

Effect of Skin to Skin Contact between the Biological Mother and Their Baby Who Born Via Surrogacy on Mother Infant Attachment

Abstract

Background: The attachment between mother and infant, beginning from pregnancy and reaching a peak with skin-to-skin contact, has a considerable effect on infants' growth and development. As stress and anxiety in contact with infants and unwillingness to embrace them have been reported in biological mothers in surrogacy, this study was conducted to assess the effect of skin-to-skin contact between the biological mother and their baby who born via surrogacy on mother-infant attachment. **Materials and Methods:** In this clinical trial, 50 biological mothers were randomly assigned to either intervention (with skin contact) or the control group. The data collection tools included a personal information questionnaire and Avant's mother-infant attachment questionnaire. **Results:** The results indicated a significant difference between the intervention group, with skin-to-skin contact with the biological mother in surrogacy, and the control group (no skin-to-skin contact) in terms of the mean score of biological mothers' attachment ($p < 0.001$). **Conclusions:** The results suggested that biological mother-infant skin-to-skin contact immediately after birth is effective in creating and increasing attachment and affecting mothers' quality of infant care. As this does not routinely occur in hospitals, taking necessary measures and educating nurses and authorities in maternity and neonatal wards is crucial to improving the quality of care and creating the desired attachment between mothers and infants.

Keywords: Biological mother, Kangaroo mother care method, nursing, object attachment, surrogate mothers

Introduction

Becoming a mother leads to personal development and reproduction and enables women to improve their inner potential regarding others and society.^[1] Unfortunately, pregnancy is not possible for some women due to physiological conditions, physical disabilities, or some pregnancy complications. Today, several assisted and alternative methods, such as artificial reproduction technology (ART), *in vitro* fertilization (IVF), intrauterine insemination (IUI), and surrogate uterus, have revolutionized reproductive science.^[2] In a study conducted in India, surrogacy was reported as one of the best alternative methods of pregnancy as, in this method, the child is related to the parents by blood.^[3] Other positive aspects of using a surrogate uterus include controlled and planned pregnancy, control of diseases, such as blood pressure, acquired immunodeficiency

syndrome (AIDS), hepatitis, rubella, and other pregnancy complications, and a decrease in divorce in the country.^[4] Since the mid-1970s, surrogacy has attracted the attention of not only infertile couples but also people wanting to have a child without marriage or couples wishing to have children without experiencing pregnancy.^[2] The separation between the roles of bearing the child and caring for them as a mother can cause several emotional problems for the biological mother. Also, this method is not culturally acceptable in some societies, which can increase mothers' concerns and stress.^[5] Attachment is an emotional bond between the child and their caregiver, which is vital to cognitive, social, and emotional development and dramatically affects health, growth, and the assessment of attachment to the fetus before birth.^[4,6] Maternal attachment is seen as mothers' caring behaviors^[5] and is characterized by looking, smiling, touching, and speaking

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to the child. The emotional bond facilitates mother-child interaction and the development of cognitive and social behaviors, affecting the child's physical and psychological health.^[7] The quality of attachment in childhood is one of the factors associated with identity formation in adulthood. Therefore, studying the factors affecting attachment can provide a way of improving people's growth and identity formation in the future. All psychology, behavioral science, and behavioral theories have somehow emphasized the initial relationship between mothers and children and its constructive or destructive effects on people's emotions, feelings, behaviors, and personality in childhood and adulthood.^[8]

Based on the universe of developmental care theory, an infant, as a being in the process of growth and development, is very sensitive and vulnerable and in need of constant care with love and affection, which is provided by its parents, especially the mother.^[9] One of these effects is the release of oxytocin leading to better contractions and faster placenta expulsion, and consequently, reduced time of the third stage of labor.^[10] Furthermore, some of its benefits include reducing pain in infants, especially during painful procedures, creating a stronger emotional relationship with the mother through touching her, hearing the mother's heartbeat like when the baby was in the uterus, more efficient adjustment of heartbeat, breathing rate, and arterial blood oxygen saturation, and a decrease in infant mortality.^[11]

