnaire score was 5 - 6, moderately smooth with a score of 3 - 4, and less smooth with a score of 1 - 2.

The intervention was conducted for 5 consecutive days every morning with a complementary certified therapist. Pretest was conducted on the first day of intervention, which was the fourth day postpartum. Posttest was conducted on the fifth day of intervention, which was on the eighth day of postpartum between the 6th to 12th hour after the last intervention. Measurement of breast milk volume was done using a manual breast pump for 30 minutes in each breast.

Data analysis used the Wilcoxon Signed Rank statistical test to determine differences before and after the intervention of each group and the Mann-Withney test to determine between two unpaired groups.

RESULT AND DISCUSSION

Result

Table 1. Distribution of Breast Milk Production Categories of Postpartum Women Before and After Oxytocin Massage Using Lemongrass Oil in The Intervention Group

Intervention Group	Fluency category						Total	
	Less Fluent		*Moderately smooth*		*Fluent*			
	n	%	n	%	n	%	n	%
Pre Test	11	91,7	1	8,3	0	0	12	100
Post Test	0	0	0	0	12	100	12	100

Source: Primary data, 2025

Based on Table 1, it shows that breast milk production in postpartum women in Tilongkabila sub-distric before being given oxytocin massage using lemongrass oil is mostly in the substandard category with 11 mother (91,7%) and no mothers who have a smooth breast milk production category. After the intervention of oxytocin massage using lemongrass oil, all 12 respondents (100%) experienced smooth breast milk production.

Tabel 2. Distribution of Breast Milk Production Categories of Postpartum Women Before and After Oxytocin Massage Using Lemongrass Oil in The Control Group

Control Group	Fluency category						Total	
	Less Fluent		*Moderately smooth*		*Fluent*			
	n	%	n	%	n	%	n	%
Pre Test	11	91,7	1	8,3	0	0	12	100
Post Test	9	75	3	23	0	0	12	100

Source: Primary data, 2025

The table above shows the category of breast milk production of postpartum women before and after in the control group, where there were 11 mother (91,7%) who experienced substandard breast milk production. In the post test conducted by the examiner, 11 mother who experienced substandard breast milk production had become 9 mothers (75%) and 2 other mothers changed to fairly smooth, but there were no respondents with smooth breast milk production.

Tabel 3. Distribution of Mean Breast Milk Volume Gain in Postpartum Women Who Were Given Oxytocin Massage Using Lemongrass Oil and Postpartum Women Who Were Not Given Any Intervention

Group	Average increase in breast milk production (ml)					
	Pre Test			*Post Test*		
	Min	Max	Average	Min	Max	Average
Intervention	10	70	29,17	60	180	104,17
Control	10	40	27,50	20	40	30

Source: Primary data, 2025

Based on the data in the table above, the average in breast milk volume in the previous intervention group was 29,17 ml and increased to 104,17 ml. Meanwhile, the control group experienced a change in breast milk volume from 27,5 ml to 30 ml.

Table 4 Average Increase in Breast Milk Volume in Intervention and Control Groups

Breast Milk Production	n	Mean Rank	Min	Max	p-value
Intervention	12	104,17	60	80	0.000
Control	12	30	20	40	

Source: Primer data, 2025

Based on statistical tests conducted by researchers, the number of samples used was 12 postpartum women for each group in Tilongkabila District with an average value of 104.17 in the intervention group with a minimum of 60 and a maximum of 180, while in the control group the average value was 30 with a minimum of 20 and a maximum of 40. Significant p value 0.000 < 0.05. This figure shows a significant effect on the intervention group against the control group before and after the increase in breast milk production in postpartum women in Tilongkabila District.

Discussion

1. Breastmilk Fluency Category in The Intervention Group

Breast milk production in postpartum women before oxytocin massage using lemongrass oil was found that most of the postpartum women experienced substandard breast milk production as many as 11 mothers (91.7%) and 1 mother (8.3%) experienced moderately smooth breast milk production and no mother had a smooth breast milk production category. After oxytocin massage using lemongrass oil (Cymbopogon citratus), it can be seen from the number of postpartum mothers who experienced smooth breast milk from none to 12 mothers (100%) who became respondents.

