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A comparative study of maternal-neonate abdominal and kangaroo (skin-to-skin) skin contact immediately after birth on maternal attachment behaviors up to 2 months

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Abstract:

BACKGROUND: Early skin-to-skin maternal–neonate contact during the 1st h following birth prepares both mother and baby to establish a two-way, interactive pattern of interaction. There are few studies on the use of kangaroo care method in term infants and maternal postpartum behavior.

OBJECTIVE: The present study aimed to compare abdominal and kangaroo skin contact on maternal attachment behaviors.

SETTINGS AND DESIGN: This single-blind randomized clinical trial was performed on 68 eligible pregnant women in Torbat Heydariyeh in 2015.

MATERIALS AND METHODS: Individuals were randomly divided into experimental groups (kangaroo skin contact) and control group (abdominal skin contact). Maternal attachment behaviors were observed for 15 min during 1 h postpartum. Each minute was divided into two 30 s, during the first and second 30 s of which the maternal behavior was observed and recorded using a checklist of behavior. Attachment behaviors were assessed using an attachment behavior checklist (including three types of emotional, proximity-seeking, and caring behaviors).

STATISTICAL ANALYSIS USED: After data coding, the analysis was performed using Kruskal–Wallis test, Chi-square test, *t*-test, and Mann–Whitney test in SPSS ver. 14. *P* < 0.05 was considered the significant level.

RESULTS: Among emotional, proximity-seeking, and caring behaviors 1 h and 2 months' postpartum in the two groups, only proximity-seeking behaviors were significantly different 2 months' postpartum (*P* = 0.033). The attachment behavior of 1 h (0.134) and 2 months' postpartum (0.051) did not differ significantly between the two groups.

CONCLUSIONS: Kangaroo skin contact has an effect, similar to the abdominal skin contact, on the maternal attachment behaviors and has a positive effect on proximity-seeking behaviors and some components of emotional behaviors compared to abdominal skin contact.

Keywords:

Attachment behaviors, kangaroo care, skin-to-skin contact

Introduction

The neonatal period covers the short but important and critical spectrum of human growth, and the emotional growth

and development of this stage is clearly evident.^[1] Attachment is a warm, intimate, and lasting relationship between mother and baby that facilitates mother–newborn interactions. This emotional relationship that forms during pregnancy is enhanced by eye contact, olfactory, and touch sense of

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the mother and the baby after delivery.^[2,3] Skin-to-skin contact that occurs in the 1st h after birth prepares mother and infant to establish an interactive and coordinated interaction pattern^[4] and enhances the mother's ability to care for the baby and mother's self-confidence and attachment.^[5] Maternal–neonate skin contact can occur in two ways immediately after birth: kangaroo or abdominal contact. Kangaroo contact was initially implemented in South America and Europe and then in the United States,^[6] and this method was used since then to overcome the problems of baby care through incubation in developing countries.^[7] This intervention is performed by placing the naked infant's abdomen on the skin and between the mother's breasts in the first few minutes of birth.^[8] However, the naked infant is placed on the abdominal skin of the mother in abdominal skin contact, which occurs more often in term neonates immediately after birth. In this type of contact, face-to-face maternal–neonate communication will not be established and will only bring the benefits of skin contact to the baby. Maternal mental health postpartum involves attachment and ability to care for the baby. Attachment disorder is the result of maternal separation or lack of maternal care or interaction that can lead to complications such as growth failure, separation anxiety disorder, psychosocial disorder, avoidance personality disorder, and delinquency, lack of intimate personal relationships with others, learning problems, or frontier IQ. Attachment includes three types of emotional, proximity-seeking, and caring behaviors. Emotional behaviors are those that show the emotional feelings of the mother toward the infant, which include looking, caressing, kissing, talking, smiling, and calling the baby. Proximity-seeking behavior is a behavior that leads to a closer relationship between the mother and the baby, including hugging, physical contact, and wrapping the arms around the baby's body. Caring behaviors are the behaviors that the mother shows to take care of her baby, such as tidying baby clothes, changing diapers, and breastfeeding.^[9,10] The main reasons for absence of the skin contact or its short duration in Iran include shortage of workforce in the maternity ward, and as a result, the time limits for midwives in the delivery room, as well as the many duties that are put on their shoulder, besides childbirth.^[11]