Halla Ahmed (2017) showed that skin-to-skin contact between mothers and their infants after birth affects infants' temperature adjustment, preventing hypothermia, which is one of the basic principles in initial infant care, and sooner and better infant nursing.^[12] Moreover, skin-to-skin contact increases the attachment between mothers and infants, improves their emotional bond, and enhances the development of infants' nervous and physiological systems.^[13]

A part of infants' natural development depends on the emotional interaction between them and their mothers, which connects them psychologically and physiologically. Skin-to-skin contact within the early hours of birth can create a mutual and shared emotional bond between mothers and their infants and increase the mothers' ability to care for their infants, their self-confidence, and the attachment between them and their infants.^[14] Therefore, the immediate time after birth is called the period of emotion, and it is recommended that contact between mothers and infants should occur within this period.^[15] The physical contact between mothers and their infants is the most important factor in attachment, and any disruption in this regard negatively affects attachment and infant care.^[16] Mothers with high attachment levels are more attentive to their infants' needs, and meeting these needs affects children's psychological development and improvement in terms

of socialization, self-confidence, abilities, independence, cooperation, and honesty. Disruptions in mother-child attachment have dire consequences, such as educational disorders, separation anxiety, lack of psychological development, low IQ, lack of trust, and delinquency, in children's future.^[17]

Therefore, considering the theory of attachment, we can establish the foundations of growth and personality formation in people's future during infancy. Based on the aforementioned points, it seems that the attachment between mothers and their infants begins in pregnancy and peaks with skin-to-skin contact immediately after birth. It has considerable consequences, such as an effect on children's growth and development, a decrease in maternal anxiety, and the improvement of childcare provided by mothers. It has been reported that due to the lack of attachment between mothers and their fetuses during pregnancy, mothers are anxious in their first contact with their infants or unwilling to embrace them in surrogacy. However, there has been no study on the effect of skin-to-skin contact between biological mothers and their infants born via surrogacy. As forming attachments in infancy plays a notable role in the improvement of physical care and the formation and improvement of physical, psychological, and social health in children, this study was conducted to assess the effect of skin-to-skin contact between the biological mother and her baby born via surrogacy on mother-infant attachment.

Materials and Methods

This clinical trial (IRCT 20210516051318N1) was conducted in private hospitals in Tehran between April 2020 and July 2021 after obtaining the ethics code. The study population consisted of biological surrogate mothers and their infants. Inclusion criteria were infants born at gestational ages of 37–42 weeks (term) with an Apgar score of 9–10 in the first and fifth minute after birth. Exclusion criteria included premature births earlier than 37-week gestational age, physical or respiratory disorders requiring medical treatment (e.g., oxygen therapy, resuscitation, and need for arterial, umbilical, or venous line), hospitalization in intensive care units, or mothers' emotional disorders and depression.^[18] The sample size of 50 was determined based on pilot studies and previous research. Fifty mothers were selected randomly based on the inclusion and exclusion criteria and randomly allocated and divided into two groups intervention (skin-to-skin contact) ($n = 25$) and control (no skin-to-skin contact).

A personal information questionnaire and Avant's mother-infant attachment questionnaire were used to achieve the research objectives. Personal information, such as age, education, employment status, duration of marriage, and gestational age (of the fetus in the surrogate uterus), was collected using the demographic questionnaire.

Attachment was evaluated using Avant's attachment behavior checklist. This checklist includes three attachment behavior groups: emotional behaviors (staring, caressing, kissing, talking, and smiling), proximity behaviors (holding the infant firmly in the arms, hugging, and close contact with the infant's body), and caring behaviors (burping the infant, changing the diaper and clothes, and giving the infant a massage). A total of 12 behaviors, each observed for a maximum of 30 seconds and recorded in the next 30 seconds, were assessed. The minimum score for each dimension of caring, proximity, and emotional behaviors was 0, and the maximum was 60, 45, and 75, respectively. The maximum total score was 180.^[19]

This checklist, introduced by Avant, has confirmed reliability and validity. The validity and reliability of this questionnaire have been confirmed in numerous studies in Iran.^[6] Its reliability was reported as 0.98.^[20] The questionnaire's validity was checked and confirmed using Cronbach's alpha ($r = 0.98$).

