ORIGINAL RESEARCH

EFFECT OF MASSAGE AND AROMATHERAPY ON STRESS AND PROLACTIN LEVEL AMONG PRIMIPAROUS PUERPERAL MOTHERS IN SEMARANG, CENTRAL JAVA, INDONESIA

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ABSTRACT

Background: Exclusive breastfeeding in Semarang during the past five years remains low. Only 20 to 64% of mothers were breastfed exclusively in 2010-2012. The incidence of postpartum blues was reported by 29.9% of mothers and most of them were primiparous.

Objective: This study aims to determine the effect of loving massage, aromatherapy, and a combination of loving massage and aromatherapy on stress levels, and changes in levels of prolactin in primiparous puerperal in Semarang.

Method: A true experimental study with a randomized pretest-posttest control group design. Cluster random sampling was used to select 12 health centers from the 37 health centers in Semarang. A random assignment with a sealed envelope was performed to divide study participants into four groups; loving massage group, aromatherapy group, and a combination group of loving massage and aromatherapy, and a control group. A total of 52 primiparous puerperal mothers was involved, with 13 mothers were distributed equally in each group.

Results: Loving massage, aromatherapy, and a combination of loving massage and aromatherapy effectively changed mother's stress and prolactin levels. Effectiveness of each treatment assessed from the average difference in scores before and after treatment. Combination of loving massage and aromatherapy had proven as the most effective treatment in reducing stress levels (11.61 ± 6.76), and increasing prolactin level (83.13 ± 6.41 ng/ml).

Conclusions: Loving massage and aromatherapy shown to lower the levels of stress, and can increase the levels prolactin in postpartum primiparous. Therefore, it is recommended to provide loving massage therapy and aromatherapy to postpartum primiparous mothers.

Keywords: loving massage, aromatherapy, stress, prolactin

INTRODUCTION

United Nations Children's Fund (UNICEF) reported that started feeding on the first day after birth can reduce the risk of neonatal mortality up to 45%.[1] In addition, exclusive breastfeeding was found effective in preventing infant mortality up to 13% - 15%.[2] Nevertheless, having their first experience, primiparous mothers are susceptible to depression during the postpartum as a result of the complex pressures of high anxiety, lability feelings, and feeling of guilt. The postpartum mothers who are depressed tend to be too late to initiate breastfeeding or choose to stop breastfeeding and therefore, tend to have low prolactin levels, both in milk and in serum.[3] Low levels of the prolactin hormone give unfavorable effects on milk production.[4,5]

Postpartum women are also at risk for inflammation which naturally rise began in the last trimester of pregnancy and these changes will continue in the postpartum period. A study showed that mothers with postpartum depression experienced acute stress and inflammatory responses withstand failure, had higher levels of IL-6 and TNF-α higher in response to an acute stressor than postpartum mothers who are not depressed. They are also less sensitive to glucocorticoids which can usually resolve the inflammatory response system.[3] The study also showed that aromatherapy massage therapy can reduce anxiety and stress, as well as beneficial to the immune system.[6]

Given the evidence from previous studies, this research applied loving massage and aromatherapy mixture of jasmine and fennel oils which the result of local processing plants native to Indonesia. Studies reported that jasmine oil has a stimulating effect on the function of the nervous system, increasing positive emotions, and improve mood. Mood that is often erratic in postpartum mothers can be improved by inhaling jasmine oil. In addition, oil foeniculum vulgare/fennel/ fennel oil contains antioxidants, can help reduce anxiety, increase the flow of milk, and it can be used as galactagogue to increase the supply of breast milk. Moreover, phytoestrogens contained in fennel can support the growth of breast tissue.[7]

Postpartum period is recognized as vulnerable to affective disorders, especially depression postpartum. In contrast, the prevalence and clinical stress levels and milk production during the postpartum period have not received much attention for research. Data show that the obsessive-compulsive disorder, stress and anxiety disorders were higher in postpartum women than in the general population.[8] Loving massage and aromatherapy are expected to help postpartum mothers to gain the feeling of relaxation and increased comfort that can affect the increase in milk production as well as maternal and infant immune system. The interaction that occurs between these therapies have mutually synergistic effect as between the two can be mutually augmented by the therapeutic work without adding to the ill effects or reduce them.

