IJN
Iranian Journal of Neonatology
http://ijn.mums.ac.ir

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Original Article

Comparison of the Effects of Attachment Training for Mothers on the Behavioral Responses of Premature Infants: A Randomized Clinical Trial

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ABSTRACT

***Background*:** Premature infants are among high-risk groups in community who need to be hospitalized at intensive care units for survival and receiving basic or special care. Hospitalization at neonatal intensive care units (NICUs) unsettles the family and leads to the separation of parents from their infants. This study aimed to determine the effects of maternal attachment behaviors on the behavioral responses of premature infants, hospitalized at NICUs.

***Methods*:** In this randomized clinical trial, 64 premature infants, who were hospitalized at NICUs and were eligible for the study, were randomly allocated to study and control groups. Attachment behaviors including touching, massage and kangaroo care were applied for the study group, while the conventional attachment method was adopted for the control group. Behavioral responses were evaluated two hours before and two hours after training attachment behaviors. Data were analyzed, using Chi-square and student's t-test.

***Results*:** **T**he mean difference in the duration of deep sleep and consciousness was more significant in the study group, compared to the control group. Furthermore, the duration of drowsiness was significantly less in the study group, compared to the control group.

***Conclusion*:** The implementation of attachment training at NICUs decreased the time of drowsiness and improved behavioral responses, deep sleep time and consciousness.

Keywords: Attachment Training, Behavioral Responses, NICU, Premature Infants

Introduction

Attachment is an intimate, continuous relation between the mother and infant (1). Bowlby applied attachment concepts in mother-infant relation for the first time (2). In recent years, mother-infant attachment has become a controversial topic. Psychologists have introduced many factors, which contribute to mental and emotional disorders. Among these factors, deprivation of maternal affection is of utmost importance (3).

In this regard, Winnicott considered lack of attachment as the main factor for mental disorders (4). Moreover, Van Wagner stated that failure in forming certain attachments during the first months of life can have negative impacts on one's behaviors during childhood and adulthood (5).

In recent decades, the incidence of premature birth has remarkably increased (6). These infants are immediately separated from their mothers due to prematurity and the associated problems (7) and require care, treatment, stable behavioral feedback (8) and hospitalization at neonatal intensive care units (NICUs) (7). Also, prematurity disrupts the process of attachment between the mother and neonate and exposes infants to several threatening conditions such as increased rate of hospital infections, weight gain, poor parent-infant relationship, prolonged length of hospital stay and increased treatments costs (8).

However, hospitalization of premature infants is inevitable in most cases. Even the length of stay at NICU may be prolonged, which disrupts

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the emotional relationship between the mother and infant and causes the family to feel the infant's absence; therefore, parents miss the opportunity to form an emotional relationship with their infants.

Generally, parents experience a lot of anxiety (9) and face difficulties in their relationship with their infants. Parent-infant interaction affects neonatal growth, as well as physiological and emotional development (10). A previous study by Bastani et al. (2012) in Babol showed that the separation of infants from their parents inevitably caused severe anxiety in parents. The parents were not annoyed by the environment or the attendants, but they were mostly disturbed due to the interference in their parental roles (11-12).

Generally, maternal care of the infant enhances the feeling of participation in mothers (13). Therefore, NICUs should be designed in a way that they can promote maternal role in infant care (14). In this regard, Budin (1907) introduced parental support as a main nursing role (15).

Mothers, who are in one room with their newborns and take responsibility for their care before hospital discharge, are more confident and satisfied and perform more effectively in meeting their neonates' needs at home (16). The provided emotional and informational support at hospitals helps parents cope with their neonates' hospitalization, outpatient appointments and continuation of treatment at home after discharge (17).

Studies have shown that active care of newborns can be in form of hugging. In fact, skin-to-skin contact is an attachment method that doubles the duration of sound sleep (18). The results of a study by Foldman suggested that skin-to-skin contact (kangaroo care) normalized sleep-wake cycle in premature infants (19). In fact, skin contact is another attachment method, which results in a stronger mother-infant relationship and usually promotes maternal care (20). Moreover, via these interventions, nurses can contribute to mothers' acceptance of maternal roles in taking care of premature neonates.

