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The impact of kangaroo care and music on maternal state anxiety☆,☆☆

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Summary
Objective: The effect of kangaroo care (KC) has not been adequately studied in mothers. This present study was undertaken to determine if music during KC has a greater effect than KC alone, on maternal state anxiety (MSA) in the early postpartum period.
Design and setting: In a randomized controlled trial, 90 Iranian women who were scheduled for a repeat Cesarean-section, were randomized into three groups: KC, music during KC, and a control group. Mothers' pain scores were evaluated using a visual analog scale (VAS). If the VAS score was $\leq$3, then MSA was measured by using the State-Trait Anxiety Inventory (STAI) Scale (Spielberg). Interventions were 30 min KC for mother—infant dyads, or playing music for the mothers during KC. Six hours later, in cases where the VAS was $\leq$3, the MSA was re-measured using Spielberg's scale for all mothers.
Results: Six hours post intervention, there was no significant difference in the overall mean scores of MSA between the groups, but the severity of MSA in the two experimental groups was less than in the control group ($P = 0.02$), although not between the two experimental groups.
Conclusions: The findings of this study provide evidence that KC has an effect on the severity of MSA in mothers who were delivered by C-section, however, music during KC had no more effect than KC alone. More research is needed to document the effectiveness of selected or familiar music during KC on state anxiety in early postpartum.

Introduction

Kangaroo care (KC) has been reported to have beneficial effects for parents and preterm infants. It was proposed as a care alternative for low birth weight infants, it was also developed to overcome problems associated with traditional incubator care in developing countries. A systematic review (2003) has found that KC promotes parental feelings of; mastery, crisis resolution, positive attitude toward

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the infant, emotional completion of the pregnancy, and increased length of breastfeeding.[1]

Pregnancy and childbirth are very significant events in a woman's life and few studies have addressed the effects of anxiety for women and babies during these periods. Studies have shown that nearly 30% of women will experience some kind of anxiety disorder during their lives and that episodes of anxiety can become frequent during pregnancy and following childbirth.[2,3] There are limitations in the findings of experimental studies due to the effect of KC on the state of anxiety levels in mothers. Lai's study (2006) is the first randomized controlled trial of music during KC on maternal anxiety, however, it had no KC alone group.[4]

Music therapy is a technique of complementary medicine which is the most commonly used treatment for somatic and mental disorders.[5,6] Exploring the effects of music therapy reveal that music can also be used to reduce stress and anxiety in patients,[7–10] nevertheless, some studies have shown that music intervention had no effect on post-procedural pain and anxiety, but music therapy did improve patients' comfort levels.[11,12]

Primo (2008) found that music as a relaxation procedure can significantly improve the emotional state and reduce anxiety in the puerperal period.[13] In another report, music during general anesthesia had no effect on post-operative pain and anxiety following Cesarean (C) section.[14]

C-section has become the most common surgery in recent years.[15] According to a report by the World Health Organization, the rate of C-sections has risen to a record level of 41.9% in Iran.[16] There is almost no complementary therapy in most C-section wards in Iran.

Anxiety disorders may develop before or at any time during the perinatal period and can coexist with other stressors.[4] As there is a high level of C-sections taking place in Iran, this study evaluated the effects of KC for mother—infant dyads, or playing music for the mother during KC, on maternal state anxiety (MSA) after a C-section. It was based on a hypothesis that playing music during KC may have a greater effect than KC alone on MSA.

Method

Design

In a single blind randomized controlled trial, study subjects were selected by convenience sampling and 90 pregnant Iranian women who were scheduled for repeat C-section under spinal anesthesia, were allocated into control and two intervention groups (30 were assigned to each group).

Setting and subjects

This study was carried out in the Akbar Abadi teaching center affiliated to Tehran University of Medical Sciences (TUMS). Subjects aged 20—40 years with singleton-term pregnancy, and at least one record of previous C-section delivery were selected. None of the women had; infection problems during pregnancy, pre-operative pain, use of sedatives or analgesic medicines, or a history of fetal death. Moreover, they had no history of; auditory deficits, somatic or psychiatric disorders, or use of illicit drugs. They were able to independently set the MP3 player and were in private rooms with their newborns. Criteria for exclusion from the study were; subject's unwillingness to continue participation in the trial, emergency surgeries, the use of drugs that can reduce stress levels and anxiety, a visual analog scale (VAS) score of $\geq$3 at the filling of the first and second questionnaire and severe crying or hospitalization of newborns in the neonatal intensive care unit (NICU). One case in the KC group (due to the mother's unwillingness to continue), and two cases in the KC and music during KC groups (one case in each group due to newborn hospitalization), were excluded from the study.

