

## Effect of Mother and Infant Skin to Skin Contact on Early Initiation Breastfeeding: A Meta Analysis

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### ABSTRACT

**Background:** Skin to Skin Contact (SSC) of mothers and babies immediately after giving birth provides many benefits at the beginning of breastfeeding, an effective intervention can increase the competence of breastfeeding babies compared to just getting routine care. This study aims to analyze the primary study of the effect of mother-infant skin to skin contact on the success of the first breastfeeding with a meta-analysis.

**Subjects and Method:** This study is a systematic review and meta-analysis with the following PICO, population: mothers and newborns. Intervention: skin to skin contact. Comparison: Routine care. Outcome: Successful first breastfeeding. The articles used in this study were obtained from three databases, namely Google Scholar, Pubmed, Science Direct and Springerlink. Keywords to search for articles ("skin to skin contact" OR "early initiation breastfeeding" OR "kangaroo mother care" AND "first breastfeeding" OR "duration breastfeeding" AND "Randomized Control Trials" OR "RCT"). The articles included are full text in English and Indonesian with a Randomized Controlled Trial study design from 2011 to 2021 and reports on the Mean and SD in a multivariate analysis. Article selection is done by using PRISMA flow diagram. Articles were analyzed using the Review Manager 5.3 aplikasi application.

**Results:** A total of 10 randomized controlled trials from Iran, India, Pakistan, Egypt, and Thailand were selected for a systematic review and meta-analysis. The data collected showed that skin to skin contact increased the success of the first breastfeeding by 1.05 times compared to conventional method care (SMD= 1.10; 95% CI= 0.63 to 1.58; p<0.001).

**Conclusion:** Skin to skin contact can increase the success of the first breastfeeding.

**Keywords:** skin to skin contact, breastfeeding success, meta-analysis.

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### BACKGROUND

The Infant Mortality Rate (IMR) is one indicator to determine the state of health and welfare of the community in a country which is included in the target of the Sustainable Development Goals (SDGs) (Nasrullah, 2021). There are 5 million neonatal deaths

every year with a mortality rate (death within the first 28 days of life) of 34 per 1,000 live births, and 98% of these deaths come from developing countries (WHO, 2019). In the life of the first 28 days of life, the neonate is the most vulnerable period for the survival of a child (Parela et al., 2021). In

2020 globally 2.4 million children died in the first month of life in 2020 around 6,500 neonatal deaths every day with about one third of all neonatal deaths occurring within the first day after birth, and nearly three quarters occurring within the first week of life (UNICEF, 2021).

Early birth is a sensitive period because this is the optimal time to establish effective breastfeeding (Almutairi et al., 2020). Modernization has brought about the trend of separating babies from their mothers (Srivastava et al., 2017). Hospital policies and routine care such as putting the baby under a heater to prevent hypothermia can lead to separation of mother and newborn (Purwaningsih and Widuri., 2019). Research shows that separation of mother and baby at birth can lead to a decrease in mother-infant interaction, mother's confidence and self-efficacy in breastfeeding success (Abdulghani et al, 2018). Supportive procedures that can be carried out by mothers and babies doing skin to skin contact after giving birth (Agudelo et al., 2021).

Skin to skin contact in infants is a condition where the baby is in direct skin contact with the mother's skin (Moore et al., 2016). Skin to skin contact is generally carried out by mothers after the baby is born which is carried out at the time of early initiation of breastfeeding (IMD) (Ionio et al., 2021). SSC is an easy intervention and can be applied to mothers who gave birth vaginally or by cesarean section (Araujo et al., 2021). Babies find it easier to adapt to the surrounding environment outside the womb, newborns instinctively have high sensory sensitivity, so that with skin-to-skin contact, mothers and babies after giving birth are successful in the first breastfeeding (Purwaningsih and Widuri, 2019). A cohort research study from Columbia, newborns undergoing SSC was compared with habitual management. A

total of 816 infants were included, 672 (82.3%) in the SSC group and 144 (17.6%) in the RC group. Direct SSC in newborns has a protective effect in the first hours of newborn life (Diaz et al., 2020).

Newborn deaths can be prevented if the baby is breastfed by the mother in the first hour after birth. The practice of early initiation of breastfeeding is very beneficial for babies because babies will get colostrum or the first milk produced by the mother (Guala et al., 2017). Mother's milk is rich in immune cells and antibodies so that it can increase the baby's resistance (Pratiwi et al., 2020).