The results of the study conducted before giving oxytocin massage using lemongrass oil, all respondents who experienced substandard breast milk production characterized by breast milk that did not seep and breasts that were not tense before breastfeeding were due to mothers who did not have knowledge about how to produce enough breast milk, mothers had entered the Taking Hold phase where mothers began to feel tired taking care of their babies so that it disrupted rest patterns and mothers rarely breastfed and did not understand the correct breastfeeding position so that the child's suction power was reduced which triggered the assumption that the mother's milk production was small.

This is in accordance with the theory put forward by Himalaya & Maryani (2021) that education about lactation management is very important to increase mothers knowledge about the breastfeeding process, the benefits of breastfeeding, and how to overcome common problems that

arise such as insufficient milk production (Himalaya & Maryani, 2021).

The previous research found that disturbed psychological conditions in postpartum mothers can interfere with the oxytocin reflex that aids in milk production (Kurniawan et al., 2022). This psychological condition is also in accordance with the results of previous research by Agustina et al. (2023) where stress and fatigue can increase the risk of postpartum depression, which in turn can interfere with the mother's ability to breastfeed effectively so that it interferes with milk production (Agustina et al., 2023).

In a previous study with the title "The Effect of Oxytocin Massage on Breast Milk Production in Postpartum Mothers" showed an 11.667 times chance of experiencing adequate breast milk production for mothers who were given oxytocin massage with mothers who were not given oxytocin massage, as well as providing the impact of relaxation and comfort to breastfeeding mothers (Hidayah & Anggraini, 2023).

The effect that can occur if breast milk production cannot be maximized, such as sore nipples, breast swelling, and blocked milk ducts, often appear, especially in the first few weeks after giving birth, which can lead to infection (Kurniawati & Srianingsih, 2021).

Previous research on educating postpartum mothers and families on oxytocin massage using lemongrass oil has shown an increase in mothers' knowledge and skills in utilizing oxytocin massage with lemongrass oil to facilitate breast milk production. This proves that non-pharmacological interventions can be widely applied in the community (Jayanti & Patriani, 2023).

2. Category of breast milk fluency in the control group

The category of breast milk fluency of postpartum women before and after the intervention in the control group, where there were 11 mothers (91.7%) who experienced substandard breast milk production. In the post test conducted by the researcher, 11 mothers who experienced substandard breast milk production had become 9 mothers (75%) and 2 other mothers changed to quite smooth, but there were no respondents with smooth breast milk production.

Based on these values, it can be seen that the control group experienced a change in category from substandard to fairly smooth. This can be attributed to the characteristics of respondents with multiparous parity.

Multiparous mothers usually have better milk production due to their experience and adaptation to the breastfeeding

process. Based on the analysis of this study, most of the respondents were primiparous (70.8%), which means this was their first experience in breastfeeding. This is important because first-time mothers often experience barriers to breastfeeding and need support and intervention (Delvina et al., 2022).

A study using chi-square analysis found that there was a significant association between parity status and breastfeeding techniques applied by postpartum mothers, with a p value = 0.01 indicating that mothers who had breastfed previously were more capable of applying the correct breastfeeding techniques, demonstrating that previous breastfeeding experience can assist mothers in producing sufficient milk during breastfeeding (Leiwakabessy & Azriani, 2020).

3. The Average Increase in Breast Milk Volume

The average increase in breast milk volume in the previous intervention group was 29.17 ml and increased to 104.17 ml, while the control group also experienced changes in breast milk volume but not significantly from 27.50 to 30 ml. This can be seen from the status of increasing breast milk volume where all postpartum women in the intervention group experienced an increase in breast milk volume while postpartum women in the control group were only 3 mothers (25%) out of 12 respondents. These results support that the provision of oxytocin massage with lemongrass oil has a significant impact on increasing breast milk volume.

