Effects of Immediate Skin-to-Skin Contact on Maternal and Neonatal Physiological Outcomes after Cesarean delivery.

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Abstract

Context: Skin-to-Skin Contact (SSC) immediately after cesarean section uncommon in Egypt. It is anticipated that this type of care is a successful approach for both maternal and neonatal outcomes. The **aim** of this study was to investigate the effect of immediate skin to skin contact on maternal and neonatal physiological outcomes after cesarean delivery. **Methods:** A Quasi-experimental design was utilized at the operative delivery and postpartum unit at El-kasr El-Ainy and El -Manial university hospitals, Egypt. A purposive sample of 100 primiparous women who underwent elective CS and their newborns (100) were included and divided into study and control groups. Six tools were used to collect data of this study, 1) characteristics of the studied mothers. 2) Newborns' medical records, 3) Infant breastfeeding assessment tool, 4) Successful breastfeeding assessment tool, 5) Maternal satisfaction self-report questionnaire and 6) Visual Analogue Scale (VAS). **Results:** 96% of neonates in the study group manifested no signs of hypothermia compared to 58% of the control group. There was highly statistical significant differences between both groups regarding the total mean pain score after 6 hrs. from cesarean delivery. Also, regarding total mean score of successful breastfeeding (11.68 ± 2.19 & 9.62 ± 2.41) in the study and control group respectively. **Conclusion:** the present study concluded that implementation of an immediate skin to skin contact after cesarean delivery had a significant effect on maternal and newborn physiological outcomes. **Recommendations.** Skin to skin contact nursing intervention should be importantly applied in all maternity units in each hospital immediately after cesarean deliveries for its great benefits.

Key words: Skin-to-skin contact (SSC), Cesarean Delivery, Maternal & Neonatal physiological outcome.

Introduction:

One of the foremost significant and basic necessities of newborns at birth is temperature maintenance as babies cannot convey heat because of a shivering mechanism, which prompts a fast drop in temperature **(Beiranvand, Valizadeh, Hosseinabadi, & Pournia, 2014).**

These days, the routine care to preclude hypothermia is to use a radiant warmer, causing taking the baby away from the mother. Nurses significantly contribute to promoting the bonding between mothers and their infants. To meet this role and avoid hypothermia, nurses apply effective, economical, and applicable strategies for immediate skin-to-skin contact (SSC) **(Beiranvand et al., 2014).** The movement of an infant's hands over the mother's breasts in kangaroo care improves the excretion of oxytocin, increasing breast milk excretion **(Safari, Saeed, Hasan, Moghaddam-Banaem, 2018).** At full-term, newborns are greatly immature. Hence, they require an inhabitant where they are cared for well. Similar to marsupials, which keep their infants in a pouch for a few times after birth, human newborns can have SSC on their mothers' chests **(Safari et al., 2018).** In this position, newborns have fast access to food and heat. Additionally, newborns' actions initiate maternal responses **(Safari et al., 2018).** Worldwide, 5.6 million children die before reaching the age of 5 years, and 2.6 million (46%) of them die within the first month of life (UNICEF, 2017). Approximately 7,000 newborns die daily; most die in the first week after birth, with nearly a million died on the first day and nearly a million died in the next 6.

Around the world, 5.6 million children die before reaching 5 years of age, and 2.6 million (46%) of them died within the first month of life (**UNICEF, 2017).** Around 7 thousand newborns died daily, the majority of whom die in the first week after birth, with nearly a million dying on the first day and nearly a million dying in the next six days in 2016 (WHO, 2017). Approximately 75% of cases occur within the first week of life, and approximately 1 million newborns die on the first day of life (**WHO, 2019**). A recent study has demonstrated that SSC instantly after birth has greater benefits on newborn survival and well-being. Additionally, SSC improved the maternal emotional status and improved fulfillment. As a result, the Baby-Friendly Hospital Initiative recommends providing infants with maternal SSC for at least 60 min after birth because of its critical benefits for babies (**Kennedy, 2019**).

SSC is performed by taking the newborn to the mother's chest straightforwardly video assisted-teaching without clothing. It should be performed minutes after birth for maximal effect and can be implemented for the first years of life. SSC affects the psychological and physical development of newborns. Numerous factors correlate an infant's development with SSC. These factors are related to neurological, autonomic, somatic, behavioral, and motor development (**Forde, 2018**).

Hypothermia is considered a major cause of significant morbidity and mortality in infancy in developing countries (**Safari et al., 2018**). A high prevalence of hypothermia has been reported in countries with the highest rate of neonatal mortality, where hypothermia is increasingly gaining attention and intervention for hypothermia is critical for newborn survival (**WHO, 2019**). Therefore, temperature maintenance is essential for infants at birth (**Safari et al.,**

2018). During SSC, heat is transferred from the mother to the infant, during which the mother's body temperature activates the infant's sensory nerves, which results in infant relaxation, reduces the sympathetic nerve tone, dilates skin vessels, and increases infant temperature.

A recent study has shown that SSC between mothers and neonates after delivery supports the early initiation of breastfeeding and increases exclusive breastfeeding in the first 6 months of life and the total duration of breastfeeding (**Elizabeth et al., 2019**). Public agencies, the United Nations Children's Fund, and the World Health Organization (WHO) recommend that breastfeeding should begin in the first hour after giving birth and advocate it as the only feeding method for the first 6 months of life. The American Academy of Pediatrics recommends that "healthy infants should be placed and remain in direct skin-to-skin contacting with their mothers immediately after delivery until the first feeding is accomplished" (Essa, & Ismail, 2015).

Cesarean section (CS) remains an established surgical and resuscitative intervention, but it hinders maternal contact, diminishes mother's satisfaction, and delays the initiation of breastfeeding. A few studies have indicated that the benefits of SSC lead to infant physiological stabilization by regulating body temperature, improving oxygen saturation levels, and decreasing episodes of apnea (**Beake, Bick, Narracott, & Chang, 2017).** SSC improves the exclusive breastfeeding period, which increases milk production and weight gain and results in the early discharge of the mother and newborn, thus boosting mothers' satisfaction **(Hashim, 2017)**.

