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SKIN-TO-SKIN CONTACT AFTER BIRTH- THE IMPACT ON PROMOTING MATERNAL AND NEONATAL HEALTH AND CREATING MOTHER-INFANT RELATIONSHIP - REVIEW OF CURRENT LITERATURE

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ABSTRACT

Introduction and Purpose: Skin-to-skin contact after birth is a low-cost procedure which can bring numerous benefits for the mother-infant dyad. This unique moment can lead to improvement of infant's health outcomes and enhance mother's well-being, as well as to creating a strong, irreplaceable parent-child bond. The aim of this review is to emphasize the importance of physical contact between mother and child after delivery in medical practice and highlight the necessity for creating a safe envinroment for women to have an uninterrupted skin to skin contact with their newborns.
Current Knowledge: It has been demonstrated that skin-to-skin contact has an impact on newborn's health. Most importantly, it has been proven to lower mortality rates in resource-limited environment. Furthermore, skin-to-skin contact improves the development of the infant's adaptive mechanisms, positively influences the establishment of their microbiota, and reduces stress while modulating the infant's reactivity towards the parent. Mothers also receive multiple benefits from this procedure, including a reduced risk of perinatal hemorrhage, enhanced mood, and notably, increased success in breastfeeding, which itself brings major advantages for both mother and child. Beyond its significant health implications, skin-to-skin contact strengthens the maternal-infant bond, bringing long-lasting positive effects on their relationship.
Conclusion: Skin-to-skin contact is a safe procedure which undeniably has an impact on a newborn's and mother's health. It has been proven to bring numerous health benefits while requiring minimal resources. It is crucial to spread knowledge about this practice and raise awareness among both: medical staff and parents to facilitate the implementation of SSC as a routine procedure. Furthermore, there is a need to conduct more research on this matter, especially focusing on very premature infants.

KEYWORDS

Skin-to-Skin Contact, SSC, Kangaroo Care

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Introduction

Early, immediate postnatal skin-to-skin contact is defined by the World Health Organization (WHO) as a element of kangaroo care, which also includes exclusive breastfeeding and early discharge home with appropriate support [1,2].

In recent years, the importance of physical closeness between mother and newborn has increasingly appeared in public discourse, particularly in the context of child developmental psychology. Studies confirm that physical contact with mother has an influence on child's nervous system[3].

Many international guidelines, such as the "WHO Recommendations on Care for Preterm or Low Birth Weight Infants", emphasize the significance of physical contact immediately after birth for the healthy development of preterm infants and the formation of the bond between mother and child. Current Polish Perinatal Care Standards also highlight the importance of uninterrupted skin- to-skin contact after birth as a method of supporting breastfeeding initiation [1,4]. Skin-to-skin contact has been recommended to be implemented right after all types of delivery, also including obstetric surgeries. It is a unique and natural phenomenon which, with minimal requirements, can result in numerous benefits. Essentially, no specific conditions are required for its implementation, besides a supportive environment and good maternal and neonatal health.

Despite previous safety concerns, research show that physical contact is mutually beneficial—both for the mother and the newborn—and entirely safe. Among mothers practicing SSC, reductions in anxiety, increases in oxytocin and antioxidant levels, decreased risk of peripartum hemorrhage, and pain reduction have been observed. Benefits for the newborn include reduced mortality, greater weight gain, reduced stress, and more effective postnatal adaptation. Additional benefits of SSC (skin-to-skin contact) include increased

success in breastfeeding—supporting the child's development in good health—and more positive maternal perception of breastfeeding [1,5].

Direct physical skin contact between the mother and newborn should be promoted and initiated as early as possible, as it has a stabilizing effect on the psychological state and behaviors of both mother and infant [6]. The impact of SSC on shaping the parent–child relationship from the very first moments of life must be particularly emphasized. This intervention improves the quality of mother-infant interaction and reduces the infant's behavioral reactivity to stress [7].

The aim of this review is to emphasize the crucial role of parental closeness with the child in the immediate postnatal period, regardless of the mode of delivery, and to answer the question: "How does skin-to-skin contact affect child development, maternal well-being and health, and the formation of the mother–child bond?"

