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ORIGINAL RESEARCH

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## EFFECT OF OXYTOCIN MASSAGE USING LAVENDER ESSENTIAL OIL ON PROLACTIN LEVEL AND BREAST MILK PRODUCTION IN PRIMIPAROUS MOTHERS AFTER CAESAREAN DELIVERY

Panglukies Ratna Agustie<sup>1\*</sup>, Suharyo Hadisaputro<sup>1</sup>, Runjati<sup>2</sup>, Ariawan Soejoenoes<sup>1</sup>, Imam Djamaludin Mashudi<sup>1</sup>, Melyana Nurul Widyawati<sup>1</sup>

<sup>1</sup>Magister Applied Midwifery, Poltekkes Kemenkes Semarang, Indonesia

<sup>2</sup>Midwifery Department, Poltekkes Kemenkes Semarang, Indonesia

\*Corresponding author:

Panglukies Ratna Agustie

Magister Applied Midwifery, Poltekkes Kemenkes Semarang

Jl. Tirta Agung, Pedalangan, Banyumanik, Kota Semarang, Jawa Tengah, Indonesia (50268)

E-mail: [panglukiesratna1313@gmail.com](mailto:panglukiesratna1313@gmail.com)

### ABSTRACT

**Background:** Low milk production is one of the barriers to exclusive breastfeeding. Oxytocin massage is considered as an alternative treatment, which combined with lavender essential oil as an aromatherapy.

**Objective:** This study aims to examine the effect of oxytocin massage using lavender essential oil on the increase of levels of prolactin and milk production in primiparous mothers after caesarean section.

**Methods:** This was a quasi-experimental study with non-equivalent control group design conducted in October-December 2016 at the General Hospital of Dr.H. Soewondo Kendal, Indonesia. There were 32 recruited by consecutive sampling, divided to be intervention (16 participants) and control group (16 participants). Prolactin hormone levels were measured using Enzyme-linked immunosorbent assay (ELIZA), breast milk production was measured based on the indicators of milk volume, urination and defecation frequency and sleep duration of babies; and infant's weight was also measured by digital scale. Data were analyzed using Mann Whitney and Wilcoxon test.

**Results:** The mean difference of prolactin hormone level in control group was 17.82 ng / ml while mean of difference of hormone prolactin level in intervention group was 132.13 ng / ml. There were statistically significant differences between intervention and control group in prolactin levels (p-value 0.000), milk volume (p-value 0.000), infant weight (p-value 0.000), urination frequency (p-value 0.017), defecation frequency (p-value 0.002), and infant sleep duration (p-value 0.000).

**Conclusion:** There was a significant effect of the oxytocin massage using lavender essential oil on the increase of breast milk production and prolactin levels. Therefore, oxytocin massage using lavender essential oil can be used as an alternative treatment for midwives and other health professionals in an effort to increase milk production in postpartum.

**Keywords:** oxytocin massage, lavender essential oil, prolactin, milk production

## INTRODUCTION

Exclusive breastfeeding means that the infant receives only breast milk. No other liquids or solids are given, not even water with the exception of oral rehydration solution, or drops/syrups of vitamins, and minerals or medicines.<sup>1</sup>

The successful exclusive breastfeeding is strongly influenced by the amount of breastmilk production. Less milk production in the first few days after birth has been an obstacle in breastfeeding. While there is also a lack of understanding of mothers, families, and communities about breastfeeding such as the habit of providing food early, thus this encourages mothers to stop breastfeeding and replace it with formula milk.<sup>2,3</sup>

At the 65th World Health Assembly, WHO member states set targets by 2025 that at least 50% of infants under six months of age are exclusively breastfed.<sup>4</sup> Based on Indonesia Health Profile data in 2014, the percentage of breastfeeding coverage in Indonesia amounted to 52.3%,<sup>5</sup> the coverage of breastfeeding in Kendal regency was 57.8% while Indonesia's target was 80%.<sup>6</sup>

The implementation of early breastfeeding should be possible in any labor process, either normal (pervaginam) or cesarean section.<sup>7</sup> However, one of the causes of the failure to breastfeed is cesarean section surgery. Labor with caesarean section may cause drowsiness and lazy suckling in infants due to drug or anesthetic effects given to the mother.<sup>7</sup> As many as 68% of post-caesarean section women have difficulty in moving up and down from bed and setting up a comfortable position during breastfeeding due to an increase in pain intensity after surgery.<sup>7</sup> In addition, the failure of breastfeeding is also due to the lack of breastfeeding information and experience in primiparous mothers which causes most

of them feel that the milk they produce is still insufficient to inhibit breastfeeding.<sup>2</sup> Studies show that mothers with first parity will have a slow process in administration breast milk compared with multiparous mothers.<sup>8</sup>