Moreover, there is evidence of the relationship between CS deliveries and maternal postpartum depressive mood (Zainal et al., 2012). Some studies have demonstrated that SSC can alleviate depressive emotions in the early few weeks after vaginal birth (Bigelow et al., 2012). Despite this, encouraging SSC after childbirth is important, regardless of the mode of delivery, because mothers are satisfied with it. In a qualitative study, mothers have stated that they feel close to their neonates during SSC and that they are gratified for having SSC (**Blomqvist & Nyqvist, 2011; Thukral et al., 2012).** In a study by Phillips (2013), the findings of this study agreed with the finding that early SSC following a cesarean delivery potentially decreases the maternal perception of pain. This has also been observed after vaginal birth in a study by Walters et al. (2007), who reported that mothers were distracted from the pain when the perineal was repaired if they had SSC.

In a review of the Region of Waterloo Public Health and Emergency Services (2015), SSC was associated with maternal and newborn advantages, including a decrease in placental delivery time, a reduced risk of atonic postpartum bleeding, decreased anxiety in mothers, the release of digestive and metabolic hormones, increased oxytocin levels improving milk ejection, decreased engorgement on 3 days postpartum, an increased chance of exclusive breastfeeding, the initiation of milk production in post-CS, and decreased pain perception from surgery. Moreover, SSC can increase maternal calmness, enhance parenting behaviors, decrease depressive mood, increase positive perception of motherhood, improve the duration of breastfeeding, increase the amount of breast milk, and enhance exclusive breastfeeding rates, among

other long-term benefits of SSC practiced immediately after delivery.

Significance of the study

Despite the fact that performing SSC as early as possible after birth and beginning breastfeeding less than an hour after birth are considered the upper fourth measures to improve the well-being and health of infants in hospitals, these measures remain unsuccessfully practiced in Egypt, and there has been no intention to practice SSC in healthcare settings; thus, the mean time of the start of breastfeeding is 4–6 h after delivery through section, is only 1.5% of infants breastfed throughout the first hour of birth **(Nahidi, et al, 2010).** The World Health Organization WHO (2013) recommended that SSC should be done immediately after delivery regardless of age, birth weight, caesarian deliveries, and neonatal disorder, due to its great benefits for mothers and neonates **(Moore, Bergman, Anderson, & Medley, 2016).**

The results of **Smith ER, *et al* (2017**) also concluded that, SSC is helpful in improving neonatal outcomes in relation to thermoregulation, sleep pattern, cry and initiation of a successful breastfeeding. This study finding also showed that SSC is helpful in improving maternal outcome in relation to uterine involution, post-partum bleeding and pain intensity. Sequentially the present study was conducted to investigate the effect of immediate skin to skin contact on maternal and neonatal physiological outcomes after cesarean delivery,

Operational Definitions

Maternal outcomes in the current study were; pain sensation, incidence of hemorrhage, early ambulation after 2 and 4 h after CS and satisfaction level toward the SSC practice.

- **Pain intensity**: The severity of pain sensation experienced by the study sample before and after the intervention using a uni-dimensional tool as a numerical rating scale (NRS) tool.

- **Mobilization**: Measures the distance that the study sample is able to walk after cesarean section 2hrs.

- **Satisfaction level:** Measuring satisfaction with the practice of SSC and preference for the same care in the future as measured by satisfactory level scale.

Neonatal outcomes in the current study included heat loss, initiation of breast feeding, and successful breastfeeding.

Aim of the study

This study was to investigate the effects of immediate SSC on maternal and neonatal physiological outcomes after cesarean delivery.

Research hypothesis:

1. Mothers who practice immediate SSC will exhibit early ambulation 2 - 4 Hrs. after CS compared with those who do not practice SSC.
2. Mothers who practice immediate SSC will experience lesser pain and greater satisfaction than those who do not perform SSC.
3. Newborns who experience immediate skin to skin contact after CS will exhibit normal body temperature compared with those who do not receive SSC.

4. Newborns who experience immediate skin to skin contact after CS will show earlier initiation of successful breastfeeding than those who do not experience SSC.

Subjects & Methods:

Research design

A quasi-experimental research design was utilized to accomplish the aim of this study. Quasi-experimental research is research that resembles experimental research but is not true experimental research. Although the independent variable is manipulated, participants are not randomly assigned to conditions or orders of conditions (Cook & Campbell, 1979). **Setting:**

This study was conducted at the Operative Delivery room and Postpartum Unit of Al Kasr Al Aini University Hospital, Egypt. Operative Delivery room and Postpartum Unit in El -Manial university hospitals which is a university affiliated hospital that provide care to low and high risk pregnant woman.

Subjects:A purposive sample of 100 healthy primiparous women who underwent elective CS and their 100 newborns were selected and divided into two groups: the immediate SSC group (study group) (n = 50) and the routine hospital care group (control group) (n = 50).

Criteria for sample selection:

1. Primiparous laboring women without any complications who underwent elective CS and received regional anesthesia (epidural or spinal).

Full-term newborns who are healthy, alert, and have an Apgar score of more than 7.Full-term newborns who are medically stable**.**

Sample size:

One hundred healthy primiparous laboring women who underwent elective CS and their newborns (100) were selected according to the following statistical formula: n = Z2p (1-p), where Z is the level of confidence according to the standard normal distribution (for a level of confidence of 95%, Z = 1.96); p is the estimated proportion of the population that presents the characteristic (when unknown, we used p = 0.5), (P is considered 0.05).

Tools of data collection:

Data pertinent to the study variables were collected using six main tools.

