ASSOCIATION OF EARLY SKIN-TO-SKIN CONTACT WITH EXCLUSIVE BREASTFEEDING SUCCESS AND NEONATAL THERMOREGULATION IN TERM NEONATES: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Early skin-to-skin contact (SSC) between mother and newborn is a simple, evidence-based intervention that promotes breastfeeding and supports neonatal physiological adaptation. SSC has been reported to improve breastfeeding success and maintain neonatal thermal stability during the immediate postnatal period.

Aim: The present study aimed to evaluate the association of early skin-to-skin contact (SSC) with breastfeeding success and neonatal thermoregulation among term neonates. The specific objectives were to assess the relationship between early SSC and exclusive breastfeeding success, evaluate its effect on neonatal thermoregulation, and compare breastfeeding and thermal outcomes between SSC and non-SSC neonates.

Materials and Methods: This prospective observational study was conducted over one year in the Departments of Pediatrics and Obstetrics &Gynecology of a tertiary care teaching hospital. A total of 200 mother–neonate dyads were enrolled and divided into an Early SSC group (n=100) and a Delayed/Non-SSC group (n=100). Maternal and neonatal demographic variables were recorded. Breastfeeding outcomes assessed included initiation of breastfeeding within one hour, LATCH score, exclusive breastfeeding at discharge, and requirement of formula supplementation. Thermoregulation outcomes included serial axillary temperature measurements, incidence of hypothermia, and requirement of external warming. Statistical analysis was performed using appropriate tests, with $p<0.05$ considered significant.

Results: Breastfeeding initiation within one hour was significantly higher in the SSC group (89.0%) than in the non-SSC group (61.0%) ($p<0.001$). Good LATCH scores (≥8) were observed in 68.0% and 35.0% of neonates, respectively ($p<0.001$). Exclusive breastfeeding at discharge was achieved by 92.0% of SSC neonates compared to 72.0% of non-SSC neonates ($p=0.001$). Mean axillary temperatures at 30 minutes, 1 hour, and 2 hours were significantly higher in the SSC group ($p<0.001$). Neonatal hypothermia (6.0% vs. 24.0%; $p=0.001$) and requirement of external warming (4.0% vs. 18.0%; $p=0.003$) were significantly lower among SSC neonates.

Conclusion: Early skin-to-skin contact significantly improves breastfeeding success and neonatal thermoregulation in term neonates. Routine implementation of SSC should be encouraged as an essential component of newborn care.

Keywords: Skin-to-skin contact; Exclusive breastfeeding; Neonatal thermoregulation; Hypothermia; LATCH score; Term neonates; Early breastfeeding initiation

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Introduction

Breastfeeding is universally acknowledged as the optimal method of infant feeding and plays a pivotal role in ensuring neonatal survival, growth, and development. The World Health Organization (WHO) recommends initiation of breastfeeding within the first hour of birth and exclusive breastfeeding for the first six months of life.[1] Early initiation of breastfeeding has been associated with reduced neonatal morbidity and mortality, improved maternal-infant bonding, and enhanced long-term health outcomes for both mother and child.[2] Despite these well-established benefits, delayed breastfeeding initiation and suboptimal breastfeeding practices remain prevalent in many parts of the world, particularly in low- and middle-income countries.[3]

Skin-to-skin contact (SSC), also known as kangaroo care immediately after birth, refers to placing the naked newborn prone on the mother's bare chest immediately or shortly after delivery. This simple, low-cost intervention has gained significant attention in recent years because of its multiple physiological and psychological benefits. Early SSC facilitates maternal-infant bonding, promotes neonatal adaptation to extrauterine life, and enhances breastfeeding outcomes by stimulating innate feeding behaviors in the newborn.[4] During SSC, newborns exhibit a sequence of instinctive behaviors, including rooting, licking, and self-attachment to the breast, which can contribute to successful breastfeeding initiation and continuation.[5]

Exclusive breastfeeding success is influenced by numerous maternal, neonatal, and healthcare-related factors. Early SSC has been identified as a modifiable intervention capable of improving breastfeeding initiation rates, increasing breastfeeding duration, and enhancing maternal confidence in infant feeding practices.[6] Previous studies have demonstrated that newborns exposed to immediate SSC are more likely to breastfeed effectively and exclusively during the early postnatal period compared to those receiving conventional postnatal care.[7] However, the magnitude of this association may vary across different populations and healthcare settings, warranting further investigation.