In a previous study, parents stated the important role of nurses' support in their attachment behaviors. In fact, there was a relationship between nursing support and increased parents' capability and independence. Parental involvement in neonatal care and decision-making leads to higher acquaintance with the infants' behavioral signs (responses), resulting in neonates' calmer state and reduced depression in mothers (21). In fact, nurses' support for the parents of premature infants improves the formation of mother-infant relationship, attachment and neonatal care (22).

Method

This single-blind randomized clinical trial was performed on 64 premature infants, hospitalized at the NICUs of Hafez and Zeinabiye hospitals in Shiraz, Iran. These two hospitals were selected, given their accessibility. Moreover, these hospitals are considered as major childbirth centers in Shiraz, with numerous cases of premature infants.

Based on a study by Salimy et al., 64 subjects were selected as the study sample (80% power and 5% alpha); overall, 32 subjects were allocated to each group (23). The subjects were selected via convenience sampling. Then, they were randomly assigned to the study or control group by block randomization (Figure 1).

The inclusion criteria were as follows: 1) 33-36 weeks of gestation; 2) birth weight of 1500-2500 g; 3) five-minute Apgar score >7 after birth; 4) no abnormalities or acute problems in neonates with the exception of prematurity; 5) non-use of sedative drugs; 6) keeping the neonates in the incubator; 7) the neonate's ability to suck through the mouth; 8) mother's physical and mental health; and 9) a one-week interval since the childbirth (minimum).

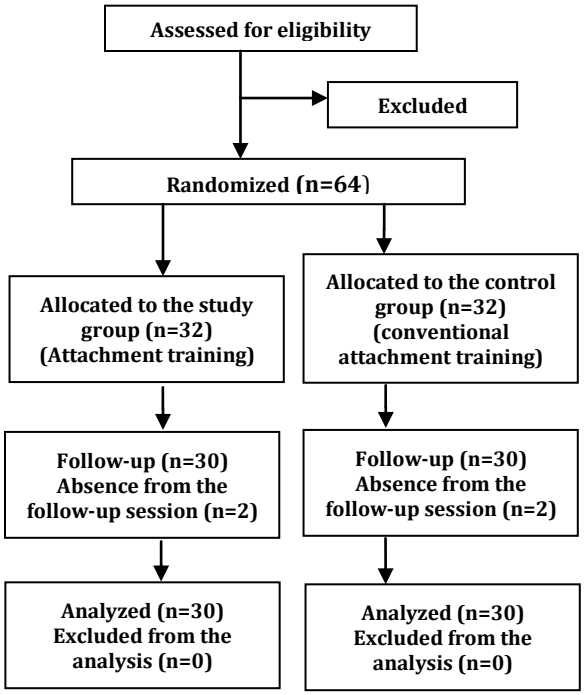

Figure 1. The flowchart of the clinical trial

According to the characteristics of study samples, the exclusion criteria were as follows: 1) parents' unwillingness to continue the study; 2) the neonate's need for ventilation during the study; 3) need for oxygen treatment by applying continuous positive airway pressure; 4) the neonate's need for hypnotic and sedative drugs; 5) use of gavage for nourishment; and 6) mother's mental or physical problems.

Permission was obtained from the Ethics Committee of Shiraz University of Medical Sciences. Moreover, permissions were granted by Hafez and Zeinabiye hospitals for conducting the study. The subjects were justified about the study objectives and the importance of training. Afterwards, written informed consents were obtained from the parents before the study.

In this study, the infants' behavioral status was considered as the dependent variable, and the effectiveness of attachment styles was regarded as the independent variable. Data were gathered, using a demographic questionnaire and an observation checklist for evaluating infants' behavioral status.

Attachment behaviors were applied for the study group (i.e., touching, massage and kangaroo care), while the conventional attachment style was adopted for the control group. After selecting samples based on the inclusion criteria, training sessions were held for the mothers of infants in the study group. For this purpose, four face-to-face sessions (60 minutes each) were held for each individual during four consecutive days.

