

Effect of Kangaroo Care Combined with Music on the Mother–premature Neonate Attachment: A Randomized Controlled Trial

Abstract

Background: Premature birth may complicate the development and quality of the mother–infant attachment relationship. Music and kangaroo care are two common complementary cares performed in the neonatal intensive care unit (NICU). The present study investigated the effect of kangaroo care combined with music on the mother–premature neonate attachment. **Materials and Methods:** In this clinical trial, 64 mothers with premature neonates were selected and assigned to the control and study groups through random allocation. In the control group, kangaroo care, and in the study group, kangaroo care combined with music was adopted. The level of mother–premature neonate attachment was measured and compared before and after the intervention in both the groups using Avant’s Maternal Attachment Assessment Scale. **Results:** There was a significant increase in the mean overall score of attachment in the kangaroo care combined with music group (70.72 (11.46)) after the intervention compared to the kangaroo care without music group (53.61 (9.76)). **Conclusions:** The mean overall score of mother–neonate attachment in the kangaroo care combined with music group was higher than the kangaroo care group. This difference can be related to the effectiveness of music combined with kangaroo care.

Keywords: Attachment, Kangaroo care, music, neonatal intensive care unit, premature neonate

Introduction

The infant–mother attachment is a loving and unique relation which forms between the mother and infant.^[1] The type of reciprocal relationship between the mother and infant has a determining effect on personality formation, social performance, cognition, and mental health of the infant in the future.^[2] The attraction between the parent and infant is a complex relationship which is created through physical contact and the first interaction between the parent and infant. However, many premature neonates are separated from their mother after birth, which can have a significant effect on the process of attraction between the mother and infant and evolution of the infant, disrupting the relationship between the mother and infant.^[3-5] Life threatening events caused by the experience of hospitalization in the neonatal intensive care unit (NICU) and differences between the needs and behavior of premature neonates are significant challenges for mothers.^[6] Carter arrived at the conclusion that parents of premature neonates, compared to those of full-term infants, show more anxiety symptoms.^[7] Studies have shown that

attraction behavior of the mother and infant in premature neonates is equally strong as in full-term infants.^[8]

Complementary cares including music and kangaroo care are conducted in the NICU with the aim of creating peace in stressful situations.^[6,9]

Tallandini and Scalembra in Italy found that kangaroo care decreases stress in mothers with premature neonates and increases the quality of attachment between the mother and infant.^[10] Johnson also found that, after performing kangaroo care, mothers felt more peace and described their role in caring for the infant as important.^[11] Moreover, Hunt found similar results; attraction between the mother and infant was higher in the kangaroo care group.^[12] However, in some studies, no meaningful relationship was observed between mother–infant attraction and kangaroo care. Lee and Shin believe that kangaroo care is effective in relieving anxiety among mothers but does not affect the mother–infant attraction.^[13]

Another method of complementary care is using desirable sound stimulus or music

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care.^[14] Edwards, in a review study, stated that infant and the caretaker can exchange information through music, which is necessary for reinforcing intimate communication.^[15] Findings of the study by Chang *et al.* also confirm the effectiveness of music in helping pregnant mothers cope with stress, especially pregnancy stress.^[16]

The birth of a premature neonate is a stressful experience for parents, especially mothers, and stress and anxiety have physical and psychological effects on the mother and hinder the creation of a suitable and early relationship between mother and infant.^[17] Thus, the identification of an effective intervention to create and promote the mother–infant attraction is necessary. Therefore, the present study was undertaken to investigate the effect of kangaroo care combined with music on attraction between the mother and premature neonate.

Materials and Methods

The present clinical trial (IRCT Registration [irct2016010125601N5](http://www.irct.ir/ctid/IRCT2016010125601N5)) was conducted on the mothers with premature neonates in the NICU of Alzahra Hospital of Isfahan (Iran) from September until the end of November 2015. The study was approved by the ethics committee of Isfahan University of Medical Sciences. The study goals were explained to all the participants and their informed consents were obtained. It should be noted that the researchers adhered to ethical principles in all research stages. The sample size ($n = 64$) was calculated based on a pilot study and using the formula for comparing averages, 95% safety factor, and statistical power of 80%. However, because of the possible sample loss, 70 mothers with premature neonates and gestational age of 30–36 weeks were entered into the study. The participants were divided into two groups of kangaroo care combined with music (32 persons) and kangaroo care (32 persons) through random allocation (drawing lottery). The inclusion criteria included all Iranian mothers with premature neonates with gestational age of 30–36 weeks, infants, and mothers with the criteria for kangaroo care, lack of addiction to drugs and alcohol, lack of smoking, lack of history of or present psychological illnesses, lack of use of anti-depressant and psychedelic drugs, age of 18–40 years, lack of stress or severe family disagreements, required training and skills for kangaroo care, and lack of deformities of head and body and other inherited disorders in the infant. The mothers of infants who were results of infertility treatments were not entered into the study. The exclusion criteria of the study consisted of disturbance of clinical stability and condition of the mother and infant, discharge from hospital before the end of the intervention, decrease in the body temperature of the infant, and increase in infant's need for oxygen by 10–20%. The mother–infant attraction was evaluated using Avant's Maternal Attachment Assessment Scale. Based on a pilot study on 20 participants by researchers, Cronbach's alpha for each attraction behavior in the scale including

