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Original Article

The Effect of Kangaroo Care on Maternal Attachment in Preterm Infants

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ABSTRACT

Aim: The study was conducted to determine the effect of kangaroo care on maternal attachment in preterm infants in Turkish mothers. **Subjects and Methods:** The study was conducted a quasi-experimental research design between October 2015 and February 2016 in the neonatal intensive care units (NICU) of two state hospitals located in the east and west of Turkey. The study population consisted of preterm infants hospitalized in the NICU at the time of the research and met the study-group selection criteria. The study population was divided into two groups as an experimental and control group. Kangaroo care (n = 30) was provided to the infants in the experimental group by their mothers. No intervention was applied to the infants in the control group (n = 30) other than the routine practice. Data were collected by the researcher using the 'Introductory Information Form' and the 'Maternal Attachment Inventory'. Data analysis was performed with SPSS (Statistical Package for Social Sciences) 18 software package. The data were analyzed using percentile distributions, mean, standard deviation, t-test, and Chi-square test. Official permissions and ethical approval were obtained to conduct the study. **Results:** It was determined that the experimental and control group included in the study were similar in terms of the characteristics of the baby and the mother ($P > 0.05$). In the study, the mean maternal attachment scale score (MAS) of the group in which the kangaroo care was provided was higher than the control group with a statistically significant difference between the groups ($P < 0.05$). **Conclusion:** As a result of the study, it was concluded that kangaroo care positively affects maternal attachment and it is suggested that further studies should be conducted to evaluate the effect of kangaroo care on mother-infant attachment in Turkey.

KEYWORDS: *Kangaroo care, maternal attachment, nursing, preterm infant*

INTRODUCTION

The maternal attachment (or infant-parent bonding) is formed during the first days postpartum and will be the basis for the mother-infant relationship that is shaped in the following days or months or years. The puerperium is a period when a mother is most willing to develop intimacy with her baby. The mother's perception of the baby will be positively affected when she sees, touches, and interacts with her baby.[1] Maternal attachment is a personal and unique relationship that is built in time and is one of the important factors that allow a child to grow and develop healthily.[2] This relationship between the mother and infant deeply affects the child's physical, psychological, and intellectual development and continues to be effective throughout life.[3] The earlier the mother establishes an attachment to her baby and interacts with the baby, the healthier this relationship develops, and the stronger the sense of motherhood develops.[4] Therefore, the mother and

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the infant should be together immediately after delivery in order to initiate the interaction between the mother and the infant. However, the transfer of the infant to a newborn intensive care unit (NICU) for any cause will affect the mother-infant interaction and slow down the formation of maternal attachment.[2]

In the intensive care setting, the infant faces a number of factors when they are not developmentally ready such as disease, noise, light, repeated painful stimulant, delivery of analgesics, and administration of medications and the infant will be destitute of behaviors enabling regular mother-infant interaction, such as the voice of mother, touching, smelling, and breastfeeding the infant by the mother. Such critical times of mother-infant relationships may adversely affect the mother-infant interaction and the safe attachment of the newborn.[5] Many studies suggest that separation of mother from her baby immediately after the birth will prevent the early contact, which has a negative effect on the maternal attachment. The studies suggested the preterm infants who saw their mothers during early postpartum (in 2–3 h after the birth) had more healthy maternal attachment comparted with the preterm infants who were not able to contact their mothers immediately after the birth.[6,7] A Turkish study performed by Öztürk[8] found that mothers who saw their baby on the first day of NICU had a higher mean of maternal attachment scores than the mean scores of mothers who saw their baby in following days, and concluded that there was a further maternal attachment. The study by Wolke *et al.*[9] on preterm and term infants found that prematurity had a negative influence on the maternal attachment.

Recently, a focus has been placed on kangaroo care, an important practice to enhance maternal attachment level and maintain a long-term attachment. Kangaroo care is a practice that initiates early-maternal attachment and facilitates adaptation between the mother and the infant.[10-16] The study performed by Ahn *et al.*[10] investigated the influence of kangaroo care delivered to premature infants in NICU on the maternal attachment, and determined that the mothers delivering kangaroo care had a higher score for maternal attachment than that of mothers that did not use kangaroo care, which was statistically significant. Furthermore, the authors suggested that kangaroo care was useful to improve maternal attachment. Another study reported that kangaroo care had positive influences on preterm infants to stabilize physiological symptoms, increase mother-infant interaction, and reduce the stress level of the mother.[11]

The foreign studies mention that kangaroo care has many beneficial effects, particularly, on maternal attachment; however, kangaroo care is not incorporated in the nursing practices and routine care and is insufficiently delivered in the ICUs in Turkey. If the kangaroo care, an important practice for mother-infant interaction, can be clinically provided then the stress level and anxiety of mothers and infants can be reduced, ensuring the maintenance of maternal attachment. This research was carried out to investigate the influence of kangaroo care on maternal attachment in preterm infants with consideration of whether it would have a similar influence in Turkey that has a different cultural structure. There is very limited study about maternal attachment level Turkish mothers who give kangaroo mother care to their preterm baby. So this study was conducted to determine the effect of kangaroo care on maternal attachment in preterm infants in Turkish mothers.