Tool (I): Socio-demographic characteristics of the studied mothers

This tool was developed by the researcher and divided into two parts. ***Part one*** : characteristics of the studied mothers ,it included age, educational level, occupation, residence, ***Part Two:*** included data about mothers' reproductive history, incidence of maternal hemorrhage and early ambulation after CS delivery, it included (yes, /no) questions. ***Part three***.

Tool (II): Newborns' medical records**:** consists of two parts. ***Part one***: characteristics of studied newborns. It included data about studied newborns; as gender, gestational age, and birth weight

Part two: Newborns' body temperature records

It includes measurement and recording of the newborns' axillary temperature with the same thermometer twice at the first 30 minutes and at 60 minutes after delivery.**Tool (III): Infant Breastfeeding Assessment Tool (IBFAT)**

This tool was developed by Matthews (1988). The IBFAT is a standardized tool for evaluating infant success in the initiation of breastfeeding, which has been used in many studies [11, 12]. The IBFAT evaluates four parameters of newborn suckling competence, including readiness to feed, the rooting reflex, fixing (latch on), and suckling pattern. A newborn can receive a score from 0 to 3 on each item for a total score of 12. Scores of 10–12 are considered successful feeding, and scores less than 10 indicate breastfeeding initiation failure. Assessments are completed through direct observation of infant breastfeeding.

Tool (IV): Time estimation of successful breastfeeding assessment tool

It includes estimation of duration between delivery and first Initiation of successful Breastfeeding in minutes. Time estimation was done twice after the first 30 minutes and then after 60 minutes after delivery.

Tool (V): Visual analog scale (VAS)

This tool was adopted from Wewers and Lowe (1990). It is used to evaluate labor pain and contains a blank line anchored at each end of the line by adjectives that designate the extremes of pain. The anchoring adjectives commonly used are “no pain” (zero scores) and “severe pain” (worst possible pain) with a maximum score of 10. The validity is concurrent, and its reliability was not reported. The mothers were instructed to place a mark on the line that best indicates the pain being experienced. The dimensions measured by this scale are sensory and affective. This tool takes 2–5 min to complete and is divided into three main parts: the first part is graded from 0 to 3.5, which reflects mild pain; the second part is graded from 4 to 7.5, which indicates moderate pain; and the third part is graded from 8 to 10, which reflects severe pain.

Tool (VI) Maternal satisfaction self-report questionnaire:

This tool is a Likert-type scale developed by the researcher after reviewing the related literature. It is divided into two sections. The first section includes questions about preferences of the same care in the future and consists of 4 items scored on a 4-points scale, ranging from 1 to 4 (4 = most certain, 3 = certain, 2 = quite certain, and 1 = not certain). The second section includes questions about satisfaction regarding the practice and consists of 4 items scored on a 4-point scale, ranging from 1 to 4 (4 = very satisfied, 3 = satisfied, 2 = fairly satisfied, and 1 = unsatisfied).

Method

3.1 Administrative considerations:

Official permission to conduct the study was obtained from the directors of the two mentioned settings after submitting an official letter from the Deans of the Faculty of Nursing of Menoufia University and Cairo University and the Directors of the Al Kasr Al Ainy University Hospital and El -Manial university Hospital, Egypt,

to obtain the official approval for data collection. The letter explained the purposes of the study and the methods of data collection. Data was collected from the March 1st, 2020, to the end of August 2020.

Reliability and validity of the tools:

Reliability and validity of the tools:

The tools were converted into Arabic language and reviewed by three experts in the fields of maternity and pediatric health nursing this revision was performed to test the content validity, relevance, and clarity of the tools. Modifications were performed accordingly. The reliability of tools was tested using Cronbach's alpha test, and the result was highly respectively reliable (0.89, 0.78 & 0.86 & 0.86) for tools (3, 4,5, & 6)

Tools reviewed by five experts in the field of maternity health nursing and pediatric health nursing (two pediatric nursing experts and two experts in maternity health nursing and one expert in pediatrics). They examine the tool for relevance, comprehensiveness, and clarity. The reliability of tools was tested using split-half methods (r= 0.88). This method was used to assess homogeneity of the tool.

Pilot study:

It was carried out on 10% of the total sample to test the clarity and applicability of the tools and the feasibility of the research process. No modifications were performed. Therefore, the pilot study sample was included in the total sample of the study.

Ethical consideration:

Regarding the protection of human rights, informed written and oral consent was obtained from the studied mothers, to obtain their permission for the participation in the study. This study was conducted in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. Therefore, the nature of the study, objectives, its importance, safety, and confidentiality were explained.

All studied mothers were informed that their participation in the study is voluntary; no name was included in the questionnaire sheet and confidentiality was ensured for each participant by the allocation of a code number to the questionnaire sheet.

Subjects were informed that their responses would be used for the research purpose only.

Data collection procedure:

This study involved three phases (Assessment, implementation, and evaluation phase).

Interviewing and assessment phase: An interview was conducted immediately before CS to collect data

regarding the demographic and obstetrical profile of the studied mothers. After birth, characteristics of newborns were also assessed using tool (I). The newborns' axillary temperature was measured twice at the first 30 min and 60 min after CS delivery using tool (II). The average time needed to complete the tool ranged from 15 min to 20 min for each mother.

Implementation:

All convenience laboring mothers were assigned equally into the study and control groups after CS delivery. The study group practiced Skin to Skin contact technique, whereas the control group received routine hospital care.

For both groups, the neonates were placed in a radiant warmer immediately after cutting the cord as hospital routine care and were cleaned and wrapped with pre-warmed sheets. Newborns APGAR score was measured, and physical assessment was performed. The laboring mothers were transferred to the postnatal ward with their newborns, and breastfeeding was initiated when the mothers were ready. The characteristics of the mothers and newborns under study were assessed using tool (I).

For the study group, once the infants are born, they were placed prone against mother's skin between her breasts. The mothers were educated about the readiness of their newborns to breastfeed. The mother and child were left in the Skin to Skin contact position for at least 1 h or until the newborn has performed its first successful feeding. After that, the baby was taken to the heat lamp to perform and complete all newborn's immediate care, including re-evaluation and the administration of vitamin K and 1% silver nitrate eye drops. If the mother expresses the desire to continue Skin to Skin contact techniques, they were allowed for once more.