Procedure

The study protocol was approved by the TUMS ethics committee, and conducted during a one month period, from August through September 2009. The study participants were randomly allocated into three groups of thirty (two intervention groups, one control group). The purpose and procedure of the study was briefly explained to the mothers by the investigator. Parents were encouraged to ask any questions that they had in regard to the research. We used a formal written paper by means of a generic consent form which was suggested and finally approved by the TUMS ethics committee. Cards of three numbers indicating group assignment were randomly placed in opaque sealed envelopes. The drawings were prepared by a different person who was blind to the order of group assignment.

As part of the routine care, two hours post-operative, pain relief (pentazocine, 25 mg IM) was given to all women, then the women's pain scores were evaluated by VAS. If the VAS score was $\leq$3, the MSA was measured using the State-Trait Anxiety Inventory (STAI) scale (Spielberg, 1983). Interventions were 30 min KC for mother—infant dyads or playing music for the mother during KC. Six hours later, if the VAS score was $\leq$3, the MSA was re-measured using the Spielberg scale for all mothers. The MSA and pain score in pre- and post-intervention, were evaluated by a co-worker who was blinded to the group assignment.

MSA was measured using a STAI scale form Y-1, which is comprised of two parts, consisting of 20 statements each. The range of possible scores on each is from 20 to 80 points, and higher scores indicate greater anxiety. In the current study, the section of state anxiety was used which consists of 20 self-descriptive statements for the state anxiety scale. The state anxiety scale evaluates the woman's state of anxiety at the moment of the postpartum interview, measured on a four-point Likert-type scale; no = 1, a little = 2, a lot = 3, totally = 4. Total scoring for state anxiety varies from 20 to 80 and is categorized as; mild anxiety: 20—39, moderate: 40—59, and severe: 60—80.[17] The construct validity of the state-anxiety scale was examined by testing military recruits after a stressful training program.[18] In one study, the reliability of the STAI in the Persian language was supported by a Cronbach's alpha coefficient of 0.9.[19] In our pilot study (20 participants), an acceptable level of 0.91 was achieved for Cronbach's alpha coefficients.

Interventions

KC group

Mothers were placed in the supine position and covered in a front-opening gown. Room temperature where the intervention was conducted, was maintained at 26 °C. Immediately before transfer, a primary educated nurse who was trained by a researcher, placed a cloth diaper over the infant. When the infant was settled on the mother's chest, the nurse removed the cloth diaper, while the mother covered the gown around the infant. During the 30 min placing of the newborn on the mother's chest, a trained partner attended in the room.

Music during the KC group

The subjects in the intervention group, were exposed to music via an MP3-player with audio settings using an occlusive headphone. The type of music played through the headphones was soft instrumental and included relaxation music by Johann Sebastian Bach, which was selected in consultation with a neuroscience specialist. The MP3-player was started immediately after induction of KC and continued for 30 min.

Sample size

In order to detect a significant difference among three groups at least a sample of 30 subjects per group was estimated. A study with such a sample size would have a power of 80% and at a 0.05 significance level.

Data analysis

SPSS (version 14) was used for the data analysis. Descriptive statistics were used to describe the sample characteristics. A Kolmogorov—Smirnov test (K—S test) was conducted to assess normal distributed data. The independent sample *t*-test and chi-square or Fisher's exact tests, were calculated to determine any significant difference in the demographic distributions. In the three groups, analysis of co-variance (ANCOVA) and Kruskal—Wallis were used for parametric and non-parametric data respectively. Paired and independent sample *t*-tests were used to find differences within and between the two intervention groups.

Ethical considerations

Ethical approval for the study was obtained from the TUMS ethics board to ensure protection of the study participants rights. All participants gave their written informed consent prior to their participation. With respect to patient confidentiality, numbers were used to identify the participants rather than names. Participants were informed that participation in the study was voluntary, and that they had the right to withdraw at any time without needing to give a reason, and care for them would not be affected whether or not they took part in the study or discontinue participating in it.

Results

Findings showed no significant differences between the three groups with regard to their demographic characteristics. The majority were housewives. However, there was a significant difference in pregnancy status among women ($P = 0.025$) (Table 1). Despite a difference in the severity of MSA ($P = 0.021$) (Table 2), the mean scores of MSA were not significantly different between the three groups (Table 3).

According to the paired t-test, there was a significant decrease in the two time periods in terms of both the severity and mean scores of MSA in the KC and music during KC groups ($P = 0.002$, $P = 0.001$, respectively) (Table 3). There was no statistically significant difference found in the mean scores and severity of MSA between the two intervention groups.

Discussion

The purpose of this study was to examine the independent effect of providing KC or of using music for mothers during KC, on state anxiety among women undergoing a repeat C-section. At six hours post-intervention, the severity of anxiety in the two intervention groups was less than in the control group, meanwhile using music had no extra effects during KC.

KC, as a mode of soothing through maternal touch, seems to result in better central nervous system control through a reduction in the stress experience for the infants as well

Table 1 Characteristics of the study subjects in the three groups.