Based on these descriptions and data, the authors are interested in knowing the effect of Skin to Skin Contact on the success of the first breastfeeding through a meta-analysis study. Meta-analysis of scientific research is shown through drawing conclusions that are more valid and reliable by increasing the sample size due to reviewing several studies with the same subject.

## SUBJECTS AND METHOD

### 1. Study Design

This study was conducted using a systematic review and meta-analysis. Article searches were conducted using electronic databases such as Google Scholar, PubMed, Science Direct, and Springerlink. The articles used were published from 2011-2021. The keywords used to retrieve the articles were: ("skin to skin contact" OR "early initiation breastfeeding" OR "kangaroo mother care" AND "first breastfeeding" OR "duration breastfeeding" AND "Randomized Control Trials" OR "RCT"). The article search results are listed in the PRISMA diagram and analyzed using the Review Manager 5.3 application.

### 2. Inclusion Criteria

Full paper article with experimental study (Randomized Controlled Trial), analysis

with Mean SD to measure the estimated effect, research subjects are mothers and newborns, research intervention is skin to skin contact (SSC) comparison or comparison is routine care (RC), outcome of the first breastfeeding success study.

**3. Exclusion Criteria**

Main articles published from the meta-analysis, articles published in languages other than English and Indonesian, and articles before 2011.

**4. Operational Definition of Variable**

In formulating research problems PICO is used. The population is mothers and newborns. The research intervention was skin to skin contact (SSC) comparison or routine care (RC), the outcome of the study was the success of the first breastfeeding. SSC is an intervention method where the baby is in direct skin contact with the mother's skin to form a bonding before routine care.

The success of the first breastfeeding

is that the baby is able to suckle on his own immediately after birth after routine care.

**5. Instrument**

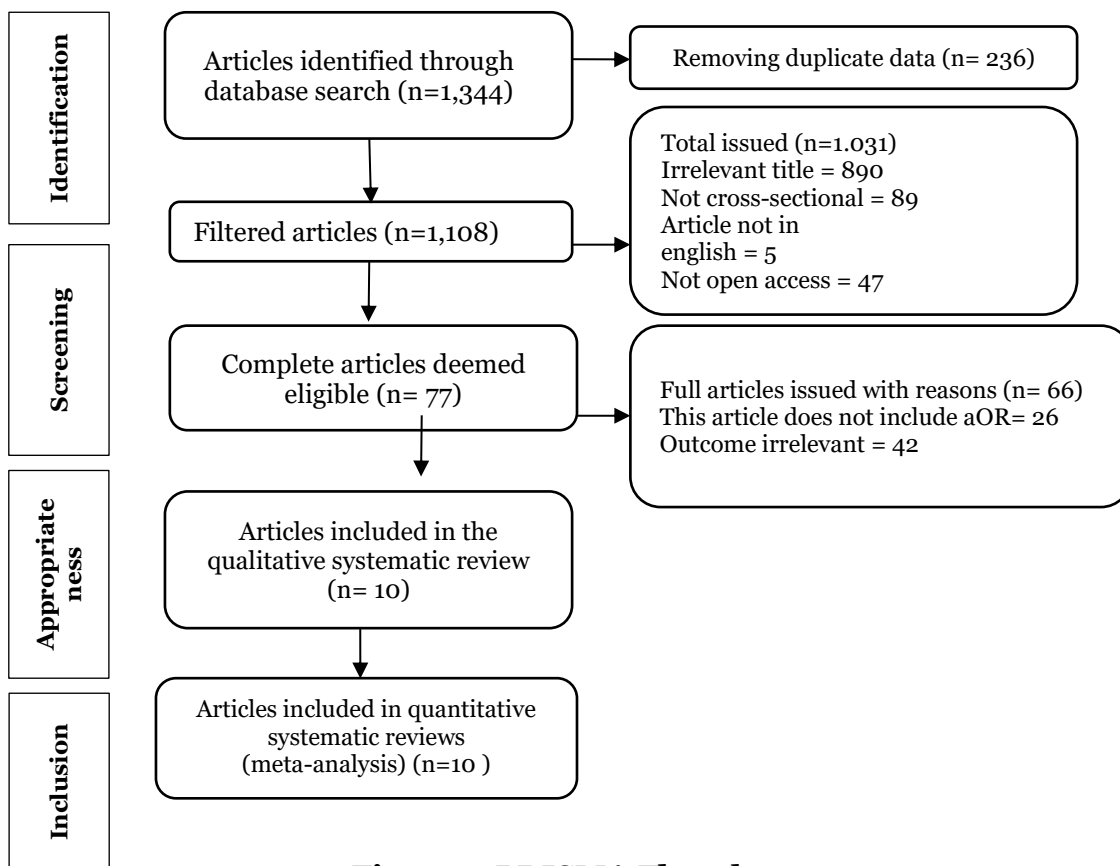
Quality assessment in this study was carried out using the Critical Appraisal Checklist for Randomized Controlled Study published by CEBM University of Oxford (2020).

