Original Article

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The Effect of Infant Massage on Attachment Behaviors in Mothers of Premature Infants

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ABSTRACT

BACKGROUND AND OBJECTIVE: Mother - infant attachment is impaired with the hospitalization of the premature infant and separation from the family, which impairs the infant's development and the mother's ability to care for the infant. The aim of this study was to determine the effect of infant massage on attachment behaviors in mothers of premature infants.

METHODS: This cluster randomized controlled trial was performed on 54 mothers and premature infants 34 to 36 weeks hospitalized in the intensive care unit of Shahid Sadoughi and Afshar hospitals in Yazd. First, the research was divided into control and experimental groups by random draw method and then the samples were selected by convenience sampling. In the experimental group, each mother massaged her infant once a day for 5 consecutive days. The control group received only the routine care. Maternal attachment was measured and compared using Avant's mother-infant attachment behavior questionnaire with a minimum score of zero and a maximum of 195 in both groups during breastfeeding and interaction with the infant, before the intervention, on the third day and fifth day after the intervention.

FINDINGS: Mean score of mothers' attachment behaviors in the experimental group on the third day (50.63±6.06) and the fifth day (66±9.96) showed a statistically significant difference with the control group on the third day (44.67±4.12) and the fifth day (49.70±4.75), respectively ($p<0.001$).

CONCLUSION: The results of the study showed that massage in premature infants can be effective in increasing maternal attachment behaviors.

KEY WORDS: *Premature Infant, Attachment, Massage.*

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Introduction

Attachment is a warm and lasting relationship between mothers and infants, which is satisfying for both and facilitates mother-infant interaction (1). This emotional connection is formed before birth during pregnancy and increases sharply after birth (2). After childbirth, visual, auditory and tactile contact of mother and infant is promoted (3) and it causes safety and security and leads to the development of neurological and behavioral consequences (4). Attachment disorder is the result of separation from the mother or lack of care or interaction with the mother, which can lead to complications such as separation anxiety disorder and physical and psychosocial failure (5, 6).

Several factors influence the occurrence of maternal attachment behaviors (2, 7, 8). Premature delivery, which includes birth before 37 weeks of gestation and hospitalization of the infant, is an event with several complications that can cause stress and impair the expected interaction skills between parents and their infant (9-11). The first hours after the infant is born are a very sensitive stage in the formation of attachment between mother and infant. In most cases, infants are separated from the mother immediately after birth due to prematurity and its complications, and are transferred to the neonatal intensive care unit (12), which separates the parents from the infant and cause psychological damage and turmoil in the family (13).

If mother-infant communication is abnormal or delayed due to prematurity, maternal or infant illness, birth defects, or family stress, it may impair the infant's development and the mother's ability to care for the infant (8). With the separation of the mother from the infant, the most important factor of attachment is physical contact with the infant (14) and the visual, auditory and tactile contact between mother and infant is limited. This limitation causes anxiety in mothers and leads mothers to a negative understanding of their motherly role (4, 15). These stress-induced behaviors produce hormones in the infant that affect the infant's respiration, heart rate, and body temperature, and may delay attachment (16, 17).

Nurses can have a positive effect on strengthening maternal attachment through support, training and empowerment of mothers (18-21). Infant massage is an effective, simple and inexpensive method that gives the mother the opportunity to have a pleasant interaction with her infant and to establish a deep relationship with him/her through eye contact and gradually acquire the necessary abilities as the primary caregiver of the child (22-24). Infant massage can be an important strategy in supporting mother and infant (25, 26). Massage of premature infants leads to stabilization of heart rate and respiration (27), weight gain, early discharge from the hospital, better bowel movements, improved sleep and reduced irritability (26, 28).

