

# Investigating the Effect of Reflexology on the Breast Milk Volume of Preterm Infants' Mothers

## Abstract

**Background:** Reflexology is an interventional method which may lead to improved breast milk. Because the mechanism of milk production is complex, detailed research is required on the relationship between lactation and reflexology. Therefore, the aim of the present study was to determine the effect of reflexology on the volume of milk among mothers with premature infants. **Materials and Methods:** This clinical trial was conducted among 50 mothers with premature infants in two groups of 25 patients admitted to the neonatal intensive care unit of Alzahra and Shahid Beheshti hospitals of Isfahan, Iran from August 2015 to November 2015. The patients were selected through convenience sampling method and divided into control and reflexology groups through random allocation. In the reflexology group, massage of the sole of the foot and foot was done in six sessions. The control group received regular breastfeeding training. Data were analyzed using descriptive and inferential statistics. **Results:** Repeated-measures analysis of variance test indicated that the mean volume of breast milk in reflexology group ( $F = 44.002, p < 0.001$ ) and control group ( $F = 43.09, p < 0.001$ ) differed significantly at different times. Independent *t*-test showed that the mean increase in milk volume from day 1 to day 5 after the intervention compared to before the intervention was significantly higher in the reflexology group compared to the control group 1 days after the intervention ( $t=5.25, p<0.001$ ), 2 days after the intervention ( $t= 4.81, p<0.001$ ), 3 days after the intervention ( $t=3.55, p=0.001$ ), 4 days after the intervention ( $t= 2.98, p=0.004$ ), 5 days after the intervention ( $t= 2.50, p=0.020$ ). **Conclusions:** The results indicate that reflexology is effective on the volume of milk of mothers, and this low-cost and easy procedure can be used along with regular lactation training.

**Keywords:** Breastfeeding, premature infant, reflexology

## Introduction

Breast milk provides all the nutritional needs of the child during the first 6 months of life. Moreover, the necessity of lactation promotion and support for the health and development of children is indisputable, and thus, breastfeeding is one of the priorities of public health in the world.<sup>[1]</sup> Exclusive breastfeeding during the first 6 months and its continuation up to 1 year of life can prevent the death of 3.1 million infants annually.<sup>[2]</sup>

Premature infants and their parents encounter many psychophysiological failures, concerns, and pressures. Researchers have studied psychological differences between parents with premature and full-term infants. Life-threatening events due to the experience of admission into the neonatal intensive care unit (NICU), along with the differences in the needs and behavior of premature infants, present a significant challenge to mothers.

Mothers of premature infants experience a lot of stress due to premature delivery and hospitalization of infants in the specialty and long-term care. Therefore, emotional responses do not have to occur as a result of these conditions affecting the parent's performance.<sup>[3]</sup>

The hospitalization of infants in NICU is accompanied with increasing concern and anxiety among parents. As a result, they repeatedly experience a huge amount of mental distress due to the lack of involvement and participation in neonatal care, and consequently, the feeling of inadequacy, anxiety, depression, as well as a change in the parental role.<sup>[4]</sup> Mothers with mental disturbances require support to continue lactation. Stress and anxiety usually reduce mothers' self-confidence and make coping with problems difficult for them. Therefore, failure in lactation is higher among these mothers. According to the United Nations International

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Access this article online

Website: [www.ijnmrjournal.net](http://www.ijnmrjournal.net)

DOI: 10.4103/ijnmr.IJNMR\_175\_16

Quick Response Code:



**How to cite this article:** Mohammadpour A, Valiani M, Sadeghnia A, Talakoub S. Investigating the effect of reflexology on the breast milk volume of preterm infants' mothers. Iranian J Nursing Midwifery Res 2018;23:371-5.

