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The Effect of Postpartum Mother–Infant Skin-to-Skin Contact on Exclusive Breastfeeding in Neonatal Period: A Randomized Controlled Trial

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Abstract

Background

The rate of exclusive breast feeding is low in many societies and has diminished in recent years in Iran. This study was conducted to determine the effects of postpartum mother–infant skin-to-skin contact on exclusive breastfeeding in neonatal period.

Materials and Methods

This was a randomized control trial. 114 healthy primiparous mothers and their neonates were recruited in Om-ol-banin hospital in Mashhad, Iran. Upon hospital admission, mothers in active labor were allocated randomly to either SSC or routine care. In the intervention group, SSC was continuously performed during the first 2 hours post-birth. In controls as is routine Om-ol-banin hospital, the first contact and breastfeeding were initiated after repairing the routine episiotomy and delivering neonates routine care. Mothers in both groups were interviewed on the 28th days postpartum to determine the exclusive breastfeeding in neonatal period.

Results

There was significant difference between two groups in the rate of breastfeeding initiation in the first 30 minutes post birth ($P<0.05$). The rate of exclusive breastfeeding was significantly higher in the SSC group from birth to day 28 (40.4% vs. 20%, $P<0.05$) and in the last 24-hour report of 28th day post-birth (70.2% vs. 46.7%, $P<0.05$).

Conclusion

Continuous SSC during the first 2 hours of post-birth in primiparous mothers compared to routine care of baby friendly hospitals significantly enhances the rate of breastfeeding initiation in the first 30 minutes post birth and exclusive breastfeeding in the neonatal period.

Key Words: Infant, Exclusive breastfeeding, Mother, Skin-to-skin contact.

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1- INTRODUCTION

It is undisputed that breastfeeding is the superior way of providing nutrition for infants (1-3). Breastfeeding has been associated with many physical and emotional advantages for mothers and their babies (1, 4-6). The World Health Organization recommends exclusive breastfeeding for at least the first 6 months of life (7, 8,9). Exclusive breastfeeding, is defined by the American Academy of Pediatrics as feeding the baby only breast milk. Medicines, minerals, and vitamins may also be given under this definition, but no water, juice, or other preparations (10). Many studies have shown that exclusive breastfeeding is the ideal nutrition and sufficient to support optimal growth and development (1, 11-13).

Exclusive breastfeeding is beneficial because of its protective effects against many infectious and non-infectious diseases (8); and avoids exposure of the infant to many foreign proteins thus protecting from food allergies (9, 12). In Iran, 56.8% of mothers sustain exclusive breastfeeding for 4 months and 27.9% for 6 months after birth. Current information clearly shows the need for improvement of exclusive breastfeeding in Iran (12).

In response to declining breastfeeding rates, the World Health Organization and UNICEF developed the Baby Friendly Hospital Initiative in 1989. This initiative lists 10 research-based steps every hospital should take to promote successful breastfeeding. One of the baby friendly 10 steps is encouraging mothers to breastfeed as soon as possible post- birth. Supporting the innate behaviors that human infants possess to initiate breastfeeding is a logical place to start interventions to enhance breastfeeding successfully (14-16). In several studies have shown that skin-to-skin contact (SSC) had a positive effect on longer-term breast feeding and growth and development (17, 18).

Previous studies expressed that the optimal time for infants to initiate innate breastfeeding behaviors, such as rooting and suckling, are in the first 2 hours post-birth when the infants are most responsive to tactile, thermal, and odor cues from the mother. This time frame may represent a "sensitive period". Sensitive period is defined as a developmental phase of built-in competence for the development of specific behavior exchanges between the organism and the environment whose consequences are long-lasting (1, 19, 20). Most commonly, sensitive periods occur in infancy, and their goal is to enhance the survival and adaptive competence of the organism (19, 21).

When SSC is initiated immediately after birth, the full term infant localizes the mother’s nipple by smelling and this enhances the infant’s ability to suckle competently and establish effective breast feeding (21). Serum noradrenalin level during the 1-hour period following the delivery is higher than those later in the life of human infants (22-24). Noradrenalin sends signals to the olfactory bulbs, and promotes olfactory learning in the infant’s nares to be exceedingly sensitive to the odor cues that guide the infant toward the mother’s nipple (19, 23). After the first 2 hours post- birth, many infants enter a sleepy phase and may be difficult to arouse for 3 to 4 hours (19). Nowadays, in most Iranian maternity units, SSC is ignored. Therefore, this study was conducted to examine the effects of postpartum mother–infant skin-to-skin contact on exclusive breastfeeding in neonatal period.

