Effect of Acupoint Stimulation with Digital Massager of Oxytocin on Breast Milk Production of working Mothers

by Anggorowati Anggorowati

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Effects of Acupoint Stimulation with Digital Massager of Oxytocin on the Breast Milk Production of Working Mothers

Anggorowati[1], Heriandi Sutadi[2], Setyowati[3], Raldi Artono Koestoer[4]

[1]*Department of Nursing, Faculty of Medicine, Diponegoro University, Indonesia*
[2]*Faculty of Dentistry, University of Indonesia, Indonesia*
[3]*Faculty of Nursing, University of Indonesia, Indonesia*
[4]*Faculty of Engineering, University of Indonesia, Indonesia*
Corresponding author: Anggorowati (aangham@gmail.com)

ABSTRACT

Background: Many breastfeeding mothers find that their milk production decreases or even stops when they return to work due to reduced breastfeeding hormones. Massage can stimulate the oxytocin hormone, and to replace the manual massage, a digital massager of oxytocin (DMO) is developed.
Purpose: This study aimed to identify the effects of the DMO on the milk production of the breastfeeding working mothers.
Methods: This study employed a quasi-experiment with pretest-posttest control group design. The samples were 93 breastfeeding working mothers in the community with a baby below 6 months. The samples were assigned into the intervention group (n=46) and the control group (n=47). An intervention of using the DMO was given to the mothers in the intervention group by applying the electrodes on the first intercostae of BL-17 and Bl-18 acupoints for 20 minutes in 3 consecutive days. Meanwhile, a standard treatment was given to the control group. Breast milk expression was carried out before and after the use of DMO. The data were analyzed using the Mann-Whitney and the Wilcoxon tests.
Results: The results showed that there were differences in the volume of the expressed breast milk before and after the use of the DMO (p=0.00). The mothers in the intervention group increased their milk production on an average of 23 ml when other variables affecting the breastfeeding were controlled.
Conclusion: The DMO stimulated and increased the milk production of working mothers. It can also be an alternative to the complementary therapy, especially for the nursing care management of breastfeeding mothers.

Keywords: Oxytocin; working mothers; milk production; oxytocin massager

BACKGROUND

The infant mortality rate is one of the nation's health indicators which has become the fourth target of the Millennium Development Goals (MDGs). Based on the data from the World Bank in 2010, the infant mortality rate in Indonesia is 35.3 per 1.000 live births. According to the Indonesia Demographic and Health Survey (IDHS) in 2007, the infant mortality rate is 34 per 1.000 live births (Ministry of Health RI, 2012). This statistic is higher than the other ASEAN countries such as Malaysia (6.3), Thailand (13), and Singapore (2.6) (WHO, 2011). The MDG's target in 2015 is to reduce the infant mortality to 23 per 1.000 live births (Ministry of Health RI, 2012).

The causes of infant mortality include asphyxia, low birth weight (LBW), and infections (IDHS, 2007). Diarrhea shows the highest cause of mortality due to infection (Hegar, 2010). Infants who are not breastfed are more at risk of diarrhea of 4.9 times greater than the ones who are breastfed. A study by Lamberti (2011) showed that non-breastfed babies have a risk of death of 10.52 times more due to diarrhea. Early breastfeeding can reduce the mortality rate by 22%as evident by Edmond (2006). Thus, breastfeeding indirectly reduces the infant mortality.

Breastfeeding without any supplementary foods for at least 6 months has fulfilled the nutritional needs of infants, from which they obtain perfect immune substances (Hegar, 2010; Rush, 2000). From 2007 to 2014, the phenomena of exclusive breastfeeding in Indonesia have shown a surprising statistic of below 80% as the national target (Ministry of Health RI, 2014).

Breastfeeding is mainly aimed to fulfill the need of the babies. In addition, the breastfeeding mothers will also get some other benefits. These include increasing uterine contractions, reducing bleeding in the post-partum period, controlling birth spacing, and restoring pre-pregnancy weight (Gartner, 2005). Furthermore, breastfeeding is also helpful to reduce the risk of ovarian cancer, premenopausal breast cancer, and osteoporosis (Angeletti, 2008; Awatef, 2010).

Breastfeeding period will last for at least 6 months and will continue until the age of 2 (Hegar, 2010). However, not all women are able to breastfeed in that time. Many studies have indicated various causes of failure in breastfeeding; among others, are the working mothers, maternal smoking, provision of complementary foods, anxiety and fatigue in mothers (Soetjiningsih, 2005; Kian, 2008; Matias, 2008; Khamzah, 2012).