Apart from its role in breastfeeding promotion, SSC is increasingly recognized as an effective strategy for maintaining neonatal thermoregulation. Newborn infants are particularly vulnerable to hypothermia because of their large surface area-to-body mass ratio, limited subcutaneous fat, and immature thermoregulatory mechanisms.[8] Hypothermia in the neonatal period is associated with increased risks of respiratory distress, hypoglycemia, sepsis, and mortality. Traditionally, radiant warmers and incubators have been employed to maintain neonatal temperature; however, SSC offers a natural and physiologically effective alternative. Maternal chest temperature adapts dynamically to the infant's thermal needs, helping maintain normothermia and reducing the incidence of neonatal hypothermia.[9]

Growing evidence suggests that SSC can simultaneously enhance breastfeeding outcomes and support thermal stability, making it a valuable component of essential newborn care. Nevertheless, data regarding its effectiveness in routine clinical settings, particularly among healthy term neonates, remain limited in several regions. Understanding the relationship between early SSC, exclusive breastfeeding success, and neonatal thermoregulation is crucial for developing evidence-based practices that improve neonatal health outcomes. Therefore, the present prospective observational study was undertaken to assess the association between early skin-to-skin contact and exclusive breastfeeding success and to evaluate its effect on neonatal thermoregulation among term neonates.[10]

The present study aimed to evaluate the association of early skin-to-skin contact (SSC) with breastfeeding success and neonatal thermoregulation among term neonates. The specific objectives were to assess the relationship between early SSC and exclusive breastfeeding success, evaluate its effect on neonatal thermoregulation, and compare breastfeeding and thermal outcomes between SSC and non-SSC neonates.

MATERIALS AND METHODS

Study Design: Prospective observational study.

Study Setting: Department of Pediatrics and Department of Obstetrics and Gynecology of a tertiary care teaching hospital.

Study Duration: One year.

Study Population: Term neonates and their mothers fulfilling eligibility criteria.

Sample Size: A total of 200 mother-neonate dyads were enrolled through consecutive sampling.

Inclusion Criteria

- Term neonates (≥37 weeks gestation)
- Birth weight ≥2500 g
- Vaginal and caesarean deliveries

Exclusion Criteria

- Preterm neonates
- Major congenital anomalies
- Neonates requiring immediate NICU admission
- Neonates requiring extensive resuscitation
- Maternal critical illness

Study Groups

- **Group A: Early SSC Group:** Skin-to-skin contact initiated within the first hour after birth.

- **Group B: Delayed/Non-SSC Group:** Skin-to-skin contact delayed beyond one hour or not performed.

Data Collection

Maternal Variables

- Maternal age
- Parity
- Educational status
- Mode of delivery
- Antenatal complications
- Previous breastfeeding experience

Neonatal Variables

- Gender
- Birth weight
- Gestational age
- APGAR score at 1 minute
- APGAR score at 5 minutes
- Rooming-in status

Outcome Measures

Breastfeeding Outcomes

- Initiation of breastfeeding within one hour
- Time to first successful latch
- LATCH score
- Exclusive breastfeeding at discharge
- Requirement of formula supplementation

Thermoregulation Outcomes

- Axillary temperature at birth
- Temperature at 30 minutes
- Temperature at 1 hour
- Temperature at 2 hours
- Incidence of hypothermia (<36.5°C)
- Requirement of external warming

Statistical Analysis: All collected data were entered into Microsoft Excel and subsequently analyzed using Statistical Package for the Social Sciences (SPSS) software version 27.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean ± standard deviation (SD), while categorical variables were expressed as frequencies and percentages. Comparisons of continuous variables between the skin-to-skin contact (SSC) and non-SSC groups were performed using Student's independent t-test. Categorical variables were compared using the Chi-square test or Fisher's exact test, wherever appropriate. Multivariate logistic regression analysis was carried out to identify independent predictors of exclusive breastfeeding success after adjusting for potential confounding variables. The strength of association was expressed as odds ratios (ORs) with corresponding 95% confidence intervals (CIs). All statistical tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant.

RESULT

Table 1. Distribution of Neonates According to Maternal Age

Maternal Age (Years)	SSC Group (n=100)	Non-SSC Group (n=100)	Total (n=200)	P-value
<20	12 (12.0%)	10 (10.0%)	22 (11.0%)	**0.742**
20–25	42 (42.0%)	38 (38.0%)	80 (40.0%)	
26–30	31 (31.0%)	35 (35.0%)	66 (33.0%)	
>30	15 (15.0%)	17 (17.0%)	32 (16.0%)	
Total	**100 (100%)**	**100 (100%)**	**200 (100%)**	

