



## Review Article

## The effect of mother-infant skin to skin contact on success and duration of first breastfeeding: A systematic review and meta-analysis

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## ABSTRACT

Breast-feeding initiation within the first half hour after birth is one of the World Health Organization recommendations. However, in most hospitals, mother-infant contact and breast-feeding initiation are delayed due to routine mother and infant care. This study aimed to determine the effect of mother-infant skin to skin contact (SSC) immediately after birth on the success rate and duration of the first breast-feeding.

In this review, databases of PubMed, Scopus, Cochrane, Google Scholar, SID and Magiran and reference sections of relevant articles were searched for both Persian and English randomized clinical trials from 2000 to December 2017, using the keywords of “(Breast-feeding OR Lactation) AND (mother-infant SSC OR KMC) AND (breast-feeding success OR breast-feeding duration)”. A total of nine trials were ultimately included. Data analysis was performed with Comprehensive Meta-analysis (CMA) software version 2.

In total 597 participants were assigned to the intervention group and 553 participants were assigned to the comparison group. Quantitative analysis Based on mean differences or odds ratio showed that Mother-Infant SSC had a significantly positive effect on success in first breast-feeding (MD: 1.90, 95% CI 0.958–2.856;  $p = 0.00$ , OR: 2.771 95% CI 1.587–4.838;  $p = 0.00$ ) and first breast-feeding duration (MD: 26.627 95% CI 1.070–52.184;  $p = 0.041$ ).

Mother-infant SSC after birth has beneficial effects on breast-feeding and can increase the success rate and duration of the first lactation. Therefore, the results of this study can be used by healthcare providers in evidence-based decision-making about ways to increase breast-feeding rates.

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## Introduction

In the new millennium, breast-feeding has an important place in general health, baby survival, mother's health and national and international policies [1]. Initial moments after birth are a sensitive period because this is an optimal time-frame for establishment of effective breast-feeding [2–4]. Presently, modernization has brought with it the trend of separating the infant from its mother [5]. In this regard, hospital policies and routine cares such as putting baby under the warmer to prevent hypothermia can cause the separation of the mother and the newborn [2]. Some studies have shown that mother-infant separation at birth can lead to a

decrease in mother-infant interaction, mother's self-esteem and self-efficacy in breast-feeding success [6–9]. This intervention can also lead to undesirable physiological effects in baby such as; stress initiation, increased crying in the newborn and consequently, the discharge of energy storage, reduction of successful nutrition, effective breast-feeding and lactation duration [3,10–12]. Supportive Proceedings at birth and minimizing interventions, such as mother-infant separation affect the success of breast-feeding and its duration [11,13,14]. One of these supportive procedures is the mother and infant skin to skin contact after delivery. Early skin-to-skin contact (SSC) attributes to the putting of the exposed newborn prone on the mother's bare chest right between the breasts instantly after birth. This procedure was implemented for the first time by Rey and Martinez in 1978, at the Institute for Maternity and Childhood in Bogotá [15–17]. Initial two hours post-birth is called critical period for stabilizing breast-feeding and its continuity. In this optimal time the infants' feeding behaviors such as rooting and

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sucking strongly exist, as well as most of the infants' responses to the touching, thermal and smell instigations received from their mother's body. They can even start breast-feeding by themselves so it seems that utilizing infant innate behaviors for initiating breast-feeding is a rationale venture to start interventions aimed at increasing the successful breast-feeding and maximum advantages of this period for that can be achieved by applying skin-to-skin care (SSC) method [11]. Skin-to skin contact makes full-term infant able to move towards the mother's nipples and latch effectively [18].

Also it can lead to a significant improvement in rooting and attachment which could develop exclusive breast-feeding (EBF) rates in infancy. The other significant impact of SSC in neonates is to reduce the stress levels related to their separation from their mothers [19]. Moore & Anderson (2007), Mahmood et al. (2011) and Srivastava et al. (2014) reported that the mother-infant skin to skin contact immediately after birth increased the success rate and duration of the first breast-feeding significantly ( $p < 0.05$ ) [5,11,18]. Whereas, in studies by Carfoot et al. (2005) and Thukral et al. (2011) there was no significant relationship between mother-infant skin to skin contact and the success rate and duration of first breast feeding [19,20]. Systematic review and meta-analysis is an essential tool for summarizing available documents and evidences in a precise, accurate and reliable way [21].

Despite the fact that several studies have been done on the impact of mother-infant skin to skin contact on the success and duration of the first breast-feeding, contradictory results of these studies make it necessary to carry out a meta-analysis study which can present a clear and consistent Result and a comprehensive guide for policy makers and researchers. Moreover, a meta-analysis study that specifically focused on the impact of skin to skin mother-infant contact immediately after birth on the success rate and duration of the first breast-feeding was not reported. Therefore, this meta-analysis study was conducted to determine the effect of mother-infant skin to skin contact immediately after birth on the success rate and duration of the first breast-feeding.

