

# Increasing the Resilience of Mothers With Preterm Infant: The Effect of Kangaroo Mother Care

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## Abstract

**Objective:** Having a preterm infant is a stressful experience for parents, especially for mothers. This study was conducted to identify the effect of kangaroo mother care on the resilience of mothers with preterm infant hospitalized in Neonatal Intensive Care Unit.

**Materials and methods:** In this randomized controlled trial study, 60 mothers with preterm infant hospitalized in Neonatal Intensive Care Unit were randomly selected and allocated to intervention and control groups (30 per group) ,in Fatemiyeh Hospital, Hamadan, Iran. Data collection tool included demographic information and Conner & Davidson Resilience Questionnaire (CD-RISC), which were completed by mothers before and after the intervention. Kangaroo Mother Care (KMC) as an intervention was run in at least one hour daily for a week in the intervention group. The mother-infant pairs in the control group only received conventional method of care (CMC).

**Results:** There was a significant increase in the total resilience score of the mothers in the KMC group (from  $58.87 \pm 14.71$  to  $69.67 \pm 14.50$ ) after intervention ( $P < 0.001$ ); however, resilience score decreased significantly in the mothers of CMC group (from  $57.77 \pm 13.33$  to  $51.63 \pm 12.20$ ).

**Conclusion:** Kangaroo mother care could increase the resilience of mothers of preterm infants. Therefore using this approach as a complementary, effective, Low-cost, non-invasive care is recommended to maintain and promote the health of mothers with preterm infant.

**Keywords:** Mothers; Infant, Premature; Kangaroo-Mother Care Method; Resilience, Psychological

## Introduction

Preterm infant is an infant born prior to 37 weeks of gestation or 259 days before the mother's last menstruation period (1). These infants are usually

exposed to a lot of problems that will cause a painful experience for the family (2, 3). When an infant is hospitalized in the neonatal intensive care unit, parents usually feel weak and helpless, and in compare to parents with full-term infants, they are prone to emotional problems (4). Mothers tend to feel guilty because they believe that the premature birth

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was caused by their carelessness or ignorance, so the hospitalization of their babies is extremely stressful (5-6). About 70 to 80 percent of mothers of preterm infants have high levels of stress, which is expressed in the form of fear, anxiety, irritability, depression, difficulty concentrating and frustration (7). Numerous studies have been aimed to providing psychological support of mothers of infants admitted to the intensive care unit to prevent or control mental disorders (8). Kangaroo mother care (KMC) is one of the most suitable approaches in neonatal intensive care units can use to decrease mothers and infants stress (9). The WHO defines KMC as "care of preterm infants carried skin-to-skin with the mother" (10). It is known that KMC decreases both the morbidity and mortality rates of infants in the neonatal intensive care unit, enables the family to be involved in the infants care from an early period, strengthens the relationship between the mother and her infant, reduce the level of anxiety and postpartum depression, and increase self-confidence in mothers (11, 12).

Proper adaptation of mothers to the unexpected event of preterm delivery, separation from their ill newborns as well as inherent stressors in the NICU requires their adequate resilience. This positive adaptation means that when the mothers understand that they cannot change their life realities, they redefine new meaning to their lives by demonstrating inner strength (13). Resilience has been characterized as the ability to bounce back or rebound from extremely adverse experiences by remaining flexible and developing strategies that result in positive outcomes and enhanced quality of life (14). Within this concept, resilience is viewed as an adaptive process, rather than a specific state, and is a predictor of positive coping in stressful situations (15). Various studies have addressed the importance of paying attention to the resilience of mothers with preterm infants (16-17), although studies that examine the impact of kangaroo care on the resilience of these mothers are rare. The aim of this study, was to investigate the effects of kangaroo care applied by mothers who have preterm babies hospitalized in intensive care unit on maternal resilience.

## **Materials and methods**

**Study design and participants:** This is a randomized controlled trial that has been conducted on mothers and newborns hospitalized in Neonatal Intensive Care Unit of Fatemiyeh hospital, Hamadan, Iran between January and May 2020. Inclusion criteria for infants