Few studies have been conducted on skin contact on term neonates, and most studies have been conducted on preterm infants and have provided different results on the effect of this method on maternal attachment. Jefferies showed in a study that kangaroo care increased maternal attachment behaviors and increased maternal sense in preterm infants.^[12] Joao Carlos Arivabence also confirmed that kangaroo contact in preterm infants increased maternal and neonatal emotional affliction^[13] while Curry stated that the maternal–neonate skin

contact during the 1st h after childbirth had no effect on maternal attachment behaviors 36 h and 3 months' postpartum.^[14] In a study, Vakelian showed that attachment behaviors such as emotional and proximity behaviors were more common in mothers who were in a kangaroo contact with their infants immediately after the birth and did the breastfeeding in each breast at least 15–20 min that the control group.^[5]

Abdominal skin contact is currently practiced more frequently by the personnel and the kangaroo is rarely done due to lack of manpower in the maternity ward and time constraints of midwives in many maternity hospitals. Considering that only maternal–neonate touching is established in the abdominal skin contact and in addition to touch, there will also maternal–neonate eye and olfactory contact, and this question will occur to the researcher's mind which type of skin contact will further enhance the emotional relationship between the mother and the baby. Therefore, the researcher aimed to conduct a study to compare the effects of abdominal skin and kangaroo contact between mother and infant on maternal attachment behaviors so that the results of this research will provide a solution to pay attention to the mental dimensions of the mother and the baby and their health at the wider level.

Materials and Methods

This randomized single-blind clinical trial study was conducted on 68 pregnant women who met the inclusion criteria and referred to the 9th day Hospital and Health Centers, Torbat Heydariyeh, Iran in 2015. The sample size was determined at 68 (experimental group = 34, control group = 34) using the formula for comparison of mean in Vakilian's study, with alpha and beta of 0.05.

$$N = (z_{1-\alpha/2} + z_{1-\beta})^2 (s_1^2 + s_2^2) / (x_1 - x_2)^2$$

$$N = 13 (6.18^2 + 5.54^2) / (18.56 - 13.37)^2 = 33.15 = 34$$

The inclusion criteria included gestational age of 38–42 weeks, singleton-term fetuses with Apgar 8–10, 2500–4000 g infants, Iranian nationality, and wanted pregnancy. Exclusion criteria included midwifery problems (premature rupture of the membrane, placental abruption, and meconium amniotic fluid), maternal medical diseases (diabetes, preeclampsia, hypertension, and heart, kidney, liver, thyroid, and mental diseases) and neonatal anomalies, maternal history of mental diseases, divorce, unsuccessful marriage, and unwanted neonate's gender. Data were gathered by questionnaire forms (selection and removal form of the research participants, demographic questionnaire, questionnaire about fertility, medical,

labor stages and neonatal informations) and attachment behavior checklist. attachment behavior checklist include three types of emotional (kissing, looking at the face, talking, checking the baby, smiling and shaking the cradle, looking at the baby's limbs, and caressing), proximity-seeking (hugging without touching the mother's trunk, hugging in close contact with the baby's mother, and wrapping the arms around the baby), and caring behaviors (breastfeeding, changing baby diapers, tapping baby's back to remove the baby's stomach air, and making tidy the infant dressing). It seems that measurement of proximity-seeking, emotional, and caring behaviors using this checklist will assess all of the mother's behaviors toward her child, which can reflect the level of attachment and emotional relationship with the child. The form for selection and removal of the research participants and the demographic questionnaire were reliable tools. The reliability of the fertility, medical, and neonatal questionnaire ($r = 0.94$, $r = 0.89$, $r = 0.84$) and the childbirth stage and attachment behavior questionnaire ($r = 0.78$, $r = 0.84$) was confirmed by test-retest method and simultaneous observation test, respectively. The validity of the attachment behavior checklist was verified by Vakelian (2010) using content validity method.^[5] The validity of other forms of study was confirmed using content validity method.