The results of several studies demonstrated the effect of massaging the body of the infant by the mother in the long term (29) and short term (1) on reducing sadness and depression (26, 30), improving mood (31), increasing maternal attachment to the infant (1, 29), improved mother-infant interaction (32) and reduced maternal negative emotion (33). Maternal massage is expected to increase maternal emotional attachment and self-confidence by reducing postpartum grief and depression (34), and massage also provides an opportunity for close communication, touch, and skin contact for both mother and infant. This in turn causes the secretion of oxytocin and increases the pain threshold and love for the infant in the mother (3), which enables the mother to know her child better and increase her response to her child (35). However, citing the results of Curry's research, Shariat et al. state that skin contact has not been shown to increase maternal attachment (36).

Research by Porter et al. also showed that massage was not effective on maternal attachment (37). Another study showed that the developmental care of preterm infants, part of which was massage, did not increase maternal attachment during the first year after birth (38). On the other hand, it seems that there is not enough research on the effect of infant massage on the attachment of mothers of preterm infants under 37 weeks in general and in Iran in particular, and in this regard, a recent study was performed on premature infants (39).

Considering that a large number of premature infants in the first days of life need to be hospitalized in the neonatal intensive care unit, and separation from the mother and hospitalization causes attachment disorders, and since it is necessary to strengthen the role of nurses as supporters of mothers and given the contradictory results of the existing studies and insufficient research on the effect of massage on premature infants and maternal attachment, it seemed necessary to conduct this research. Therefore, the present study was conducted to determine the effect of infant massage on attachment behaviors in mothers of premature infants in neonatal intensive care unit.

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Methods

This cluster randomized controlled trial was approved by the ethics committee of Shahid Sadoughi University of Medical Sciences in Yazd with the code IR.SSU.RES.1397.048 and registered in the clinical trial database with the code IRCT20180621040184N1. This study was conducted on 54 mothers with premature infants hospitalized in the neonatal intensive care unit of Shahid Sadoughi and Afshar hospitals in Yazd in 2018. In order to prevent the exchange of information between the control and experimental groups, both hospitals were randomly assigned to the control and experimental groups by random draw. Then, samples were selected through non-probability convenience sampling from mothers and infants in each hospital. Considering the significance level of 5% and the test power of 80% and according to a previous similar study (1), the standard deviation of the attachment score S= 4 to achieve a significant difference of at least 3 units in the average attachment score in the two Group, 27 people were assigned into each group.

Mothers speaking Persian, minimum literacy and singleton pregnancies with infants 34 to 36 weeks gestation, breastfeeding or formula feeding and 3 to 5 days after childbirth were included in the study. Infants conceived via IVF or after years of infertility and infants with severe abnormalities and disorders of the heart, lungs, nerves and muscles requiring intubation, mothers with dissatisfaction with the gender of the infant, having a history of high-risk behaviors in the mother or spouse such as history of prison, history of substance abuse (drugs and alcohol) and mothers who used antidepressants were excluded. Mothers' unwillingness to continue participation, discharge of the infant before the end of the study and exposure of the infant to mechanical ventilation or resuscitation during the intervention led to loss of samples.

Before conducting the research, the informed consent form was read by the parents and their written consent was obtained in two copies for their participation in the research. In the experimental group, two one-hour training sessions on massage were held for mothers in small groups (4 to 5 people), and at the end, practical massage exercise was performed by mothers under the supervision of a researcher. In the experimental group, each mother massaged her infant in the morning shift (8 to 12 A.M.), once a day for 30 to 40 minutes after breastfeeding for 5 consecutive days in the presence of the researcher. The control group received only routine ward care. To perform the massage, after washing hands according to hygiene protocols (21) and drying and warming them, sweet almond oil from a commercial brand called FADAK was poured on the palm.