This study aims to determine the effect of loving massage, aromatherapy, and a combination of loving massage and aromatherapy on stress levels, and changes in levels of prolactin in primiparous puerperal in Semarang, which was expected to increase the coverage of exclusive breastfeeding. The novelty of this research can be observed from the nature of the treatments given: (1) loving massage technique, which had never been studied before is a massage technique modification designed by the researchers in this study. The technique combines massage with effleurage techniques,

petrissage, acupressure, and love kneading with the concept of holistic body-mind-spirit connection through touching; (2) a mixture of aromatherapy fennel and jasmine had never been studied before; (3) a combination of massage with aromatherapy loving fennel and jasmine have not been investigated before.

METHODS

It was a true experimental study with a randomized pretest-posttest control group design. Cluster random sampling was employed to select 12 health centers from the 37 health centers in Semarang. A random assignment with a sealed envelope was performed to divide study participants into four groups; loving massage group, aromatherapy group, combination of loving massage and aromatherapy group, and a control group.

The subject of this research was postpartum primipara mothers who agreed to receive the treatment, and has met the inclusion and exclusion criteria of the study. The subjects were given the treatment, each treatment is divided into 4 groups, loving massage group, aromatherapy group, combination of loving massage aromatherapy group, and control group. A total of 52 primiparous puerperal mothers were involved, with 13 mothers were distributed equally in each group. There was no drop out reported during the study period.

Loving massage treatment using sunflower oil was given with a duration of 50 minutes each time once a week for four weeks at the beginning on the 7th day after birth, up to four weeks postpartum. Aromatherapy treatment fennel/ fennel and jasmine / jasmine (each 3 drops in 100 ml of water) was given by inhalation using a diffuser for 30 minutes. Aromatherapy inhalation was given every week for four weeks at beginning on the 7th day after birth, up to four weeks postpartum.

The combination treatment of loving massage and aromatherapy fennel / fennel and jasmine / jasmine was given as a combination of massage with a duration of 50 minutes, using sunflower oil with additional aromatherapy fennel / fennel and jasmine / jasmine (each 3 drops in 100 ml sunflower oil) once a week for four weeks. Total giving massage four times beginning on the 7th day after birth, up to four weeks postpartum. The control group was given standard treatment in the postpartum care service, including the examination of signs - vital signs, diagnose the perceived complaints (fever, shortness of breath, abdominal pain, severe headache, blurred vision, breast pain, swelling in the breasts, sore nipples, swelling in hands, swelling in the face, swelling in the limbs, severe bleeding, vaginal discharge that smells), nutrition, defecation, micturition, and breastfeeding patterns. Blood sampling in the control group performed at the same time as the treatment group.

The stress levels of mothers in the treatment group were measured using DASS (depression anxiety and stress scale) on the 7th day postpartum prior to the treatment, and after obtaining four times the treatment on day 28 postpartum. Likewise, the stress levels of mothers in the control group were also measured using the same methods on the 7th day postpartum and 28 days postpartum.

Prolactin serum was measured using DRG Prolactin ELISA, and laboratory analyzes were performed at the GAKY Laboratory of Medical Faculty of Diponegoro University Semarang. Measurement of prolactin levels in the treatment and control group was performed on the 7th day of postpartum at 10.00 am, and after obtaining the treatment at 11:00 am. Different test analysis between treatment groups were analyzed

by One Way Anova, by setting up *p* value > 0.05.

The therapists were midwives who have been trained in providing treatment for primiparous puerperal mothers. Data collection in the experimental group was retrieved by researchers, assisted by nine midwives certified competent as enumerators who previously given special training for four days. Ethical approval of this study was obtained from Medical Faculty Research Ethics Committee Diponegoro University Semarang.

RESULTS
Respondents' characteristics

The respondents of this research were postpartum primipara mothers who agreed to receive the treatment, and met the inclusion and exclusion criteria of the study. They were women at reproductive age 20-35 years old and primiparous.