This research was registered at the Iranian Center for Clinical Trials with IRCT2014090419039N1 code after approval of the research project in the Ethics Committee of Torbat Heydariyeh University of Medical Sciences. After the approval of the ethics committee of Medical Sciences University, the study objectives were explained to the patients and the eligible participants were selected using convenience sampling method and then they were divided into two groups (experimental and control groups) by using random blocks after obtaining informed consent. Questionnaires on demographic, fertility, and medical information were completed for both groups. Prenatal cares were the same for both groups. After providing early postbirth care (clean the airway if necessary, cord clamping, and baby drying), the naked baby in the experimental group was placed in the prone position on the mother's body and between her breasts so that the naked body of the baby was in contact with the mother's skin and eye contact was also established. To prevent hypothermia, the baby was covered with dry and warm clothes and the baby's head was covered with a hat, and the mother was later asked to caress her baby and look at her/his face. The contact duration was 5–10 min, during which no breastfeeding was done. The baby was then transferred to a radiant warmer, and other cares were provided to her/him. However, the care process was performed in the control group according to the hospital routine; i.e., immediately after birth, the naked baby was placed on the mother's abdomen, regardless of

her/his position, and the measures were taken to open the airway, remove the umbilical cord clamp, and dry the baby; then, the baby was shown to the mother and transferred to the radiant warmer. The childbirth stage and infant questionnaire was completed, and during the 1st h after delivery, the breastfeeding was done for all of the research participants. The breastfeeding duration was the same in both groups. During the first 15 min of baby transfer to mother's bed, the researcher's assistant used checklist to indirectly observe and record the mother's behavior in such way that she was unaware of it. Within this 15 min, each minute was divided into two 30 s and the behavior was observed and recorded during the first and second 30 s, respectively. Two months after birth, the researcher assistant attended the health center while giving mothers' necessary recommendations through telephone during the second vaccination stage. Each room was equipped with a private space with seats and beds, and the mothers were asked to be with their child 15–20 min before the vaccination and provide any necessary care. The researcher's assistance also attended the room and indirectly monitored and recorded the mother's behavior for 15 min without informing the mother. In the absence of the mother's willingness to continue the collaboration and bad conditions of the baby for any reason, the research participant was excluded from the study. After being collected and coded, the data were analyzed using Mann-Whitney test, *t*-test, Chi-square test, and covariance analysis in SPSS (Version 11.5, USA). $P < 0.05$ was considered as the significant level.

Results

The data showed that the mean age in the abdominal skin contact and kangaroo skin contact groups was 25.76 ± 6.305 and 26.75 ± 5.49 , respectively. Most of the research participants had high school education and were housekeepers in the intervention and control groups. The results of Chi-square test, *t*-test, and Mann-Whitney test showed no significant differences between the two groups in terms of personal characteristics (your education level and your spouse's income, family income level, divorce history, marital satisfaction, separation intention, use of cigarettes and hookahs or drugs, the history of mental illness, and the use of psychiatric drugs), fertility information and medical history (the number of pregnancy and abortion and stillbirth, wanted pregnancy, the baby gender, prenatal care and the time of the first visit, and spouses' feeling about the pregnancy), information about the childbirth stages (use of analgesia and type of analgesia, medications used during labor, and postpartum perineal status), maternal (level of satisfaction with delivery, the desired gender of the baby, the feeling after skin contact with the baby, and the level of satisfaction with the behavior of the staff) and neonatal information

(baby's gender, weight, height, and head circumference), and other intervening variables ($P < 0.05$) [Table 1].

The intradelivery baby weight was not homogeneous according to Mann-Whitney test, and homogeneity test was performed using covariance assay; results showed that the weight variable did not have intervening effect.

The results of investigating the components of maternal emotional behaviors 1 h and 2 months' postpartum showed that the most frequent emotional behaviors in both groups included looking at the face and then shaking the cradle of the baby, and there was a significant difference between the two groups only in terms of two variables of kissing ($P = 0.036$) and smile ($P = 0.007$). There was no significant difference between the two groups in terms of the total score of maternal emotional behaviors according to *t*-test [Table 2].

