

## The Effect of Kangaroo Mother Care Immediately after Delivery on Mother-infant Attachment 3 Months after Delivery

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### Abstract

#### Background

The aim of this study was determine the effect of kangaroo mother care (KMC) immediately after delivery on mother-infant attachment 3-month after delivery.

**Materials and Methods:** In this RCT study, 72 mother-infant pairs were randomly divided in to kangaroo mother care and routine care groups. The intervention group received kangaroo mother care (KMC) in the first two hours post birth. The control group just received routine hospital care. Mothers in the intervention group were encouraged to keep the baby in KMC as much as possible during the day and night throughout the neonatal period. Participants were followed up for three months after birth. The Main outcome measure was mother-infant attachment at 3 months postpartum and maternal anxiety about the baby at the same time. The data was collected by questionnaire (demographic information of parents and neonates) and maternal attachment scale. Analysis was performed using SPSS software (version 14).

**Results:** There was no significant difference between two groups regarding their baseline data. Mean maternal attachment score in the KMC group and in the routine care group at three months after delivery was  $52.40 \pm 3.30$  and  $49.86 \pm 4.18$  respectively, which was significantly higher in the KMC group ( $P < 0.05$ ). Mean anxiety about the baby score at three months after delivery in the KMC and routine care group were  $26.34 \pm 3.86$  and  $28.80 \pm 3.18$ , respectively, which was significantly lower in the KMC group ( $P < 0.05$ ).

#### Conclusion

Kangaroo mother care improves mother-infant attachment and reduces the mother anxiety about the baby; it is simple, acceptable to mothers and can be continued at home.

**Key Words:** Anxiety, Attachment, Kangaroo Mother Care, Routine Care.

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## 1- INTRODUCTION

Attachment is a strong and permanent socio-emotional relation between the mother and infant (1, 2) which keeps the infant close to mother and increases the possibility of infant's survival. The basis of the attachment theory is that mothers who are close to their babies and meet their needs, form a sense of security in them which gives the baby the opportunity to discover the world under the shadow of this attention (3). Failure in attachment formation and/or attachment disorders during early months of life may leave negative behavioral effects on the baby throughout life (4).

This lack of attachment formation may result from mother-infant separation, or lack of mother care or interaction with the baby, which means that the baby could not form a normal relationship with mother. Many infants are socially isolated; they are emotionally restricted and cannot enjoy the social interactions or playing, and gradually show aggressive behaviors during the toddler age. Growth failure, separation anxiety disorder, avoidance personality disorder, delinquency, learning problems and/or borderline IQ are among other side effects of this disorder (1, 2).

Mother-infant separation immediately after birth is a common practice in many hospitals in our country and many other countries and many post partum hospital care policies do not support this method of care. Early mother – infant skin to skin contact started in the early of 20<sup>th</sup> century and its benefits has been well documented and is recommended by World Health Organization (WHO), American academy of pediatrics, the academy of breastfeeding medicine (ABM) and neonatal resuscitation program (NRP) (5-7). It is well established that mother-infant separation immediately after birth, even for a short period of time can lead to unpleasant psychological and physiological consequences (7-10) such as

decreased mother-infant interaction and attachment (2, 11). Skin-to-skin care, generally referred to as kangaroo care, is most often provided by mothers. In kangaroo care, an infant is placed upright on the mother's bare chest, maximizing ventral skin-to-skin exposure and a blanket or shawl is wrapped around both mother and child. Kangaroo mother care was performed for the first time in 1978 (12-15). Kangaroo mother care (KMC) is a humane, low cost method of care (16).

Kangaroo care helps both infants and parents. Mothers report being significantly less stressed during kangaroo care than when the baby is receiving conventional care. Mothers prefer skin-to-skin contact to conventional care and report an increased convenience, confidence, self-esteem, and feeling of fulfillment, also in high-income countries they describe a sense of empowerment, confidence and a feeling that they can do something positive for their preterm infants in different settings and cultures (17). Kangaroo care has been promoted around the world for enhancing newborn physiologic stability, breastfeeding, and growth and development (18). During skin-to-skin contact, thermal, contact, and olfactory receptors may result in releasing maternal oxytocin. Oxytocin has anti-anxiety effects and can increase the sense of confidence and convenience; it also plays an important role in mammals expressing maternal behaviors which in turn can be effective in decreasing the level of anxiety in mother (19-22).