**6. Data Analysis**

Articles were collected using PRISMA diagrams and analyzed using the Review Manager 5.3 application by calculating effect sizes and heterogeneity to determine the combined research model and form the final results of the meta-analysis.

**RESULTS**

Research from the primary study on the effect of SSC on the success of the first breastfeeding consisted of 10 articles, 9 studies from the Asian continent (Iran, India, Pakistan, Thailand), 1 study from Africa (Egypt).



**Figure 1. PRISMA Flowchart**



**Figure 2. Map of Research Locations**

A total of 1,371 articles were identified through the electronic database. After removing duplication, 1,007 articles were screened. Of these, 51 articles were assessed for eligibility. The following reasons are given for full-text articles that meet the exclusion criteria:

1. The article does not meet the criteria for the PICO formulation.
2. The population in the article is not mothers and newborns.
3. The article does not include the mean and standard deviation values.

A total of 10 articles that met the quality assessment were included in the quantitative synthesis using the Meta-Analysis. Critical Appraisal Checklist for Randomized Controlled Study published by CEBM University of Oxford (2020). This assessment criteria consists of twelve criteria, with each measure given a score of 1 = if you answered yes, 0 = if you answered no. The following are the assessment criteria of the Controlled Study published by CEBM University Of Oxford.

The next step is to calculate the overall effect of combining the data. Data ana-

lysis was performed using Review Manager (RevMan) 5.3 software released by the Cochrane Collaboration. Table 1. Shows the assessment of study quality using the Controlled Study Checklist published by CEBM University of Oxford (2020) as follows:

The forest plot in Figure 2 shows that mothers who breastfed their newborns with skin-to-skin contact had a 1.10 unit greater probability of successful first breastfeeding than without skin-to-skin contact, and the effect was statistically significant (SMD=1.10; 95% CI=0.63 to 1.58) and statistically significant  $p < 0.001$ . Statistical heterogeneity among studies was  $I^2 = 93\%$  indicating a heterogeneous distribution of data (random effect model).

A funnel plot is a plot that depicts the estimated effect size of each study against its estimated accuracy which is usually the standard error. The following funnel plot shows the risk of publication bias among the included studies.

Figure 3 shows a balanced distribution of effect estimates (symmetrical) to the right and left of the estimated average vertical line, so that it does not indicate any publication bias.

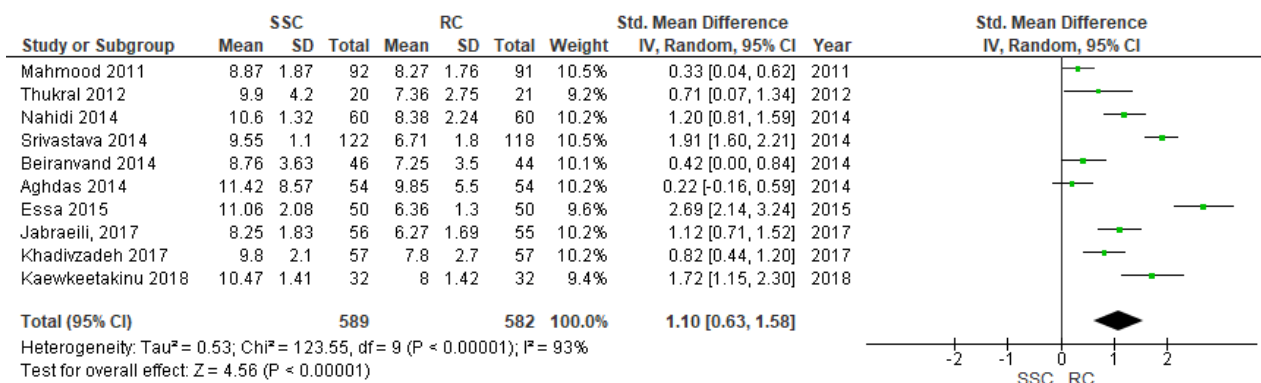
**Table 1. Assessment of the quality of randomized controlled trial studies**