## Materials and methods

### Data sources, search strategy

In this meta-analysis, the databases of Medline, PubMed, Scopus, Cochrane, SID, Magiran and google scholar were searched for published articles in English and Persian language until September 2017.

The following keywords and their Persian equivalents were applied for electronic search, "(Breast-feeding OR Breast Feeding OR Lactation OR Human Milk) AND (skin to skin mother-infant contact OR Kangaroo Mother Care Methods OR Kangaroo Mother Care OR KMC) AND (breast-feeding success OR breast-feeding duration) AND (Randomized Clinical Trials"; these keywords were used separately or in combination together. In addition, reference sections of relevant trials, were manually checked to recognize further trials missed by electronic search. In this meta-analysis, possible publication bias among studies was evaluated by Funnel plot and Egger's test.

### Inclusion and exclusion criteria

Inclusion criteria consist of trials in which: 1-were conducted on mothers and their neonates immediately after delivery. 2- were designed as randomized controlled clinical trials. 3- compared the mother-infant skin to skin contact with routine care. 4-The participants consisted of Mothers and term healthy infants (between 37 and 42 weeks of pregnancy). 5- The intervention consisted of skin to skin contact that defined as placing the naked newborn

infant prone on mother's bare chest at birth or soon afterwards. Immediate SSC means within 10 min of birth. 6- In control group, infants were shifted to the radiant warmer immediately after cutting the cords; then infants were handed to their mothers in a blanket. Exclusion criteria consist of trials with: 1- duplicate citation. 2- Failure to report the necessary data for meta-analysis.

### Study selection, data extraction and quality appraisal

Title and abstract of the articles were assessed by two independent investigators (FZK and NMS) and a third researcher (RS, expert in meta-analysis) to resolve any cases of disagreements. Totally, nine articles published between 2001 and 2015 were selected based on the above inclusion and exclusion criteria. Using the data extraction form, the information needed for systematic review was extracted. The details of the form included the name of the first author, year, location of the study, design, participants, intervention type, number of samples in the intervention group, comparison, number of samples in the control group, dropout rate, instrument, outcome, and quality indicators (see Table 1). The selection process of RCTs included is described in Fig. 1.

The meta-analysis was reported using the PRISMA checklist. All qualified studies were sensibly reviewed. Oxford Evidence-Based Medicine Check List and the Cochrane Collaboration's tool for assessing risk of bias in randomized trials were used to evaluate the quality of the studies (see Tables 1 and 2, and Fig. 2).

### Statistical analysis

In order to sum up effect size in different studies, the random effects model was used. The effect size was reported in two ways of odds ratio or difference in mean. The heterogeneity among studies was assessed by the Chi-square based on Q-test and  $I^2$  statistics with a significance level of  $<0.05$ . All data analysis was performed using Comprehensive meta-analysis software version 2.

## Result

A total of nine clinical trials met the inclusion criteria and were included in the meta-analysis (see Table 1). All of the nine articles were randomized clinical trials except one study which designed to evaluate the efficacy of mother-infant early skin-to-skin contact (SSC) on first breast feeding success and duration. In total, 597 participants were assigned to the intervention group and 553 participants were assigned to the comparison group. Out of nine studies, one was carried out in UK, one in Egypt, six in Asia (i.e. three in Iran, one in Pakistan, and two in India) and one in the United States of America. Out of nine existing studies, eight studies were published in English and one in Persian. The randomized allocation was used in all of studies. Outcome measured included first breast feeding success and duration. Most of the studies measured outcomes within two hours after birth. The intervention strategy employed included mother and infant skin-to-skin contact. Each time of intervention duration lasted 2 h. Out of these 9 articles, all measured breast-feeding successfulness with Infant Breast-feeding Assessment Tool (IBFAT), and 6 studies measured breast-feeding duration by observing and taking notes. Due to the nature of the intervention, blindness of participants and personnel was not possible in all studies but outcome blinding was done in 2 studies including Beiranvand et al. (2014) and Thukral et al. (2012) [19,22].

In all of the studies, there were no statistically significant differences between the intervention and control group concerning the socio-demographic and clinical characteristics at baseline. There were two studies that reported 0% participant dropouts

**Table 1**

Characteristics of 9 clinical trials included in study. RCT:Randomized controlled trial. SSC:Skin to skin contact.