The working mothers are at risks of four times higher for not breastfeeding their babies than those who do not work (Tan, 2011). Cardenas (2005) stated that the length of exclusive breastfeeding in the working mothers got shorter. Similarly, a study in Malaysia also showed that 51% of working mothers stopped breastfeeding. The majority of these mothers stopped breastfeeding when the baby was aged less than 3 months (Amin, 2011). Furthermore, Sadyoga (2011) indicated that only 62.2% mothers working in the government institutions, and 51.1% mothers working in the private institutions in Jakarta breastfed their babies for more than 6 months. In Semarang, it was indicated that the rate of exclusive breastfeeding in the working mothers was 5.6% (Sadyoga, 2011).

One form of satisfaction that the working mothers possess in their lives is an ability to balance their family and professional roles. Otherwise, a conflict could be triggered due to these unbalanced roles (Cardenas, 2005; Angeletti, 2008). The working mothers have to choose whether they should give a priority to their work or the breastfeeding, or balance between the two. Women with low incomes would find it difficult to combine working and breastfeeding (Kimbro, 2006).

Working mothers also have a higher level of stress due to the physical activity and workload. This stressful condition causes a decrease in the milk production. Another influencing factor is the attempts to express the milk. Many breastfeeding working mothers do not optimally express the milk due to the time constraints. A decreased breast milk production, if remains untreated, may stop the milk production (Renfrew, Lang, Wooldridge, 2008). This is likely to cause problems on the adequacy of breast milk (Permana, 2006). Other affecting factors include motivation, pain, knowledge about breast milk, fluid intake, anxiety, and husband or family supports (Nurliawati, 2010).

For working and breastfeeding mothers, an effort to maintain the production of breast milk is necessary by expressing it once in 3-4 hours during work hours. This can be manually done using a breast pump. The use of this equipment is beneficial to help the mothers express and store the milk. A manual breast pump is generally affordable and controllable for its rhythm as adjusted to the mothers' wish. However, it can cause a breast tissue damage and infection. On the other hand, an electric breast pump provides a shorter time for milking. Unfortunately, it brings some sides effects such as pain, redness, uncomfortable sensation and breast tissue damage (Gill, 1993; Brown, 2005).

The ability of mothers to produce sufficient milk during a milking period depends on the letdown reflex. It is a response of the nervous system that causes the breast milk producing cells contract so that the milk inside is squeezed out, flows along the milk duct, and comes out through the nipples. The letdown reflex will work only if given a command from the oxytocin hormone. A high level of oxytocin hormone maximizes the amount of breast milk reservoir. The letdown reflex or oxytocin reflex is a neuroendocrine reflex which is stimulated by the breastfeeding activities. Nervous impulses from the nipple to magnocellular oxytocin neurons in the hypothalamus stimulate the synthesis of the oxytocin and are then taken to the capillary neurophysics. Oxytocin is released from the posterior pituitary neurosecretory terminal and runs in the blood flow towards the mammary glands, which serve as a place to contract breast myoepithelial cells and produce the milk flow. This kind of reflex reduces or eliminates the effects of dopamine, causing the release of prolactin (Greenstein, 2010; Walshal, 2010).

Letdown reflex will increase when mothers are imagining of breastfeeding their baby, seeing the baby, listening to the baby sounds, and kissing the baby (Soetjiningsih, 2005). In addition, the stimulation can also be done by promoting a comfortable atmosphere and avoiding stress, such as massaging the breasts, stimulating the nipples, and massaging the back area up and down. A high level of oxytocin increases the pressure of first wave amplitude in the ductus and causes the milking reflex (Walshal, 2010).

One of the ways to stimulate oxytocin hormone is by massaging (WHO, 2009; Lund 2002). A massage which is performed on the back, including the neck and shoulders, with a prone position for 30 minutes gives effects on the level of oxytocin in women before and after this intervention (Wikstrom, 2003). According to WHO (2009), the massage is performed in the back area with a distance of 1-2 cm from the spine. When oxytocin increases, the milk flow is getting stronger so that much more milk can be produced during the expression. The working mothers need more oxytocin stimulation to reduce the stress and create a relaxed sensation. Unfortunately, massaging is so far much more done when the mothers are under the treatment in hospitals or at special times at home. In doing so, they require not only a particular time but also an assistance of others who are capable of performing a massage (WHO, 2009).

The massage technology assists the breastfeeding working mothers to become more self-reliant as always suggested by the Oremtheory. This self-reliance is associated with the ability of the mothers to do self-care to meet their own need during the breastfeeding period. A nursing intervention which promotes the milk production and provides an ease of its implementation is therefore required. Within this context, the breast feeding working mothers can do the procedure themselves any time they wish since it can be done independently without depending on others. Anggorowati (2014) stated that a square wave is appropriate for use to stimulate the oxytocin hormone to increase the milk production. This type of wave is adopted in this study in the form of a massage device called the Digital Massager of Oxytocin (DMO). Therefore, the present study is the first study to apply the digital massage device to help the breastfeeding mothers.