2- MATERIALS AND METHODS

2-1. Study design and population

This was a randomized control trial (IRCT.2012091610848N1). It was performed in the labor and delivery unit of Om-ol-banin hospital (Large Tertiary Hospital) in Mashhad- Iran. This study is

part of an extensive study and some of data has been published in previous study. The sample consisted of 114 primigravida mothers who were admitted in the labor room, and the sample size was determined based on findings from a pilot study.

2-2. Inclusion and exclusion criteria

Maternal inclusion criteria were age between 18 -35 years old, intention to have normal vaginal delivery and breastfeeding, and no history of medical problems, mental disease, or drug addiction. Infants exclusion were birth weight < 2,500 grams, gestational age < 37 weeks or > 42 weeks, Apgar score < 7 at 1st and 5th minute after birth, presence of medical conditions which interfered with skin- to-skin contact. After obtaining informed consent from the mothers, they were randomly allocated into two groups of SSC (n=57) and routine care (n=57).

2-3. Ethical consideration

This study was approved by the Ethic Review Board of Mashhad University of Medical Sciences (ID number: 86154), and eligible mothers signed informed consent.

2-4. Methods

In SSC group, immediately after birth, the infant was placed prone between the mother's naked breasts. To avoid heat loss the infant was dried and his/her head and back were covered with a hat and a warm blanket, respectively and episiotomy repair was done during SSC.

All participants in the SSC group had 2 full hours of SSC before being transferred to the obstetrical ward. During SSC, as soon as any infant pre-feeding behaviors such as lip or hand-to-mouth movements were seen, the infant was moved close to the mother's breast to start breastfeeding. Neonatal weight, height, and head circumference were measured and vitamin K was injected as a single intramuscular dose of 1.0 mg, after two full hours of SSC by second researcher. In the control group, as it is routine in delivery rooms, immediately after cutting cords, the infants were dried and Apgar score was determined at 1st and 5th minute after birth. Then, the infants were shown to their mothers and were put under radiant warmer for physical assessment and vitamin K injection. After repairing mothers' perineal rupture or episiotomy, the infants were handed to their mothers in a blanket, and mothers were helped to start breastfeeding. Time of initiation and duration of each breastfeeding was recorded. Upon the termination of the first breastfeeding the infants were again returned to the radiant warmer until the end of the second hour post- birth. After that, the mothers and their babies were transferred to the maternity ward. Notably, in our sample, all of the mothers in both groups had episiotomy.

The primary outcome was the time from birth to first breastfeeding in both groups (SSC and control group). It was measured with chronometer and recorded. Secondary outcomes included the assessment of the infants' feeding patterns during the last 24-hour period immediately before the visit on the 28th day; and the infants' weight on the 14th and 28th days of life. The infant's feeding patterns were measured by a questionnaire designed specifically to identify exclusive and non-exclusive breastfeeding patterns, where exclusive breastfeeding is as we have defined it here, adapted from the American Academy of Pediatrics (5).

2-5. Measuring tools: validity and reliability

Demographic, labor, and delivery history data were obtained in labor room; breast feeding data were collected in the delivery room; and the infants' feeding patterns at discharge were recorded in the maternal ward. All follow-up data was collected by 2 research assistants masked to group assignment (SSC and control group) during at home visits on day 28, but they

were aware of the purpose of the study. Also, the infants' weights were measured using a digital scale, made Hungary with an accuracy of ± 10 grams. Validated scale which its accuracy has been calibrated using a 0.5 kg Balance weights; the infants' height and head circumference were measured using a tape made Iran.

2-6. Data Analyses

Data were analyzed using SPSS (version 11.0; SPSS Inc., Chicago, IL) and a value of $P<0.05$ was considered significant. The results were expressed as mean ± standard deviation, and the statistical differences between groups in quantitative data were determined by a t-test. Mann-Whitney was used in analyzing quantitative data with abnormal distribution and ranked data. Chi-square test was used for comparing qualitative data.

3- RESULTS

10 couples of mother and neonate from SSC and 12 couples from RC groups were excluded from the study due to lost to follow up, not accessibility, mother or neonatal hospitalization and discontinuation of participation. Finally, 92 couples completed the study. There was no significant difference between the two groups in mothers' age (P= 0.49), mothers' education (P=0.59), mothers' job (P=0.97), mothers' opinion about breastfeeding (P=0.54), fathers' education (P=0.27), infants' gender (P=0.85) and infants' weight (P= 0.2) (**Table.1**). The rate of breastfeeding initiation in the first 30 minutes post birth was 89.4% in SSC and 2.2% in control groups (P=0.000).