After obtaining informed consent from all participants, the intervention group received education at the hospital during the waiting period before labor. This education covered research objectives, skin-to-skin contact (definition, process, duration, and location), and its benefits (attachment, emotional bonding, physiological and metabolic stability, reduced maternal anxiety, increased self-confidence, and improved infant care). Subsequently, biological mothers in the intervention group engaged in one-hour skin-to-skin contact in the neonatal ward. This involved placing the naked infant vertically on the mother's bare chest, while the infant slept on their belly. To facilitate eye contact, mothers were positioned with their heads slightly elevated, and infants were held at a focal distance of 5–19 cm. The room temperature was maintained at 25–28°C, and both mother and infant were covered with warm, soft, clean blankets. Routine infant care procedures (weighing, measuring) were conducted while preparing infants for transfer or mothers for skin-to-skin contact. The control group received identical care except for skin-to-skin contact.

The biological mothers and their infants remained in the hospital for 24 hours. On the day following the infants' birth, and before discharge, the researcher conducted in-person observations of both the intervention and control groups. Attachment behaviors were recorded for 15 minutes using Avant's checklist, while infants were in their mothers' arms. Observed behaviors included emotional (staring, caressing, kissing, talking, and smiling), proximity (hugging, infant contact with mother's body, and holding infant in arms), and caring behaviors (changing clothes, burping, cleaning reproductive organs, and massaging). According to the checklist, each behavior was observed for 30 seconds, followed by a 30-second scoring period. Behaviors were scored as 1 for presence or 0 for absence within each behavioral dimension.

Individual dimension scores and total attachment scores were calculated for each observer and recorded separately on the checklist. A blinded statistical analyst processed the data. Data were analyzed in the Statistical Package for the Social Sciences (SPSS) version 18.0.0, with descriptive and inferential statistics ($p < 0.05$).

Ethical considerations

This clinical trial was conducted in private hospitals in Tehran between April 2020 and July 2021 after obtaining the ethics code (NO: IR.TUMS.FNM.REC.1399.197). Observance of trustworthiness and honesty throughout data collection, examination, analysis, and publication of results, along with obtaining informed consent from study participants, were emphasized.

Results

This study included 50 mother-infant dyads: 25 in the intervention group (with skin-to-skin contact) and 25 in the control group (without skin-to-skin contact). No significant differences were found between intervention and control groups regarding biological mothers' age.

Regarding maternal employment, the intervention group included 15 working mothers (60%) and 10 homemakers (40%), while the control group had 14 working mothers (56%) and 11 homemakers (44%). In terms of the distribution of frequency of the biological mothers' education in the intervention and control groups, there was no significant difference between the two groups in terms of the distribution of frequency of the biological mothers' education ($p = 0.77$).

Based on the independent-samples *t*-test, there was a significant difference between the intervention and control groups in terms of the mean score of the biological mothers' emotional behaviors ($p < 0.001$). Based on Welch's test, a significant difference was observed between the two groups in terms of the biological mothers' caring behaviors ($p < 0.001$).

The results of the independent-samples *t*-test revealed a significant difference between the two groups in terms of the biological mothers' proximity behaviors ($p < 0.001$). There was a significant difference between the two groups in terms of the mean of attachment scores based on the independent-samples *t*-test.

Discussion

Skin-to-skin contact is one of the effective factors in forming safe attachment and reducing anxiety and stress in mothers. The descriptive indices of attachment scores for emotional, caring, and proximity dimensions, as well as total attachment scores, were assessed in both groups using Avant's checklist. Results suggested a significant difference between the two groups in terms of emotional, caring, and proximity behaviors, and total attachment

scores. Furthermore, attachment behaviors showed marked improvement in mothers who had skin-to-skin contact with their babies. The results of the study conducted by Norholt *et al.* (2020)^[21] on the biological and physiological effects of skin-to-skin contact on mothers reported that skin-to-skin contact immediately after birth plays a significant role in creating attachment, and this period is crucial. These results align with this study.