No	Questions	Srivastava et al. (2014)	Beiranvand et al. (2014)	Mahmoud et al. (2011)	Khadivzadeh et al. (2017)	Thukral et al. (2012)	Essa et al. (2015)	Nahidi et al. (2014)	Aghdas et al. (2014)	Kaewkeetakinu et al. (2018)	Jabraeili et al. (2017)
1	Does this study address a clear research focus?	1	1	1	1	1	1	1	1	1	1
2	Is the Randomized Controlled Trial research method appropriate to answer the research question?	1	1	1	1	1	1	1	1	1	1
3	Were there enough subjects in the study to establish that the findings were not coincidental?	1	1	1	1	1	1	1	1	1	1
4	Were the subjects randomly divided into the experimental and control groups? If not, can this be biased?	1	1	1	1	1	1	1	1	1	1
5	Does the study use inclusion/exclusion criteria?	1	1	1	1	1	1	1	1	1	1
6	Were the two groups comparable at the start of the study?	1	1	1	1	1	1	1	1	1	1
7	Were objective and unbiased outcome criteria used?	1	1	1	1	1	1	1	1	1	1
8	Is the measurement method used objective and valid to measure the results? If not, is there any blinding in the study?	1	1	1	1	1	1	1	1	1	1
9	Is effect size practically relevant?	1	1	1	1	1	1	1	1	1	1
10	Is the estimated effect correct? Is there a confidence level interval?	1	1	1	1	1	1	1	1	1	1
11	Are there any confounding factors that have not been taken into account?	1	1	1	1	1	1	1	1	1	1
12	Can the results be applied to your research?	1	1	1	1	1	1	1	1	1	1
	<b>Total Score</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>