3-1. Exclusive Breastfeeding

As **Figure.1** shows, the rate of exclusive breastfeeding was significantly higher in the SSC group and Chi-square test indicated a significant difference between the two groups in exclusive breastfeeding from birth to day 28 (40.4% vs. 20%, P= 0.03), and in the last 24-hour report of 28th day post-birth (70.2% vs. 46.7%, P=0 .02).

3-2. Infants' weight gain

No significant differences were found in infants' weight on the 14th (3436.36 ± 258.80 grams vs. 3461.73 ± 318.15 grams, P= 0.67) and 28th days of life (4235.14 ± 365.08 grams vs. 4177.75 ± 525.76 grams, P= 0.54), weight gain during the first 14 days (314.62 ± 486.51 grams vs. 224.17 ± 276.42 grams, P= 0.27), and the 15th to 28th days (798.78 ± 354.79 grams vs. 716.01 ±420.59 grams, P= 0.31, and weight gain from birth to day 28 between SSC and routine care groups (1113.40 ± 545.50 grams vs. 940.19 ± 510.02 grams, P= 0.12) (**Table.2**).

Table-1: Characteristics of mothers and infants in skin- to- skin contact group and routine care groups (n= 92)

Variables	Groups		P- value
	Skin to skin contact	Routine Care	
Qualitative variables	Number (Percent)	Number (Percent)	
Education			0.59
Elementary school	13 (27.7)	6 (13.3)	
Guidance school	12 (25.5)	19 (42.2)	
High school	20 (42.6)	18 (40)	
Higher Education	2 (4.3)	2 (4.4)	

Job			0.97
Housewife	2 (97.90)	44 (97.80)	
Employed	1 (2.1)	1 (2.2)	
Husband's literature			0.27
Illiterate	2 (4.3)	0 (0)	
Elementary school	9 (19.10)	9 (20)	
Guidance school	26 (55.3)	21 (46.7)	
High school	9 (19.10)	15 (33.3)	
Higher Education	1 (2.10)	0 (0)	
Opinion about breastfeeding			0.54
Completely agree	37 (78.7)	33 (73.3)	
Agree	10 (21.3)	12 (26.7)	
Infant gender			0.85
Girl	27 (57.4)	25 (55.6)	
Boy	20 (42.6)	20 (44.4)	
Quantitative variables	Mean ± SD	Mean ± SD	
Mother's age	22.02 (2.84)	21.62 (2.73)	0.49
Duration of active phase of child-birth first stage (min.)	267.68 ± 85.65	244.75 ± 78.43	0.18
Duration of child-birth second stage (min.)	37.28±17.92	35.95 ± 19.14	0.73
Oxytocin	36(76. 6)	35(77.8)	0.89
Infant weight	3123.73 ± 509.55	3237.55 ± 347.34	0.2

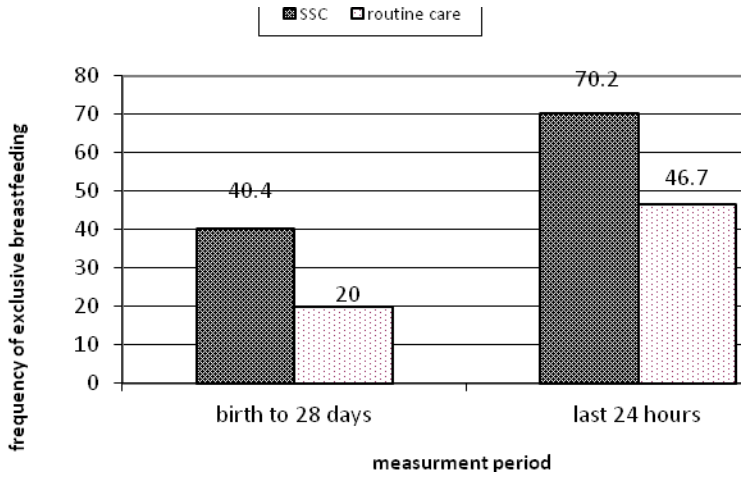

Fig.1: The rate of exclusive breastfeeding (percent) in two groups from birth to day 28 and the last 24-hour report of 28th day post-birth.