No.	Author Year Location of the study	Design	Participants	Intervention	Comparison	Dropout rate	Instrument	Outcome	Quality indicators: Assignment, groups similarity, groups treated equally, losses to follow-up, blindness, what were the results
1.	Essa and Ismail 2015 Egypt	RCT	mother- infant pairs N = 100	mother- infant SSC N = 50	routine care N = 50	0	IBFAT	94% of the SSC group had successful first breastfeeding, compared to 56% of the RC group ( $p < 0.01$ ) The duration of first breastfeeding was longer in SSC group than in RC group, where the mean duration was $20.06 \pm 2$ min and $6.36 \pm 1$ min, respectively ( $p < 0.01$ ).	-/+/-/+/-/+
2.	Srivastava et al., 2014 India	RCT	mother- infant pairs N = 298	mother- infant SSC N = 150	routine care N = 148	10%	IBFAT	IBFAT mean score in SSC group was significantly better than the control group (mean 9.55 vs. 6.77; $P < 0.0001$ ).	+/+/-/+/- <sup>a</sup>
3.	Nahidi et al., 2014 Iran	RCT	Mother infant pairs N = 120	mother- infant SSC N = 40 non skin to skin contact N = 40	routine care N = 40	0	IBFAT	IBFAT mean score in SSC group was $10.60 \pm 1.32$ and in the RC group was $8.38 \pm 2.24$ , which had a significant difference.	-/+/-/-/-
4.	Beiranvand et al. 2014 Iran	RCT	mother- infant pairs N = 90	mother- infant SSC N = 48	routine care N = 48	6%	IBAT <sup>1</sup>	IBAT mean score in SSC group ( $8.76 \pm 3.63$ ) and RC group ( $7.25 \pm 3.5$ ) ( $P = 0.048$ ).	+/+/-/+/-/+
5.	Thukral et al., 2012 India	RCT	mother-infant pairs N = 41	mother- infant SSC N = 20	routine care N = 21	15%	BAT <sup>2</sup>	There was no significant difference in the BAT scores between the groups ( $p = 0.6$ )	+/+/-/+/- <sup>a</sup>
6.	Mahmood et al., 2011 Pakistan	RCT	mother-infant pairs N = 183	mother- infant SSC N = 92	routine care N = 92	12%	IBFAT	The first breastfeed was 26.25% more successful in SSC group (58.8% in SSC group as compared to 32.5% in RC group with $p < 0.001$ ).	+/+/-/+/- <sup>a</sup>
7.	Khadivzadeh and Karimi 2009 Iran	RCT	mother-infant pairs N = 92	mother- infant SSC N = 46	routine care N = 46	0	IBFAT	The rate of success and duration of first feeding was significantly higher in SSC group (56.6% in SSC group as compared to 35.5% in CC group. ( $p = 0.02$ )). The mean IBFAT score was $9.8 \pm 2.1$ in the SSC group and $7.8 \pm 2.7$ in the RC group ( $P = 0.0001$ ) duration of first feeding was $57.59 \pm 14.23$ min in SSC group as compared to $35.5$ in $17.81 \pm 8.41$ min, $p = 0.0001$ )	+/+/-/+/-/+
8.	Moore, Anderson 2007 U.S	RCT	mother-infant dyads N = 23	mother-infant SSC N = 12	routine care N = 10	17%	IBFAT	SSC group compared to RC group had higher IBFAT mean score ( $8.7 \pm 2.1$ vs $6.3 \pm 2.6$ ; $P < 0.02$ ). The first breastfeed was success 55.5% in SSC group as compared to 20% in CC group.	+/+/-/+/- <sup>a</sup>

(continued on next page)

Table 1 (continued)

No.	Author Year Location of the study	Design	Participants	Intervention	Comparison	Dropout rate	Instrument	Outcome	Quality indicators: Assignment, groups similarity, groups treated equally, losses to follow-up, blindness, what were the results
9.	Carfoot et al. 2005 UK	RCT	mother-infant dyads N = 197	mother-infant SSC N = 99	routine care n = 98	2%	IBFAT <sup>a</sup>	In the SSC group 91% had a successful first feed compared with 83% in the RC group (P = 0.1)	+ / + / + / + / - / +

RCT: Randomized controlled trial.

SSC: Skin to skin contact.

IBAT: Infant Breastfeeding Assessment Tool.

IBFAT: Infant Breastfeeding Assessment Tool.

RC: Routine care.

BAT: Breastfeeding Assessment Tool.

<sup>a</sup> Intervention not possible to blind.

during the course of study, while six studies had 2–17% dropouts and in another study the participant dropouts was not reported. Inclusion criteria were described in all studies. In the reviewed studies mother and infant skin-to-skin contact provided with almost similar methods in such a way that babies were placed undressed in a prone position against the mother's bare chest between breasts immediately after birth and this intervention continued for at least 2 h. All of these studies acknowledged that skin-to-skin contact has affected stress reduction mechanism since the salivary cortisol levels considered as a marker of stress, decreased in infants given SSC. This infant's stress levels are associated with their separation from their mothers. In this study, meta-analysis was performed based on both mean differences (MD) and OR (odds ratio) for breast feeding success and MD for breast feeding duration.

Initially the results of the meta-analysis are reported based on the mean differences. Six trials assessed the effect of mother-infant early skin-to-skin contact on breast feeding success [5,11,18,22–24].