The massage technique (field technique) (21) consisted of three 5-minute steps that lasted a total of 15 minutes. In the first and third stage, the infant was placed in a supine position and the massage was performed as follows: 1- from the top of the head to the neck and vice versa 2- from the neck to the shoulders and vice versa 3- from the top of the back to the waist and vice versa 4- from the shoulder to the hand and then in the back direction in both hands 5- from the thigh to the ankle and then in the back direction in both feet. Massage was performed in each of the mentioned areas in 12 5-second movements. In the second stage, the infant was placed in a supine position and the inactive movements of flexion and extension of the arms and legs were done separately and with both legs together, in 5 one-minute steps, each step involving 6 10-second movements.

Demographic information including age, education and occupation of the mother and type of delivery as well as the gender of the infant, chronological age and fetal age of the infant, birth rank of the infant in the checklist were completed by the researcher. Maternal attachment was measured and compared using Avant's mother-infant attachment behavior questionnaire. Its scientific validity was first confirmed by Avant (40, 41) and then by making changes, the validity of this tool in Iran was confirmed and the reliability of this tool was determined by simultaneous observation by two trained individuals with a correlation coefficient of 90% (1, 19, 33) and has been used in several studies (1, 18-20, 39).

Avant checklist consists of 13 behaviors in three types of "emotional behaviors" including kissing, looking, cuddling, talking, checking the infant, smiling and shaking, "proximity behaviors" including hugging without touching the mother's torso, hugging as the mother comes in close contact with the infant, hugging as the arms wrap around the infant, and "care behaviors" including changing diapers, tapping the infant on the back to expel stomach air, and tidying up the infant. For each behavior, if it is performed by the mother in every one minute, it is considered number one and if it is not performed, it is considered zero and the score of each behavior is calculated according to its repetition in 15 minutes. Therefore, the minimum score for each behavior is zero and the maximum is 15 and the maximum score for all attachment behaviors is 19). Of course, since repetition of some behaviors such as

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changing diapers or clothes may occur infrequently, the actual score is lower than this, but the difference between the two groups is the difference in the average number of behaviors, and higher total score indicates stronger mother - infant attachment.

Assessment of attachment in both groups was done on the first day (before the intervention) and the third and fifth day after the intervention (with an interval of one hour from the time of massage) when the mother was on the infant's bed, or wanted to feed her infant or interacted with her infant. To assess the attachment, two research assistants who were nurses in the neonatal intensive care unit and were unaware of the goals and methods of the project, each observed maternal attachment behaviors separately in the two hospitals in a specific period (8 to 12 A.M.) and recorded it in the relevant checklist.

The researcher assisted in assessing the mother's attachment at a distance from the mother and infant to prevent natural interaction between mother and infant. The duration of observation of mothers' behavior was 15 minutes. Each minute was divided into two 30 seconds, in which the mother's behaviors were observed in the first 30 seconds and recorded in the second 30 seconds. Thus, the frequency of the desired behaviors during 15 minutes was calculated as the score of each mother's attachment behavior. If the mother interacted with her infant for less than 15 minutes, the assessment was performed in later assessments. The seconds were counted by a stopwatch.

To determine the reliability of records by the evaluators, first 5 mothers from each hospital (ten people in total) who were not part of the study samples, were selected and then the scores of their attachment behaviors were recorded by two evaluators using the ICC (Interclass Correlation Coefficient), which was found to be 0.95.

To analyze the data, Kolmogorov-Smirov test was performed and after determining the normality of the data, descriptive statistics including mean and standard deviation and percentage as well as inferential statistics including independent t-test were used to compare quantitative variables such as attachment score, maternal age and gestational and calendar age of the infant. Chi-square and Fisher test were used to compare qualitative variables such as job, education and birth rank, gender while repeated measures ANOVA was used to compare the mean changes in the two groups in SPSS software version 21. $p<0.05$ was considered significant (Figure 1).