**Received:** September, 2016. **Accepted:** February, 2018.

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Children's Emergency Fund (UNICEF) in 2005, only 39% of all infants in the world and 27% of infants in Muslim countries are exclusively fed with breast milk during the first 6 months of life. In addition, according to a recent study, this rate is only 23.1% in Iran.<sup>[5]</sup>

Lactation is a complex process affected by not only the tissue of the breast and the endocrine system but also genetics and psychological and environmental sensibilities. Most lactation problems associated with premature infants are related to mother's stress, which can threaten internal homeostasis in the body. Mother's fear and anxiety may cause physiological stresses and also lead to the production of adrenalin; adrenaline affects lactation by suppressing oxytocin secretion.<sup>[4]</sup> There are many interventional methods that result in improved milk, including putting a warm towel on the breast for 5 to 10 minutes, bathing and massaging the breast, rolling the fist on the breast, rotational massage using the tip of the fingers, and back massage.<sup>[5]</sup>

Reflexology is a treatment in which pressure is applied to areas in the hands, feet, and ears. Pressing these areas can restore balance to the body and result in the secretion of hormones or digestive enzymes.<sup>[6]</sup> Sufficient information is not available on reflexology and its mechanism of action.<sup>[7]</sup> Reflexology has stimulating effects on the central nervous system (CNS) and mood enhancing effects, and causes deep relaxation; hence, reducing mental stress and pressure and improving blood flow.<sup>[8]</sup> Reflexology has a comprehensive function, i.e., in addition to the reduction of physical problems (pain, physiological indicators, etc.); it also affects the human mental dimension (anxiety, depression, stress, schizophrenia).<sup>[9]</sup>

Because reflexology is a noninvasive, inexpensive, and applicable method, it can be performed by a skilled or trained midwife or nurse. Therefore, it can be considered as an alternative to pharmaceutical methods in view of its safe nature.<sup>[10]</sup> In reflexology, through pressing and massaging the reflective areas on the sole of the foot, hand, and ear, all parts of the body can be affected. Energy flows through the vertical regions across the body from the feet to the head; hence, applying pressure to a reflex point on the sole of the foot can affect all the organs, glands, bones, and muscles at that point.<sup>[11]</sup>

Many studies have been conducted on reflexology. For example, a study on the effect of foot reflexology on pain and anxiety among women after selective cesarean indicated that reflexology in post-cesarean care was effective in reducing mother's pain; however, it did not reduce anxiety levels.<sup>[12]</sup> Nevertheless, this result is in contradiction with those reported by Tipping and Mackereth.<sup>[13]</sup>

In a study on the effect of reflexology on homeostasis and milk production, reflexology has been shown to increase milk, such that performing reflexology three times a week

for 21 days resulted in 10 ml of milk secretion among mothers.<sup>[13]</sup> Moreover, performing reflexology with the aim of increasing milk was effective in empowering mothers and fathers, improving lactation, and controlling the feelings of parents. However, despite their findings, the authors concluded that, because the mechanism of milk production is complex, detailed studies are required on the relationship between lactation and reflexology.<sup>[13]</sup>

Another study regarding the effect of acupressure on the volume of milk among mothers indicated that the difference in mean breast milk volume in 2 and 4 weeks after acupressure on depression-related acupressure points was statistically significant in both acupressure and routine lactation training groups ( $p < 0.001$ ).<sup>[14]</sup> According to the findings, both acupressure and routine breastfeeding methods were effective on the volume of milk in lactating mothers; however, acupressure was more effective compared to conventional training.<sup>[14]</sup>

Furthermore, in another study, there was no significant difference in the severity of pain after foot reflexology among patients with cancer.<sup>[15]</sup> The results of this study are inconsistent with those of Razmjo *et al.*<sup>[12]</sup>

Although numerous studies have been carried out on reflexology, due to the contradictory results of the mentioned studies with this study and the limited number of studies on lactation and reflexology, the present study was performed with the aim of investigating the effect of reflexology on the volume of milk among mothers with premature infants.

## Materials and Methods

The present study was a clinical trial with the registration code IRCT2016120126153N3 comprising two groups (intervention and control) using a pretest–posttest design. It was performed in the NICUs of Alzahra and Shahid Beheshti hospitals in Isfahan, Iran from August 2015 to November 2015 after explaining the goals of the research to the parents and obtaining informed consent from them. The number of patients was calculated with 95% confidence interval and 84% test power coefficient as 25 individuals in each group. Then, 25 cards with the each group name were provided and kept in a bag. Then, each mother of a premature infant selected one of the cards and was placed in the selected group. The selected card was removed from the bag. Therefore, in this research, the participants were divided into two groups of intervention and control using convenience sampling and random allocation (lottery method) based on the inclusion criteria [Figure 1]. The inclusion criteria in this study were being a mother undergoing cesarean section and having an infant with a gestational age of 29 to 36 weeks admitted to the NICU, residence in the lactating mothers' room, lack of injury, wound, or tumor on the feet for reflexology, passage of 3 days since delivery, lack of lactation 3 hours