Heterogeneity was examined with Chi-square test and the Result showed that the difference between the results of studies was huge, which means these studies were heterogeneous ( $p = 0.000000006$ ;  $I^2 = 88\%$ ). The result of six pooled studies showed that breast-feeding success has an increase in participants receiving SSC compared to the control groups (mean diff: 1.90, 95% CI 0.958–2.856;  $p = 0.00$ ) that indicated a statistically significant effect for SSC with respect to breast-feeding success. The forest plot is shown in Fig. 3. The publication bias of studies is presented in the funnel plot, Fig. 4. Reportedly, P-value was 0.31 for Egger's test, which is not statistically significant, Fig. 5. These results can be interpreted as no effect of publication bias on this type of studies and are shown as symmetry in the funnel plot.

The results of the meta-analysis based on OR showed that six trials assessed the effect of SSC on breast-feeding success in participants [11,18–20,24,25]. Heterogeneity was examined with Chi-square test and the Result showed that the studies are homogeneous ( $p = 0.119$ ;  $I^2 = 43\%$ ). The result of six pooled studies showed that breast-feeding successfulness has an increase in participants receiving SSC, compared to the control group (OR 2.771 95% CI 1.587–4.838;  $p = 0.00$ ). Compared with the previous meta-analysis, analysis based on MD also showed a statistically significant effect for SSC with respect to breast-feeding successfulness. The forest plot is shown in Fig. 6. Use of a funnel plot and Egger's regression test revealed symmetrical results with respect to breast-feeding success again Figs. 7 and 8. These results can also be interpreted as no possible effects of publication bias on this kind of studies. P-value was 0.35 for Egger's test.

The results of the meta-analysis based on mean difference showed that two trials assessed the effect of SSC on first breast-feeding duration in participants [24,25]. The Result of two pooled studies showed that duration of first breast-feeding have an increase in participants receiving SSC compared to the control group (mean diff 26.627 95% CI 1.070–52.184;  $p = 0.041$ ). The forest plot is shown in Fig. 9. Moreover, Heterogeneity was examined with Chi-square test and the result showed that the studies are heterogeneous ( $p = 0.000$ ;  $I^2 = 99.09\%$ ).

## Discussion

The results of this systematic review and meta-analysis study showed that the Mother-Infant Skin to Skin Contact had a significant statistical effect on the success rate and duration of first lactation compared with routine care. Meta-analysis is a method that collects and analyzes several research data that has a common goal to provide a reliable estimate of the impact of some interventions or observations in medicine. In fact, one of the most

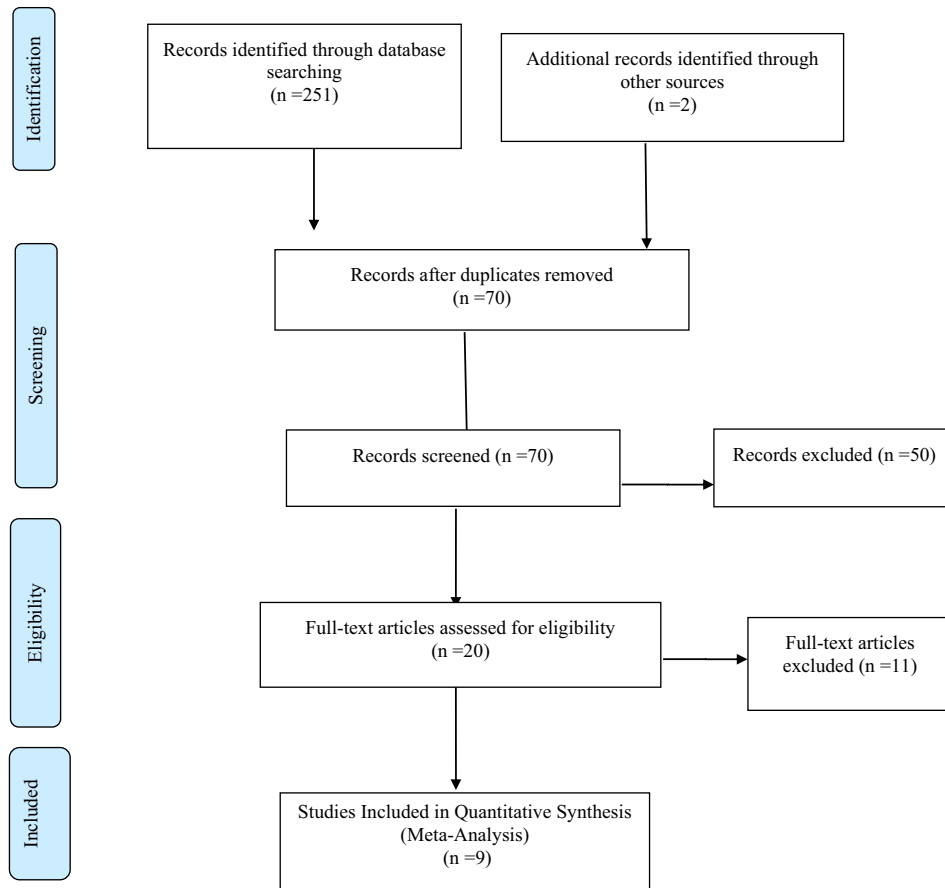


Fig. 1. PRISMA Flowchart of the study selection process.

important objectives of meta-analysis studies is to provide a precise and valid Result due to the increasing sample size, which is caused by the combination of various studies and the resolution of problems arising from the controversial results of past studies [26,27].