Research's hypotheses

H1: Maternal attachment levels for mothers of preterm infants who are developmentally ready to increase with kangaroo care application.

Materials and Methods

This was quasi-experimental research that was carried out in the tertiary NICUs of two state hospitals located in the east and west of Turkey between November 2015 and February 2016.

Universe sample

The universe of this research included preterm infants that met the inclusion criteria for the research group and stayed in the NICU when the present research was conducted. The research was completed with mothers and infants that met the research criteria between the given dates before a sample was selected.

Inclusion criteria for research

Criteria for mothers:

- Willingness to participate in the research
- Absence of any health problems
- No smoking or alcohol intake
- The proper delivery of kangaroo care.

Criteria for infants:

- Having a stable condition
- Born before the 37th gestational week
- Hospitalized for a minimum of 5 days
- Apgar score ≥7.

Exclusion criteria for research

Infants who;

- Received positive pressure ventilation
- Had congenital anomaly
- Were at risk for infection
- Had a decrease in body temperature and oxygen saturation during kangaroo care

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- Were scheduled for early discharge were excluded
- The mothers that were unwilling to participate in this research and hindered kangaroo care were excluded from the research.

Sample size calculation

The G*Power 3.1.9.2 software (Program written, concept and design by Franz, Universitat Kiel, Germany; freely available windows application software)[14] was used to calculate the sample size. In the study, maternal attachment post-test score averages and standard deviations of Cho *et al.*[11] were taken as reference in determining the sample size.

With a power of 0.8 and an acceptable Type I α error size of 0.05, each group required 28 participants Figure 1. The mothers were divided into two groups, experimental and control. Each group consisted of 30 mothers, considering data loss. Thus, 60 participants in this research were acceptable for the sample size.

Data collection

The 'Introductory Information Form' including introductory characters of mothers and infants and the 'Maternal Attachment Scale (MAS)' were used as a data collection tool. Scales were applied to the experimental group mothers on day 5 in a proper room at the clinic following the final kangaroo care practice and the baby was taken to his place. Equipment that would distract the mother in the room (TV, radio, etc.) was shut down. Measurement instruments were applied to the mothers in the control group on day 5 and after 10 min they visited their children. Data of the mothers in the control group were collected in the same room and in an environment without any stimulant. The questionnaire and MAS were presented to the mothers in both groups and they were asked to complete them individually. The collection of data lasted about 10–15 min. [Table 1]

Introductory Information Form: This form was developed by the researchers in accordance with the literature[13,15,16] and intended to collect data on the preterm newborns and mothers. This form was used to review newborns' gender, gestational week, weight, height, Apgar score, the method for delivery, and the mothers' age, education level, employment, family type, and delivery of prenatal care. The answers to the questions in the form were obtained from the hospital records. In the form 'mothers' age, education level, employment, family type, and delivery of prenatal care' questions were filled by mothers. Ten mothers were asked whether the questions were understandable before the study. There were no unclear questions. These ten mothers were not included in the study.

Maternal Attachment Scale (MAS)

The MAS was developed by Müller[17] to assess a mother's love and attachment to her baby and is a 4-point Likert scale including 26 items. Each item contains direct expression and a general score is achieved from sum of all items. The lowest score from the scale is 26, and the highest score is 104. A high score indicates a high maternal attachment. The validity and safety study of this scale was performed by Kavlak and Şirin[18] in Turkey and Cronbach's Alpha (coefficient of consistency) was calculated to be 0.85. In this research, Cronbach's Alpha for scale was calculated to be 0.83.

Procedure

The research data were collected from the tertiary NICU of two state hospitals located in the east and west of Turkey. The data for the experimental group were collected from the hospital in the west and that for the control group were collected from the hospital in the east. We chose these two hospitals because kangaroo care was a routine practice in the hospital in the west and not yet a routine practice in the hospital in the east when this research was conducted. Infants who met the study criteria were continuously included in the study. Since the study was conducted in two different hospitals, it was not possible for mothers to be affected by each other. Data collection tools were filled by mothers to prevent bias and the researchers did not intervene. In addition, the data were coded as A and B instead of experimental and control groups, which group is associated with A or B were not specified to the statistician. Statistical blinding was performed.