Inability to breastfeed make mothers increasingly feel less confident and anxious, so that milk production decreases.<sup>9</sup> Today, the pharmacologic treatment has been given to the mothers who have disorder by giving drugs, such as metoclopramide, domperidone, and chlorpromazine, but these drugs cause side effects such as fatigue, skin irritation, headache, thirst, diarrhea, and dry mouth. Alternatively, an oxytocin massage, the massage along the spine (vertebrae) to the fifth-sixth costae bone, is an attempt to stimulate the hormone prolactin and oxytocin after delivery.<sup>10</sup> The massage can significantly affect the peripheral nervous system, increase stimulation, and reduce the pain. For this, study, Lavender is used for massage.<sup>10</sup>

Lavender is one of the most popular essential oils and is widely used in the field of clinical health, especially overcoming psychosomatic problems in gynecology.<sup>11</sup> The largest content of the lavender oil is linalool of 26.12% which has the anti-anxiety effect.<sup>12</sup> Research suggests that by inhaling lavender aromatherapy can have a relaxing effect on the central nervous system,<sup>13</sup> and the use of lavender essential oil in massage can also help postpartum women increase relaxation and comfort, so milk production is expected to increase.<sup>12</sup> Therefore, this study aims to examine the effect of oxytocin massage using Lavender essential oil on prolactin level and breast milk production in primiparous mothers after caesarean delivery.

## METHODS

### *Design*

This was a quasi-experimental study with non-equivalent control group design.

### *Setting*

This research was conducted in October-December 2016 in the General Hospital of Dr.H. Soewondo Kendal.

### *Population and sample*

The population in this study were all postpartum mothers of cesarean primiparas. The inclusion criteria in this study were mothers aged 20-35 years, gestational age 37-42 weeks, infant weight  $\geq$  2500-4000 gram, normal mother's nipple, good suction reflex, no consuming cigarettes and alcohol, and willing to be respondents. While the exclusion criteria in this study were mothers who did not like aromatherapy perfume, used contraception after giving birth, had another way to increase breastfeeding such as: consumption of breast milk and herbal medicine, warm compress, other massages, etc. The number of sample size in this study was 32 recruited by consecutive sampling, divided to be intervention (16 participants) and control group (16 participants). The selection of the sample was categorized with the odd and sequence number. Those who came with sequence number order were included in the intervention group, and those who came with odd number were included in the control group.

### *Intervention*

Intervention was performed after obtaining written approval from respondents by signing informed consent. The Young Living 100% was used as a lavender essential oil. The essential oil of lavender was mixed with sun flower oil

for the intervention group, with 10% lavender essential oil and 90% sunflower oil. The intervention was performed by researcher and enumerators that have been trained before intervention. Intervention was performed two times a day combined with breast care in the morning and evening session, for 15 minutes in each treatment. While the control group only received breast care two times per day.

### *Instruments*

Prolactin hormone levels were measured using Enzyme-linked immunosorbent assay (ELIZA). Blood sampling was performed by researchers and enumerators and analyzed in the GAKI laboratory of Diponegoro University, Semarang. While breast milk production was measured with the indicators of the volume of breast milk, urination and defecate frequency, and sleep duration. The volume of breast milk which was pumped by researchers and enumerator once a day before feeding for 15 minutes on each breast of the mother. In addition, infant's weight was also measured by digital scale, and 24-hours observation was also performed, including urination and defecate frequency, and sleep duration recorded in the observation sheet.

### *Ethical consideration*

This research was approved by the Health Research Ethics Committees (K.E.P.K) of the Health Polytechnic of Semarang with No.184 / KEPK / Poltekkes-Smg / EC / 2016. The research permission was also obtained by Kesbangpol of Kendal District and the General Hospital of Dr. H. Soewondo Kendal.

### *Data analysis*

Mann-Whitney and Wilcoxon test were performed to analyze the effect of lavender massage on prolactin levels and

milk volume, while urination and defecate frequency, and sleep duration were analyzed using Independent t-test and paired t-test.