The present study is a meta-analysis which used statistical methods for reporting a significant relationship between Mother-Infant Skin to Skin Contact and the success rate and duration of first breast-feeding using this feature.

Along with the findings of this study, similar results have been reported in other studies including a meta-analysis study by Moore and colleague (2016) showed that the Mother-Infant Skin to Skin Contact after birth had beneficial effects on the success and duration of exclusive breast-feeding. Although this study confirms the useful effects of Mother-Infant Skin to Skin Contact, some of the Moore et al., (2016) study's limitations were; examination of many different variables in one study that reduced the accuracy of the search and extraction of data, not including all eligible studies, especially Persian published studies in to Meta- Analysis, which led to a decrease in the size of the final sample entered into the study hence, it could have affected the results of the analysis [28].

Also, Forster and Mc Lachlan (2007) in a review of the literature stated that Mother-Infant Skin to Skin Contact is one of the ways to increase breast-feeding success and support lactation initiation. But this study has some methodological imitations since it was merely a literature review and only systematic review and meta-analysis studies could provide the best evidence for judging the impact of interventions in medicine and its clinic usage [6].

The mechanism, by which Mother-Infant Skin to Skin Contact immediately after birth can increase breast-feeding success and

duration, may be affected by different pathways. In the possible explanation for the cause of these effects, Theory of Ethology can be mentioned. According to this theory, the instinctive behaviors that lead to the survival of species are developed without learning and experience and many of them occur over a sensitive period. This phase is the evolution of the intrinsic ability of the living organism which enables it to evolve, succeed, and stabilize the particular behaviors that are necessary for survival and compatibility with the environment [9,29,30].

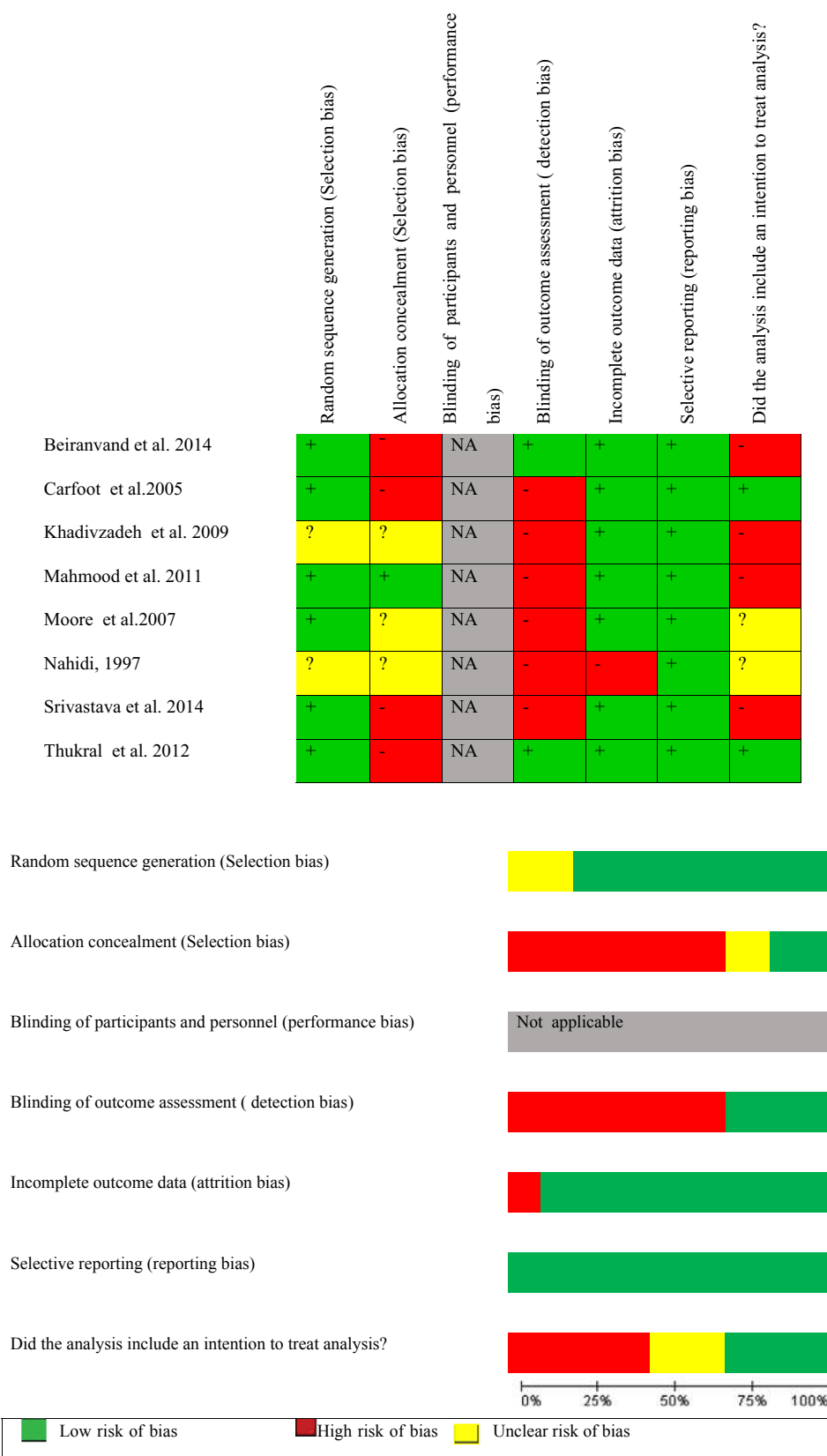
The concept of the sensitive period is related to the concept of the critical period. This is a short, constructive and virtually irreversible period in which the living organism's exposure to the endogenous and exogenous factors is very vulnerable [30,31].