Experimental group

The researcher explained the objectives of the study to the mothers in the experimental group; the mothers were provided with information on kangaroo care and the researcher demonstrated how kangaroo care should be administered on a model 1 day prior to the start of kangaroo care. The researcher then observed whether the mothers could properly provide kangaroo care as it was demonstrated on the model. Prior to start of research, the mothers were instructed to continuously maintain kangaroo care for 5 days. In this context, the mothers were educated that they should be careful with their body cleanliness prior to arrival to clinics; they should wear clean and comfortable clothes and they should not wear any jewels, perfume, or deodorant. It was ensured that mothers stayed in the hospital during the day, were milked, and released to their home for having a rest in the evening. The guidelines published by WHO in 2003 recommends that kangaroo care should be initially provided for 30 min.[19] Therefore, 30-min kangaroo care was provided to the

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experimental group twice a day i.e. in the morning and in the afternoon. The first contact of infants, eligible for inclusion in this research, with mothers was made by the help of researcher. The researcher also observed how other kangaroo care was provided. The room temperature was kept at 24°C to 26°C. An armchair was placed next to the infant's incubators for the mother to sit comfortably and the mother was asked to sit on the armchair in a way she felt comfortable. The infant who wore only a diaper and baby's hat was placed in prone and horizontal position on the bare chest of mother then the infant was covered with a preheated clean cover and a thin blanket previously provided by the mother. It was made sure that mother had warm hands and body. The mother was instructed to hold and support the baby through his/her back and rump. The researcher made sure that there were no stimulants to disturb the mother and infant in the clinics during delivery of kangaroo care. The mothers provided kangaroo care in the same manner twice a day for 30 min for 5 days. The researcher administrated the Introductory Information Form and MAS to mothers at the end of day 5.

Control group

The infants in the control group received only routine practice. The infants in this group were visited by their parents once a day according to the routine practices of the clinics. During those visits, the mothers took their baby in their arms, fed them, and made hand contact with their baby if they wished to do so. The visit of mothers to intensive care unit (ICU) approximately took 10 min (since mothers visited their babies for 10 min twice, in the morning and evening other than breastfeeding and care practices as routine at the clinic where the study was performed, so routine practice was carried on). The researcher administrated the Introductory Information Form and MAS to mothers at the end of day 5.

Assessment of data

The data collected for the present research were assessed using SPSS (Statistical Package for Social Science Inc., Chicago, IL, USA) version 18.0. Normally distributed data were parametric tests and nonparametric tests were used for data that did not conform to normal distribution. While the percentage distribution, mean, independent samples *t*-test, and Cronbach's alpha coefficient calculations were used to assess the data. Kruskal Wallis test was used to compare MAS mean scores according to the demographic characteristics of the mothers. Statistical results were evaluated in the confidence interval of 95% and at the significance level of $P < 0.05$.

Ethical principles for research

In order to conduct the research, first of all, the ethics committee approval of the Ethics Committee of Çanakkale Onsekiz Mart University Faculty of Medicine in and the written permission of the hospital where the study was conducted were obtained. [Table 1] In addition, the mothers participated in this research were explained the objectives of research, methods, and benefits. Verbal consent was provided by mothers who were willing to participate in this research. "Informed Consent" was obtained from all mothers.

Results

The control group and the experimental groups were compared for the characteristics of mothers, and the groups were found similar in terms of mean age of mothers, education level, employment, family type, delivery method, and prenatal care as well as the infants' gender, and number of infants ($P > 0.05$).

Also, the control group and the experimental groups were compared for the characteristics of infants,

Table1: Study Period

Study Period	Date	Authors
Literature search	November 2015	FYK, SK
Ethics committee approval	November-December 2015	FYK, SK, AAÖ
Permission of the hospital	December 2015	FYK, ZÖ
Data collection	January and February 2016	ZÖ, FYK
Reporting	November 2015- February 2016	FYK, SK, AAÖ

Table 2: The comparison of experimental and control groups according to the descriptive characteristics of infants

Descriptive Characteristics	Control Group Mean (SD)*	Experimental Group Mean (SD)*	Test & *P*
Gestation week	32.77 (2.65)	32.97 (2.47)	*t*=0.302 *P*=0.763
Birth weight	2028.83 (542.89)	1985.83 (501.14)	*t*=0.319 *P*=0.751
Birth body length	44.97 (3.88)	44.03 (3.62)	*t*=0.963 *P*=0.340
Head circumference	31.23 (2.10)	30.80 (2.01)	*t*=0.818 *P*=0.417
Apgar score (First min)	7.20 (0.81)	6.80 (1.21)	*t*=1.503 *P*=0.138
Apgar score (Fifth min)	8.30 (0.70)	8.13 (0.82)	*t*=0.846 *P*=0.401