Table 1 Respondents' characteristics

Variable	Groups								Total	
	X_1		X_2		X_3		C			
	F	%	f	%	F	%	f	%	f	%
Age										
20-25	7	53.8	9	69.2	7	53.8	7	53.8	30	57.7
26-30	2	15.4	3	23.1	4	30.8	4	30.8	13	25.0
31-35	4	30.8	1	7.7	2	15.4	2	15.4	9	13.3
Total	13	100	13	100	13	100	13	100	52	100
Education										
Primary	2	15.4	1	7.7	0	0.0	1	7.7	4	7.7
First secondary	2	15.4	1	7.7	2	15.4	3	23.1	8	15.4
Secondary	8	61.5	8	61.5	10	76.9	7	53.8	33	63.5
Higher education	1	7.7	3	23.1	1	7.7	2	15.4	7	13.5
Total	13	100	13	100	13	100	13	100	52	100
Occupation										
Housewife	6	46.2	7	53.8	8	61.5	8	61.5	29	55.8
Private employee	6	46.2	5	38.5	3	23.1	4	30.8	18	34.6
Civil servant	1	7.7	1	7.7	1	7.7	0	0.0	3	5.8
Business owner	0	0.0	0	0.0	1	7.7	1	7.7	2	3.8
Total	13	100	13	100	13	100	13	100	52	100
BMI										
Underweight	0	0	2	15.4	0	0	1	7.7	3	5.8
Normal	6	46.2	3	23.1	6	46.2	8	61.5	23	44.2
Overweight	1	7.7	4	30.8	0	0	3	23.1	8	15.4
Obese	6	46.2	4	30.8	7	53.8	1	7.7	18	34.6
Total	13	100	13	100	13	100	13	100	52	100

Table 1 shows that more than half (57 percent) of primiparous mothers were at the youngest age group (20-25). Among the intervention and control groups, mothers at the second groups (given aromatherapy intervention) have the highest proportion of younger mothers than others. Mothers at the third and control group are more likely to be older primiparous.

In terms of education, the vast majority of respondents (63 percent) attained secondary education. The proportion of mothers who completed secondary level at all groups is also equally distributed that most mothers have similar educational background. Nevertheless, it should be noted that more mothers in the third and control group (15

and 23 percent, respectively) completed only first secondary.

Aside from education, socio-economic background of mothers in this study can be seen from their occupation. Table 1 shows that most mothers in the intervention and control group shared similar characteristics in terms of their occupation. The vast majority (55 percent) of respondents were housewife and private employee (35 percent). Looking at the proportion distribution of occupation among four groups, it can be seen that group three and control group have higher proportion of housewife compared to the first and second group.

Other basic characteristic that relevant to be considered for this study is Body Mass Index or BMI. Generally, most mothers (44 percent) were categorized as having normal BMI. Nevertheless, it should be noted that about a third of mothers were obese. When comparison made among the four groups, it showed that more mothers in the third group were obese.

Stress level

The study found, among primipara mothers who received loving massage treatment, all of them (13 persons) reported medium to severe stress level (acute, chronic), as shown in Table 2. After applying loving massage treatment, the proportion of mothers who reported acute and chronic stress declined, from 30.8 percent to 15.4 and 7.7 percent respectively.

Similarly, of 13 mothers who received aromatherapy, about a third were experiencing medium stress level, whilst the other 60 percent experienced acute and chronic stress level. After the treatment, the proportion of mothers who had severe stress symptoms was significantly decreased to "not stress" (46 percent), medium (30 percent), and acute (15

percent). There were only 7 percent of mothers in aromatherapy treatment who were reported in chronic stress level.

Prior to treatment, more mothers in the third group (combined loving massage and aromatherapy) showed severe stress level than the first two groups. More than half (53 percent) of the subject reported acute stress level while 30 percent was reported at medium stress level and another 15 percent was in chronic condition. After the treatment, the majority of mothers in this group (53 percent) reported no symptoms of stress, whilst 30 percent experienced medium stress level. There were only 7 percent of mothers in this group reported acute stress level. Among mothers in the control group, the proportion of mothers who experienced stress showed no significant difference before and after the treatment.

Prolactin levels

Table 3 shows the mean difference in prolactin level of mothers in the intervention group. Prior to the intervention, the mean level of prolactin was varying; 197.65 ng/mL in loving massage group; 209.70 ng/mL in aromatherapy group; 195.35 ng/mL in combined aromatherapy and massage, and 181.35 ng/mL in control group.