It has been argued that infant feeding practices have the criteria for innate behaviors and Theory of Ethology also provides a biological explanation for the way mother and infant contact during a sensitive period influence the success and duration of the first breast-feeding. This theory also provides a framework that helps to understand the innate behaviors of a baby, such as breast searching and sucking, and explains how the separation of the mother and infant disrupts this innate behavior.

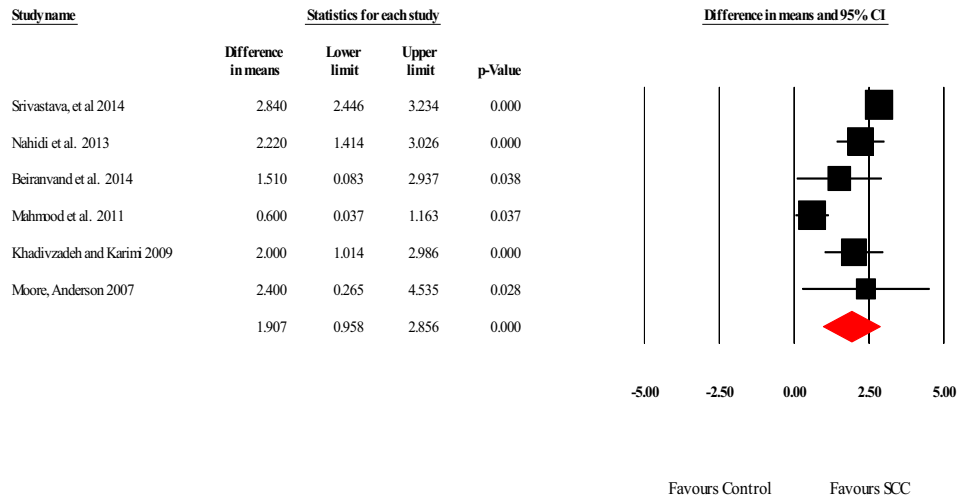
From the viewpoint of Ethologists, early hours after birth when the fetus is transmitted to external life and subject to rapid and profound physiological changes, are a critical period in which the infant needs to adapt in a short time in order to survive. Ethologists believe that an early hour after birth are the ideal time to start infant's nutritional behaviors, such as searching and sucking, and is a sensitive and critical period for breast-feeding that most infants respond to the touching, warmth, and olfaction

**Table 2**

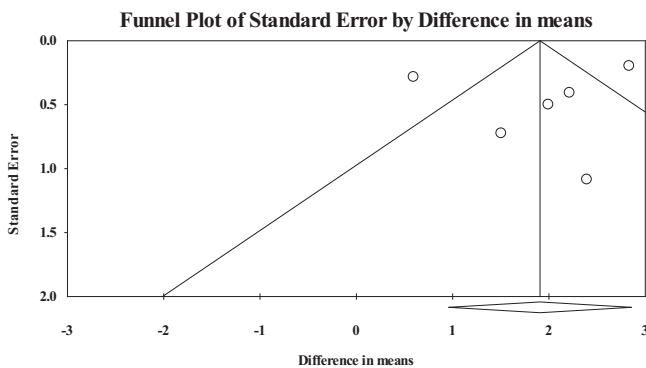
Risk of bias summary: Systematic review. Author's judgments of risk of bias item for each included study (NA: Not applicable).

**Fig. 2.** Risk of bias graph: Systematic review. Author's judgments of risk of bias presented as percentages across all included studies.





**Fig. 3.** The effect of mother-infant skin to skin contact on first breast feeding success based on mean difference. The horizontal lines denote the 95% CI, ■ point estimate (size of the square corresponds to its weight); ◇ combined overall effect of treatment.