*Standard deviation

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Table 3: The comparison of maternal attachment score averages of the experimental and control groups

Scale	Experimental Group (*n*=30) Mean (SD)*	Control Group (*n*=30) Mean (SD)*	Test & *P*	Effect Size
Maternal Attachment	35.03 (5.54)	29.87 (4.66)	*t*=3.908 *P*=0.001	1.0080202

*Standard deviation

Table 4: The comparison of maternal attachment score averages according to the descriptive characteristics of mothers and infants in experimental and control groups

Descriptive Characteristics	Maternal Attachment		
	Control Group Mean (SD)*	Experimental Group Mean (SD)*	Test & *P*
Education Status			
Primary education	31.20 (5.78)	35.09 (6.18)	KW=18.110
High school	28.14 (2.97)	34.67 (3.88)	*P*=0.003
University	28.88 (2.75)	35.33 (5.03)	
Working Status			
Working	32.00 (8.32)	35.00 (4.86)	KW=17.307
Housewife	29.54 (3.87)	35.04 (5.80)	*P*=0.001
Birth Method			
Vaginal	28.78 (2.68)	35.20 (7.58)	KW=16.904
Caesarean	30.33 (5.28)	34.95 (4.43)	*P*=0.001
Family Type			
Core	29.50 (4.33)	34.75 (5.53)	KW=17.765
Wide	31.33 (6.02)	39.00 (5.66)	*P*=0.001
Baby Gender			
Female	30.17 (5.67)	35.68 (6.11)	KW=16.553
Male	29.67 (4.01)	33.91 (4.44)	*P*=0.001

*($p<0.05$). KW: Kruskall-Wallis Test

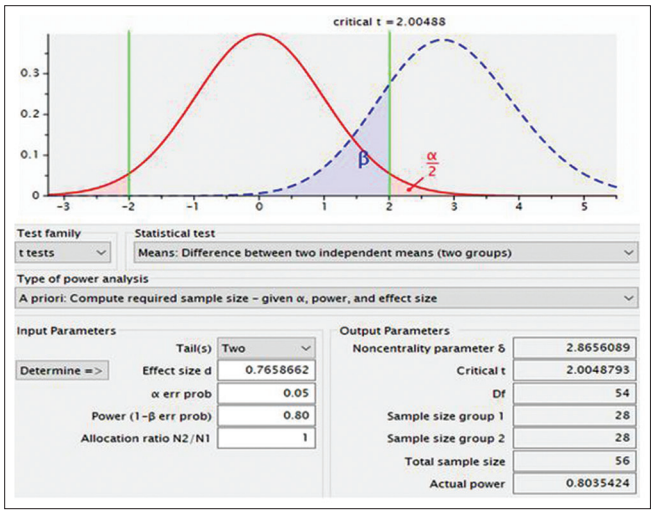


Figure 1: Power analysis of the study

and the groups were similar in terms of gestational weeks, birth weight, height, head circumference, and Apgar scores at 1 min and 5 min, thus there were no statistically significant differences in groups (Table 2, $P > 0.05$).

The MAS mean score of mothers in the experimental group that delivered kangaroo care (35.03 ± 5.54) was significantly higher than the mean score of mothers in the control group (29.87 ± 4.66) ($P < 0.001$, Table 3). In this study, the effect size of kangaroo care on maternal attachment is positive and high.

The education level, employment, delivery method and family type of mothers in the control and experimental groups, and gender of infants and the relationship between the MAS mean scores were compared and a significant difference was found in the favor of experimental group ($P < 0.05$) [Table 4].

Discussion

In the intensive care setting, the infant faces a number of factors when they are not developmentally ready such as a disease, noise, light, repeated painful stimulant, delivery of analgesics, and administration of medications and the infant will be destitute of behaviors enabling regular mother-infant interaction, such as the voice of mother, and touching, smelling and breastfeeding the infant by the mother. The infant lacks maternal touch and stimulants and is exposed to extreme stimulants that disturb and cause stress to the infant in the intensive care setting, thus the infant's physical, psychological and intellectual development is