Moreover, the study conducted by Potgieter and Adams *et al.*^[22] (2019) indicated that skin-to-skin contact between mothers and their infants enhanced the emotional bond between them. Adeli *et al.*, (2015) also reported the effect of abdominal skin-to-skin and kangaroo mother care contact immediately after birth on mothers' attachment behaviors.^[11]

Gathwala (2008) conducted a study on the facilitating effect of kangaroo mother care on attachment in mothers with infants hospitalized in the neonatal ward. Results indicated that mothers who provided kangaroo mother care while their infants were hospitalized had higher attachment scores.^[23] Ahn *et al.*^[24] (2010) also reported the effect of kangaroo mother care on mothers' attachment and postpartum depression in mothers with preterm infants. In the skin-to-skin contact group, the mean attachment score was higher, while the score was lower in the postpartum group. Additionally, growth indices (weight, height, and respiratory system development) were better in the skin-to-skin contact group. Similarly, Karimi and Bagheri^[15] (2016) reported an increase in attachment and a decrease in anxiety in mothers and infants following kangaroo mother care provided immediately after birth.

Pouraboli (2018) assessed the effect of skin-to-skin contact between mothers and infants immediately after a C-section on attachment behaviors. Findings indicated higher attachment and attachment behavior scores in the emotional and caring dimensions for the skin-to-skin contact group.^[25] In this study, emotional behaviors had the highest scores, while caring behaviors were the lowest. This difference might be attributed to differences in the study population's psychological and emotional status.

Varela (2018) found that skin-to-skin contact between infants and fathers reduces infant salivary cortisol levels, leading to decreased stress and increased attachment.^[26] Hardin *et al.*^[27] (2020) suggested that kangaroo mother care's mechanism involves elevated oxytocin, reduced cortisol, and consequently, decreased stress. Oxytocin and cortisol are key physiological factors in stress regulation and attachment, with prolonged elevated oxytocin levels observed in mothers and infants after skin-to-skin contact.

Ionio's *et al.* (2021) systematic review demonstrated that skin-to-skin contact positively influences physiological parameters, such as heart rate, cortisol, and oxytocin,

ultimately reducing stress and enhancing attachment.^[1] Lisanti *et al.* (2021)^[28] also found that skin-to-skin contact decreased stress and increased attachment in mothers and infants with congenital heart disease through physiological and hormonal regulation.

According to reviewed studies, surrogacy is widely used to treat infertility in the world and in Iran. Mothers opting for surrogacy to overcome infertility are susceptible to stress, worry, and the weight of past failed attempts. Additionally, challenges, such as limited social support and cultural acceptance in Iran, exacerbate parental concerns and limitations. These factors hinder the development of maternal-infant attachment.^[29,30] As biological parents lack fetal contact during surrogate pregnancy, they are deprived of attachment-building behaviors. This increases parental anxiety, weakens infant attachment, and negatively impacts the quality of infant care and subsequent child development.^[31]

Based on this study's findings, prioritizing skin-to-skin contact, maternal and nursing education, and informed authorities is crucial for postpartum biological mothers. This practice fosters attachment, reduces maternal stress and anxiety, and enhances maternal-infant care.

A study limitation was the coronavirus disease 2019 (COVID-19) pandemic, which hindered in-person data collection. Therefore, this study focused solely on the immediate postpartum effects of skin-to-skin contact between biological mothers and their infants. To expand understanding, future research should investigate the impact of skin-to-skin contact between fathers and infants, given the father's role in family-centered care. Additionally, exploring the relationship between immediate postpartum skin-to-skin contact and maternal depression or care quality would provide valuable insights.

Conclusion

Based on study results, immediate postpartum skin-to-skin contact significantly enhances maternal-infant attachment. The analysis of biological indices revealed no significant relationship between attachment scores (based on Avant's checklist) and biological mothers' age, education, employment status, marital duration, or gestational age.

Given the heightened stress levels in infertile women opting for surrogacy, educating these mothers, informing relevant authorities, and facilitating skin-to-skin contact are crucial. These actions can improve infant care, strengthen maternal-infant attachment, reduce maternal stress and anxiety, and potentially prevent future child-related social issues.

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Conflicts of interest

Nothing to declare.

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