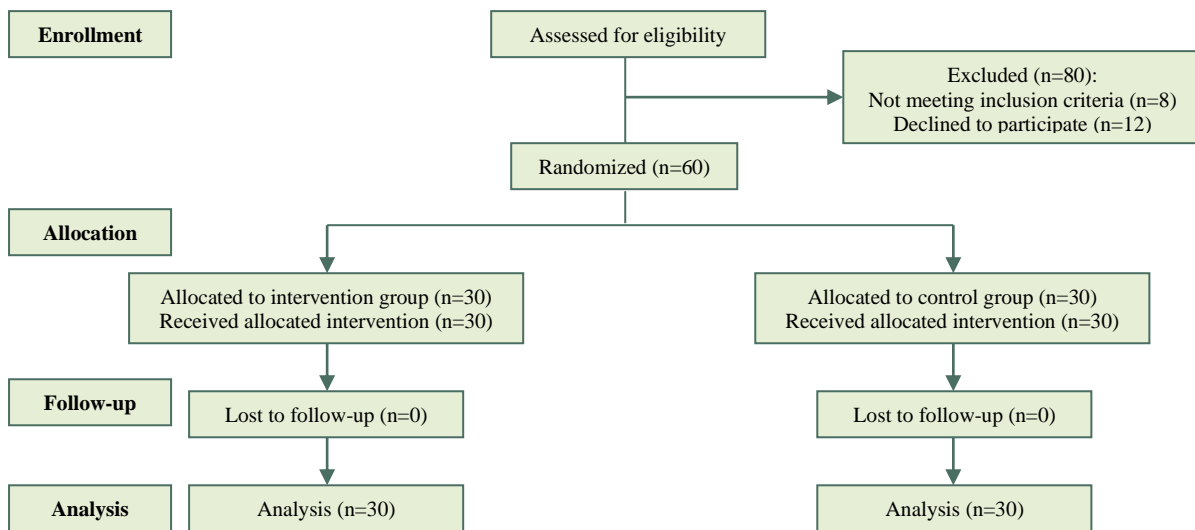
included gestational age between 28-34 weeks, birth weight over 1500 gr, maximum 14 days of hospitalization, absence of specific congenital disease, no need for a ventilator, NCPAP, pulse oximeter, intravenous nutrition, phototherapy, and blood transfusion. Exclusion criteria were instable respiration, need for invasive mechanical ventilation, and infant death. Inclusion criteria for the mothers were lack of previous preterm birth experience, diagnosed psychiatric disorders, addiction, infectious disease, epileptic illness, as well as lack of skin disease. Mothers who could not visit their infants regularly were excluded.

The study was approved by the Ethics Committee of Hamadan University of Medical Sciences (IR.UMSHA.REC.1398.465), and was registered in Iranian Registry of Clinical Trials (IRCT20120215009014N312). Participants were informed about the objective of the study, written consent was obtained from each participant, and they were assured of the confidentiality of information. In addition, participants could be excluded whenever they did not want to participate in the study.

**Sample size:** To calculate the sample size, the Sampsi Module in Stata-13 was used. With considering 80% power and significance level of 0.05, sample size for each group, 30 pairs of mother and preterm infants were obtained. Mothers and their babies were enrolled using convenience sampling method (Figure 1). To prevent the information leakage between the two groups, the samples of the experimental group were selected first. After completing the intervention, sampling was stopped for 4 weeks until the mothers of the experimental group were discharged. After that, sampling of mothers in the control group began.

**Data collection instruments:** Demographic Questionnaire: It was used to collect data on the preterm newborns and mothers including parent's age, education level, and employment, family income, location, method of delivery, gravidity, parity, abortion, newborn's gender, gestational age, infant's age, APGAR score, weight and duration of hospitalization.

Conner & Davidson Questionnaire (CD-RISC): The CD-RISC was developed to assess an individual's ability to cope with traumatic stress (17). This measure has been widely used in cross-cultural research to measure resilience, and the reliability and validity of the scale have been verified in numerous studies (18-19). CD-RISC contains 25 items, all of which have a 5-point Likert scale response, ranging from 0 = *not true at all* to 4 = *true nearly all of the time*.



**Figure 1:** Flowchart of sampling

The scale is rated based on how the respondent has felt over the past month. The total score ranges from 0 to 100, with higher scores reflecting greater resilience. The validity of the questionnaire was assessed using different experts' opinions, and its reliability was calculated using the Cronbach  $\alpha$  coefficient (0.89).

**Intervention:** After selecting eligible mothers to enter the study the researcher explained the objectives of the study to them and they completed demographic and Resilience Questionnaire. Mothers in the intervention group were educated individually for 10 minutes as follows: Mothers were recommended to take a shower before kangaroo care and to wear clean shirts. They were prohibited to use perfume and makeup on times of providing kangaroo care. Room temperature was maintained at 24-26 °C and the mother was asked to sit on the comfortable chair placed next to the infant's incubators. The mother held her infant to her bare chest in a vertical position, holding the infant's bottoms in one hand and letting the other hand touch the infant's head and back, with the infant wearing only a diaper and hat. The infant's head was turned to one side to touch the ear to the mother's chest. The infant's mouth and nose were faced sideways to ensure open breathing. The kangaroo care was performed at least one hour daily for a week. The infants in the control group received only routine care and visited by their parents, fed and had hand contact with them if they wished to do this.