## RESULTS

The homogeneity test for characteristics of the respondents in the intervention and

control group was performed using the Levene's test and showed p-value of age (0.983), moths psychological factor (0.333), and frequency of feeding (0.378); while chi-square test showed p-value of education was 0.693 and employment was 0.446 ( $>0.05$ ), which indicated that there was no difference of the characteristics of the respondents between the two groups.

**Table 1** The difference of prolactin hormone in the intervention and control group

Prolactin level	Group		p-value
	Intervention (N=16) Mean±SD	Control (N=16) Mean±SD	
Before intervention	199.41±58.036	171.50±60.94	0.228 <sup>1</sup>
After intervention	331.54±84.603	189.33±57.151	0.000 <sup>1</sup>
Difference	132.13±47.52	17.82±22.686	0.000 <sup>1</sup>
p-value	0.000 <sup>2</sup>	0.000 <sup>2</sup>	

<sup>1</sup>Wilcoxon Test <sup>2</sup>Mann-Whitney Test

Table 1 shows that there was no difference in prolactin level before intervention between the intervention and control group with p-value 0.228 ( $>0.05$ ). However, there was a significant difference after intervention with p-value 0.000 ( $<0.05$ ). The mean difference of prolactin hormone level in control group

was 17.82 ng / ml while mean of difference of hormone prolactin level in intervention group was obtained 132.13 ng / ml. There was statistically significant difference in prolactin levels between intervention and control group with p-value 0.000 ( $<0.005$ )

**Table 2** Breast milk production (milk volume, baby's weight, urination frequency, defecation frequency, sleep duration) between intervention and control group

Variable	Group		p-value
	Intervention (N=16) Mean ± SD	Control (N=16) Mean ± SD	
<b>Breast Milk Volume</b>			
Before intervention	3.00±0.730	2.63±0.619	0.184 <sup>1</sup>
After intervention	139.69±17.366	121.56±10.602	0.001 <sup>1</sup>
Difference	136.69±17.723	118.94±10.402	0.002 <sup>1</sup>
p-value	0.000 <sup>2</sup>	0.000 <sup>2</sup>	
<b>Infant weight</b>			
Before intervention	2799.38±247	2688.13±170.1	0.148 <sup>3</sup>
After intervention	3067.81±249.9	2895.23±169.0	0.029 <sup>3</sup>
Difference	268.44±22.929	207.19±7.521	0.000 <sup>1</sup>
p-value	0.000 <sup>4</sup>	0.000 <sup>4</sup>	

<b>Infant defecation frequency</b>			
Before intervention	1.63±0.500	1.56±0.512	0.780 <sup>1</sup>
After intervention	5.44±0.814	4.56±0.629	0.004 <sup>1</sup>
Difference	3.81±0.655	3.00±0.516	0.002 <sup>1</sup>
<i>p-value</i>	0.000 <sup>2</sup>	0.000 <sup>2</sup>	
<b>Infant urination frequency</b>			
Before intervention	5.31±0.479	5.25±0.447	0.780 <sup>1</sup>
After intervention	9.63±1.204	8.56±0.814	0.008 <sup>1</sup>
Difference	4.31±1.302	3.31±0.479	0.017 <sup>1</sup>
<i>p-value</i>	0.000 <sup>2</sup>	0.000 <sup>2</sup>	
<b>Infant sleep duration</b>			
Before intervention	16.38±0.500	16.63±0.806	0.539 <sup>1</sup>
After intervention	19.69±1.014	18.56±0.892	0.003 <sup>1</sup>
Difference	3.31±0.946	1.94±0.772	0.000 <sup>1</sup>
<i>p-value</i>	0.000 <sup>2</sup>	0.000 <sup>2</sup>	

<sup>1</sup>Mann-Whitney test <sup>2</sup>Wilcoxon test <sup>3</sup>Independent t test <sup>4</sup>Paired t test

Table 2 shows that the mean difference of milk volume in the control group was 118.94 ml while the mean difference of milk volume in the intervention group was 136.69 ml. There was statically significant difference of breast milk volume between intervention and control group with p-value 0.002 (<0.05). On the other hand, the mean difference of infant weight in control group was 207.19 gram while mean difference in intervention group was 268.44 gram. There was statistically significant difference of breast milk volume between intervention and control group with p-value 0.000 (<0.05).