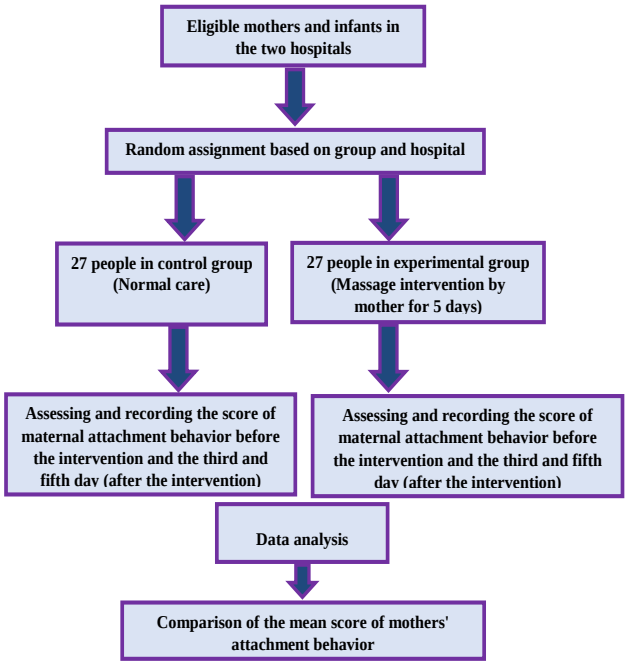


Figure 1. Study flowchart

Results

The findings of this study showed that there is no significant difference between the two groups in terms of basic variables (age, mother's education and occupation, type of delivery, gestational and calendar age, gender) (Table 1).

Table 1. Demographic variables in control and experimental groups

Variables	Control group Mean±SD or N(%)	Experimental group Mean±SD or N(%)	P-value
Occupation			
Housewife	24(88.9)	25(92.6)	NS
Employee	3(11.1)	2(7.4)	
Education			
Lower than High school diploma	10(37)	9(33.3)	NS
High school diploma	12(44.4)	12(44.4)	
BA and above	5(18.5)	6(22.2)	
Maternal age	27.37±4.57	27.67±4.60	NS
Infant gender			
Boy	19(70.4)	18(66.7)	NS
Girl	8(29.6)	9(33.3)	
Gestational age	34.48±0.75	34.56±0.80	NS
Calendar age	4.19±1.2	4.11±1.0	NS

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All infants were born by cesarean section and were breastfed. There was no loss of samples in this study. The results showed that the total score of mothers' attachment behaviors before massage in the experimental group was 41.07±5.67 and in the control group was 40.48±5.15 and there was no statistically significant difference. However, the total scores of attachment behaviors of mothers in the experimental group on the third and fifth day after massage were 50.63±6.06 and 66±9.96, respectively and in the control group on the third and fifth day were 44.67±4.12 and 49.70±4.75, respectively and the difference between the two groups was statistically significant (p<0.001) (Table 2).

Table 2. Mean and standard deviation of the score of attachment behaviors of the two groups

Attachment behaviors	Control Mean±SD	Experimental Mean±SD	Mean difference	P-value T-test
First day	40.48±5.15	41.07±5.67	0.59±0.42	0.68
Third day	44.67±4.12	50.63±6.06	5.96±1.94	<0.001
Fifth day	49.70±4.75	66±9.96	16.29±4.94	<0.001

Repeated measurements showed that the changes in the mean score of attachment behaviors over time (regardless of group type) were significant (p<0.001). In investigating the interaction of time and groups, the trend of attachment score changes in groups was different and significant (p<0.001) and the effect of total times on the score of attachment behaviors was statistically significant between the two groups (p<0.001) (Figure 2).