The newborns' axillary temperatures were measured using the same thermometer twice (at the first 30 min and 60 min after delivery) using tool (II) for both groups. Also, they were monitored to assess the successfulness of their first breastfeeding session. The IBFAT evaluates four newborn factors (i.e., suckling competence, which includes readiness to eat; rooting reflex; latching on; and suckling pattern). The newborns were appropriately scored using tool (III) for both groups. The duration between delivery and the first initiation of effective breastfeeding in minutes was measured using tool (IV) for both groups. Moreover, the mothers' pain was assessed twice (30 min and 60 min after childbirth) in both groups using tool (V). Mothers' satisfaction was assessed in both groups using tool (VI).

Evaluation:

All of the studied variables were reassessed using the same instruments.

Statistical design

Data were collected, tabulated, and statistically analyzed using Statistical Package of the Social Sciences, version 22 (IBM Corp., Armonk, NY, USA). For descriptive statistics, quantitative data were presented in the form of mean, standard deviation, and range, whereas qualitative data were presented in the form of numbers and percentages. Analytical statistics include the following significant tests. The chi-square test ($\chi 2$) was used to examine the association between two qualitative variables. Two-way analysis of variance was

- Descriptive statistics, in which quantitative data presented in the form of the mean ($\overline{X}$), standard deviation (SD), range, and qualitative data presented in the form of numbers and percentages.

- Analytical statistics include the following significant tests. **Chi-square test (χ^2)** used to study the association between two qualitative variables. **Two Way ANOVA** is used to measure difference between groups. **Pearson's correlation (r)** is a test used to measure the association between quantitative variables. Also, effect size was used to measure the effectiveness of the study program on dependent variables (maternal and neonatal physiological outcomes). It considered as follow:

Cohen d = z/√n

Effect size	**Cohen's D =**
Small	0.20
Medium	0.50
Large	0.80

P value of >0.05 was considered statistically non-significant.

P value of <0.05 was considered statistically significant.

P value of <0.001 was considered statistically highly significant.

Results:

Table (1): Socio-demographic characteristics of the studied mothers:

This table shows that, most of the mothers (56%) in the control group were more than 35 years old, whereas 34% of the mothers in the study group were between 30 and 35 years old. The mean age was 32.50 ± 5.14 years in the control group and 30.54 ± 5.08 years in the study group. Regarding the education level, 40% and 32% of the mothers in the study and control groups were secondary school graduates. Meanwhile, more than two-thirds of the mothers in the study and control groups (86%), were workers, whereas 88% of them were housewives. Moreover, 66% and 78% of the mothers in the study and control groups were lived in urban areas.

Table (2) characteristics of the studied neonates.

This table shows that, approximately two-thirds (78% and 84%) of the newborns in the control and study groups were male. Additionally, 54% and 60% of the neonates in the control and study groups respectively, had a gestational age of 40–42 weeks. The mean gestational age was 38.68 ± 1.92 weeks in the control group and 38.48 ± 1.31 in the study group. Meanwhile, 70% and 72% of the neonates in the control and study groups respectively, had birth weight of 2,500–3,500 g.

Table (3): Distribution of studied sample regarding early ambulation after practicing skin to skin contact.

This table indicates that, the mothers in the control group (82%) could not ambulate 2 h after SSC compared to the mothers in the study group (40%). 58% of mothers in the control group could not ambulate 4 h after SSC compared to the study group (40%).

Table (4) Total Mean score of pain perception among studied mothers after practicing skin to skin contact.

This table shows that, A statistically significant difference was found between control group and study group after 6 hours from delivery regarding their pain perception.

Table (5): Distribution of studied mothers regarding their clinical outcome and satisfaction (n=100):

This table illustrated that, 96% of the mother in the study group manifested no hemorrhage compared to 68% in the control group. Nearly 97% of the studied mothers preferred this type of care (skin to skin contact technique) in the future compared with 52% in the control group. Fortunately, 98% of the studied mothers were satisfied about skin to skin contact technique.

Table (6): Distribution of newborns regarding their initiation and Successful breastfeeding in both groups:

The present table indicates that, 96% of the studied group started their initial breast feeding 30 ≤ 60 minutes after delivery compared to 46% of the newborns in the control group. 86% of the studied neonates had successful breast feeding within 10-12 minutes duration.

Table (7) Distribution of newborns regarding their body temperatures and occurrence of hypothermia in both groups.

This table indicates that, 60% and 68% of the newborns in the control and study groups respectively, had an average axillary temperature of 26.4–35.4°C 30 after CS. In contrast, 66% of the newborns in the study group and 54% of the newborns in the control group respectively, had normal body temperature. Meanwhile, 96% of the neonates in the study group manifested no signs of hypothermia, whereas 58% of the neonates in the control group manifested signs of hypothermia.

Table (8) Mean ± SD of newborns body temperature among studied groups.

This table indicates that, this table indicates that**,** A statistically significant difference in the mean body temperature 30 min and 60 min after CS was observed between both groups.

Table (9): Mean ± SD regarding efficiency of breastfeeding of studied newborns:

This table shows that, the meantime between delivery and the initiation of breastfeeding was significantly shorter in the study group 37.96 ± 14.80 than in the control group 108.82 ± 31.50 respectively. Moreover, the duration of the first breastfeeding was longer in the study group 33.06 ± 10.50 than in the control group 8.62 ± 1.86respectively. Also, the study group had a n effective breastfeeding than the control group where the mean duration of effective breast feeding was 121.92 ± 39.97 in the control group compared to 397.00 ± 105.54 in the control group. A statistically significant differences were found between both groups regarding their successful breastfeeding where the total mean score was 11.68 ± 2.19 and 9.62 ± 2.41 respectively.