Mann-Whitney showed that the components of proximity-seeking behaviors did not differ significantly between two groups at 1 h and 2 months' postpartum. The most frequent maternal proximity-seeking behaviors included hugging. There was no significant difference between the two groups in terms of total score of the three variables of proximity-seeking behaviors at 1 h postpartum ($P = 0.289$), but there was a significant difference 2 months' postpartum ($P = 0.033$) [Table 3].

Comparison of the mean score of components of caring behaviors as well as the total score of four variables of caring behaviors 1 h and 2 months' postpartum showed that there was no significant difference between the two groups ($P < 0.05$). The highest maternal-caring behaviors were observed in both groups at 1 h and 2 months' postpartum [Table 3].

Table 1: Mean comparison of some information about the infant and the information of the first, second, and third stages of childbirth of the research participants for each group

Variable	Mean±SD		The significance level (<i>P</i>)
	Kangaroo skin contact group	Abdominal skin contact group	
The amount of oxytocin (cc)	1.03±14.54	1.88±24.74	0.064*
Active phase length of the first stage of labor (min)	172.2±9.94	148.2±11.64	0.381**
Length of the second stage of labor (min)	42.94±3.21	28.69±4.52	0.071*
Length of third stage of labor (min)	9.58±1.72	6.51±4.23	0.876*
First minute Apgar score	9.00±0.00	9.00±0.00	
Fifth minute Apgar score	10.00±0.00	10.00±0.00	
Time interval between birth and first maternal-neonate contact (min)	4.10±16.04	1.43±5.57	0.900*
Time interval between birth and first breastfeeding (min)	33.67±12.26	40.64±16.96	0.061**
Duration of first breastfeeding	22.74±10.71	24.29±12.38	0.845*

***t*-Test, *Mann-Whitney test. SD=Standard deviation

Table 2: Comparison of mean scores of emotional behaviors in the 1st h and 2nd month postpartum by group

Variable	Follow-up duration	Mean±SD		The significance level (<i>P</i>)
		Kangaroo skin contact group	Abdominal skin contact group	
Looking at the face	1 h postpartum	13.70±8.55	16.75±9.19	0.164*
	2 months postpartum	10.35±5.48	8.84±4.86	0.239**
Caressing	1 h postpartum	2.72±2.51	2.15±2.87	0.390**
	2 months postpartum	3.20±3.53	2.66±3.88	0.309*
Kissing	1 h postpartum	0.47±0.78	0.18±0.46	0.087*
	2 months postpartum	0.79±1.32	0.33±0.98	0.036*
Talking	1 h postpartum	3.55±4.96	3.18±5.17	0.122*
	2 months postpartum	4.91±8.91	3.21±4.72	0.130*
Looking at the limbs	1 h postpartum	1.61±1.65	2.66±2.99	0.134*
	2 months postpartum	1.35±1.57	1.51±1.34	0.435*
Smiling	1 h postpartum	2.61±3.20	2.87±4.56	0.326*
	2 months postpartum	2.85±3.45	1.21±2.53	0.007*
Shaking the cradle	1 h postpartum	1.17±4.33	0.51±1.27	0.638*
	2 months postpartum	4.14±5.28	4.65±6.23	0.951*
Calling the baby by name	1 h postpartum	0.41±0.85	0.63±2.24	0.331*
	2 months postpartum	1.52±3.62	0.87±2.71	0.541*
Total score	1 h postpartum	26.50±1.66	23.87±1.66	0.328**
	2 months postpartum	29.14±1.99	22.59±1.72	0.129**

***t*-test, * Mann-Whitney test. SD=Standard deviation

Table 3: Comparison of the mean score of proximity-seeking and caring behaviors at the 1st h and 2nd month postpartum by group