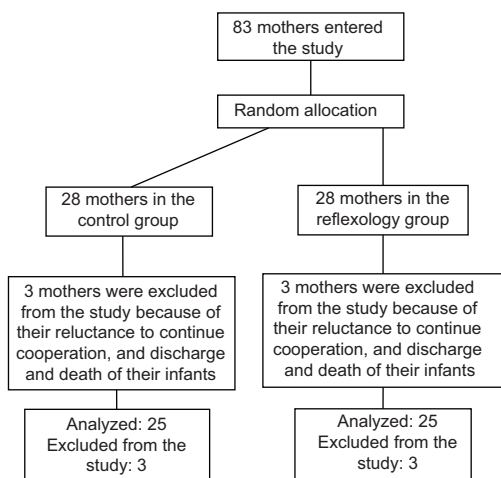


Figure 1: Consort diagram

before measuring, and lack of a history of back massage and reflexology use. Exclusion criteria included mothers' reluctance to continue the research at any time during the study, mother's death during the study, having a recent stressful experience (in the past 6 months) such as death and divorce, illness or hospitalization, or the need to take medications affecting breast milk such as antibiotics, anticonvulsants, and antipsychotics.

In this study, mothers collected milk themselves using a breast pump for 15 min at 11 a.m. and measured the milk using a baby milk bottle; the measurements were recorded in a table. Then, the reflexology intervention was performed – one session a day for 6 days. In each session, 60 min after reflexology, mothers were asked to collect milk themselves using an electric breast pump and the volume of milk collected in each session was recorded in a table. To perform reflexology, the mother first washed her feet with warm or lukewarm water and was placed in a comfortable position, supine or sitting. Then, starting at the calf to the ankle and moving on to the sole of the foot and finally the toes the mothers received a simple massage, and this action was repeated several times. The ankle was also rotated on both sides in such a manner as to support the sole of the foot with one hand. These two relaxation techniques relax the feet and prepare them for the practice of reflexology. Subsequently, the researcher first applied continuous pressure to kidney one, and then, the pressure was applied in a rotational manner. Next, the pituitary point in the middle of the toe was pressed continuously, and then, the points on the foot between the second, third, and fourth metacarpus were reflected with the clockwise rotational movement of the thumb. In total, reflexology for each foot separately lasted 20 min for a total of 40 min (including 15 min of general reflex and 5 min of special reflex). In addition, only routine interventions were performed in the control group and the mothers' milk was measured and recorded using the electric breast pump available in the ward every day at 11 a.m. for 6 days. Data were analyzed

using descriptive statistical methods, one-way analysis of variance (ANOVA), repeated-measures ANOVA, and Chi-square test in SPSS software (version 18, SPSS Inc., Chicago, IL, USA). A *p* value of less than 0.05 was considered significant.

### Ethical considerations

At all stages of the study, the researchers precisely observed ethical principles. After explaining the goals and importance of the study and lack of complications for the infants under intervention, written informed consent was obtained from mothers. They were also informed that they could leave at any stage of the study.

### Results

The results of the present study showed that the mean demographic characteristics of the participants such as the gender of the infants (*p* = 0.20), consuming food other than hospital food (*p* = 0.90), use of medication by the mother (*p* = 0.30), mother's education level (*p* = 0.65), mean age of mothers (*p* = 0.20), gestational age (*p* = 0.16), and number of pregnancies (*p* = 0.50) were the same in the two groups. Repeated-measures ANOVA showed that the mean volume of breast milk in both groups differed significantly at different times (*p* < 0.001). Independent *t*-test showed that the mean increase in milk volume from day 1 to day 5 after the intervention, relative to before the intervention, was significantly higher in the reflexology group compared to the control group (*p* < 0.05). However, 6 days after the intervention, there was no significant difference between the two groups compared to before the intervention (*p* > 0.05) [Table 1].

### Discussion

The results of this study showed that the mean total score of milk volume in the reflexology group increased after the intervention compared to before the intervention. The mean total increase in milk volume in the reflexology group was higher than the control group, especially during the first 4 days of the intervention; this difference was statistically significant. Moreover, the mean variation in milk volume from day 1 to day 4 after the intervention was significantly higher in the reflexology group than the control group compared to before the intervention.