Groups Factors	KC ($n = 30$)	Music during KC ($n = 30$)	Control ($n = 30$)	*P* (value)
Maternal age (yr)	27.33 ± 4.48	29.37 ± 5.29	29.03 ± 4.58	0.217
Gravidity	2.40 ± 0.77	2.47 ± 0.86	2.73 ± 0.87	0.267
Parity	2.27 ± 0.58	2.23 ± 0.57	2.53 ± 0.68	0.122
Gestational age at delivery time (days)	269.13 ± 7.73	266.73 ± 6.67	269.47 ± 6.21	0.159
Caesarian section	2.07 ± 0.25	2.13 ± 0.35	2.23 ± 0.50	0.464
Wanted, unwanted pregnancy	18,12	27,3	23,7	0.025
Job status (employed, housewives)	0,30	2,30	0,30	0.129
Sex of newborn (female, male)	13,17	14,16	15,15	0.875
Economic status (undesirable, desirable)	5,25	6,24	6,24	0.930

n, number.

Table 2 Severity of MSA after intervention.

Groups Factors	KC ($n = 30$)	Music during KC ($n = 30$)	Control ($n = 30$)	*P* (value)
Mild (20—39)	18 (60%)	20 (66.7%)	9 (30%)	0.021
Moderate (40—59)	11 (36.7%)	10 (33.3%)	21 (70%)	
Severe (60—80)	1 (3.3%)	0 (0%)	0 (0%)	

Analysis of co-variance adjusted for pregnancy status (wanted/unwanted) (ANCOVA).

Table 3 Comparison of anxiety score.

Groups Factors	KC ($n = 30$)	Music during KC ($n = 30$)	Control ($n = 30$)	*P* (value)
Pre-intervention	41.47 ± 5.87	42.50 ± 5.13	42.27 ± 6.58	0.719
Post-intervention	38.70 ± 7.45	38.70 ± 6.76	41.43 ± 5.73	0.191
P (value)[a]	0.002	0.001	0.481	

Mean ± SD.
Analysis of co-variance adjusted for pregnancy status (wanted/unwanted) (ANCOVA).
[a] Statistical significance within groups.

as for the mothers.[15,16,18] This study showed that KC had a positive effect in lowering anxiety levels in women who delivered by C-section which is in accordance with Lie's study who found that KC with music decreased maternal anxiety. In another study, skin to skin contact decreased salivary cortisol (32%), heart rate (7%), and stress levels (89%) in mothers' of preterm infants who were hospitalized in NICU.[20]

In the current study, none of the participants had a chance to select the type of music post-operatively, moreover, a culturally unfamiliar type of music was used. In addition, most subjects were discharged on the morning of the second post-operative day, otherwise, we would have been able to measure anxiety levels in the longer term.

In Lai's study (2006),[4] subjects in the treatment dyads listened to their choice of lullaby music during KC for 60 min, and the infants were preterm and hospitalized for longer periods in the NICU, so there was access to these mothers for three consecutive days. In the previously mentioned study, blinding of the data collector was not practical, furthermore, the lack of a group who received KC alone was the other weaknesses of that study.

The optimal period of time for KC has been found to take about 30—60 min.[21] In a pilot study, we realized that 60 min KC was too long for the mothers, because they were uncomfortable during such a long time intervention, therefore, we decided to use 30 min KC in our study.

With regard to the music's effects, we did have access to some previous studies. One of them showed that post-operative anxiety following a C-section was not affected by the music played during the general anesthesia.[14] In another study, the use of music as a relaxation technique improved the women's emotional state and reduced anxiety in the puerperal period.[13] In an Iranian study, a piece of a Johann Sebastian Bach composition played before abdominal surgery decreased the anxiety levels of patients and improved some physiological responses.[19]

Although music has three principle effects, including; release of endorphins as body's natural opiates, decrease in the secretion of catecholamines, such as epinephrine and norepinephrine, and also a decrease in levels of adrenal corticosteroids.[22—24] However, in the current study, exposure to the relaxation music of Johann Sebastian Bach during KC had no extra effect than KC alone. Researchers believe that music preference also plays a substantial role in reducing anxiety, because people generally like what they know and dislike the unfamiliar,[4] so determining whether exposing patients to selected and familiar music with more cultural acceptability would affect the results of studies in Iranian population, needs to be evaluated.

Conclusion

The results revealed a significant decrease in the level of MSA in the two intervention groups, but exposure to music during KC had no more effect than KC alone. C-section is one of the most common surgeries in recent years, and KC is safe, non-invasive, free of side-effects, and a remarkably potent intervention, that can be used to reduce state anxiety immediately after C-section.

Further trials will certainly help to increase the value of findings and improve understanding of how selected or familiar music impacts during KC on MSA. Utilizing KC for longer periods, more often, and extending the length of follow-up are also suggested in order to document the effectiveness of this type of intervention on the frequency of breastfeeding and postpartum depression.

Conflict of interest

None declared.

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