Variable	Follow-up duration	Mean±SD		The significance level (P)
		Kangaroo skin contact group	Abdominal skin contact group	
Proximity-seeking behaviors				
Hugging	1 h postpartum	5.50±5.94	3.63±4.97	0.134*
	2 months postpartum	11.33±4.19	9.51±5.70	0.189*
Close contact between maternal trunk and the baby	1 h postpartum	3.29±4.59	5.27±6.19	0.520*
	2 months postpartum	3.08±4.71	3.30±5.06	0.801*
Wrapping arms around the baby	1 h postpartum	0.88±1.55	1.03±2.93	0.372*
	2 months postpartum	2.05±3.22	1.33±2.72	0.181*
Total score	1 h postpartum	9.67±6.33	7.93±8.79	0.289**
	2 months postpartum	16.33±6.73	14.15±7.51	0.033*
Caring behaviors				
Making baby's clothes neat and tidy	1 h postpartum	3.55±3.47	4.00±4.95	0.148*
	2 months postpartum	3.17±2.84	3.39±3.14	0.800*
Breastfeeding	1 h postpartum	11.17±4.64	9.43±6.47	0.217**
	2 months postpartum	5.14±4.83	3.84±4.34	0.264*
Changing diapers	1 h postpartum	0.00±0.00	0.42±2.43	0.317*
	2 months postpartum	0.11±0.53	0.09±0.52	0.587*
Tapping the back of the baby to let the gastric gas out of the stomach	1 h postpartum	0.27±0.45	0.30±0.17	0.094*
	2 months postpartum	1.29±2.05	0.54±1.17	0.177*
Total score	1 h postpartum	14.81±3.77	13.93±5.92	0.423*
	2 months postpartum	9.73±5.82	7.87±4.11	0.136*

** t-test, *Mann-Whitney test. SD=Standard deviation

Table 4: Comparison of the mean score of attachment behavior (total emotional, proximity-seeking and caring behaviors) at the 1st h and 2nd months postpartum in each group

Variable: Attachment behavior	Mean±SD		Significant level of t-test (P)
	Kangaroo skin contact group	Abdominal skin contact group	
1 h postpartum	50.623±2.21	47.06±1.74	0.134
2 months postpartum	54.72±24.58	44.21±21.00	0.051

SD=Standard deviation

According to Mann–Whitney test, the mean attachment behavior score 1 h (0.134) and 2 months' postpartum (0.051) was not significantly different in the two groups [Table 4].

Discussion

The results of the present study showed that although the mean score of emotional behavior in the kangaroo skin contact group was higher than the abdominal skin contact group 1 h and 2 months' postpartum, this difference was not significant. However, mothers who had a kangaroo skin contact smiled and kissed their baby more frequently ($P < 0.05$). Svensson *et al.* in a study in Stockholm showed that the kangaroo method during breastfeeding, compared with the control group, which adhered to the normal breastfeeding conditions, increases the positive emotions of the mother and shortens the time required for the baby to take the breasts.^[15] In a study, Vakelian (2009) showed that kangaroo skin contact

significantly increased maternal attachment behaviors in two dimensions of emotional and proximity-seeking behaviors 1 and 3 months' postpartum. These differences between results of Vakilian's study and those of the present study are may be due to the duration of the intervention and the time required for evaluating the attachment behaviors.^[15]

In the present research, looking at baby's face and then shaking the cradle were the most frequent maternal emotional behaviors 1 and 2 months' postpartum in both groups. Vakelian referred in his study to looking at baby's face as an emotional behavior with the highest mean 1 and 3 months' postpartum in the kangaroo and control groups, and there was a significant difference between the two groups in terms of emotional behavior of shaking the cradle ($2.09 \pm 2.09, 3.32 \pm 3.65$) ($P = 0.001$).^[15]

The proximity behaviors in mothers who experienced kangaroo skin contact 1 h postpartum was like the abdominal skin contact group ($P = 0.889$); however, the proximity-seeking behaviors of kangaroo skin contact group was higher 2 months' postpartum ($P = 0.033$). Contact, heat, and smell receptors can lead to maternal oxytocin release during skin contact. Oxytocin has antianxiety effects and can increase the confidence and comfort feeling and plays an important role in mammals in the onset of maternal behaviors.^[16,17] Since only the maternal–neonate skin contact is established in the abdominal skin contact, and in addition to the skin

contact, the eye and olfactory contact is also established in the kangaroo contact, it seems that the kangaroo skin contact can cause increased maternal proximity-seeking behaviors compared with the abdominal skin contact 2 months' postpartum. In a research on 146 mothers with premature infants, Feldman and Eidelman showed that mothers receiving kangaroo care have more proximity-seeking behaviors, such as face-face hugging, which is consistent with the results of the present study.^[18] Charpak *et al.* also believe that kangaroo contact has increased the awareness of parents about the infant, and as a result, they are more responsive to the infant's needs, which in turn is an influential factor in improving the family-baby attachment behaviors.^[19] Hugging is the most frequent proximity-seeking behavior 1 h and 2 months' postpartum in two groups. According to Vakilian's study, hugging was the most frequent proximity-seeking behavior in both groups of kangaroo and control groups.^[5]