In addition to, when infants are exposed to skin-to-skin contact with the mother, they express species specific innate behaviors such as Sucking. During skin-to-skin contact, vocal and contact interaction increases between the mother and infant which leads to increase in mother's body response to the stimulations which baby expresses and develops nutritional behaviors by smelling and results in taking

the nipple and feeding. Sucking and stimulation of the nipple in the first hour after the birth can lead to hormonal responses in mother and results in increasing the secretion of oxytocin (9, 20, 22-26). Studies have indicated that mothers prefer skin-to-skin contact with their babies rather than routine care methods, because in this method the baby is really close to the mother, vocal and contact interaction increases between mother and baby and taking care of the baby becomes much easier and more complete (27-30).

Therefore, according to the fact that a part of normal infant interactions depend on interchanging a series of emotional reactions between mother and baby which mentally and psychologically bind them together (31), mother-infant interaction has deep impact on baby's behavior and is one of the most important factors of socio-mental growth of the baby and his/her adulthood character; since disorders in mother-infant attachment can lead to relationship problems and psychological disorders in infant's subsequent years of life (2, 29) the current study aimed to evaluate the effect of mother-infant skin to skin contact on mother-infant attachment and maternal anxiety about the baby 3-month after birth.

## **2- MATERIALS AND METHODS**

### **2-1. Study Design and Population**

This was a randomized Control Trial (code: 86263) conducted in Omolbanin obstetric hospital (large tertiary hospital affiliated with Mashhad University of medical sciences), Mashhad, Iran. This study is part of an extensive study and some of data has been published in previous study. 72 mother-infant pairs were included in the study according to the inclusion and exclusion criteria by two research assistants.

### **2-2. Inclusion criteria**

Inclusion criteria were as follows: age between 18-35 years, minimum literacy to read and write in Farsi, single pregnancy, term pregnancy with healthy infant, wanted pregnancy, normal delivery, no history of delivery and pregnancy complications, no smoking and drug use, no history of wife abuse, no marital problems, no history of high risk behaviors in mother or spouse (prison and addiction), no use of antidepressant medicines, no history of mental and physical problems.

### **2-3. Ethical Considerations**

The study was approved by the medical ethics committee of Mashhad University of Medical Sciences prior to performance and the participants signed informed consent.

### **2-4. Methods**

Mother-infant pairs were randomly assigned to either of the two groups, kangaroo mother care group (KMC) and routine care group with an allocation ratio of 1:1. In KMC group, the infant was placed between the mother's breasts in an upright position chest to chest for skin-to-skin contact immediately after birth. The umbilical cord was cut in the same position. The head and back of the baby were covered by two warm towels in order to prevent heat loss. Mothers were helped to keep this position in the delivery room, during stay in the postpartum room before transfer to the midwifery ward which lasted for two hours.

All mothers in the intervention group experienced this two hours of direct skin to skin contact with their babies. Apgar score was measured during mother-infant skin-to-skin contact, and weight (using a digital scale, made Hungary), height and head (using a tape made Iran) measurement and vitamin K injection were performed after two hours, when transferring to the midwifery ward. In routine care group, according to hospital routines, after delivery and cutting umbilical cord, the

baby was dried and Apgar score was determined. The baby was shown to mother and then weight, height and head circumference measurements and vitamin K injection were performed. Newborns were placed under a radiant heater, and were kept there as long as mother's episiotomy and perinea was repaired. Then, the baby was given to the mother, wrapped in a blanket.

A research assistant accompanied mothers in both groups for two hours after birth. Mothers in the intervention group were encouraged to keep the baby in KMC as long as possible during the day and night with an uninterrupted minimum period of 30 minutes at a time during the neonatal period. Mothers who did not perform skin to skin contact at least 30 minutes a day during the first month of life of infant and also mothers of both groups were breastfeeding their infants and those who did not breastfeed were excluded from the study. Upon discharge, the mothers of the intervention group were given a daily skin to skin contact form to sign up their daily contact information.

Mothers were facilitated to attend the clinic monthly and they were assessed by research assistants about their performing skin to skin contact and breastfeeding. If any of the criteria was not met the mothers were excluded from the study. A computerized research randomizer was used for this purpose and the sequence was generated by the statistical advisor of the research. The research assistants were blinded to this sequence with the use of sequentially numbered sealed envelopes. After the participants signed consent forms, envelopes were opened.