After the treatment, among those who received loving massage, the mean prolactin level elevated from 197.65 to 248.79 ng/mL. Of mothers who received aromatherapy, prolactin level was slightly increased from 209.70 to 200.68 ng/mL whilst combination of loving massage and aromatherapy resulted in an increment of prolactin level from 195.35 to 278.48 ng/mL. Mothers in the control group showed a decreased in prolactin level from 181.35 to 168.54 ng/mL.

The highest increase in the average level of the prolactin hormone difference occurs in the combination group loving

massage & aromatherapy (83.13 ± 6.41 ng/mL) followed by loving massage treatment group (69.14 ± 6.60 ng/mL), aromatherapy (-9.01 ± 1, 38 ng/mL), and finally the control group (-12.81 ± 5.14 ng/mL). This suggests that the combination treatment loving massage & aromatherapy was the most effective way to increase prolactin levels for primiparous puerperal.

Table 2 Stress level of postpartum primipara mothers before and after treatment

Group	Stress level	Before treatment		After treatment	
		F	%	F	%
Loving massage	Not stress	0	0.0	4	30.8
	Mild	0	0.0	2	15.4
	Medium	5	38.5	4	30.8
	Acute	4	30.8	2	15.4
	Chronic	4	30.8	1	7.7
	Total	13	100.0	13	100.0
	Mean	29.92		19.38	
	Mean difference	-10.54			
	SD	6.267			
	p-value	0.001**			
Aromatherapy	Not stress	0	0.0	6	46.2
	Mild	0	0.0	0	0.0
	Medium	4	30.8	4	30.8
	Acute	4	30.8	2	15.4
	Chronic	5	38.5	1	7.7
	Total	13	100.0	13	100.0
	Mean	30.77		19.31	
	Mean difference	-11.46			
	SD	8.521			
	p-value	0.001**			
Loving massage & Aromatherapy	Not stress	0	0.0	7	53.8
	Mild	0	0.0	1	7.7
	Medium	4	30.8	4	30.8
	Acute	7	53.8	1	7.7
	Chronic	2	15,4	0	0.0
	Total	13	100.0	13	100.0
	Mean	28.54		16.92	
	Mean difference	-11.62			
	SD	6.764			
	p-value	0.001**			
Control	Not stress	0	0.0	0	0.0
	Mild	0	0.0	1	7.7
	Medium	4	30.8	5	38.5
	Acute	6	46.2	5	38.5
	Chronic	3	23.1	2	15.4
	Total	13	100.0	13	100.0
	Mean	29.85		27.85	
	Mean difference	-2			
	SD	2.025			
	p-value	0.343			

Table 3 Prolactin level differences of postpartum primipara mothers before and after treatment

Group		N	Prolaction level (ng/mL)			
			Mean	SD	Min	Max
Loving Massage	Before treatment	13	197.65	48.79	120.28	258.30
	After treatment	13	248.79	87.16	106.86	386.67
Aromatherapy	Before treatment	13	209.70	80.28	65.26	317.77
	After treatment	13	200.68	102.69	54.33	357.91
Loving Massage & Aromatherapy	Before treatment	13	195.35	68.52	128.12	353.14
	After treatment	13	278.48	58.93	176.78	377.21
Control	Before treatment	13	181.35	60.48	52.38	259.83
	After treatment	13	168.54	73.22	36.08	272.59

DISCUSSIONS

Statistical analysis showed that loving massage that was given four times in 4 weeks with a duration of 50 minutes each session significantly influenced the reduction of stress levels with average differences (± SD) 10.54 ± 6.27 whilst in the second group, mothers who were given aromatherapy intervention with diffuser for 30 minutes also showed a decreased in the stress level of 11.46 ± 8.52 in average. In the third group, primiparous puerperal mothers who received a combination of interventions loving massage and aromatherapy showed a significantly decrease in their stress level with an average difference of 11.61 ± 6.76. Unlike mothers in the intervention group, mothers in the control group experienced only a slight difference in their stress level during the study period.

The decrease in stress levels was found highest in the combination group loving massage and aromatherapy. It can be understood because the stimulation of pressure receptors is innervated by vagal afferent fibers, which ultimately lead to the limbic system, including the structure of the hypothalamus that is involved in the regulation of the autonomic nervous system and the secretion of cortisol.