Table (10) Correlation between characteristics of newborns and successfulness in breastfeeding.

This table indicates that, statistically significant differences were found between both groups regarding to successful breastfeeding.

Table (11) Correlation between characteristics of newborns and their body temperature 30 and 60 min after delivery.

This table indicates shows that, statistically significant differences were found between both groups regarding to their body temperature 30 min after delivery ($p > 0.05$). Meanwhile, statistically significant differences in gestational age and body temperature 1 h after delivery were observed between the two groups ($p < 0.05$).

Figure (1) Distribution of newborns regarding their successful breastfeeding.

This figure shows that**,** 86% of neonates in the study group were successfully breastfed compared to 64% in the control group failed to maintain breastfeeding within the first hour after CS delivery.

Figure (2) Effect size of the skin to skin contact nursing intervention on neonatal outcomes: This figure shows that**,** the intervention was highly effective on the management of neonates' body temperature, initiation of breast feeding and on maintenance of successful breast feeding 0.663, 0.85, and 0.85 respectively.

Figure (3) Effect size of the skin to skin contact nursing intervention on maternal outcomes: This figure shows that**,** the intervention was highly effective on the management of maternal outcome regarding alleviation of pain 6 Hrs. after delivery and maternal early amputation 4 Hrs. after delivery 0.663, 0.85, and 0.85 respectively

Table (1): Characteristics of the studied mothers (100):

Variables	Control group (n = 50)		Study group (n = 50)		Test
Maternal age	**NO**	**%**	**NO**	**%**	
20 < 25	3	6%	5	10%	
25< 30	7	14%	12	24%	χ^2**=-0.21**
30<-35	12	24%	17	34%	**P=0.09**
≥ 35	28	56%	16	32%	
(Mean ± SD) years	**32.50±5.14**		**30.54±5.08**		

Mothers Education					
Read & write	1	2%	6	12%	
Primary education	9	18%	10	20%	
preparatory	11	22%	10	20%	χ^2=8.88
secondary	16	32%	20	40%	
university	13	26%	4	8%	P=0.06
Mothers Occupation					
Workers	6	12%	7	14%	
House wives	44	88%	43	86%	χ^2=0.088
					P=0.76
Residence					χ^2=1.78
Rural	11	22%	17	34%	
Urban	39	78%	33	66%	P=0.18

Table (2): Characters of the Studied Newborns (n=100).

Variables	Control group (n=50)		Study group (n=50)	
	No	%	No	%
Gender:				
Male	39	78%	42	84%
Female	11	22%	8	16%
Gestational age:				
37< 40 wks	23	46%	20	40%
40 ≤ 42 wks	27	54%	30	60%
Mean ± SD	**38.68 ±1.92**		**38.48± 1.31**	
Birth Weight:				
2,500 < 3,500	35	70%	36	72%
3,500 ≤ 4,500	15	30%	14	29%
Mean ± SD	**3.04± 0.43**		**2.87 ±0.44**	

Table (3): Distribution of studied sample regarding early ambulation after practicing skin to skin contact.

Variables	Control group (n = 50)		Study group (n = 50)		Test
Early ambulation after 2 hrs	**No**	**%**	**No**	**%**	
- **Yes**	9	(18%)	30	(60%)	χ^2=-18.53
- **No**	41	(82%)	20	(40%)	P=0.001

Early ambulation after 4 hrs					
- **Yes**					
- **No**	29	(58%)	45	(90%)	χ^2= 13.30
	21	(42%)	5	(10%)	**P=0.00**

Table (4): Total Mean score of pain perception among studied mothers after practicing skin to skin contact after 6 hrs (n=100).

Variable	Control group (n=50) Mean ± SD	Study group (n=50) Mean ± SD
Pain score after 6hrs	**8.14± 01.19**	**5.78 ±1.50**
	T=8.69, p=0.001	

Table (5): Distribution of studied mothers regarding their clinical outcomes and their satisfaction (n=100).

Mother's clinical outcome and satisfaction	Control group (n=50)		Study group (n=50)		p-value
Incidence of hemorrhage					
Yes	16(32%)		2 (4%)		**P<0.05**
No	34(68%)		48 (96%)		
Preference of the same care in the future					
Most certain.	3	(6%)	22	(44%)	
Certain.	13	(26%)	15	(33%)	
Quite certain.	10	(20%)	10	(20%)	
Not certain.	24	(48%)	3	(3.00)	
					P<0.05
Women satisfaction regarding the SSC practices					
Very satisfied	10	(20%)	8	(16%)	
Satisfied	14	(28%)	28	(56%)	
Fairly satisfied	16	(32%)	12	(24%)	**P<0.05**
unsatisfied	10	(20%)	2	(4%)	

Table (6): Distribution of newborns regarding their initiation and Successful breast feeding in both groups (n=100).

Neonatal initiation of breast feeding	Control group (n=50)		Study group (n=50)	
	No	**%**	**No**	**%**
Initiation of breast feeding				
Immediately after delivery				
< 30 minutes	4	8%	27	54%
	11	22%	37	74%

30 m ≤ 60 m	23	46%	48	96%
Successful breast feeding				
Successful (10-12 minutes) duration	18	36%	43	86%
Failure (< 10 minutes) duration	32	64%	7	14%

Table (7): Distribution of newborns regarding their body temperatures and occurrence of hypothermia in both groups (n=100).

newborns' body temperature	Control group (n=50)		Study group (n=50)	
	No	%	No	%
At first 30 minutes:				
26,4 °C – 35,4			8	16%
36,4 - 37,5 °C	30	60%	42	84%
	20	40%		
At 60 minutes:				
26,4 °C – 35,4				
36,4 - 37,5 °C	23	46%	3	6%
	27	54%	47	94%

Table (8): Mean ± SD of newborns body temperature among studied groups.