This paper highlights the need to provide women with the space for free and uninterrupted (unless medically necessary) SSC with their newborn after birth and emphasize the low cost in comparison to the many benefits of this practice. In this research paper we use the abbreviation "SSC" as a synonym to "skin-to-skin contact", referring to the physical contact between the mother's and the newborn's skin in the direct postpartum period.

What does "skin-to-skin contact" mean?

Skin-to-skin contact, also known worldwide as a component of kangaroo care, is a direct physical contact of the newborn with the mother's chest immediately after birth [3]. It is an element of kangaroo care and is often mistakenly used as a synonym for this concept. Meanwhile kangaroo care has a broader meaning and also includes, among other things, exclusive breastfeeding, which SSC itself significantly influences. Despite differences in terminology, these phenomena can coexist and complement each other [2]. Early contact is most commonly defined as initiated within 180 minutes after birth, but it is recommended to achieve it as soon as possible, preferably immediately after the second stage of labor. For preterm and low birth weight infants in home care, it is recommended to perform at least 8 hours of SSC a day. If possible, the mother should mainly be present with the child, but the father and other caregivers can also successfully participate in SSC. Physical skin-to skin contact provides a developmental environment appropriate for all mammals after birth. It is very important for infant's neurodevelopmental prevention. It is also believed that the first day of life plays an important role in building the bond between the parent and the child [1,8]. The mother's body, a one of the most vital elements of this process, provides a safe environment for the newborn, enabling the development of its own adaptive mechanisms, which form the foundation of physiological stability at early stages of development [2]. New evidence-based recommendations also advise kangaroo care, and thus skin-to-skin contact, even for hospitalized newborns who have not yet achieved clinical stability. Exceptions, of course, are newborns who have not initiated spontaneous breathing and newborns in shock [1].

The impact of SSC on newborns's health

Adaptive mechanisms are the pillar of physiological stability in the newborn and prepare them for life outside the mother's womb. Thermoregulation is one of the immediately used mechanisms for adapting to new conditions by the newborn's body, causing problems mainly in the group of preterm infants, especially those with low birth weight. Among preterm infants born between 28+0 and 30+6 weeks of gestation, adaptive mechanisms often require support. In kangaroo care groups, the body temperature is on average 0.4 °C lower compared to the group not routinely receiving skin-to-skin contact. For newborns with birth weight below 1500 g, it is 0.34 °C lower. This procedure may protect newborns from overheating in an early stage of life outside the womb [9]. Linner et al. in their study conducted on a group of preterm infants between 28+0 and 32+6 weeks of gestation showed that preterm infants from the group with access to maternal kangaroo care immediately after birth also showed better results in measurements of cardiopulmonary stability, defined by the normality of the heart rate, breathing rate, type of respiratory support, fraction of inspired oxygen, and oxygen saturation [10].

Another aspect influenced by contact with mother's skin is the colonization of the infant's body by bacterial flora. Humans are born without microbiota, which they begin to gain shortly after birth. Understanding the factors shaping the human microbiome and its transmission pathways builds awareness of the complexity of this process and the necessity to care for it from the moment of birth [11]. It has been proven that breastfeeding is one of the mechanisms through which skin-to-skin contact influences microbiota maturation, even after the direct intervention of regular kangaroo care has ended. This occurs because kangaroo

care indirectly affects microbiota development by making breastfeeding last longer. In a study involving 116 mother-infant pairs, they were randomly assigned to two groups. Group 1 practiced skin-to-skin contact for one hour daily, and Group 2 received standard care without SSC. Early on, differences in the percentage of breastfeeding mothers were not significant, but differences appeared later. Since differences in microbiota composition were observed at 2 and 5 weeks of life, They were linked not to breastfeeding, but to the stress-reducing effect of skin-to-skin contact on the infant [12].

Another clinical issue during the neonatal period is postnatal hypoglycemia, which is affecting 5–15% of newborns. The systematic review by Lord LG et al. demostrates that skin-to-skin contact may reduce the likelihood of hypoglycemia in newborns and shorten the time of initial hospital stay after birth. Multiple indirect mechanisms related to physical contact result in the reduced risk of hypoglycemia, including prolonged quiet sleep, improved thermoregulation, and support of breastfeeding [13].