The mean difference of infant defecation frequency in control group was 3 times per day while in the intervention group was 3.81 times per day. There was statistically significant difference of breast milk volume between intervention and control group with p-value 0.002 (<0.05). The mean difference of infant urination frequency in the control group was 3.31 times per day while in the intervention group was 4.31 times per day. There was statistically significant difference of breast milk volume between intervention and control group with p-value 0.017 (<0.05).

The mean difference of infant sleep duration in the control group was 1.94 hours per day while in the intervention group was 3.31 hours per day. There was statistically significant difference of breast milk volume between intervention and control group with p-value 0.000 (<0.05).

## DISCUSSION

Oxytocin massage is one of the solutions to overcome the insufficiency of breast milk production.<sup>14</sup> Aromatherapy is a way of treating diseases by using the smells of fragrant plants such as lavender, which can be absorbed into the body through the skin or olfactory system.<sup>12</sup> The essential oil of lavender massage provides a relaxation effect on the central nervous system helping to increase the production of the oxytocin, which increase milk production.<sup>13</sup>

Lavender is one of the aromatherapy that has an effect on the amygdala in the brain and is capable of producing a sedative effect.<sup>15</sup> Doing the massage twice a day may affect breast milk in postpartum mothers.<sup>16</sup> The results of this study indicated that the treatment of oxytocin massage using lavender essential

oil was proved to increase the prolactin levels due to the increase of stimulation of afferents nerve so that the hormone oxytocin increases, which also increase the prolactin levels.<sup>17</sup> Studies show that postpartum mothers who are given massage in the back area from the neckline to the lower border of the scapula around the vertebrae for 15 minutes can increase the levels of oxytocin and prolactin in the blood.<sup>18</sup>

On the other hand, the increase of breast milk production can be identified from the milk volume, baby's weight, urination and defecation, and baby's sleep duration. The volume of breast milk produced and excreted by the breast glands may differ by influencing factors.<sup>15</sup> If there is an adequate nipple suction, on the first day of life, the baby will get breast milk 50-100 ml per day, and the number will continue to grow to 400- 450 ml per day during the second week.<sup>19</sup>

Breast milk is a liquid formed from a mixture of two substances, namely fat and water contained in protein, lactose and inorganic salts produced by the mother's breast gland, and useful as baby food.<sup>20</sup> If the baby's nutritional needs are met, The baby's weight will increase.<sup>20</sup> However, breastfed babies will be different from formula-fed babies.

Infants who were given breastfeeding, the pattern of defecation was 2-5 times per day with yellow stool, not too thin and not too thick; while babies who get milk formula had 1 time defecation per day with pale stool.<sup>10,16</sup> In addition, it is because breast milk is so easy to digest, then the babies will have more frequent bowel movement. Baby's elimination frequency depends on the intake that babies get. Babies who drink breastmilk may have urination at least 8-10 times a day with clear color and typical urine smell.<sup>10</sup>

The baby will sleep soundly 2-3 hours after feeding. The adequacy of breastfeeding is also demonstrated by infant behavior that is usually quiet and non-fussy.<sup>10</sup> In this regard, mothers should not schedule breastfeeding, but rather breastfeeding based on the demand of the babies. Breast milk production is strongly influenced by the frequent feeding of babies.<sup>21</sup> The more often babies suckle on the mother's breast, the more the production and expenditure of breast milk will be.<sup>22</sup> Lavender essential oil in massage in this study can help postpartum women increase relaxation and comfort so milk production are increased.<sup>13</sup> Thus, it could be said that there is an effect of oxytocin massage using Lavender essential oil on the increase of mother's milk production with increasing indicator of milk volume, body weight, defecation and urination frequency, and duration of baby's sleep, which is in line with previous study indicated that primiparous postpartum mothers who were given back massage for 15 minutes experienced improved milk fluids.<sup>22</sup>

#### *Limitation of the study*

In this study, foods were only subjectively controlled by asking respondents with criteria of mothers not to abstain from eating during the study. While the cultural aspects of food avoided after childbirth were not asked in detail. In addition, the physical condition of each mother was different. There were mothers who could not deal with pain might slow the recovery and affect or inhibit the amount of hormone prolactin and milk production.

#### **CONCLUSION**

Based on the findings of this study, it could be concluded that there was a significant effect of the oxytocin massage using lavender essential oil on the

increase of breast milk production and prolactin levels. Therefore, oxytocin massage using lavender essential oil can be used as an alternative treatment for midwives and other health professionals in an effort to increase milk production in postpartum. However, further studies are needed, especially to control the dietary factors using 24-hour food recall sheets, and the measurement of the intensity of pain level in the puerperal mothers.