**Statistical analysis:** Collected data were analyzed using SPSS version 25. Independent t-test was used to compare quantitative variables with normal distribution and Mann-Whitney test was used to

compare quantitative variables with abnormal distribution. Chi-square test and Fisher's exact test were used to compare demographic and obstetric classified variables. Independent t-test for intergroup comparison and paired t-test for intragroup comparison were also used to compare resilience and its subscales. Regarding the spirituality subscale, which had an abnormal distribution, Mann-Whitney test was used for intergroup comparison and Wilcoxon test for intragroup comparison. ANOVA/ANCOVA was used to control the effect of pretest and possible interfering factors.

## Results

There was no significant difference in demographic characteristics between intervention and control groups ( $p > 0.05$ ) (Table 1).

The mean resilience score and most of its subscales increased after the intervention in the KMC group, so that the total resilience score in the intervention group before and after care changed from  $58/87 \pm 14/71$  to  $69/67 \pm 14/50$  and in the control group from  $57/77 \pm 13/33$  to  $51/63 \pm 12/20$  ( $p < 0.001$ ). Therefore, in the intervention group, compared to the control group, after receiving kangaroo care, the mean score of resilience and its subscales except for spiritual effects, increased significantly (Table 2).

The results of ANCOVA test by controlling the effect of pre-test and location also showed that the total score of resilience and its subscales except for spirituality in the intervention group was higher than the control group, which was statistically significant ( $p < 0.001$ ) (Table 3).

**Table 1:** Characteristics of the participants

Variables	KMC group M ± SD / N (%)	CMC Group M ± SD / N (%)	P-value
Mother's age	28.73 ±4.86	28.23 ±5.96	0.72
Father's age	32.20 ±5.90	32.70±6.29	0.85
Mother's education			0.59
Under diploma	12 (40.0)	9 (30.0)	
Diploma	12 (40.0)	12 (40.0)	
College	6 (20.0)	9 (30.0)	
Father's education			0.70
Under diploma	11 (36.7)	10 (33.3)	
Diploma	9 (30.0)	12 (40.0)	
College	10 (33.3)	8 (26.7)	
Mother's job			0.62
Housewife	26 (86.7)	23 (76.7)	
Employee	4 (13.3)	7 (23.3)	
Father's job			0.17
Labor	9 (30.0)	3 (10.0)	
Employee	7 (23.3)	7 (23.3)	
Self-employment	14 (46.7)	9 (63.3)	
Income			1.00
Weak	7 (23.3)	6 (20.0)	
Average	19 (63.3)	19 (63.3)	
Good	4 (13.3)	5 (16.7)	
Location			0.28
Urban	27 (90.0)	20 (66.7)	
Rural	3 (10.0)	10 (33.3)	
Method of delivery			0.27
NVD	12 (40.0)	8 (26.7)	
C/S	18 (60.0)	22 (73.3)	
Parity			0.59
1	20 (66.7)	18 (60.0)	
> 1	10 (33.3)	12 (40.0)	
Abortion			1.00
Yes	8 (26.7)	8 (26.7)	
No	22 (73.3)	22 (73.3)	
Infant's sex			0.79
Female	12 (40.0)	13 (43.3)	
Male	18 (60.0)	17 (56.7)	
Gestational age (week)	32.00 ± 1.59	31.67 ± 1.84	0.45
Infant's age (day)	8.30 ± 3.44	8.50 ± 4.41	0.84
Apgar score	8.07 ± 1.14	8.00 ± 1.23	0.82
Duration of hospitalization	8.30 ± 3.44	8.50 ± 4.44	0.84
Infant's weight (gr.)	1753.3 ± 253.61	1711.1 ± 228.3	0.71

M: Mean; SD: Standard deviation; N: Number;

KMC: Kangaroo-Mother Care; CMC: Conventional Method of Care

## Discussion

Kangaroo Mother Care is an intervention aimed at reducing the mortality of low birth weight infants by regulating their temperature, supporting breastfeeding and early hospital discharge in countries with limited resources and has comparative advantages over conventional method of care (CMC) in terms of cost

and impact on neonatal survival (20-21). Its multi-fold advantages beyond thermoregulation for newborns and parents are very well documented in literature (22-23).

The results of the present study showed that Kangaroo mother care could increase the resilience of mothers of preterm infants.