Mean ± SD	Control group (n=50)	Study group (n=50)	***p-value
At first 30 minutes			
35,4 – 26,4 °C		36.35 ± 0.46	
36,4 - 37,5 °C	36.32 ± 0.46	37.32 ± 0.66	**P<0.001**
	36.17 ± 0.98		**P<0.001**
At 60 minutes			
35,4 – 26,4 °C			
36,4 - 37,5 °C	36.40± 0.41	36.56 ± 0.46	**P<0.001**
	36.44 ± 0.45	36.57 ± 0.48	**P<0.001**

Table (9): Mean ± SD of efficiency of breast feeding of the newborns.

Efficiency of breast feeding	Control group (n=50)	Study group (n=50)	***p-value
Time of initiate first breastfeeding (minutes)	108.82 ± 31.50	37.96± 14.80	P<0.05
Duration of first breastfeeding (minute)	8.62 ± 1.86	33.06 ± 10.50	P<0.05

Time of effective breastfeeding (minutes)	397.00 ± 105.54	121.92 ± 39.97	P<0.05
Total score	**9.62 ±2.41**	**11.68 ± 2.19**	**P<0.05**

Table (10): Correlation between characteristics of newborns and successful breastfeeding. (n=100).

Variables	Successful breast feeding		*Test
	Control group (n=50)	Study group (n=50)	
Gender			
Male	7.87± 2.56	11.76 ±3.32	F=48.35
Female	7.27 ± 2.28	11.25 ± 1.90	P= 0.00
Gestational age			
37<40 wks	8.17 ±2.85	12.35 ±4.43	F=4.93
40 ≤ 42 wks	7.37 ±2.13	11.23± 1.77	P=0.003
Baby weight			
2,500 < 3,500	7.80 ± 2.69	11.61± 3.48	F=48.35
3,500 ≤ 4,500	7.60± 2.02	11.85 ± 2.07	P=0.00

- **TWO-WAY ANOVA**

Table (11): Correlation between neonatal characteristics and their body temperature at 30 minutes and 60 minutes (n=100).

items	body Temperature at (30 minutes)		body Temperature (60 minutes)	
	Control group (n=50)	Study group (n=50)	Control group (n=50)	Study group (n=50)
Gender of the baby				
Male	35.86 ±0.82	35.78± 0.46	35.82 ±0.80	35.84± 0.30
Female	36.53± 0.68	35.50 ±1.06	36.53 ±0.68	36.00 ±0.00
	F=3.47, p=0.06		**F=0.76, p=0.38**	
Gestational age				
37< 40 wks	35.50± 0.75	35.74 ±0.40	35.43 ±0.68	35.66 ±0.41
40 ≤ 42 wks	36.44 ±0.65	35.73 ±0.70	36.44 ±0.65	35.57 ±0.71
	F=3.47, p=0.06		**F=6.61, p=0.01**	
Baby weight	35.90 ±0.85	35.81 ±0.35	35.86 ±0.83	35.82± 0.32
2,500 < 3,500	36.25± 0.76	35.53± 0.97	36.25 ±0.76	36.00 ±0.00
3,500 ≤ 4,500	**F=3.47, p=0.06**		**F=0.76, p=0.38**	