#### Declaration of Conflicting Interest

None declared

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#### Author Contribution

All authors contributed equally in this study.

#### References

1. Cadwell K, Turner-Maffeï C. *Buku saku manajemen laktasi [Lactation management handbook]*. Jakarta: EGC; 2011.
2. Cox S. *Breastfeeding with confidence: Panduan untuk belajar menyusui dengan percaya diri [Guideline to learn breastfeeding confidently]*. Gracina J, translator. Jakarta: Gramedia; 2006.
3. Ministry of Health. *Basic health research (Riskesdas) 2013*. Jakarta: Ministry of Health of Indonesia. 2013.
4. World Health Organization. *WHO child growth standards: Length/height for age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age, methods and development*. Geneva: World Health Organization; 2006.
5. Ministry of Health. *Health profile of Indonesia 2013*. Jakarta: Ministry of Health of Indonesia. 2014.
6. Department of Health of Central Java. *Health profile of Central Java in 2014*. Semarang: Department of Health of Central Java; 2014.
7. Chertok IR, Shoham-Vardi I. Infant hospitalization and breastfeeding post-caesarean section. *British Journal of Nursing*. 2008;17(12).
8. Desmawati D. *Efektifitas kombinasi areolla massage dengan rolling massage terhadap pengeluaran ASI secara dini pada ibu postpartum di Puskesmas Pamulang dan Cikupa Banten [Effectiveness of combination of areolla massage and rolling massage on early breast milk production in postpartum mothers at Public Health Center of Pamulang dan Cikupa Banten]*. Jakarta: Program Pasca Sarjana Fakultas Ilmu Keperawatan Universitas Indonesia; 2008.
9. Flanders D, Lowe A, Kramer M, et al. A consensus statement on the use of domperidone to support lactation. 2012. <https://kindercarepediatrics.ca/wp-content/uploads/Domperidone-Consensus-Statement-Final-May-11-2012.pdf>
10. Bobak IM, Lowdermilk DL, Jensen MD. *Buku ajar keperawatan maternitas [Maternity nursing textbook]*. Jakarta: EGC; 2005.
11. Kramer MS, Chalmers B, Hodnett ED, Sevkovskaya Z, Dzikovich I, Shapiro S, Collet JP, Vanilovich I, Mezen I, Ducruet T, Shishko G. Promotion of Breastfeeding Intervention Trial (PROBIT): A randomized trial in the Republic of Belarus. *JAMA*. 2001 24;285(4):413-420.
12. Matsumoto T, Asakura H, Hayashi T. Does lavender aromatherapy alleviate premenstrual emotional symptoms?: A randomized crossover trial. *BioPsychoSocial Medicine*. 2013;7(1):12.
13. Koulivand PH, Khaleghi Ghadiri M, Gorji A. Lavender and the nervous system. *Evidence-Based Complementary and Alternative Medicine*. 2013; 2013.
14. Department of Health of Indonesia. *Pedoman penyelenggaraan pelatihan konseling menyusui dan pelatihan fasilitator konseling menyusui [Guideline of the implementation of training of*

- counseling of breastfeeding and its facilitator*]. Jakarta: Department of Health of Indonesia; 2011.
15. Lindquist R, Snyder M, Tracy MF. *Complementary & alternative therapies in nursing*. United States: Springer Publishing Company; 2013.
  16. Biancuzzo M. *Breastfeeding the newborn: clinical strategies for nurses*. United States: Mosby Incorporated; 2003.
  17. Hockenberry MJ, Wilson D. *Wong's nursing care of infants and children-e-book*. Philadelphia: Elsevier Health Sciences; 2014.
  18. Morhenn V, Beavin LE, Zak PJ. Massage increases oxytocin and reduces adrenocorticotropin hormone in humans. *Alternative Therapies in Health and Medicine*. 2012;18(6):11.
  19. Hubertin SP. *Konsep penerapan ASI eksklusif [Exclusive breastfeeding application concept]*. Jakarta: EGC; 2004.
  20. Wambach K, Riordan J. *Breastfeeding and human lactation*: Burlington: Jones & Bartlett Publishers; 2014.
  21. Suradi R, Tobing HK. *Lactation management*. Jakarta: CV Sagung Seto; 2004.
  22. Patel U, Gedam DS. Effect of back massage on lactation among postnatal mothers. *International Journal of Medical Research and Review*. 2013;1(01).

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