The attachment methods were trained in these sessions and a Q&A session was held at the end of each training session. Mothers visited the NICUs on the fifth day and applied the attachment methods during three consecutive days (in the morning for about 35 minutes). The behavioral responses were assessed, based on Braselton's criteria. The behavioral indices were assessed two hours before and two hours after the intervention.

The results were recorded in a checklist, which was approved by several experts. The neonates' behaviors were recorded by the researcher in the checklist, based on the Brazelton's criteria. This process was repeated for three consecutive days; the mean values of data obtained during these three days were statistically analyzed.

Mothers of infants in the control group, who were previously trained by NICU nurses, applied the conventional attachment method (only kangaroo care) during three consecutive days (in the morning for 35 min). The behavioral responses were assessed similar to the study group for three days (four times a day), based on the Brazelton's criteria.

In both groups, the infants were filmed from the beginning to the end, using a digital camera (Canon PowerShot sx220 made in Japan). A computer with a Media Player was used for viewing each recorded section. The recording sheets of behavioral responses were compiled by the researcher, based on relevant studies. After observing and recording the behavioral responses, 20 video recordings were randomly selected and interpreted by an independent trained individual, blinded to the study hypotheses and interventions.

The consensus on the interpretations was assessed, using Pearson's correlation coefficient (r=0.95). The collected data were analyzed by SPSS version 17. At the end of the study, considering the ethical issues, a training booklet was given to the control subjects and a Q&A session was held to answer mothers' questions in the control group. Two subjects were excluded from each group due to parents' unwillingness to continue the study, the need for oxygen therapy and discharge from the NICU.

Results

In this study, 12 female and 18 male infants were included in the study group. Also, the control group consisted of 13 female and 17 male infants. The mean Gestational age was 33.37 weeks (SD=1.5) in the study group and 33.67 weeks (SD=1.6) in the control group. However, the sample t-test did not show a statistically significant difference between the two groups (P=0.87).

The mean weight of infants was 1905±390 g in the study group and 1929±393 g in the control group. The sample t-test did not indicate a statistically significant difference between the groups in terms of mean weight (P=0.81).

The mean age of mothers was 29.83±5.8 years in the study group and 30.3±7.4 years in the control group. However, the sample t-test did not show a statistically significant difference between the two groups in terms of maternal age (P=0.7) (Table 1). The mode of delivery was caesarean section in 90% and 76.7% of cases in the study and control groups, respectively. However, Chi-square results did not show a statistically significant difference between the two groups (P=0.29).

The mean duration of deep sleep, sound sleep, and consciousness (assessed on three successive days) significantly increased in the study group, compared to the control group (P<0.001). Also, the mean duration of drowsiness, open eyes, and crying (assessed on three successive days) significantly decreased in the study group, compared to the control group (P<0.001).

The mean difference of deep sleep, sound sleep and consciousness (assessed during three days) increased in the study group, compared to the control group before and after the intervention; this difference was statistically significant (P<0.001). In addition, the mean duration of drowsiness, open eyes, and crying (assessed during three days) decreased in the study group, compared to the control group before and after the intervention; this difference was statistically significant (P<0.001) (Table 2).

The mean difference of deep sleep, sound sleep and consciousness increased in the study group, compared to the control group; this difference was statistically significant (P<0.05). Moreover, the mean duration of drowsiness, open eyes, and crying decreased in the study group, compared to the control group, which was statistically significant (P<0.05). In addition, the mean difference of deep sleep and consciousness (assessed during three days) increased in the study group, compared to the control group before and after the intervention; this difference was statistically significant (P=0.02 and P<0.001, respectively).

Additionally, the mean difference of sound sleep (assessed during three days) increased in the study group, compared to the control group before and after the intervention, however, this difference was not statistically significant (P=0.06). The mean duration of drowsiness decreased in the study group in comparison with the control group, which was statistically significant (P<0.001). Also, the mean difference of open eyes and crying decreased in the study group, compared to the control group, which was not statistically significant (P=0.7 and P=0.09, respectively) (Table 3).