Changes in the concentrations of certain biological markers in newborn blood depending on contact with the mother after birth have been observed. Cortisol is frequently studied and, in most current studies, does not differ significantly between groups. However, oxytocin levels may rise sharply after a session of skin-to-skin contact [2]. A study on allantoin levels showed that its concentration is significantly lower in infants receiving SSC [14].

A prospective multicenter study on the effect of two-hour SSC in the delivery room on neurodevelopmental outcomes at 2–3 years of age found no significant differences between children who experienced SSC and those separated from their mother after birth. However, the study demonstrated significantly more frequent breastfeeding in the SSC group [15]. SSC has also been shown to contribute to stress reduction in newborns [2].

There have also been studies taking into consideration the effect of contact with the father as support for newborn development in cases of necessary separation from the mother. Heart rate was significantly higher in the group with paternal SSC performed by a father, with no observed differences in oxygen saturation or awake periods. Nevertheless, the procedure was assessed as safe and beneficial, showing no negative impact on newborn parameters [16].

Results for preterm and low weight newborns receiving SSC

Preterm infants after an early delivery are forced to continue their development in an environment that is not suited to their gestational age. They may struggle with complications related to prematurity, which often affect their further development. SSC can improve developmental outcomes in this group [17]. It has also been shown that, in limited-resource settings, skin-to-skin contact with the mother lowers morbility rates among preterm newborns and helps with their cardiorespiratory stability [18].

In a multicenter study conducted in Ghana, India, Malawi, Nigeria, and Tanzania, involving over 3,000 newborns with a low birth weight between 1.0 and 1.8 kg, it was demonstrated that immediate initiation of kangaroo care significantly reduced mortality among the newborns. However, this did not apply to the first 72 hours of life but rather to survival in the days following birth. This is a high significance study, taking into consideration that low birth weight infants—regardless of etiology (IUGR, prematurity, etc.)—represent approximately 15% of all newborns, but when it comes to total neonatal deaths - they represent as much as 70%. In low- and middle-income countries, neonatal mortality remains relatively high, and the target is to reduce it to 12 per 1,000 live births by 2030 [19].

Preterm infants often experience impairments in adaptation mechanisms outside the womb. One of such mechanisms is thermoregulation, which requires monitoring and support. A prospective, randomized clinical trial investigated the impact of kangaroo care on preterm infants born between 28+0 and 31+6 weeks of gestation with a birth weight above 1,000 g, who did not present severe respiratory disorders requiring respiratory support or intubation. In the kangaroo care group, a difference in the presence of hyperthermia was observed—this phenomenon occurred less frequently among kangarooed infants (4% vs. 7%). However, vital parameters in the intervention group did not improve, and the incidence of neonatal complications during hospitalization in the neonatal intensive care unit did not differ between groups [18]. A separate study investigated regional cerebral tissue oxygen saturation as an additional parameter monitored during SSC. The measurements did not show significant differences between the preterm infants in the SSC group and those in the control group placed in incubators [20].

The development of a preterm infant can be complicated on multiple levels, and the parent–infant relationship plays a key role in a child's development. It has been shown that physical contact with the mother, compared to visual contact, enhances the infant's motor and vocal responses toward the mother at a later stage

of development, supporting the formation of the parent–child bond [21]. Unfortunately, the number of studies on preterm infants—especially those born at very early stages of gestation—related to this phenomenon remains limited, and this issue unquestionably requires further investigation [8].

The impact of SSC on mother's health

The direct consequences of giving birth can be life-threatening and pose health risks to the mother. Among these, one of the most clinically significant is postpartum hemorrhage, which is one of the causes of peripartum maternal mortality. A systematic review and meta-analysis of randomized controlled trials and prospective quasi-experimental studies demonstrated that SSC significantly shortens the third stage of labor, reducing the need for vasoconstrictive drugs. It also increases the chances of delivering an intact placenta and results in less frequent occurrence of the uterine fundus above the level of the navel. This is equivalent to a higher probability of proper uterine muscle contraction and a reduction in hemorrhage risk [22]. Additionally, studies indicate that SSC during the third stage of labor is associated with less frequent uterine atony and less frequent blood loss equal to or exceeding 500 ml. However, this area requires further high-quality research [23]. Besides limiting bleeding in the third stage of labor, SSC also impacts the reduction of postpartum pain [24].