## **2-5. Measuring tools, validity and reliability**

Data collection was done using demographic questionnaire and maternal attachment scale. The demographic questionnaire was applied to record

personal, social, pregnancy and delivery data of mother and baby. It was developed by the researchers. Maternal attachment scale contained 15 items and 2 subgroups as main attachment and anxiety about the baby which was scored based on a 4 level Likert scale as "always", "often", "sometimes" and "never". In the current study, maternal attachment scale was completed 3 months after delivery in both groups. Mothers were invited to the clinic 3 months after birth and the questionnaires were completed there. It is noteworthy that the higher score in maternal scale shows the higher attachment of mother to the baby, and the higher score of the subgroup of anxiety about the baby indicates the lower anxiety.

To determine the validity of maternal attachment scale and maternal anxiety scale first and second tools, content and facial validity methods were used as follows, the questionnaires were prepared, verified and corrected by the study reader and advisor, and then they were given to 18 faculty members of Mashhad University of Medical Sciences, and through their feedback and recommendations, the final data gathering tool was approved.

Reliability of the first and the second tools were measured as  $r=0.88$  and  $r=0.94$ , respectively by reliability equivalent method. Validity of Persian version of maternal attachment scale had already been approved by Nematbakhsh et al. (2), using content and facial validity methods.

The validity of subgroups maternal main attachment, and anxiety about the baby, were approved by Cronbach alpha method as  $\alpha=0.7$ . The investigators who performed the 3 months evaluation were blinded to the group interventions. Mothers were also not told about the purpose of the study.

The Main outcome measure was mother-infant attachment at 3 months postpartum and maternal anxiety about the baby at the same time.

## 2-6. Data analyses

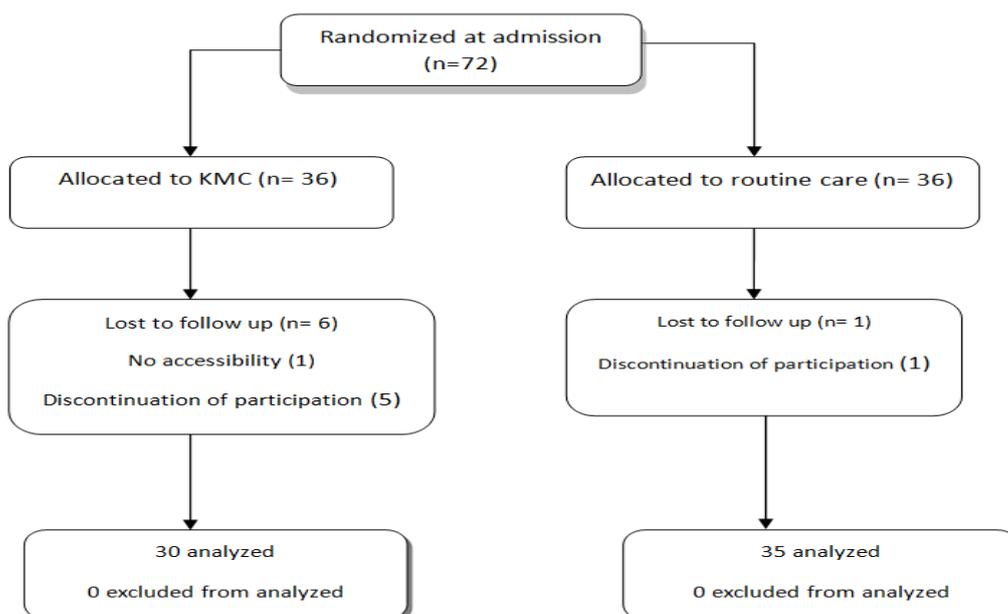
Data were analyzed using SPSS- 14 statistical package. Descriptive statistics including frequency and standard deviation tables were used to show the characteristics of the participants. Chi-square test was used to compare the qualitative variables of the groups. Independent T test was used to compare the quantitative variables of the groups and to compare the rating variables of the groups; Mann-Whitney non-parametric test was used. Level of significance was 0.05.