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affected. Therefore, postpartum interaction of mother with her baby should be supported as early as possible. Kangaroo care is a safe care practice that enables the earliest contact between the mother and the infant.[20] Although kangaroo care is a routine practice in many developed countries because of its known benefits, this practice is not common in developing countries such as Turkey, unfortunately. Especially in preterm infants, both mothers and health workers do not exert adequate efforts in kangaroo care. In this study, we aimed to emphasize the positive effect of kangaroo care in preterm infants on the mother-baby attachment and to present the evidence-based effect of kangaroo care on maternal attachment in the international literature. The primary outcome of this study is that MAS averages of mothers with preterm infants in the kangaroo care experimental group were significantly higher than those of the control group [Table 3]. This result confirms the H1 hypothesis and emphasizes that kangaroo care increases maternal attachment in mothers with preterm babies. In addition, a number of studies investigating the influence of kangaroo care on the maternal attachment were reviewed, and they reported that kangaroo care delivered to premature infants in NICU enhanced the mother-infant interaction, calmed down mothers and infants, and made maternal attachment easy.[5,12-15,21] A study by Talipoğlu[21] performed to investigate the relationship between the maternal attachment level and the kangaroo care provided as part of family-centered care found that mothers providing kangaroo care in the study group had a higher mean score from maternal attachment scale than that of mothers in the control group. The findings of this research suggest that kangaroo care is an effective method to initiate mother-infant interaction earlier as shown in the literature and to form a maternal attachment. In this study, the effect size of kangaroo care on maternal attachment was found to be positive and high. Kangaroo mother care (KMC) is an evidence-based approach to reduce mortality and morbidity in preterm infants and it's a significant intervention to establish mother-infant attachment.[22] However, there wasn't any study on the effect size of kangaroo care on maternal attachment in the literature. In this regard, it is believed that this study will make an evidence-based contribution to the literature.

It is important to identify the factors affecting mother-infant bonding due to their influence on the infant's health and development. The cesarean section, detachment of mother from the infant, unintended pregnancy, difficult pregnancy, and delivery negatively affect the attachment process whereas planned pregnancy, the baby of wanted gender, preparations for birth, and a good diet are factors positively affecting the attachment process.[2] The secondary outcome measures of this research that mother's education level, employment, delivery method, and family type, and infant's gender had significant influence on the maternal attachment; however mother's age, number of children, and delivery of prenatal care did not have any influence on the maternal attachment [Table 4]. There are different results in the evaluation of factors affecting maternal attachment in the literature.[13,23] Özyurt *et al*.[23] reported that mother's age, education level, and employment did not affect the maternal attachment but indicated that gestational week, birth weight and duration of hospital stay affected maternal attachment. We reviewed Turkish studies on maternal attachment and determined that younger age and low socio-economic conditions of mothers negatively affected the maternal attachment and that the women with planned pregnancy had a significantly higher maternal-fetus attachment than those with unplanned pregnancy.[24,25] Although cultural factors are not considered in this study, mothers included in this research lived in societies in the west and east of Turkey, thus they had different cultural characteristics. Different cultural characteristics may have an impact on the results. In the literature review, which examined the barriers and facilitatory factors in kangaroo care, it was noted that socio-cultural factors were effective in the application of the KMC.[26]

Conclusion

The results of this research show that kangaroo care positively affected the maternal attachment, and several characteristics had a positive influence on the maternal attachment (education level and employment of mothers, delivery method, family type, and gender of infants). Based on these results, it is recommended that kangaroo care should be included in the routine care in the NICU, and the environment and support required by mothers to have more physical and emotional interaction with their baby should be provided for kangaroo care. It is also recommended that nurses and midwives should identify factors that might affect maternal attachment during the prenatal period and thus provide support for women with education during the postpartum period. As a health policy, it is recommended to implement CPC as a routine practice in different regions of Turkey and make it a priority. The effect of kangaroo care on maternal attachment is mostly concentrated on the term infants in the literature. In future studies, it is recommended to conduct studies with wider sampling by taking cultural characteristics into consideration to determine barriers, and facilitating factors for parents and health workers on KMC and maternal attachment in mothers with preterm infants.

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Strengths and limitations of the study

1- The major limitations include a small sample groups and delivery of short-term kangaroo care.
2- As another limitation, it can be said that the study should be conducted in the east and west of Turkey, which has cultural differences. We believe mothers in the eastern region are more reluctant to perform KMC practice because of this cultural difference.
3- Since the size of the impact is not reported in randomized controlled studies, experimental, and quasi-experimental studies, which is needed to determine the evidence level; the discussion was carried on the basis of the MAS averages and statistical significance in the studies.
4- The effect of kangaroo care on maternal attachment is mostly concentrated on the term infants in the literature. Our study results confirm the limited number of studies on the subject.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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