emotional behaviors ($\alpha = 0.789$), proximity behaviors ($\alpha = 0.714$), care behaviors ($\alpha = 0.731$), and sum of attraction behaviors ($\alpha = 0.765$) was calculated. This scale includes 13 mother–infant attraction behaviors; 7 emotional behaviors, 3 proximity behaviors, and 3 care behaviors. Each item in the scale is scored on a 5-point scale of I completely agree (100), I agree (75), no comment (50), I disagree (25), and I completely disagree (0).

After completing the demographic information form before starting the intervention, the behaviors of mothers in both groups during breastfeeding the infant were evaluated for 15 minutes by the researcher. During 15 minutes, each minute was divided into 30 seconds each; the behavior of mothers towards infants was observed during the first 30 seconds of each minute and it was recorded only once during the second 30 seconds. Then, the number of all behaviors was recorded in the scale for 15 minutes were considered as the total score of attraction. Subsequently, only kangaroo care was conducted among mothers in the control group, and music by Dr. Arnd Stein was played for 20 minutes^[18] using an MP3 player with headphones (disposable) during kangaroo care in the combined intervention group. The selected music for the intervention group was a piece of music which was not stimulating, exciting, or sad. Slow rhythms and uniform melodies were chosen, and in the background of this effective melody, the sound of waves of the ocean breaking on the beach and the sounds of birds could be heard.^[9]

It should be noted that kangaroo care was performed with identical conditions (60 minutes per day and for 3 consecutive dates) for both the groups;^[6] after stabilization, the infant was placed naked and vertical on the breast of the mother and in direct skin contact with the mother's skin. After the intervention, the behavior of mothers was reevaluated during breastfeeding the infant for 15 minutes in the two groups. For analyzing data, paired *t*-test, independent *t*-test, Fisher's exact, Mann–Whitney test, and Chi-square tests were used in SPSS software (version 14, SPSS Inc., Chicago, IL, USA).

Ethical considerations

This study was approved by the Ethics Committee of Isfahan University of Medical Sciences. All enrolled mother signed and informed consent containing the clear data about the study and its purpose and methods.

Results

Data analysis showed that the two groups of kangaroo care combined with music and kangaroo care were identical in terms of the variables of infants' age, birth weight, hospitalization duration, gestational age, reason of hospitalization, and gender, and age and education level of mothers [Tables 1 and 2]. Moreover, based on independent *t*-test results, there was no significant difference between the two groups in terms of mean overall score of attraction

Table 1: Mean infant age, birth weight, hospitalization duration, and gestational age, and mother's age in the two groups

Variable	Kangaroo care combined with music	Kangaroo care without music	Independent <i>t</i> -test	
	Mean (SD)	Mean (SD)	<i>t</i>	<i>P</i>
Infant age (day)	5.90 (4.21)	4.26 (3.43)	1.48	0.14
Birth weight (g)	1673.90 (503.94)	1775.00 (567.08)	0.75	0.45
Hospitalization duration (day)	5.06 (3.27)	4.12 (2.83)	1.22	0.23
Gestational age (week)	32.74 (1.81)	33.04 (1.98)	0.65	0.52
Mother's age (year)	28.78 (4.16)	29.09 (5.87)	0.25	0.81

Table 2: Distribution of characteristics of the mother and infant in the two groups

Characteristics of mother and infant	Kangaroo care combined with music	Kangaroo care without music	<i>P</i>
	<i>N</i> (%)	<i>N</i> (%)	
Infant gender			
Boy	18 (56.25)	16 (50.00)	0.71*
Girl	14 (43.75)	16 (50.00)	
Reason of hospitalization			
Preterm	28 (87.50)	25 (78.12)	0.26**
Other	4 (12.50)	7 (21.88)	
Mother's education			
Illiterate	2 (6.25)	3 (9.37)	0.53***
Primary and secondary education	4 (12.50)	5 (15.63)	
High school and associate degree	19 (59.37)	18 (56.25)	
Bachelor's degree and higher	7 (21.88)	6 (18.75)	

*Chi-square test, **Fisher's exact test, ***Mann-Whitney test

and attraction behaviors before the intervention. This lack of difference was because sampling was done through random allocation [Table 3]. However, the results [Table 4] showed that the mean overall attraction and attraction behavior scores were higher in the kangaroo care combined with music group compared to the kangaroo care group after the intervention. Thus, based on independent *t*-test results, there was a statistically significant difference between the groups.