## 3- RESULTS

65 mothers and their babies were analyzed (30 in KMC group and 35 in routine care group) (**Figure.1**). 7(9.7%) mother-infant pairs were lost to follow up because of inaccessibility or discontinuation of participation. There was no significant difference between the two groups in mothers' age ( $22.23 \pm 2.99$  vs.  $21.62 \pm 2.85$ ,  $P= 0.40$ ), mothers' education ( $P= 0.97$ ), fathers' education ( $P=0.45$ ), job ( $P=0.27$ ), mothers' opinion about breastfeeding ( $P=0.052$ ), infants' sex

( $P=0.81$ ) and infants' weight ( $P= 0.37$ ). The mean age of mothers in both groups was almost equal. Most of the mothers had and their spouses of both groups had guidance school. From 65 mothers participated in this study, 20 (56.6%) were guidance school, 53 (88.3%) were housewife and 39 (65%) had cesarean delivery method. Average weight of the babies in kangaroo mother care and routine care groups were  $3174.72 \pm 298.78$  and  $3246.85 \pm 343.08$  gr, respectively. Gender of most babies in both groups was girl (**Table-1**).

The average mother-infant attachment score at 3 months postpartum in KMC and routine care groups were  $52.40 \pm 3.30$  and  $49.86 \pm 4.18$ , respectively and the independent t- test indicated a significant difference between the two groups ( $P=0.009$ ) (**Table-2**). The average score of anxiety about the baby at three months after birth in the KMC and routine care group were  $26.34 \pm 3.86$  and  $28.80 \pm 3.18$ , respectively and the independent t- test indicated a significant difference between both groups ( $P=0.007$ ) (**Table-3**).



**Fig.1:** Methodology flowchart used for carrying out this study.

**Table-1:** Characteristics of mothers and infants in KMC group and routine care groups

Variables	Groups		P-value
	Skin to skin contact	Routine Care	
Qualitative variables	N (%)	N (%)	
Education			0.97
Illiterate	0 (0)	5 (14.3)	
Elementary school	9 (30)	14 (40)	
Guidance school	5 (16.7)	15 (42.9)	
High school	14 (47.6)	1 (2.9)	
Higher Education	2 (6.7)	5 (14.3)	
Job			0.27
Housewife	29 (96.7)	35 (100)	
Employed	1 (3.3)	0 (0)	
Husband's literature			0.45
Illiterate	1 (3.3)	0 (0)	
Elementary school	5 (16.7)	7 (20)	
Guidance school	18 (60)	17 (48.6)	
High school	6 (20)	11 (31.4)	
Higher Education	0 (0)	0 (0)	
Opinion about breastfeeding			0.052
Completely agree	26 (86.7)	23 (65.7)	
Agree	14 (13.3)	12 (34.3)	
Infant sex			0.81
Girl	18 (60)	20 (57.1)	
Boy	12 (40)	15 (42.9)	
Quantitative variables	Mean $\pm$ Std. Dev.	Mean $\pm$ Std. Dev.	
Mother's age	22.23 $\pm$ 2.99	21.62 $\pm$ 2.85	0.40
Duration of active phase of child-birth first stage (min.)	275.70 $\pm$ 88.80	245.97 $\pm$ 82.02	0.16
Duration of child-birth second stage (min.)	39.08 $\pm$ 20.04	36.08 $\pm$ 20.58	0.55
Infant weight (gr)	3174.72 $\pm$ 298.78	3246.85 $\pm$ 343.08	0.37

**Table-2:** Comparison Between the Average of Maternal Attachment three months after delivery in KMC group and routine care group

Mother-infant Attachment	Groups	
	KMC group	Routine care groups
	Mean $\pm$ SD	Mean $\pm$ SD
	52.40 $\pm$ 3.30	49.86 $\pm$ 4.18
P= 0.009		

SD: Standard deviation.

**Table-3:** Comparison Between Average of Anxiety about Infant three months after delivery in KMC group and routine care groups

Groups		
Anxiety About Infant	Mother-Infant Skin-to-Skin Contact	Routine Care of Infant
	Mean $\pm$ SD	Mean $\pm$ SD
	28.80 $\pm$ 3.18	26.34 $\pm$ 3.86
P= 0.007		

#### 4- DISCUSSION

Findings of the current study indicate a significant difference between the level of mother-infant attachment in KMC group and that of routine care group. Level of mother-infant attachment at 3 months postpartum in skin-to skin contact group was higher than the routine care group. Also, the anxiety level about the baby showed a significant difference between the two groups and was significantly lower in KMC group.