**Fig. 4.** Funnel plot for publication bias evaluation.

#### Egger's regression intercept

Intercept	-1.36945
Standard error	2.69541
95% lower limit (2-tailed)	-8.85311
95% upper limit (2-tailed)	6.11421
t-value	0.50807
df	4.00000
P-value (1-tailed)	0.31907
P-value (2-tailed)	0.63814

**Fig. 5.** Egger's regression intercept for publication bias evaluation.

stimulation. Therefore, the separation of mother and infant immediately after birth can lead to discontinuation of these innate behaviors [11,32,33].

When healthy infants have skin to skin contact with their mother immediately after birth, they show their own specific intuitive behaviors. During Mother-Infant Skin to Skin Contact, the verbal and touching interaction between mother and infant increases, leading to an increase in response to mother's body stimulation and the development and progression of breast-feeding nutritional behaviors in a newborn. As a Result, the infant takes her/his mother's breast, and achieves the ability to suck and begin to nourish [3,9,11,34–36].

In addition, infant sucking and breast stimulation at the first hour after birth give rise to hormonal responses in the mother, accordingly increased oxytocin secretion to produce milk and prolactin hormone reflex for milk production. Furthermore, during

skin to skin contact, touching, thermal and olfactory receptors that are some of the strongest vagus nerve stimulants can enhance the release of maternal oxytocin. Moreover, the level of catecholamines in the newborn is increased immediately after the second stage of labor due to fetal head pressure and intermittent hypoxia during uterine contractions. Increasing the level of catecholamines in the bloodstream causes high response of the baby's olfactory bulb to odor in the first hours after birth, and the baby's olfactory sensation becomes sensitive to the smell which conducts the baby to the mother's nipple. However, after the first two hours after birth due to the reduction in the level of catecholamines in the baby's bloodstream, the baby falls into deep sleep and is difficult to be woken up for 3–4 h, which leads to impairment in breast-feeding [3,9,11,33,35–39].

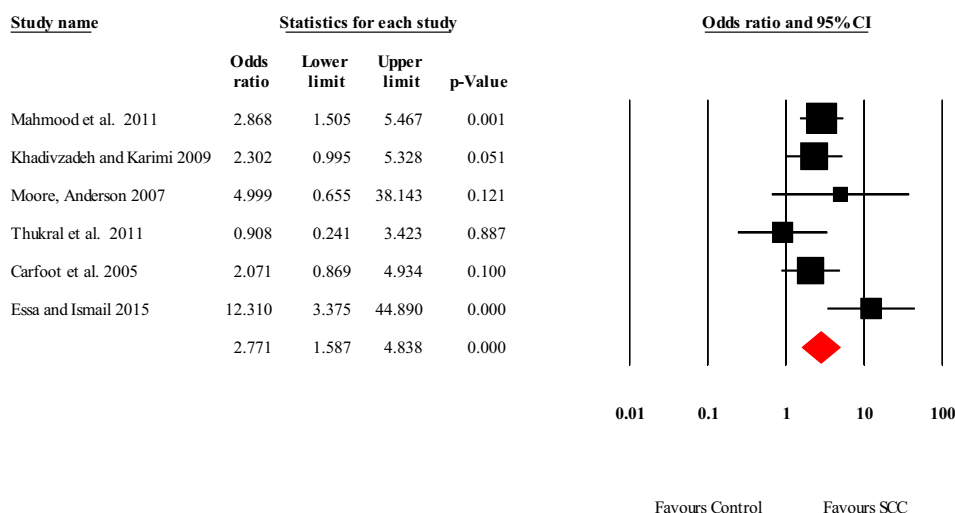
Among the reviewed studies in the present meta-analysis, 8 studies showed a higher success rate in the first breast-feeding in the group with skin to skin contact between the mother and infant compared with the routine care group; moreover, in 3 studies first breast-feeding duration was significantly higher [2,5,11,18,19,22,23,25]. And only in the study of Carfoot et al. (2005), there was no significant difference between the two groups receiving skin to skin care and conventional care [20].

The lack of consistency between the findings among the trials examined may be due to the difference in the way the infant's breast-feeding measurements are scored, the mild variances over the course and way of skin to skin contact between the mother and the infant. In all studies, assessment of the breast-feeding success was done using the IBFAT instrument. The IBFAT measures 4 parameters:

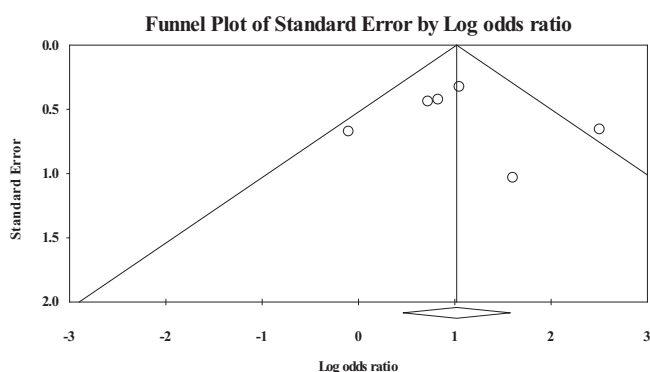
- 1) Infant state of arousal or readiness to feed;
- 2) Rooting reflex;
- 3) Latch-on;
- 4) Suckling pattern.