In this regard, a study reported that the average volume of mothers' milk before, 2, and 4 weeks after the intervention in the acupressure group was more than the control group.<sup>[14]</sup> Therefore, the present study results are consistent with that of this study, with the difference that this study has only discussed the effect of acupressure; in addition, contrary to the present study, acupressure was effective for more than 4 days. Therefore, it is likely that this difference in outcome is due to the difference in the study method (location and duration of intervention) of these two studies.

**Table 1: Comparison of changes in breast milk volume at three different time periods with preintervention period**

| Variation in milk volume (cc)<br>relative to before the intervention | Mean (SD)    |              | Independent <i>t</i> -test |          |
|--|--------------|--------------|----------------------------|----------|
|  | Reflexology  | Control      | <i>t</i>                   | <i>p</i> |
| 1 day after the intervention   | 3.18 (3.02)  | 0 (0)        | 5.25                       | <0.001   |
| 2 days after the intervention  | 7.22 (3.25)  | 3.30 (2.45)  | 4.81                       | <0.001   |
| 3 days after the intervention  | 11.46 (4.25) | 6.64 (5.29)  | 3.55                       | 0.001    |
| 4 days after the intervention  | 14.94 (5.91) | 10.66 (4.08) | 2.98                       | 0.004    |
| 5 days after the intervention  | 18.54 (5.85) | 14.52 (5.50) | 2.50                       | 0.020    |
| 6 days after the intervention  | 20.98 (6.99) | 18.74 (7.50) | 1.09                       | 0.280    |
| Repeated-measures ANOVA  | <i>F</i>     | 44.002       | 43.09                      |          |
|  | <i>p</i>     | 0.001        | 0.001                      |          |

Furthermore, some studies have examined the effect of reflexology on other body systems and indicated that foot reflexology was effective in improving the physical and mental symptoms of premenstrual syndrome.<sup>[8]</sup> Another study also showed a significant difference in pain severity before, immediately after, and 6 weeks after reflexology.<sup>[10]</sup> The results of this study are consistent with the present study. However, the duration of the effect of reflexology in this study was longer than the present study. In line with this study, a study showed that reflexology method reduced the fatigue scale score. Therefore, the researcher recommended reflexology to control fatigue, pain, and symptoms of reduction of cramp severity, especially among patients with low levels of albumin, as well as among the elderly and women.<sup>[16]</sup> Therefore, according to the results of the studies by Abdullahi *et al.*,<sup>[8]</sup> Valiani *et al.*,<sup>[10]</sup> and Ozdemir *et al.*<sup>[16]</sup> it can be said that reflexology reduces the severity of pain and anxiety by reducing the level of adrenaline and noradrenaline and increasing endorphins and oxytocin; oxytocin also affects lactation.<sup>[10,13]</sup>

The results of this study indicated that reflexology affected increase in breast milk for the first 4 days of intervention. Moreover, lactation time during the first few hours and the frequency of lactation increased the rate of milk secretion, early milk flow, and its prolonged duration.<sup>[18]</sup> Thus, breastfeeding in the first hours after birth has been emphasized by the World Health Organization (WHO) as the fourth step of the 10 steps of success in breastfeeding in a child-friendly hospital.<sup>[19]</sup> In addition, this care does not have any cost or require special equipment; however, it requires trained personnel with sufficient time to perform reflexology.<sup>[10]</sup> Therefore, reflexology along with medications for increasing milk supply and lactation training can be used to increase breast milk, especially in the first 4 days after birth when mothers usually have low milk levels.

Given that the researcher found a limited number of studies on the effects of reflexology on mothers' milk, further studies are required in this area.

The limitations of this study were the level of interest and mental status of the participants when performing the intervention. Furthermore, despite the request of the

researcher from the intervention and control groups not to use other milk-enhancing methods, they may have used these methods. In addition, the impossibility of selecting participants who had had a natural delivery was another limitation of this study.

### Conclusion

According to the results, reflexology can be an effective intervention to increase the milk volume of mothers with premature infants admitted to the NICU. Hence, the use of this method is recommended for care planning in the NICU to increase the milk volume of mothers with premature infants, especially in the first days of lactation.

### Acknowledgement

We would like to thank those who participated in this study.

### Financial support and sponsorship

Isfahan University of Medical Sciences (Project No 394462).

### Conflicts of interest

Nothing to declare.

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