OBJECTIVE

This study aimed to identify the effects of the digital massager of oxytocin (DMO) on the milk production of the breastfeeding working mothers.

METHODS

The present study was approved by the Ethics Committee of the Faculty of Medicine, Diponegoro University, Indonesia. The study employed a quasi-experiment with pretest-posttest control group design and was conducted in the city of Semarang. A stratified random sampling was used to select the research sites. Seven Public Health Centers (PHCs): Bandarharjo, Bangetanyu, Candilama, Rowosari, Padangsari, PudakPayung, and Mangkang were involved in the study.

The population of the study was the breastfeeding working mothers in Semarang city. The samples were calculated based on the sample size to obtain a mean difference. The inclusion criteria included the working mothers who had babies of age 0-6 months, breastfed their babies, had a body mass index equal to or greater than 18 and did not consume any drugs affecting the milk production. Furthermore, they did not experience a moderate level of anxiety or more severe category. They also had a baby that was born at term and had no physical defects such as cleft lip. Meanwhile, the exclusion criteria were the infants who received supplementary food, and the mothers who had a severe illness.The total samples were 94 mothers. They were assigned into the intervention group (n=47) and the control group (n=47). However, in the intervention group, 1 participant dropped out and thus only 46 participants were analyzed.

All participants were given a pre-test. A day after it, the intervention was begun. The participants in the intervention group started to be given a massage using the DMO. Technically, the electrodes of the DMO were applied on the acupoints of Bl-17andBl-18 for20minutes, and the milk expression was done afterward. This intervention was given in 3 consecutive days. Meanwhile, in the control group, a standard treatment was given. As for 5 days, the mothers in the intervention and control groups expressed their breast milk, and the milk produced was measured for its volume each day. A post-test was administered on the fifth day both in the intervention and control groups.

The instrument used in this study was the questionnaire about the characteristics of participants (age, education, and length of working time, type of childbirth, and the start of breastfeeding). In addition, a documentation sheet for the milk production was also provided.

The differences in the milk production of the breastfeeding working mothers with and without the intervention of the DMO were initially tested using the unpaired t-test. However, the non-parametric Mann-Whitney test was finally used since the data were abnormally distributed. On the other hand, the differences in the milk production before and after the intervention were initially tested using the paired t-test. As the data distribution was abnormal, the Wilcoxon test was used instead.

The data in this study were collected after obtaining the ethical approval from the Ethics Committee of the University of Indonesia. An informed consent and information on the study protocols were also given to the participants, including their involvement and agreement to participate.

RESULTS

Table 1. Distribution of the frequency and homogeneity of the participants in the intervention and control groups

Variables	Intervention Group (n=46)				Control Group (n=47)				p
	f	%	Mean	SD	f	%	Mean	SD	
Age			30.65	5.04			29.45	4.12	0.26
Time of starting breastfeeding (hour)			17.52	31.49			13.00	18.99	0.09
Length of work (hour)			7.73	1.74			7.65	1.54	0.93
Education									
Primary	5	10.9			4	8.5			0.74
Secondary & above	41	89.1			43	91.5			
Type of labor									
Vaginam	33	71.7			29	61.7			
Section caesarean	13	29.3			18	38.3			0.42

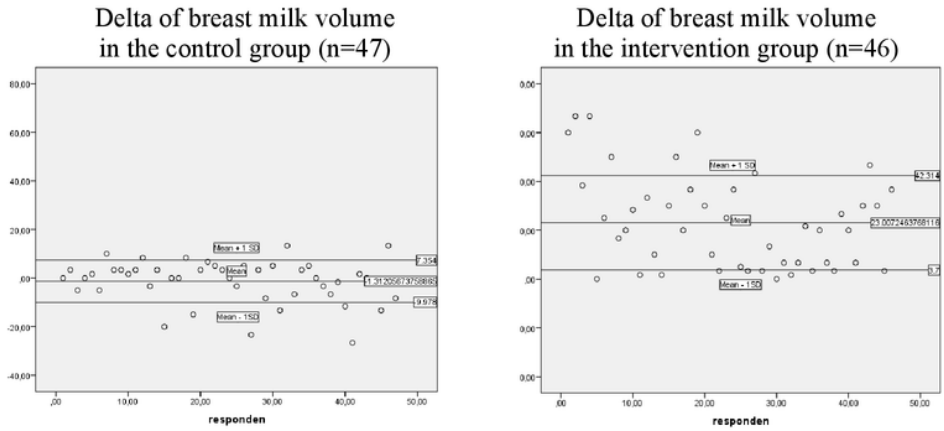

Figure 1. The average of milk production per milking period on breastfeeding working mothers in the intervention and control groups

As seen in Table 1, the results of the homogeneity test found no differences invariance between the participants in the intervention group and the control group. The participants' age (p-value = 0.26) and the time of breastfeeding start (p- value= 0.09) were similar. Furthermore, the length of work (p-value= 0.93) and the type of labor (p-value=0. 42) also showed similarities. In short, the homogeneity test showed no differences in variance between the intervention and the control groups.