Peripartum depression is a common phenomenon which involves persistent feeling of sadness and loss of interest, specifically occurring during pregnancy or after childbirth [25]. It affects not only the mother but, as is known, also the condition of the newborn [6]. The peripartum period requires special attention to mental health, as the woman experiences a major life transition and prolonged physical exhaustion. The American College of Obstetricians and Gynecologists has defined the postpartum period as the fourth trimester of pregnancy period, during which attention should be paid to the woman's mental health [25]. SSC can also be attributed with an influence on this aspect of a young mother's postpartum life. During this critical time, it reduces depressive symptoms and stress symptoms and supports the mother’s well-being, which also affects the mood and development of the child. This creates a mutual reinforcement between them. This contact does not generate costs in medical peripartum care and should be implemented as a routine practice because it may bring disproportionate benefits in the form of reduced anxiety and improved maternal mood [6]. It has been shown that maternal sensitivity toward offspring is more expressed in women who had the opportunity for immediate skin-to-skin contact with their baby. Such mothers also report higher satisfaction levels after childbirth [8]. Mothers who experienced skin-to-skin contact after birth, which was their first contact with their child and the first chance to see them, report feeling happy because of this opportunity [26].

Another undeniable benefit of SSC is its positive effect on the initiation and continuation of exclusive breastfeeding [27]. During the first month of life, significantly more newborns who experienced SSC are exclusively breastfed [8]. Breastfeeding is correlated with a reduced risk of ovarian and breast cancer later in life, as well as a lower risk of postpartum depression. It has been proven that mothers performing SSC after cesarean section had significantly better breastfeeding rates within the first 2 hours after delivery [28]. Long-term effects include a greater likelihood of breastfeeding at 3 and 6 months of age [29]. SSC has been shown to translate into a longer total duration of exclusive breastfeeding. In a study conducted on 116 women, it was shown that a time-limited, 5-week intervention did not significantly prolong breastfeeding duration. However, in women who regularly practiced SSC for at least one hour daily, breastfeeding duration extended by several months [30]. Special attention should be given by staff to patients from particular groups such as those with mental illnesses, including schizophrenia, as contact with the newborn and breastfeeding may be difficult and delayed for them [31].

The role in building the mother-child relationship

The quality of the mother’s contact with her infant influences the child's future psychosocial development [32]. Numerous studies demonstrate that skin-to-skin contact has a real impact on the parent-infant relationship. Mothers who do not have the opportunity for such contact are less likely to show positive interactions toward their child. These mothers also tend to be in need for painkillers more frequently and experience anxiety, which affects their relationship with the infant and disrupts natural interactions [8]. SSC has been shown to enhance the responsiveness of both the infant and the mother toward each other, including vocal, facial, and motor responses [21].

A secondary analysis of a randomized controlled clinical trial conducted in Sweden and Norway investigated the effect of immediate SSC on infant responsiveness and affect in relation to the mother at 4 months of age. The study included newborns delivered between 28+0 and 32+6 weeks of gestation, who did not present significant clinically relevant neonatal disorders. Participants were divided into two groups: the

first received immediate SSC after birth and for the following 6 hours, while the second initially received standard care. Vaginally delivered newborns were placed on the mother's chest immediately after birth, while after cesarean section, SSC was initiated on the father's chest until the mother was transported to the neonatal intensive care unit. Twins benefited from contact with one or both parents. Statistically, fathers provided more kangaroo care time. In the control group, SSC was initiated after 6 hours. Reassessment was conducted by analyzing short video recordings of the mother interacting with the 4-month-old infant. Interactions were evaluated using the specialized Parent-Child Early Relational Assessment scale. A significant difference was observed in the subcategory "positive infant affect, communication, and social skills," favoring the SSC group. This study highlights that SSC should be promoted in clinical practice, as it is particularly important in creating the relationship between mother and child, especially in the case of preterm birth [33].