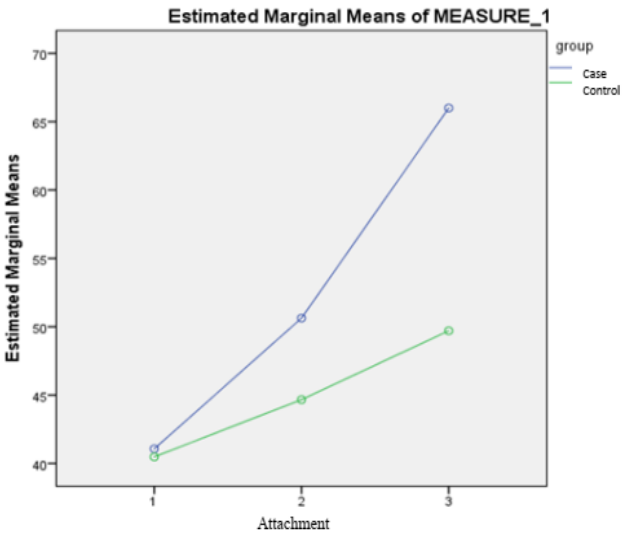


Figure 2. The trend of changes in the mean score of attachment behaviors in the control and experimental groups

Discussion

In this study, it was found that the mean score of total attachment behaviors of the mother in the experimental group was higher than the control group, which indicates the positive effect of massage during these five days by the mother. In the study of Sohrabi et al. and Shoghi et al., massage of term infant and preterm infant, respectively, for 5 days and 15 minutes every day by the mother in the neonatal care unit was reported to be effective on maternal attachment behaviors. The mean score of attachment behaviors of mothers who massaged their infant on the fifth day was higher than the control group (1, 39). Gurol et al. also reported that massaging term infants by primiparous mothers at home for 38 days, 15 minutes each day, had an effect on mother-infant attachment behaviors (29). Therefore, the results of the mentioned studies are in line with the results obtained from the present study and indicate that infant massage, even in a short period of time, i.e. five days, showed effects on mother's attachment score similar to longer massage for 38 days.

In the study of Arzani et al., the implementation of kangaroo care immediately after birth and in the study of Chomp et al., the implementation of kangaroo care by mothers in the neonatal intensive care unit for premature infants had a positive effect on maternal attachment behaviors (13, 16). In fact, kangaroo care, in which skin-to-skin contact between the infant and mother is established, prepares the mother and infant to establish a two-way coordinated interaction pattern and increases mother-infant attachment (42).

Studies by Karbandi et al., Toosi et al., and Zeraati et al. also showed the effect of maternal empowerment program as well as the effect of family-centered education and care on increasing the score of maternal attachment behaviors (19, 21, 43). Although the type of intervention was different from the present study, but it can be said that massage, like the empowerment and education program, has been able to increase mother-infant interaction. Porter et al. stated that combining a parenting program with massaging one- to four-month

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infants for three months by addicted mothers did not affect the attachment between mother and child, which researchers believe could be due to prolonged study time in this study and imbalance in the output of the number of data (37). The results of this study are not consistent with the present study, although it should be said that the two studies were different in terms of sample type and attachment measurement tool since mothers in that study were addicted. They also used the Muller tool to measure maternal attachment.

In the present study, massage of premature infant by mother had a significant increase on maternal attachment in the experimental group compared to the control group until the fifth day. In the control group, a slight increase in mother-infant attachment was observed during the study period, which is probably due to the passage of time and the mother's adaptation to the situation. The massage program gives the mother the opportunity to have a pleasant interaction with her infant, and frequent skin and eye contact releases the hormone oxytocin and creates relaxation and improves the mother-child relationship, which in turn improves the mental state and attachment (44). On the other hand, the secretion of cortisol during massage improves sleep patterns and helps the infant feel relaxed by helping bowel movements and reduce bloating (29).

One of the limitations of this study was that to prevent the exchange of information between mothers of the two groups, two different research environments were forcibly selected and on the other hand, samples of premature infants in both groups were born through cesarean section without any preconditions. It is suggested that other studies be performed for this purpose in preterm infants with a fetal age of less than 34 weeks and also in infants born naturally with long-term results.

In general, according to the results of this study, it can be said that massaging a premature infant by the mother increases the mother's attachment score. Due to the importance of maternal attachment in the health of the infant and the fact that massage is an easy, low-cost, useful and affordable method, it is recommended that nurses teach mothers in this regard.

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