The results of the present research showed that although the mean scores of caring behaviors were higher in the kangaroo contact group, this difference was not statistically significant, and the kangaroo contact did not increase caring behaviors. Vaikilian (2009) stated in their study that there was no significant difference between the two groups in terms of caring behaviors.^[5] The most frequent maternal caring behaviors observed in both groups included breastfeeding 1 h postpartum, but its mean was higher in the kangaroo care group. Keshavarz (2011) also showed that the frequency of hospital feeding and the exclusive breastfeeding rate were up to 6 months longer in the kangaroo care group than the usual care group.^[20]

In the present study, the comparison of mean maternal attachment behaviors showed that kangaroo skin contact did not increase attachment behaviors, compared with abdominal skin contact. It may be due to the short duration of our intervention because some researches show that mothers who had kangaroo contact with their infant immediately after birth had more opportunity to show behaviors such as looking, laughing, hugging, and touching.^[11] In a study, Vaikilian showed that the mean scores of attachment behaviors in kangaroo contact group were significantly higher than the control group in the 1 and 3 months' postpartum. Vakilian's study was conducted on 90 people with a contact time of at least 15–20 min, so mothers had more time to look, caress, and touch their baby. The breastfeeding was performed during kangaroo contact in Vakilian's study, and infants who could not breastfeed at this stage were excluded from the study, and the attachment behaviors were evaluated 1 and 3 months after birth.^[5] Nematbakhsh showed that the placement of the baby on the mother's naked breast increased the maternal attachment as compared with

the control group on the 3rd- and 10th- day postpartum. Nematbakhsh study was conducted on women who had cesarean sections, and skin contact was performed at home at least 20–30 min per day; however, on the other hand, the degree of attachment was performed in both kangaroo contact and the control group (no contact).^[2] In Karimi's study, maternal-neonate attachment in the kangaroo contact group was significantly different from that of the usual care group. The difference between results of Karimi's study and those of the present study may be attributed to the intervention procedure. In Karimi's study, the infants in the case group were placed in the middle of their mother's breasts immediately after delivery and the skin contact continued in the delivery room, during the transfer to the next delivery room, and in the next delivery room until the mother being to the midwifery department. The entire length of this period was 2 h and no skin contact was practiced in the usual care group.^[10] Curry stated that the maternal-neonate skin-to-skin contact did not affect maternal attachment behaviors during the 36 h and 3 months' postpartum,^[14] which is consistent with the results of the present study. Messmer also showed that there was no significant relationship between maternal and neonatal bonding with kangaroo care.^[21]

One of the limitations of the present research was that the low temperature of the labor room might have prevented the intervention from being performed correctly. To resolve this limitation, warm clothes and hats were used to cover the baby and a heating device for the labor room. Since the presence of the researcher in the maternity room may have been a source of maternal discomfort, the researcher's assistant indirectly monitored the mother for 15 min in order to remove this limitation.

Conclusions

Despite the fact that breastfeeding was not practiced in the kangaroo contact used in the study and the duration of kangaroo contact was also short, this method has positive effects on proximity-seeking behaviors and some components of sensory behaviors compared to abdominal skin contact. According to the present conditions and considering the fact that shortage of manpower in the maternity ward and as a result, the time limits for midwives in the delivery room are one of the main reasons for absence or low duration of the kangaroo care method in Iran to establish a short contact; the kangaroo skin contact used in the present research is preferable to abdominal skin contact midwives, and nurses responsible for the care of mothers and infants are recommended to use this method.

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Conflicts of interest

There are no conflicts of interest.

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