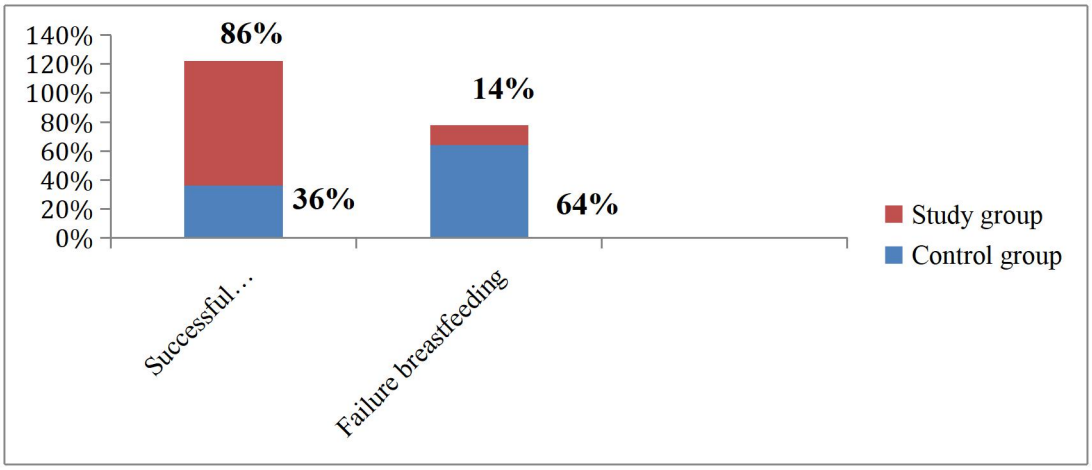
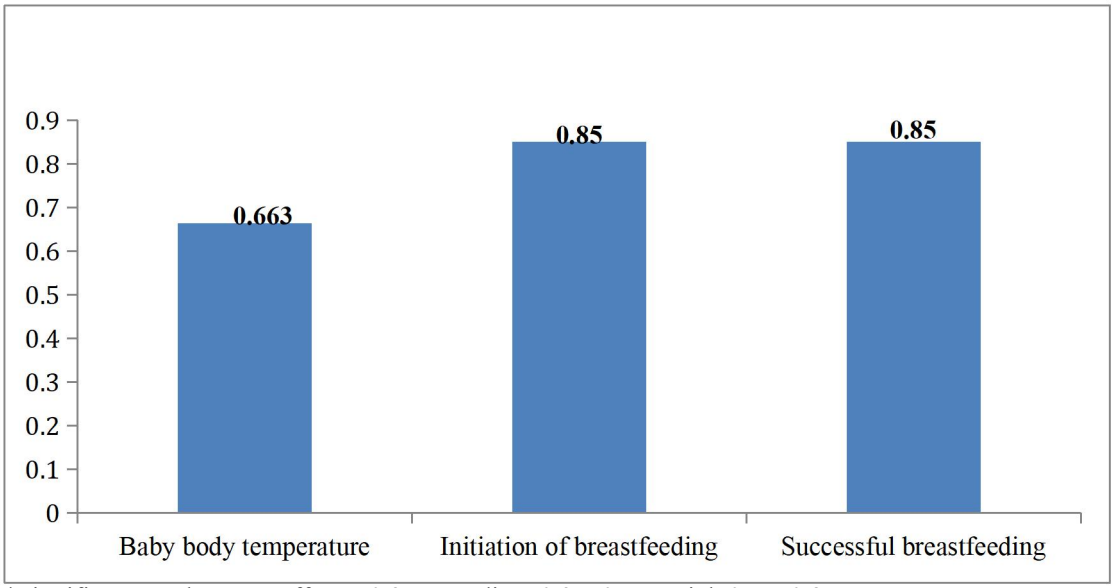
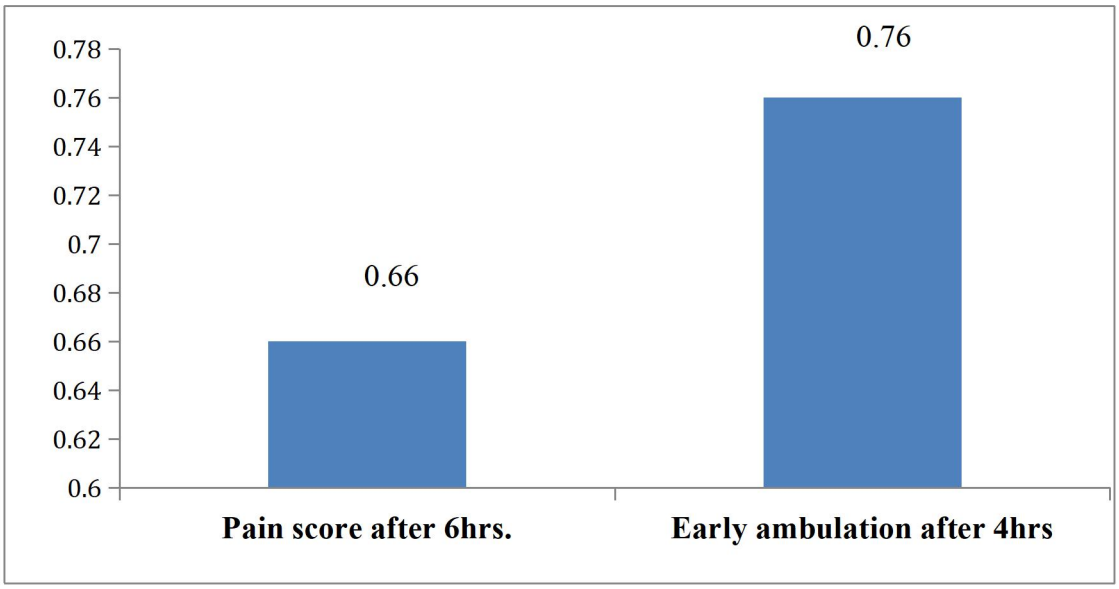


Figure (1): Distribution of newborns regarding to successful breast-feeding.



*Significant results: Low effect < 0.2 Medium 0.2 < 0.5 High 0.5 < 0.8

Figure (2) Effect size of skin to skin contact nursing intervention on neonatal outcomes.



*Significant results: Low effect < 0.2 Medium 0.2 < 0.5 High 0.5 < 0.8

Figure (2): Effect size of the skin to skin contact nursing intervention on maternal outcomes.

Discussion

Practicing SSC provides the mothers immediate contact with their newborns, allowing them to feel closer to their babies and start successful breastfeeding (**Safari, Saeed, Hasan, & Moghaddam-Banaem, 2018**). Breastfeeding is a healthy and natural way of infant feeding, and successful lactation relies on the rapid initiation of breastfeeding. Breastfeeding increases oxytocin release, followed by subsequent milk let-down, and reduces postpartum hemorrhage (Heidarzadeh **et al., 2013**). Early SSC may be a low-cost process to get achieve a better quality of care and is one of the methods for achieving the Millennium Development Goals. Moreover, it decreases the rate of mortality among neonates and improves maternal well-being (**Tharashree, Shravani, & Srinivasa, 2018).** This study was designed to investigate the effects of immediate SSC after CS delivery on maternal and neonatal physiological outcomes. The discussion of this study is twofold: personal data

between the two groups and research hypothesis.

Regarding characteristics of the studied sample, most of the mothers (56%) in the control group were more than 35 years old, whereas 34% of the mothers in the study group were between 30 and 35 years old. The mean age was 32.50 ± 5.14 years in the control group and 30.54 ± 5.08 years in the study group. Regarding the education level, 40% and 32% of the mothers in the study and control groups were secondary school graduates. Meanwhile, more than two-thirds of the mothers in the study and control groups (86%), were workers, whereas 88% of them were housewives. Moreover, 66% and 78% of the mothers in the study and control groups were lived in urban areas. For the studied neonates. Approximately two-thirds (78% and 84%) of the newborns in the control and study groups were male. Additionally, 54% and 60% of the neonates in the control and study groups respectively, had a gestational age of 40–42 weeks. The mean gestational age was 38.68 ± 1.92 weeks in the control group and 38.48 ± 1.31 in the study group. Meanwhile, 70% and 72% of the neonates in the control and study groups respectively, had birth weight of 2,500–3,500 g. This finding is analogous to the results of **Safari et al. (2018),** who study the effect of maternal touch on newborns' physiological outcomes and reported no statistically significant difference between the study and control groups regarding their characteristics.

The first research hypothesis: Mothers who practice immediate SSC will exhibit early ambulation 4 h after CS delivery compared with those who do not practice SSC.