Table 2. Comparison of Breastfeeding Initiation Within One Hour

Breastfeeding Initiation	SSC Group (n=100)	Non-SSC Group (n=100)	Total	P-value
Within 1 hour	89 (89.0%)	61 (61.0%)	150 (75.0%)	**<0.001**
After 1 hour	11 (11.0%)	39 (39.0%)	50 (25.0%)	
Total	**100 (100%)**	**100 (100%)**	**200 (100%)**	

Table 3. Comparison of LATCH Scores Between Groups

LATCH Score Category	SSC Group (n=100)	Non-SSC Group (n=100)	Total	P-value
Poor (<6)	8 (8.0%)	26 (26.0%)	34 (17.0%)	**<0.001**
Moderate (6–7)	24 (24.0%)	39 (39.0%)	63 (31.5%)	
Good (≥8)	68 (68.0%)	35 (35.0%)	103 (51.5%)	
Total	**100 (100%)**	**100 (100%)**	**200 (100%)**	

Table 4. Exclusive Breastfeeding at Discharge

Feeding Status at Discharge	SSC Group (n=100)	Non-SSC Group (n=100)	Total	P-value
Exclusive Breastfeeding	92 (92.0%)	72 (72.0%)	164 (82.0%)	**0.001**

Mixed Feeding	8 (8.0%)	28 (28.0%)	36 (18.0 %)	
Total	**100 (100%)**	**100 (100%)**	**200 (100 %)**	

Table 5. Comparison of Mean Axillary Temperature (°C)

Time of Assessment	SSC Group (Mean ± SD)	Non-SSC Group (Mean ± SD)	P-value
At Birth	36.72 ± 0.21	36.71 ± 0.24	0.768
30 Minutes	36.81 ± 0.19	36.58 ± 0.28	<0.001
1 Hour	36.89 ± 0.18	36.63 ± 0.26	<0.001
2 Hours	36.96 ± 0.17	36.70 ± 0.25	<0.001

Table 6. Incidence of Neonatal Hypothermia and Requirement of External Warming

Variable	SSC Group (n=100)	Non-SSC Group (n=100)	Total	P-value
Hypothermia (<36.5°C)	6 (6.0%)	24 (24.0%)	30 (15.0%)	0.001
No Hypothermia	94 (94.0%)	76 (76.0%)	170 (85.0%)	
External Warming Required	4 (4.0%)	18 (18.0%)	22 (11.0%)	0.003
No External Warming	96 (96.0%)	82 (82.0%)	178 (89.0%)	

Figure: 1.Comparison of LATCH Scores Between Groups

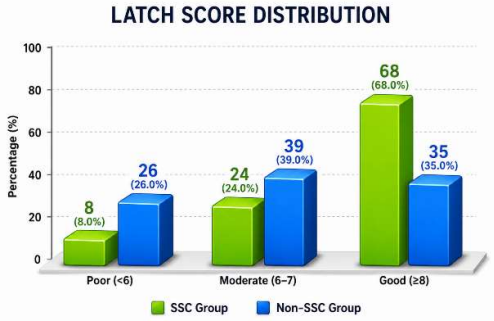

Figure: 2.Incidence of Neonatal Hypothermia and Requirement of External Warming

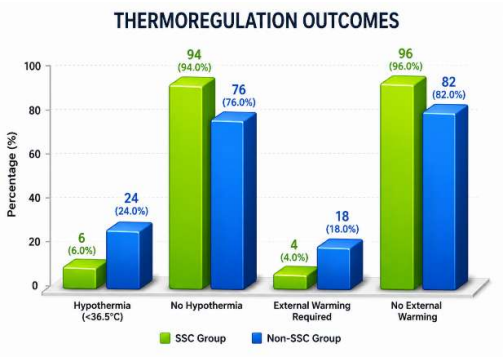

Table 1: A total of 200 mother–neonate dyads were enrolled in the study, comprising 100 participants each in the SSC and non-SSC groups. The majority of mothers belonged to the 20–25 years age group, accounting for 42.0% (n=42) in the SSC group and 38.0% (n=38) in the non-SSC group. Mothers aged 26–30 years constituted 31.0% (n=31) and 35.0% (n=35) of the SSC and non-SSC groups, respectively. Participants aged less than 20 years represented 12.0% (n=12) of the SSC group and 10.0% (n=10) of the non-SSC group, while mothers older than 30 years comprised 15.0% (n=15) and 17.0% (n=17), respectively. The distribution of maternal age was comparable between the two groups, and the difference was not statistically significant (p=0.742), indicating baseline homogeneity with respect to maternal age.