An additional factor influencing both the mother and the infant and supporting their bonding, as mentioned above, is the promotion of exclusive breastfeeding through the use of SSC. It works on multiple levels—not only reducing the risk of cancer and postpartum depression in the mother, but also lowering neonatal mortality [34].

Challenges and barriers in implementing skin-to-skin contact

The most common concerns associated with the SSC procedure include risks such as hypothermia, worsening of respiratory dysfunction, and delays in admission to the neonatal intensive care unit. These one of the main the main barriers to routine skin-to-skin contact between mother and infant [8]. Among strategies implemented in many centers worldwide, immediate skin-to-skin contact following vaginal birth is more commonly practiced than one after cesarian section. However, implementing SSC after obstetric surgeries faces more limitations, including unsuitable environments and an increased need to monitor the health status of both the mother and the newborn after this type of delivery. Since barriers to SSC are more frequently related to cesarean deliveries, modifications to operating rooms should be considered, as newborns are still most often separated from their mothers immediately after cesarean sections [28]. Despite concerns, it is important to emphasize that this practice is completely safe [18]. It can also be successfully implemented in preterm infants without causing adverse health outcomes [35].

Proper training of medical personnel and education of parents can help promote this practice and assist in overcoming related barriers [8]. Interventions and guidelines related to the implementation of SSC should also be directed toward mothers, as the majority currently target healthcare providers. The level of satisfaction among medical staff when implementing the procedure is reported to be high, with the most frequently mentioned barrier being limited knowledge. Education of healthcare personnel is a key element in the implementation of SSC and the effort to make it a routine practice [36].

Most current studies have been conducted in high-income countries, and not many of them focus on preterm infants. Moreover, the majority of studies involve relatively small sample sizes. As a result, SSC is still not consistently accepted as a routine practice for newborns, particularly those born prematurely. There is a clear need for more research, especially concerning extremely preterm infants, as most existing studies focus on full-term or late preterm newborns [8].

Summary

Skin-to-skin contact (SSC) after birth is the first, unique moment of connection between a mother and her newborn, bringing numerous benefits for health and family bonding. Although this practice is not associated with high costs for either the mother or the infant, concerns still exist, especially for SSC directly after cesarean section. However, promoting this intervention has led to increased awareness of SSC as a safe and beneficial procedure that supports both physical and mental health of the mother and newborn. SSC helps reduce the risk of postpartum depression, improves maternal well-being, and lowers anxiety levels after childbirth. It also decreases the likelihood of postpartum hemorrhage by supporting proper uterine contraction and placental expulsion. For newborns, SSC plays a role in neuropsychological development, supports the formation of adaptive mechanisms, improves behavioral responsiveness, helps establish healthy microbiota, and—most importantly—reduces infant mortality in low-resource settings. It also promotes breastfeeding, which, together with SSC, forms a key part of newborn kangaroo care. Exclusive breastfeeding provides significant benefits for infants and children later in life. Skin-to-skin contact often initiates this cascade of support for optimal development. As is widely known, the well-being of both mother and baby strongly influence each other, and early physical contact strengthens their bond. Building this relationship from the very first minutes of infant's life can have long-lasting effects on the parent-child relationship. Despite its benefits,

implementing SSC—especially in operating rooms—can be challenging. Therefore, it is essential to introduce clear guidelines and pilot programs for both healthcare staff and parents, while also addressing physical barriers, such as the lack of SSC-friendly clinical environments. There remains a strong need for high-quality research on the impact of SSC on the mother–newborn dyad, with particular focus on preterm infants.

Disclosure

Author Contributions:

Conceptualization: Adrianna Truszyńska-Zawisza, Weronika Lusarczyk Methodology: Aleksandra Białas; Software: Natalia Sapeda; Check: Zuzanna Romanowska; Formal analysis: Karolina Gorczyca; Weronika Lusarczyk Investigation: Adrianna Truszyńska-Zawisza, Natalia Sapeda; Resources: Aleksandra Młocek; Data Curation: Karolina Gorczyca; Writing - rough preparation: Adrianna Truszyńska-Zawisza; Writing - review and editing: Aleksandra Młocek, Zuzanna Romanowska; Visualization: Karolina Gorczyca; Supervision: Aleksandra Białas; Project administration: Adrianna Truszyńska-Zawisza;

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