The combination of loving massage and aromatherapy effect was even more significant when it was seen from the decline in the number of respondents who experience severe stress. The combination of massage and aromatherapy mechanism reduced the hormones of stress, namely cortisol and aromatherapy, and stimulated the production of endorphins that provides the relaxing effect to reduce stress more than in a massage or aromatherapy treatment only.

Aromatherapy used in this research was the essential oil of fennel and jasmine. Jasmine essential oil stimulates the body to release endorphins which are natural painkillers and mood enhancer, thus making the body becomes relaxed.[9] The mechanism of reduction in stress levels may be related to modulation of the sympathetic and parasympathetic nervous systems. Aromatherapy can reduce the activity of the sympathetic nervous system

and increase the activity of the parasympathetic nervous system which can lead to relaxation of the body and reduce stress levels.[10]

In the control group, stress levels of the mothers were also decreased, although in a very minimal level. The result was in accordance with studies that reported mothers who do not work at risk of postpartum depression is 10 times greater than working mothers.[3] All respondents are primiparas that in this case the adjustment to the new role is more difficult than in multiparous. In the absence of specific interventions in women both with regard to both physical and psychological, the mother will tend to be more easily stressed.[11] According to the results, the hypothesis of loving massage, aromatherapy, and the combination of loving massage aromatherapy can lower stress levels in primiparous puerperal is acceptable.

On the other hand, the combination of massage and aromatherapy proved to have the most significant effect, since it affects through three channels body systems simultaneously, namely a combination of receptors mechanical physically through massage directly on the skin, the mechanism of aromatherapy through the skin which is absorbed by the epidermis, and the working mechanism of aromatherapy to stimulate the olfactory receptors in the nose through neurotransmitters stimulate parts of the brain.[6,12]

According to the results, the hypothesis of loving massage, and the combination of loving massage aromatherapy can increase prolactin levels in primiparous puerperal is acceptable, but the hypothesis of aromatherapy can increase prolactin levels in primiparous puerperal is rejected. Aromatherapy had no significant effect in increasing prolactin levels was possibly due to the lack of

physical stimulation. Studies found, in order to stimulate prolactin level, stimulation through mechanical receptors physically through massage directly on the skin is needed because stimulation via receptors olfactory allegedly less impact on increasing prolactin.[6] This requires further research related to comparative effectiveness of mechanical stimulation and stimulation via receptors olfactory to increase prolactin.

The results of this study correspond to the result of similar study on postpartum mothers by Pamuji in 2014[13] regarding the effect of a combination of woolwich massage methods and endorphin massage. The study found, the treatment given may increase the prolactin hormone levels and the volume of milk.[13] Various studies also found that stimulation to release prolactin also can be done with breast massage, nipple cleaning, and breastfeeding early and regularly.[14,15] The prolactin hormone stimulates cells in the alveoli to produce milk. The more of the prolactin hormone, the milk production increases. Among breastfeeding mothers, prolactin will be decreased under stress, psychic influence, anesthesia, and surgery.[16,17] In this case, the psychological condition of nursing mothers determines the success of exclusive breastfeeding. Since stress condition can inhibit the production of prolactin hormone, therefore several holistic therapies that provide relaxation sensation to mothers can be suggested: massage therapy, acupuncture, yoga, exercise, relaxation, hypnosis, music therapy and aromatherapy.[18,19]

Limitations of this study were related to the threat of internal validity:

(1) Bias history. That it is possible some respondents at the primiparous puerperal period have frequently obtained massage therapy prior the intervention that may affect the dependent variable. Therefore, the changes in the dependent

variable are not entirely due to treatment or experimentation, but also influenced by the previous experience of the study subjects in terms of massage and aromatherapy.

(2) Selection bias. In this case, it is related to the selection of members of the experimental group and the control group. In other words, the changes in the dependent variable not only because of the effect of treatment, but also due to the influence of education, BMI, age, occupation.

It should be noted that both limitations have actually been sought to be controlled, and the selection of respondents was expected to be ideally matched to each group. Given the above constraints, the researchers have attempted to examine the confounding variables and determine the criteria for inclusion as tightly as possible. Therefore, the results shown in this paper can be assumed as the result from treatments that have been given.