Table 2: Early initiation of breastfeeding was significantly more common among neonates receiving skin-to-skin contact. In the SSC group, 89.0% (n=89) of neonates-initiated breastfeeding within the first hour of life compared to 61.0% (n=61) in the non-SSC group. Delayed initiation beyond one hour was observed in only 11.0% (n=11) of neonates in the SSC group, whereas 39.0% (n=39) of neonates in the non-SSC group experienced delayed breastfeeding initiation. The difference between the groups was highly statistically significant (p<0.001), demonstrating a strong positive association between early SSC and timely initiation of breastfeeding.

Table 3: Assessment of breastfeeding effectiveness using the LATCH scoring system revealed significantly better scores among neonates exposed to early SSC. A good LATCH score (≥8) was achieved by 68.0% (n=68) of neonates in the SSC group compared to only 35.0% (n=35) in the non-SSC group. Moderate scores (6–7) were observed in 24.0% (n=24) and 39.0% (n=39) of neonates in the SSC and non-SSC groups, respectively. Poor LATCH scores (<6) were recorded in 8.0% (n=8) of the SSC group compared with 26.0% (n=26) of the non-SSC group. The difference in LATCH score distribution was highly significant (p<0.001),

indicating that SSC substantially improved breastfeeding performance and latch quality.

Table 4: Exclusive breastfeeding rates at discharge were significantly higher among neonates who received early SSC. In the SSC group, 92.0% (n=92) of neonates were exclusively breastfed at discharge, whereas only 72.0% (n=72) of neonates in the non-SSC group achieved exclusive breastfeeding. Mixed feeding was required in 8.0% (n=8) of neonates in the SSC group compared with 28.0% (n=28) in the non-SSC group. The observed difference was statistically significant (p=0.001), highlighting the beneficial role of SSC in promoting successful exclusive breastfeeding during the early neonatal period.

Table 5: The mean axillary temperature at birth was comparable between the two groups, with values of 36.72 ± 0.21°C in the SSC group and 36.71 ± 0.24°C in the non-SSC group (p=0.768). However, significant differences emerged during subsequent assessments. At 30 minutes after birth, the mean temperature was significantly higher in the SSC group (36.81 ± 0.19°C) compared to the non-SSC group (36.58 ± 0.28°C) (p<0.001). At 1 hour, the SSC group maintained a mean temperature of 36.89 ± 0.18°C, whereas the non-SSC group recorded a lower mean temperature of 36.63 ± 0.26°C (p<0.001). Similarly, at 2 hours after birth, neonates in the SSC group demonstrated a significantly higher mean temperature (36.96 ± 0.17°C) than those in the non-SSC group (36.70 ± 0.25°C) (p<0.001). These findings indicate superior thermal stability among neonates receiving early SSC.

Table 6: Neonatal hypothermia occurred significantly less frequently among neonates receiving SSC. Only 6.0% (n=6) of neonates in the SSC group developed hypothermia compared with 24.0% (n=24) in the non-SSC group. Conversely, normothermia was maintained in 94.0% (n=94) of SSC neonates and 76.0% (n=76) of non-SSC neonates. The difference in hypothermia incidence was statistically significant (p=0.001). Furthermore, external warming measures were required in only 4.0% (n=4) of neonates in the SSC group, whereas 18.0% (n=18) of neonates in the non-SSC group required additional thermal support. This difference was also statistically significant (p=0.003). These findings suggest that early skin-to-skin contact is highly effective in maintaining neonatal thermal regulation and reducing the need for external warming interventions.

DISCUSSION

In the present study, maternal age distribution was comparable between the SSC and non-SSC groups, with the majority of mothers belonging to the 20–25 years age category (40.0%). No statistically significant difference was observed between the groups (p=0.742), indicating that maternal age was unlikely to confound the observed breastfeeding and thermoregulatory outcomes. Similar findings were reported by Srivastava et al., who observed no significant difference in maternal demographic characteristics, including maternal age, between mothers receiving immediate SSC and those receiving routine newborn care.[11] Likewise, the randomized trial conducted by Carfoot et al. demonstrated comparable maternal age profiles between study groups, supporting the validity of outcome comparisons related to SSC interventions.[12] These findings suggest that the benefits associated with SSC are independent of maternal age and can be generalized across different maternal age groups.

The present study demonstrated a significantly higher rate of breastfeeding initiation within one hour among neonates receiving SSC (89.0%) compared with those who did not receive SSC (61.0%) (p<0.001). Early initiation of breastfeeding is a cornerstone of neonatal nutrition and survival, and SSC appears to facilitate this process by enhancing neonatal feeding reflexes and maternal responsiveness. Similar results were reported by Mahmood et al., who found significantly earlier breastfeeding initiation among newborns exposed to SSC immediately after birth.[13] A study by Gabriel et al. also reported that neonates receiving SSC were more likely to initiate breastfeeding during the first hour of life than neonates receiving conventional postnatal care.[14] The consistency of these findings across different settings reinforces the role of SSC as an effective intervention for promoting early breastfeeding initiation.