Table-2: Comparing infant weight in skin- to- skin contact group and routine care groups

Variables	Groups		P-value
	Skin to skin contact Mean ± SD	Routine Care Mean ± SD	
Infant weight (gr.)			
Birth weight	3121.73 ± 509.55	3237.55 ± 347.34	0.2
Weight at 14th day	3436.36 ± 258.80	3461.73 ± 318.15	0.67
Weight gain in first 14-day afterbirth	314.62 ± 486.51	224.17 ± 276.42	0.27
Weight at 28th day	4235.14 ± 365.08	4177.75 ± 525.76	0.54
Weight gain in second14-day afterbirth	798.78 ± 354.79	716.01 ±420.59	0.31
Weight gain in whole of the neonatal period	1113.40 ± 545.50	940.19 ± 510.02	0.12

4- DISCUSSION

This randomized controlled trial study showed that early and continuous skin-to-skin contact between mother and infant during two hours post birth improves breastfeeding initiation compared to routine method of infant care in delivery rooms, which can result in more successful and longer duration of breastfeeding in the future. The experiences of first breastfeeding was obviously different in two groups, as the rate of breastfeeding initiation in the first 30 minutes based on the infants' readiness. It seems that in SSC infants are quite alert and ready for sucking and initiation of feeding, leads to a longer and more successful breastfeeding, and that this could positively affect the infant's subsequent feeding behaviors. The benefits of the early and undisturbed contact and the harmful effects of the early separation post birth have been reported in other studies (16, 20, 25). Some of studies been shown that early separation is followed by shorter duration of the whole breastfeeding period (17, 20). Studies on newborn mammals have shown that if SSC is initiated immediately after birth, the baby starts moving towards the nipple and localizes the mother's nipple by smelling. This practice enhances the infant's ability to suckle competently and establishes effective breastfeeding. The first 2 hours post birth is the time when infants are most responsive to tactile, thermal, and odor cues from the mother (17, 19, 26). Even a brief separation of mother and infant may influence the success of this process and, therefore, the success of the first breastfeeding (15). Our study shows that exclusive breastfeeding could be enhanced by early mother infant skin- to- skin contact. There was significant differences in the rate of exclusive breastfeeding in the SSC group from birth to day 28 and in the last 24-hour of neonatal period. Moore et al. (2012) examined the early skin-to-skin contact for mothers and their healthy newborn infants. The study showed that early SSC has a significant positive effect on breastfeeding at one to four months post birth, and SSC increases breastfeeding duration (17).

Thukral et al. (2012) evaluated whether early skin-to-skin contact improves breastfeeding (BF) behavior and exclusive BF (EBF) rates in term infants at 48 hours of age. This study showed that exclusive breastfeeding rates was significantly higher in the early-SSC group than in the control group at 48 hours and at 6 weeks after birth (27). Bramson et al. (2010) also showed that exclusive breastfeeding was higher in mothers who experienced skin-

to-skin contact than in the mothers with no early skin-to-skin contact and the results showed a dose–response association between early skin-to-skin contact and exclusive breastfeeding (28). Mikiel-Kostyra et al. (2002) showed that mother–infant skin-to-skin contact lasting longer than 20 minutes increases the duration of exclusive breastfeeding (29). But our study results are different from the study of Moore and Anderson (2007) who found no significant differences in breastfeeding exclusivity between two groups in their research (19). Early SSC may not have a significant positive effect on breastfeeding status in the societies where so many barriers in the environment negatively influence long-term breastfeeding. As it may be believed that SSC bear some inconveniences to mothers, we investigated the mothers' opinion in this regard. In our study nearly all mothers in the intervention group had good feelings about skin-to-skin care.

4-1. Limitations of the study

Performing delivery by different midwives was a limitation, but care of mother and neonate and SSC was performed by two research assistants through the study.

5- CONCLUSION

Continuous SSC during the first 2 hours of post-birth in primiparous mothers compared to routine care of baby friendly hospitals significantly enhances rate of breastfeeding initiation in the first 30 minutes after birth, and also the rate of exclusive breastfeeding in the neonatal period. We believe that there is enough evidence to offer women a choice of SSC in early post-delivery care. The results support the Baby Friendly Hospital Initiative step 4 and help mothers to initiate breastfeeding within one hour of birth. The results of this RCT provide support for the health policy that promotes "facilitation of breastfeeding as soon as possible after birth, and to provide continuous skin-to-skin contact". These results indicate if it is possible, the neonatal separation for routine assessment and cares should be postponed for at least the first 2 hours after birth or until after the first breastfeeding. Also, skin to skin contact should be maintained during episiotomy.

6- CONFLICT OF INTEREST: None.

7- ACKNOWLEDGEMENT

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