Mother-infant skin to skin contact has been promoted around the world for enhancing newborn physiologic stability, breastfeeding, and growth and development (12). During skin-to-skin contact, thermal, contact, and olfactory stimulations may result in maternal oxytocin releasing (19-22).

Oxytocin has anti-anxiety effects and can increase the sense of confidence and convenience; it also plays an important role in mammals expressing maternal behaviors which in turn can be effective in decreasing the anxiety level in mother (19, 21). In addition, when infants are exposed to skin-to-skin contact with their mothers, they express species specific innate behaviors such as Sucking. During skin-to-skin contact, vocal and contact interaction increases between the mother and infant, which lead to increased maternal responses to the baby's stimulations and thus developing nutritional behaviors like taking the nipple and suckling. Sucking and stimulation of the nipple in the first hours postpartum can lead to maternal hormonal responses and results in

increased secretion of oxytocin (19, 20, 22). Studies have indicated that mothers prefer skin-to-skin contact with their babies rather than routine care methods, because in this method the baby is really close to the mother, vocal and contact interaction increases between mother and baby and taking care of the baby becomes much easier and more complete (27-29).

The studies of Meaney, Plotsky, Liu and Francis on animals showed that infants with the least attentive contact from their mothers were the ones whose health and intelligence were compromised throughout life (22). During skin-to-skin contact, discharge of infant's energy storage reduces because of decreased stress and crying, and comfortable sleep time increases. This caring method leads to easier adaptation of the infant with out of uterus life (7, 24). Babies, who receive enough attention and care, experience less crying and restlessness by the end of the first year of life (31).

Nematbakhsh et al. (2) in his study indicated that skin- to- skin contact between the mother and baby may lead to increased maternal attachment and decrease in the anxiety level about the baby in the experimental group compared to that of control group; these findings are compatible with the results of the current study. Gathwala et al. (32) showed that the total score of mother-infant attachment in the kangaroo mother care (KMC) receiving group was significantly higher than that of control group. Their findings also indicates that the sense of competence and sensitivity in the mothers of kangaroo

mother care (KMC) group was higher than the control group and mothers of KMC group paid more attention to their babies. Bystrova et al. (33) and Charpak et al. (34) in their studies have also indicated that mother-infant skin-to-skin contact has positive effects on the interaction between the mother and her baby. The results of the current study are compatible with the findings of their studies.

The current and the other mentioned studies, indicate that mother-infant skin-to-skin contact has positive effects on the interaction between mother and baby which enhances their attachment. Skin-to-skin contact is associated with higher rates of maternal satisfaction and mothers feel more competent and confident to take care of their babies, and meet the babies' needs as compared to mothers who have been separated from their babies after delivery (2, 18, 35). Therefore, mother-infant skin-to-skin contact immediately after delivery can be used as a rather easy, economic and noninvasive method to increase interaction between mother and baby and to decrease anxiety about the baby.

During the current study, stressful and unpleasant events were investigated, but daily life stresses were not measurable. While it was tried to minimize individual conflicts by randomly specifying mothers into the two groups, individual life experiences and conflicts can be considered as a limitation to the study. It is recommended that mother-infant skin-to-skin contact method be applied as a caring method by midwives, physicians and students, who are responsible to take care of pregnant women during delivery, in order to guarantee the future mental health of the babies by increasing the mother-infant attachment.

#### **4-1. Limitations of the study**

Although during the current study, stressful and unpleasant events were also investigated, daily life stresses were not

measurable and it can be considered as a limitation to the study. Of course it was tried to minimize individual conflicts by specifying mothers into the two groups randomly.

#### **5. CONCLUSION**

It is recommended that mother-infant skin-to-skin contact method be applied as a caring method by midwives, physicians and students, who are responsible to take care of pregnant women during delivery, in order to guarantee the future mental health of the babies by increasing the mother-infant attachment.

#### **6- CONFLICT OF INTEREST**

The authors had not any financial or personal relationships with other people or organizations during the study. So there was no conflict of interests in this article.

#### **7- ACKNOWLEDGMENT**

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