Each parameter contains 4 parts, scaled between 0 and 3. In some studies, gaining a score of 10–12 and in some others, a score of 8 or more represents success, while earning a score of less than 10 or less than 8 is considered as a failure in the first breast-feeding.

It is worthy to note that breast milk is a very desirable and ideal food for infants and can provide specific nutritional and



**Fig. 6.** The effect of mother-infant skin to skin contact on first breast feeding success based on Odds ratio. The horizontal lines denote the 95% CI, ■ point estimate (size of the square corresponds to its weight); ◇ combined overall effect of treatment.



**Fig. 7.** Funnel plot for publication bias evaluation.

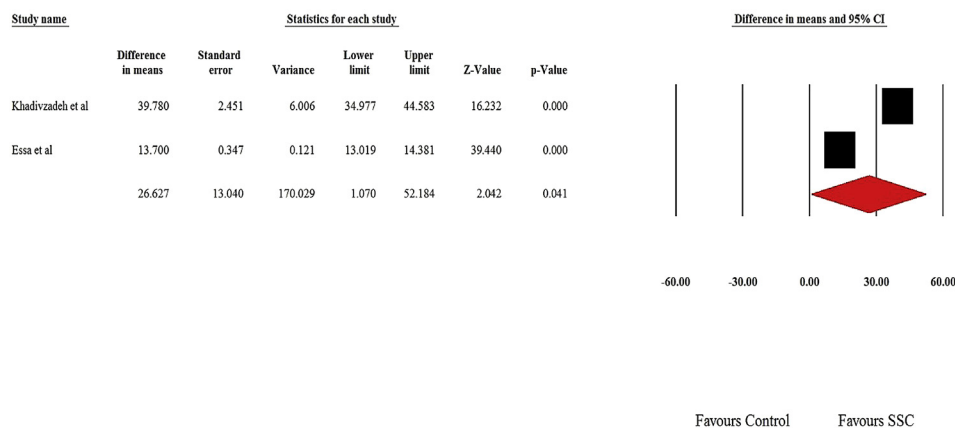
#### Egger's regression intercept

Intercept	0.73131
Standard error	1.77110
95% lower limit (2-tailed)	-4.18607
95% upper limit (2-tailed)	5.64868
t-value	0.41291
df	4.00000
P-value (1-tailed)	0.35042
P-value (2-tailed)	0.70085

**Fig. 8.** Egger's regression intercept for publication bias evaluation.

age-specific qualities for the infant, and during the first 6 months of baby's life this alone will provide all the infant's nutrition needs for its natural development [40,41]. So the need to identify ways to establish and continue lactation is evident. In this regard, this study showed that mother-infant skin to skin contact after birth has beneficial effects on lactation and can increase the success and duration of the first breast-feeding. It is suggested that contact between the mother and the infant as a method of care should be made by mother and child healthcare providers, such as midwives, doctors, and students who are responsible for the care of women in childbirth. However, further studies are needed in this area.

One of the strengths of the present study was that, it is a systematic review and meta-analysis that specifically examined the effect of mother-infant skin to skin contact immediately after birth on the success rate and duration of the first breast-feeding. One of this study's limitations is the low number of clinical trials, and consequently, the lack of sample size for proper evaluation of first breast-feeding duration; other limitations included the quality of the studies in terms of methodology and the different methods of scoring. Therefore, it is suggested that clinical trials with higher methodological quality in terms of allocation concealment (Selection bias), blinding of outcome assessment (detection bias) and considering intention to treat analysis be performed to achieve more robust evidence.



**Fig. 9.** The effect of mother-infant skin to skin contact on duration of first breast feeding based on mean difference. The horizontal lines denote the 95% CI, ■ point estimate (size of the square corresponds to its weight); ◇ combined overall effect of treatment.



**Conclusion:** The reviewed papers in this systematic review and meta-analysis showed that mother-infant skin to skin contact increases the success rate and duration of the first breast-feeding, and hence it is the best provider of post-natal care for the infants.

But, in spite of the above evidence and the benefits of mother-infant skin to skin contact after birth, this practice is still not desirable in Iran, and the separation of mother and infant after birth is carried out to conduct hospital routine care in many cases; seemingly, this has an important role in lactation disorders and could be the reason why, despite the benefits of exclusive breast-feeding during the first 6 months after birth, this rate has declined in our country over the past few years. Therefore, the results of this study can be used in evidence-based decision-making by healthcare providers and also can be suggested as a way to promote and facilitate breast-feeding.

### Conflict of interest

The authors report no conflicts of interest.

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