Discussion

In the present study, the effect of kangaroo care combined with music and kangaroo care without music on attraction between mothers and their premature neonates was compared. The results showed that the mean overall score of attraction and each of the attraction behaviors (emotional, proximity, and care) had increased compared to before the intervention in the kangaroo care combined with music group compared to the kangaroo care group. In recent years, different support methods have been performed to increase and improve the quality of attraction between the mother and infant. Nevertheless, no study was found on the combined effect of music and kangaroo care on the mother-premature neonate attraction. The studies conducted on kangaroo care combined with music were mostly related to the effect of this care on decreasing anxiety and stress among mothers, and also reported conflicting results. The study

by Norouzi *et al.* showed that playing music concurrently with kangaroo care does not result in decreasing anxiety in mothers.^[19] However, Lai *et al.* presented the combined use of music and kangaroo care as an effective intervention for decreasing anxiety in mothers.^[6] Some researchers in separate studies considered the effect of kangaroo care and music on attraction. For example, regarding music therapy, Shin and Kim found no meaningful relationship between music therapy, and stress and the mother-neonate attraction.^[20] However, Sharifi expressed that music distracts the patient from negative stimulants towards desirable and heart-warming subjects.^[18]

Edwards also stated that music is used for sharing emotions and experiences and adjusting social behavior, and it is a method for experiencing desirable two-way interaction.^[15]

The results of Ahn *et al.* regarding the effect of kangaroo care on attraction were similar to that of the present study; mean attraction behaviors in the kangaroo care group was higher than the routine care group.^[21] However, Pineda in his study did not find a significant difference between the two groups of kangaroo care and routine care at the ages of 6 weeks and 3 months in terms of the mother-neonate attraction score.^[22] The difference between this study and the present study may be due to the fact that Pineda's study was performed on full-term infants. However, the above studies only considered the effect of kangaroo care on attraction.

Table 3: Average of mother's attraction score and its dimensions (out of 100) before the intervention in the two groups

Variable	Kangaroo care without music	Kangaroo care combined with music	Independent t-test	
	Mean (SD)	Mean (SD)	t	P
Total attraction	38.04 (10.90)	39.10 (9.10)	0.42	0.68
Emotional behaviors	43.40 (12.10)	44.90 (9.80)	0.57	0.56
Proximity behaviors	35.70 (15.10)	33.30 (14.20)	0.64	0.52
Care behaviors	27.90 (13.60)	31.30 (13.04)	1.01	0.31

Table 4: Average of mother's attraction score and its dimensions (out of 100) after the intervention in the two groups

Variable	Kangaroo care without music	Kangaroo care combined with music	Independent t-test	
	Mean (SD)	Mean (SD)	t	P
Total attraction	53.61 (9.76)	70.72 (11.46)	6.43	<0.001
Emotional behaviors	62.90 (12.13)	77.19 (12.64)	4.57	<0.001
Proximity behaviors	44.53 (12.27)	65.88 (15.02)	6.23	<0.001
Care behaviors	41.66 (14.19)	60.67 (17.61)	4.75	<0.001

One dimension of attraction behaviors were emotional behaviors. In the present study, mothers in the kangaroo care group combined with music showed greater emotional behaviors in interaction with their infants. Moreover, this increase in average score of emotional behaviors was significantly higher than proximity and care behaviors. Therefore, it may be said that emotional behaviors in the mother–neonate interaction and attraction are among the most important emotional and communication agents. Roller also found similar results; mothers in the kangaroo care group expressed a greater sense of peacefulness.^[23] However, Roller only considered the effect of kangaroo care on attraction.

Another attraction behavior measured in this study was proximity behaviors. The results showed that the mean proximity behaviors in the kangaroo care group combined with music was higher than the control group, and this difference was significant. Feldman *et al.* also found greater proximity behaviors, such as face-to-face hugging, in the kangaroo care group, which confirms the results of the present study.^[24] However, Feldman *et al.* did not combine kangaroo care with music.

Another dimension of attraction behavior is the care behavior of mothers, which was also evaluated in the current study. The results showed that the mean care behavior of mothers in the intervention group was higher than the control group. Gathwala *et al.* also reported that mothers in the kangaroo care group had significantly higher contribution in infant care activities such as bathing, changing diapers, and sleeping next to the

infant.^[25] Furthermore, Tessier *et al.* found that mothers in the kangaroo care group took care of their infants more.^[26]

Therefore, the present study confirms most of the above studies regarding the effect of kangaroo care on attraction, with the difference that the present study investigated the concurrent effect of music and kangaroo care on the mother–neonate attraction.

Noise and bustle in NICU during intervention and study, short sample size and short duration were the main limitations. More studies with greater sample sizes and longer duration are recommended.

Conclusion

Based on the results, kangaroo care combined with music can be an efficacious intervention for creating and promoting the mother–infant attraction and mental health of the mother and infant. Therefore, listening to mild music combined with kangaroo care can be a beneficial intervention in the NICU for encouraging mothers to perform kangaroo care because it has no cost and does not need special equipment.

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Conflicts of interest

There are no conflicts of interest.

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