Table 1. The comparison of mean and standard deviation of quantitative variables in the two groups

Variables	Control group		Study group		P-value
	Mean	SD	Mean	SD	
Mother's age (year)	30.3	7.7	29.83	5.8	0.7
Father's age (year)	36.1	8.7	33.36	5.6	0.15
Neonate's intrauterine age (week)	33.67	1.6	33.73	1.5	0.87
Neonate's birth weight	1920.17	392.749	1905.17	390.39	0.81
Five-minute Apgar score	8.43	1.1	8.1	0.9	0.32
Length of hospital stay (day)	15.67	7	18.33	9.1	0.21

Table 2. The comparison of behavioral parameters (during three days) before and after the intervention in the study and control groups

Behavioral Parameters	Control group				P-value	Study group				P-value
	Before		After			Before		After		
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Deep sleeping mean	0.5	2.3	5.8	8	0.001	1.3	3	16	11	0.001
Calm sleeping mean	25	15	43	18	0.001	31	21	69	56	0.001
Drowsiness mean	70.6	8.4	55.8	8.8	0.001	63	15	24	17	0.001
Consciousness mean	2	3.8	10	19.2	0.001	3	4.7	18	10	0.001
Open eyes mean	12	7.4	3	4.4	0.001	14	8.5	2	2.7	0.001
Crying mean	7.9	8.1	2	4	0.001	6.4	8.9	1	0.9	0.001

Table 3. The comparison of mean difference in behavioral parameters (during three days) before and after the intervention in the study and control groups

Behavioral parameters	Control group		Study group		P-value (between the groups)
	SD	Mean	Mean	SD	
Deep sleep (mean)	7.9	-5.2	-14.7	11.3	0.001
Sound sleep (mean)	12	-18	-38	55	0.06
Time of drowsiness (mean)	19	+15	+38	21	0.001
Consciousness (mean)	8.5	-8	-14	9.9	0.02
Open eyes (mean)	8	+9.3	+13.22	9.2	0.09
Crying (mean)	7.1	+5	+6	7	0.70

Discussion

This study was conducted to compare the effects of attachment behaviors (i.e., handling, massage and kangaroo care) and conventional attachment methods on behavioral responses in premature infants. The results indicated that deep sleep and consciousness after the intervention were better in the study group, compared to the control group. Unfortunately, no Iranian or foreign studies have been conducted regarding the effects of attachment methods (i.e., handling, massage, and kangaroo care) on behavioral responses in premature newborns.

The results of the present study were consistent with those reported by previous studies on the effects of attachment styles on behavioral responses in premature infants. For instance, in a previous study, the implementation of 1-3 hours of attachment methods (such as kangaroo care) in a day increased sound sleep duration and decreased crying in neonates (24).

Ludington in his study showed that the neonates' activity level decreased during face-to-face contact, as an attachment method; moreover, infants became more relaxed, which was associated with longer sound sleep (25). The results of this study suggested that the behavioral status of premature infants in the study group before and after the implementation of attachment behaviors (on all three days) was significantly different. In other words, by the implementation of attachment behaviors in the study group, the infants became more relaxed, in comparison with the control group.

Overall, the obtained results indicated the positive effects of attachment training on the improvement of premature infants' behaviors. According to the results, it seems necessary to pay attention to attachment behaviors between mothers and neonates, as well nurses and infants in order to enhance the quality of care for premature neonates.

Conclusion

The applied attachment method (including handling, massage and kangaroo care), which consists of the components of developmental care, is an appropriate, low-stress and safe method for preterm and ill infants and can be used as a routine attachment method at NICUs. It is hoped that the obtained results help increase the quality of nursing care and improve the short-and long-term developmental outcomes in preterm infants, hospitalized at NICUs. Further studies are required to study the effects of this attachment method on stress, weight gain and length of hospital stay in premature infants. The effects of this method on mother-infant attachment, parental stress, confidence in parental skills and parental satisfaction need to be evaluated, as well.

Acknowledgement

We express our deepest gratitude to the research deputy of Shiraz University of Medical Sciences, School of Nursing and Midwifery and all parents and infants who participated in this study. The present article was extracted from a thesis written by Sahra Zendehzaban and was funded by Shiraz University of Medical Sciences (grant No.: 93-7057). This research was registered in the Iranian Registry of Clinical Trials (IRCT code: 2014070818406N2).

Conflicts of interest

The authors declare no conflicts of interest in this study.

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