SSC has physiological and psychological benefits for both mothers and infants; however, this is often not the standard practice in all birthing departments in several healthcare settings (Haxton et al., 2012). As for mothers, the findings of this study revealed that the mothers in the study groups could ambulate after the effects of the epidural anesthesia

had ceased. A statistically significant difference in early ambulation 1 and 4 h after delivery was observed between the study and control groups.

The second research hypothesis: Mothers who practice immediate SSC will experience lesser pain and greater satisfaction & less pain sensation compared to than those who do not perform SSC.

Considering postpartum pain, the mothers in the study group had a lower pain score than those in the control group, indicating that SSC lowers the pain perception, which may be a reaction to oxytocin released due to the early initiation of breastfeeding. Oxytocin is a hormone that improves well-being and decreases the anxiety and stress levels. Moreover, oxytocin stimulates maternal behaviors, such as attachment, and can have anxiolytic, antidepressant, and sedative effects and increase the mother's pain threshold. Also, it may help suppress the circulation of catecholamines, which is considered a positive outcome because it reduces maternal pain perception (Stuebe et al., 2013; Feldman et al., 2010).

Therefore, approximately three-quarters of the study group were satisfied with SSC, and most of them were certain that they will practice SSC in their upcoming childbirth experiences as they thought that SSC is useful for them and their newborns. In a study by Ferrarello and Hatfield (2014) that assessed the barriers to SSC during the postpartum stay in hospitals, most mothers were aware of the importance of SSC and had spent enough time for SSC. The barriers for SSC most frequently identified by mothers were visitors within the room, other people wanting to hold the baby, and safety concerns associated with dizziness.

The third research hypothesis: Newborns who experience immediate SSC will exhibit normal body temperature after birth compared with those who do not receive SSC on the posttest than on the pretest

Hypothermia is one of the most common causes of increased

infant mortality after birth, especially in developing countries (Darmstadt et al., 2005). In this study, the group of mothers who practice SSC immediately after CS had a decreased incidence of hypothermia compared with the control group with statistically significant differences. This may be because the delivery room was cold, but SSC after birth is associated with temperature control, metabolic adaptation, and blood glucose level maintenance in newborns. The results of this study contradict those of Safari et al. (2018), who reported that approximately 50% of newborns who did not experience SSC had hypothermia; however, in this study, approximately 20% of newborns who received SSC developed hypothermia after birth. During SSC, the heat from the mother's skin is directly transmitted to the fetus, during which the mother's body temperature stimulates the infant's sensory nerves, which causes the infant to relax, reduces the sympathetic nerve tone, dilates skin vessels, and raises the infant's temperature.

The fourth research hypothesis: Newborns that experience immediate SSC will show earlier initiation of successful breastfeeding than those who did not experience SSC on the posttest than on pretest.

Regarding the initiation of breastfeeding, this study found that the study and control groups were statistically different in the success rate of breastfeeding, and the length of the first breastfeeding was longer in the study group than that in the control group. Early SSC increases the incidence of exclusive breastfeeding. This result conforms to that of **Aghdas et al.** (2014), who reported that the time taken to start the first breastfeeding was also shorter in the SSC group, which is similar to the results of a study by **Mahmood et al.** (2011). However, **Moore** (2012) has shown that the time taken to start the first breastfeeding was equal in both groups. **Widström et al. (2019)** have provided evidence supporting the practice of SSC after birth for both mother and baby.

According to **Bystrova et al. (2007**), a baby's skin temperature increases after birth due to an increased metabolic rate, but the mechanism by which SSC affects the infant's temperature remains unknown. Researchers have indicated that the touch, light pressure, and, specifically, warmth received by the infant during SSC activate sensory nerves, which lead to cutaneous vasodilation and increased skin temperature. In the postpartum period, an increase in maternal breast skin temperature is most likely the expression of an inborn bio psychological manner, which aimed at enhancing maternal–infant interaction.

Keshavarz and Haghighi (2010) conducted a study to investigate the impact of kangaroo contact on physiological parameters of mature babies after CS. The study included 160 neonates who were randomly assigned to the SSC or routine care group. The temperatures of the newborns were measured three times with a 30-min interval between measurements. The SSC group had a mean temperature of 36.8°C compared with the mean temperature of 36.6°C in the routine care group (p = 0.05), and the mean temperature 1 h after SSC was 36.9°C, which was higher than the mean temperature of 36.6°C in the control group with a statistically significant difference between the two groups. Additionally, the frequency of atonic postpartum, which is a serious complication after delivery, was diminished with in the study group with a statistically significant difference between the study and control groups. Saxton et al. (2014) have concluded that every mother and baby should be encouraged and supported to practice immediate and prolonged SSC and breastfeeding at birth, as these practices improve uterine contractility and reduce the amount of lochia, subsequently decreasing the incidence of atonic postpartum.

Finally, immediate SSC after CS may increase the success rate of breastfeeding initiation, decrease time to the first breastfeeding, prevent the use of formulas for neonatal feeding, enhance bonding and maternal well-being, and maintain the normal body

temperature of newborns (Stevens et al., 2014).

Conclusion

It was concluded that, immediate skin to skin contact among mothers and their neonates after caesarian delivery had a highly significant effect on maternal and neonatal physiological outcomes.

Recommendation:

1-Continuous educational and training programs concerning the benefits and practice of skin to skin contact among health personnel is necessary.
2-The implementation of policies and pro-breastfeeding routines are the major recommended interventions to reduce neonatal mortality.
3-All midwives and pediatric nurses who are at the forefront of communication with the mother and the infant should importantly practice this intervention.
4- Further studies with larger sample sizes can provide better and more accurate results in this regard to generalize the findings.
5- This area of research needs additional efforts to expand the evidence base on the association between skin to skin contact technique and exclusive breastfeeding as well as, the duration of the third stage of labor.
6- Efforts in formulating an effective policy focusing on early initiation of breastfeeding and maintaining normal newborns body temperature as well as promoting mothers' satisfaction are needed after the cesarean deliveries.

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Conflicts of Interest:

The authors declare no conflict of interest.

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