In Figure 1, it could be seen that the average milk production of the participants in the intervention group showed a significant difference (p- value = 0.00) before and after the use of the DMO. Before the intervention, the average milk production every single expression was 92.28 ml, and after the intervention, the average volume increased to 113.04 ml per expression period. The results also showed that the delta of the breastmilk volume in the intervention group was 20.76 ml and in the control group was 3.62 ml, indicating that there was an average difference in the milk production with a p-value of 0.01.

DISCUSSION

The findings showed a difference in the milk production between the mothers who used the DMO and the ones who did not use. This indicated that the DMO was able to increase the milk production as evident by the delta of breast milk volume before and after the application. This finding supports the study by Widayanti (2013) which found that mothers who were given a massage stimulation of endorphins, oxytocin and suggestive (SPEOUS) after giving birth, had a significant difference in their milk ejection than those who were not. This indicates that the massage can stimulate the oxytocin hormone to express the breast milk, and gives feedbacks towards the prolactin hormone, which therefore stimulates the milk production.

The present study is in line with Suryani & Astuti (2010) which found that the oxytocin message in postpartum mothers gave effects on the milk production on the first day and after two weeks from the birth time. Furthermore, this study also supports Budiati, et al. (2009) which stated that there were differences in the milk production between the post sectio mothers who were given the health education and oxytocin massage interventions, and those who were not. In the study, the milk production was measured in terms of satisfaction of the milk production, the lactation from mother indicator and the lactation from baby indicator (Budiati, et al., 2009).

Another study with similar findings was conducted by Mardiyaningsih, et al (2011). The study showed that the milk production and lactation of the post sectio mothers who were given the Marmet techniques and oxytocin massage were 11.5 times higher than those who were not (Mardiyaningsih, et al, 2011). In the present study, though the application of oxytocin massage was replaced by a digital device (DMO), the production of milk remained different. This shows that the manual massage is replaceable with the use of the DMO.

The current study differs from other previous studies in the sense that the measurement of breast milk volume was administered in every expression period. Many other studies measured the milk production in terms of satisfaction of lactation, lactation of mother indicator, lactation of baby indicator, and lactation of breast milk itself. This study is also in line with Mexitalia (2010) which found that the breast milk expressed by the mothers during a milking period ranged from 90-120 ml in volume.

The present finding shows that the main factor causing the increase of the milk production is the use of the DMO. The increased milk production can be predicted from the use of the DMO based on the regression equation resulted in this study. The need for increased milk production can be adjusted with the use of DMO in a day.

In a study by Abdullah (2012), it was shown that in the working mothers, the activity of breastfeeding could stop due to the very little production of milk. Considering this situation, the DMO can be used as an independent intervention for the breastfeeding mothers who have problems with the milk production.

The use of the DMO in this study determined the increased milk production. Meanwhile, the characteristics of the participants were not a determining factor of this improvement. This does not mean that the present finding is not in accordance with Arifin (2004), which stated that the milk production was affected by the frequency of milk ejection, nutrition, stimulation of early breastfeeding to the baby, and the age of the baby. The nutritional factor in this study was limited by the mothers' body mass index (BMI), and the age of the infant was restricted to be less than six months old so that the effects of the DMO were not influenced by the other factors.

The findings in this study are consistent with the nursing interventions to address the issue of the ineffective breastfeeding. The DMO can be an alternative to replace the use of oxytocin stimulation with manual massage to deal with the problem of the ineffective breastfeeding (Herdman, 2014). The device can be independently used by the mothers

with an easy operation tool. Moreover, the results of this study support the goal of self-care to promote someone's self-reliance (Orem, 2001). This study also confirms Capik (2015), stating that the use of the Orem's theory could prevent the ineffective breastfeeding problems.

CONCLUSION

The study indicated similarities in the characteristics of participants both in the intervention and the control groups. The intervention of using the DMO on the acupoint Bl 17 and Bl 18 for 3 consecutive days was evident to increase the milk production of the breastfeeding working mothers.

Based on the findings, it is recommended that the breastfeeding mothers, especially the working ones use the DMO as a nursing intervention which can be independently performed to maintain or increase their milk production during working hours. The breastfeeding mothers who experience a decrease in their milk production are urged to use the device routinely every day. The health care industry could use the DMO as a basis for more specific medical equipment. In addition, the use of DMO can also be an alternative to the complementary therapy, especially for the nursing care management of breastfeeding mothers.

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