**Table 2:** Comparison of resilience scores between KMC and CMC groups

Subscale	KMC* Group		P-value	CMC** Group		P-value
	M + SD			M + SD		
	Before	After		Before	After	
Perception of individual competence	17.20± 6.33	21.00±6.14	<0.001	17.13±6.11	14.40±5.51	<0.001
Tolerance of negative emotions and trust in individual instincts	15.60±4.61	18.27±4.01	<0.001	14.43±4.19	12.90±3.75	0.01
Secure relationships and acceptance of positive change	12.17±3.29	14.23±3.32	<0.001	12.90±2.85	11.50±3.26	<0.001
Control	7.43±2.14	9.23±2.8 <sup>2</sup>	<0.001	7.58±2.12	6.97±1.93	0.08
Spirituality	6.47±1.63	6.93± 1.70	0.09	5.77± 1.88	5.87± 1.75	0.81
Total resilience score	58.87±14.71	69.67±14.50	<0.001	57.77±13.33	51.63±12.20	<0.001

KMC: Kangaroo-Mother Care; CMC: Conventional Method of Care; M: Mean; SD: Standard deviation

It seems that mother’s ability to care for her baby at the NICU has a positive effect on the mother’s endurance, adaptability to the conditions, and her resilience (13). In this regard, the results of Ghazi et al study in Iran showed that the home visit program based on the continued KMC was effective in increasing maternal resilience. This study is similar to the present study in terms of the study population, with the difference that in their study, premature infants of 26-32 weeks were studied and the experimental group continued the KMC one month after discharge at home. Both studies confirm the effectiveness of KMC on maternal resilience (23).

Although the studies on the effect of embracing care on maternal resilience are rare, the results of most previous studies indicate the positive effects of this type of care on maternal mental health. Svensson et al. showed that skin to skin contact between the mother and baby creates a positive feeling and reduces maternal stress (24) Based on the results of other studies, KMC yielded positive effects on stabilizing the breathing of the preterm infants, improving maternal–infant attachment, and reducing maternal stress (25, 26). Participants in the study of Rossman et al showed resilience during the NICU hospitalization as they overcame their multiple losses by redefining or reframing their expectations, accepting alternatives to the lives they thought they would live, and learning to

live with what was beyond their control (13). It has been shown that KMC has a positive effect on the resilience of other family members, while families with premature infants suffered from resilience disorders (27). In another study on parents of preterm infants, KMC is associated with a decrease in parental anxiety levels and a high percentage of parents reported extreme confidence level in caring for their infant at discharge and breastfeeding in the NICU (28). In another study by Bitiska et al. parental resilience is inversely related to their stress, anxiety and depression, so that reducing anxiety and stress increases resilience (29). The results of a qualitative study on the resilience of mothers with prematurely low birth weight infants showed that the role of health care providers in the NICU in promoting mothers’ strengths and empowerment and increasing their self-confidence in caring for their infants was much more effective than other supporters (13). Accompanying and educating mothers with premature infants has several benefits, including a positive impact on breastfeeding and safe infant care methods as well as maternal mental health (30). Coşkun et al. showed that the amount of milk produced by the mothers in the KMC group gradually increased and the stress levels of the mothers who applied kangaroo care decreased significantly when compared with the stress levels the mothers of in the routine care group (31).

**Table 3:** Results of ANCOVA analysis related to the subscales of CD-RISC

Subscale	Margin		F	P-value*
	KMC group	CMC group		
Perception of individual competence	20.92	14.47	58.01	< 0.001
Tolerance of negative emotions and trust in individual instincts	17.80	13.36		< 0.001
Secure relationships and acceptance of positive change	14.54	11.18		< 0.001
Control	9.19	7.00		< 0.001
Total resilience score	69.09	52.20		< 0.001

\*Adjusted for pre-intervention scores and location

KMC: Kangaroo-Mother Care; CMC: Conventional Method of Care

In a study, kangaroo mother care increased breastfeeding self-efficacy perception of the mothers and reduced the perceived insufficient milk supply. This shows that kangaroo mother care can potentially have an important effect on breastfeeding perceptions (32). In the present study, the maternal resilience was measured in the first day and after a week. The average score of the resilience in the kangaroo care increased, in compared with the mothers in the control group significantly. Despite the cost-effectiveness of KMC in neonatal care, its implementation is associated with specific challenges in different communities (33, 34). Due to the major program implementation constraints, especially in countries with limited resources, global funding and assistance, continuous training of health personnel and especially designing and creating a suitable physical environment in hospital environments can benefit mothers and infants from this useful and effective care.

One of the main limitations of the present study was the small sample size of the participants at a single hospital. Therefore, for higher power and generalization of the findings in this study, further study is needed with a large sample size. Furthermore, individual differences of the mothers, their interactions with others as well as ability to cope with stressors have not been considered in this study.

## Conclusion

Kangaroo Mother Care was associated with an increase in maternal resilience as measured by CD-RISC. In addition to the many benefits for premature infants, KMC can also play an important role in maintaining and promoting maternal mental health.

## Conflict of Interests

Authors declare no conflict of interests.

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