Based on the researchers' primary data, the increase in breast milk volume in mothers who were given oxytocin massage using lemongrass oil varied. A significant increase in breast milk volume occurred in 4 mothers by 100 – 160 ml where the four mothers were multiparous mothers who had previous breastfeeding experience. Meanwhile, the other respondents with an average increase in breast milk volume below 100 ml were mothers with primiparous parity. The control group that experienced an increase in breast milk volume occurred in 3 mothers (25%) who were multiparous mothers.

The results of the delta calculation of breast milk volume in the control group and the intervention group showed a significant difference. The average volume of the intervention group after being given oxytocin massage using lemongrass oil increased by 75 ml, while in the control group, the average increase in breast milk volume was 2.5 ml.

Based on the results of previous research conducted by Damayanti and colleagues. (2024) on the Effectiveness of Oxytocin Massage and Breast Care on Milk Production in Post Partum Mothers

explaining that there is an increase in milk production seen from the volume of breast milk pumped where on the first day the volume of breast milk was 5 drops of colostrum then increased to 130 ml (Damayanti et al., 2024). Research conducted by Kholila et al. (2023) stated that the effectiveness of this massage can also be supported by giving aromatherapy. Apart from being inhaled, the use of aromatherapy can also be applied to be applied directly to the skin, mixed with water for soaking and used as massage oil (Kholilah et al., 2023).

According to Suci (2022) the type of breast milk in postpartum women from day four to day eight is classified as transitional breast milk where the volume of transitional breast milk will increase by 50 – 300 ml. This is in line with the results of the current research and previous research (Nurita, 2022).

4. Breast Milk Production in Postpartum Mothers

Based on the results of the study, the mean value of breast milk production before treatment was 65.00 and a minimum value of 30 and a maximum of 160, after treatment was 2.50 with a minimum value of 10 and a maximum of 40 in the variable after with a significant p value of 0.000 < 0.05. This figure shows a significant effect between the intervention group and the control group before and after the increase in breast milk production in postpartum women in Tilongkabila District.

Previous research entitled “The Effect of Lemongrass Aromatherapy Oil and Compassionate Lactation Massage on Breast Milk Production in Postpartum Mothers at the Ciomas Health Center” explains that lemongrass oil has a significant effect on increasing breast milk volume when administered in conjunction with massage, compared to massage alone (Subagio et al., 2023).

Based on the results of the study, the use of lemongrass oil as a medium for oxytocin massage has advantages over other aromatherapy oils such as chamomile and lavender because, in addition to providing a relaxing effect, lemongrass also contains citral compounds that act as natural stimulants in improving blood circulation and accelerating the oxytocin reflex. Lemongrass is also a traditional plant that is easier to cultivate than other herbal plants. When compared to studies using chamomile, breast milk production showed an increase of 50% (Umbarawati et al., 2024). Using lavender recorded a 70.65 cc surge in breast milk volume after intervention (Yorita et al., 2023). The combination of oxytocin massage using lemongrass oil in this study showed a more significant increase, namely from 75 cc in the intervention

group. This shows that lemongrass oil has the potential to be superior in supporting the effectiveness of oxytocin massage in increasing breast milk production.

CONCLUSION

Oxytocin massage using lemongrass oil was proven effective in increasing the smoothness and volume of breast milk production in postpartum women. Based on the results of research on the *Effectiveness of Oxytocin Massage Using Lemongrass Oil (Cymbopogon citratus) on Increasing Breast Milk Production in Postpartum Mothers in Tilongkabila District*, it can be concluded that:

1. The results of statistical tests found that a total of 12 mothers (100%) who became the treatment group experienced an increase in breast milk volume, while in the control group only 3 (25%) of 12 mothers experienced an increase.
2. Statistical test results showed that the average increase in breast milk volume in the intervention group before oxytocin massage using lemongrass oil was 60 ml and increased to 180 ml after the intervention.
3. The Mann-Whitney test results in the intervention group and control group showed a significance value of p = 0.000 (p = <0.05). This shows that there is a significant difference between the breast milk fluency score before and after oxytocin massage using lemongrass oil.

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