CONCLUSION

Loving massage and aromatherapy were proven as an effective method to reduce stress levels either separately or in a combination. The study noted aromatherapy only could not increase prolactin levels. A combination of loving massage and aromatherapy is recommended to significantly reduce stress and increase prolactin hormone, which eventually will increase milk production.

References
1. UNICEF. ASI penyelamat hidup paling murah dan efektif di dunia [Breastfeeding is the cheapest and most effective way of life in the world]. Jakarta: UNICEF; 2012.
2. Mgongo M, Mosha MV, Uriyo JG, Msuya SE, Stray-Pedersen B. Prevalence and predictors of exclusive breastfeeding among women in Kilimanjaro region, Northern Tanzania: a population based cross-sectional study. *International Breastfeeding Journal.* 2013;8(1):1.
3. Kendall-Tackett KA. *Depression in new mothers: Causes, consequences, and treatment alternatives.* New York: Routledge; 2007.
4. Groer MW, Morgan K. Immune, health and endocrine characteristics of depressed postpartum mothers. *Psychoneuroendocrinology.*2007;32(2):133-139.
5. Kendall-Tackett K. A new paradigm for depression in new mothers: the central role of inflammation and how breastfeeding and anti-inflammatory treatments protect maternal mental health. *International Breastfeeding Journal.* 2007;2(1):1.
6. Kuriyama H, Watanabe S, Nakaya T, et al. Immunological and psychological benefits of aromatherapy massage. *Evidence-Based Complementary and Alternative Medicine.* 2005;2(2):179-184.
7. Jamwal N, Kumar S, Rana A. Phytochemical and pharmacological review on foeniculum vulgare.*International Journal of Pharmaceutical Sciences.* 2013;4(3):327-341.
8. Ross LE, McLean LM, Psych C. Anxiety disorders during pregnancy and the postpartum period: a systematic review. *Depression.* 2006;6(9):1-14.
9. Badgujar SB, Patel VV, Bandivdekar AH. Foeniculum vulgare Mill: a review of its botany, phytochemistry, pharmacology, contemporary application, and toxicology. *BioMed Research International.* 2014;2014.
10. Duan X, Tashiro M, Wu D, et al. Autonomic nervous function and localization of cerebral activity during lavender aromatic immersion. *Technology and Health Care.* 2007;15(2):69-78.
11. Wahyuni S, Murwati M, Supiati S. Faktor internal dan eksternal yang mempengaruhi depresi postpartum [Internal and external factor that influence postpartum depression]. *Jurnal Terpadu Ilmu Kesehatan.* 2014;3(2).
12. Primadiati R. *Aromaterapi: Perawatan alami untuk sehat dan cantik [Aroma-*

therapy: Natural care for healthy and beautiful]. Jakarta: Gramedia Pustaka Utama; 2002.

13. Pamuji SEB, Rahayu S. Pengaruh kombinasi metode pijat woolwich dan endorphine terhadap kadar hormon prolaktin dan volume asi (studi pada ibu postpartum di Griya Hamil Sehat Mejasem Kabupaten Tegal) [Effect of combination of woolwich and endorphine massge methods on prolactin hormone and breastfeed volume (case study of pospartum mothers at Griya Hamil Sehat Mejasem Kabupaten Tegal]. Jurnal Ilmu dan Teknologi Kesehatan. 2015;5(1).

14. Benson RC. Handbook of obstetrics & gynecology. Jakarta: McGraw Hill; 2008.

15. Biancuzzo M. Breastfeeding the newborn: Clinical strategies for nurses. Missouri: Mosby Incorporated; 2003.

16. Gartner LM, Morton J, Lawrence RA, et al. Breastfeeding and the use of human milk. Pediatrics. 2005;115(2):496-506.

17. Department of Health. Manajemen laktasi: buku pegangan bagi petugas kesehatan [Lactation management: A handbook for health workers]. Jakarta: Department of Health of Indonesia; 2010.

18. Hall HG, Griffiths DL, McKenna LG. The use of complementary and alternative medicine by pregnant women: a literature review. Midwifery. 2011;27(6):817-824.

19. Kinser PA, Goehler L, Taylor AG. How might yoga help depression? A neurobiological perspective. Explore (New York, NY). 2012;8(2):118.