Breastfeeding effectiveness, assessed using the LATCH scoring system, was significantly better in the SSC group. Good LATCH scores (≥8) were achieved by 68.0% of SSC neonates compared with 35.0% of non-SSC neonates (p<0.001). These findings indicate improved latch quality, infant positioning, and overall breastfeeding performance among neonates exposed to SSC. Similar observations were reported by Aghdas et al., who demonstrated significantly higher breastfeeding assessment scores among neonates receiving immediate SSC compared with controls.[15] Furthermore, Bramson and colleagues observed improved breastfeeding competence and maternal confidence following early SSC implementation.[16] The improved LATCH scores in the present study may be attributed to enhanced neonatal alertness and spontaneous breast-seeking behavior facilitated by uninterrupted maternal contact.

The present study found significantly higher exclusive breastfeeding rates at discharge among SSC neonates (92.0%) compared to non-SSC neonates (72.0%) (p=0.001). This finding

underscores the positive impact of SSC on the establishment and maintenance of exclusive breastfeeding. Similar results were reported by Mikiel-Kostyra et al., who observed that SSC immediately after birth was associated with prolonged exclusive breastfeeding and improved breastfeeding continuation rates.[17] Likewise, a prospective cohort study by Marín Gabriel et al. demonstrated that SSC significantly increased exclusive breastfeeding prevalence during the early postpartum period.[18] The enhanced breastfeeding outcomes observed in the present study may result from increased maternal oxytocin release, improved mother–infant bonding, and successful early breastfeeding experiences.

One of the major findings of the present study was the superior thermal stability observed among SSC neonates. Although baseline temperatures were similar at birth, significantly higher mean axillary temperatures were recorded in the SSC group at 30 minutes, 1 hour, and 2 hours after birth ($p<0.001$ for all comparisons). These findings are consistent with the physiological concept that maternal skin acts as a natural thermal regulator for the newborn. Similar results were reported by Bystrova et al., who demonstrated that SSC effectively maintained neonatal body temperature and reduced thermal stress during the early neonatal period.[19] Christidis et al. also observed significantly better thermal adaptation among neonates receiving SSC compared with those placed under conventional warming methods.[20] The progressive increase in temperature stability observed in the SSC group of the present study further supports the effectiveness of SSC in maintaining neonatal normothermia.

The incidence of neonatal hypothermia was significantly lower among neonates receiving SSC (6.0%) compared with those in the non-SSC group (24.0%) ($p=0.001$). Similarly, the requirement for external warming was significantly reduced in the SSC group (4.0% versus 18.0%, $p=0.003$). These findings indicate that SSC serves as a highly effective, low-cost intervention for preventing neonatal hypothermia. Comparable findings were reported by Bystrova et al., who demonstrated a significant reduction in hypothermia among neonates exposed to immediate SSC.[19] Christidis et al. also reported lower rates of hypothermia and reduced dependence on external warming devices among SSC recipients.[20] The reduced requirement for thermal interventions observed in the present study highlights the potential of SSC to improve neonatal outcomes while minimizing healthcare resource utilization.

The findings of the present study are in agreement with the growing body of evidence supporting early skin-to-skin contact as a key component of essential newborn care. SSC was associated with significantly improved breastfeeding initiation, higher LATCH scores, increased exclusive breastfeeding rates, better thermal stability, reduced hypothermia, and decreased need for external warming. These observations are consistent with findings from previous national and international studies and emphasize the importance of integrating SSC into routine delivery room practices for all stable term neonates.

CONCLUSION

The present study demonstrated that early skin-to-skin contact (SSC) is significantly associated with improved breastfeeding outcomes and enhanced neonatal thermoregulation among term neonates. Neonates receiving SSC showed higher rates of breastfeeding initiation within the first hour of life, better LATCH scores, and greater prevalence of exclusive breastfeeding at discharge compared to those who did not receive SSC. Furthermore, SSC was associated with significantly higher axillary temperatures during the early postnatal period, a lower incidence of neonatal hypothermia, and a reduced need for external warming measures. These findings highlight the effectiveness of SSC as a simple, safe, cost-effective, and evidence-based intervention that supports both successful breastfeeding and thermal stability in newborns. Incorporation of early SSC into routine delivery room and postnatal care practices can contribute substantially to improving neonatal health outcomes. Healthcare providers should actively promote and facilitate SSC immediately after birth for all stable term neonates whenever feasible.

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