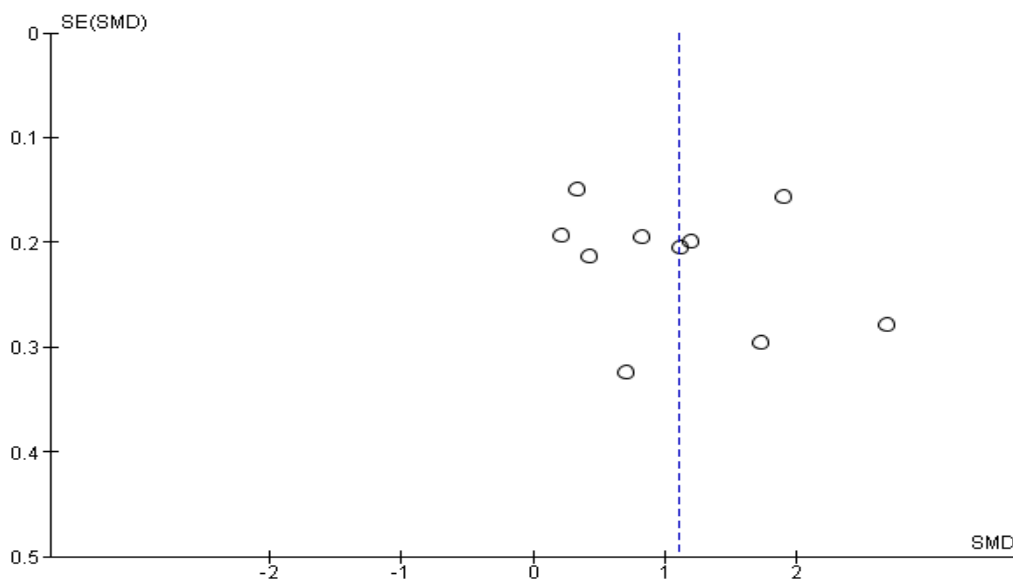
Note: 2: Yes; 1: Can't tell; 0: No

**Table 2. Description of the main studies included in the primary study of the meta-analysis**

Author (Year)	Country	Study Design	Total of sample		Population	Intervention	Comparison	Outcome	Mean		SD	
			SSC	RC					SSC	RC	SSC	RC
Srivastava et al. (2014)	India	RCT	122	118	Mother and infants	Skin to skin contact immediately 1 hour after giving birth	Routine standard maintenance	Baby is successful at first feeding	9.55	6.71	1.10	1.8
Beiranvand et al. (2014)	Iran	RCT	46	44	Mother and infants	Skin to skin contact 1 hour immediately after giving birth	Hospital routine standard care	SSC facilitates successful first breastfeeding	8.76	7.25	3.63	3.50
Mahmood et al. (2011)	Pakistan	RCT	92	91	Mother and infants	Skin to skin contact at least 120 minutes immediately after giving birth	Conventional standard care	Significant to the success of the first breastfeeding	8.87	8.27	1.87	1.76
Khadivzadeh et al. (2017)	Iran	RCT	57	57	Mother and infants	Skin to skin contact at least 1 hour immediately after giving birth	Routine standard maintenance	First breastfeeding success	9.80	7.80	2.10	2.70
Thukral et al. (2012)	India	RCT	20	21	Mother and infants	Skin to skin contact at least 1 hour immediately after giving birth	Routine conventional care	First breastfeeding success	9.90	7.36	4.20	2.75
Essa et al. (2015)	Mesir	RCT	50	50	Mother and infants	Skin to skin contact 2 hours immediately after giving birth	Routine standard maintenance	First breastfeeding success	11.06	6.36	2.08	1.30
Nahidi et al. (2014)	Iran	RCT	60	60	Mother and infants	Skin to skin contact at least 1 hour immediately after giving birth	Routine standard maintenance	First breastfeeding success	10.60	8.38	1.32	2.24
Aghdas et al. (2014)	Iran	RCT	54	54	Mother and infants	Skin to skin contact at least 1 hour immediately after giving birth	Routine standard maintenance	First breastfeeding success	11.42	9.85	8.57	5.50
Kaewkeetakinu et al. (2018)	Thailand	RCT	32	32	Mother and infants	Skin to skin contact at least 1 hour immediately after giving birth	Routine conventional care	First breastfeeding success	10.47	8.00	1.41	1.42
Jabraeilie et al. (2017)	Iran	RCT	56	55	Mother and infants	Skin to skin contact at least 1 hour immediately after giving birth	Routine standard maintenance	Baby's first successful breastfeeding	8.25	6.27	1.83	1.69



**Figure 2. Funnel Plot meta-analysis of the effect of Skin-to-Skin Contact (SSC) on the success of the first breastfeeding**



**Figure 3. Funnel Plot meta-analysis of the effect of Skin-to-Skin Contact (SSC) on the success of the first breastfeeding**

### DISCUSSION

Breastfeeding is an important feeding practice in neonates which is expected to reduce mortality and morbidity rates such as diarrhea, pneumonia, neonatal sepsis and can reduce obesity and diabetes in later life. Modernization has brought about the trend of separating babies from their mothers (Srivastava et al., 2017). One of these supportive procedures is for the mother and baby to make skin-to-skin contact after giving birth (Agudelo et al., 2021). Mother-infant contact (skin to skin contact) can have an impact on the success of the first

breastfeeding because by carrying out SSC the temperature of the mother's skin is the same as that of the pregnant belly (Araujo et al., 2021). During mother-infant skin-to-skin contact, verbal and tactile interactions between mother and baby are increased, leading to an increased response to maternal bodily stimuli and the development and development of nutritional breastfeeding behavior in newborns. As a result, the infant takes on the mother's breast, and attains the ability to suck and begins to suckle (Reshma et al., 2020).

This research is related to preventive

efforts in newborns to prevent the increase in mortality and morbidity of newborns, and the main thing is to increase the success of the first breastfeeding. The first meta-analysis of the effect of SSC on breastfeeding success consisted of several primary studies spread across 2 continents, namely the Asian continent and the African continent. The primary studies included in this meta-analysis were 10 articles from Iran, India, Pakistan, Egypt, and Thailand. This meta-analysis included 1,171 pregnant women from ten primary randomized controlled trials (RCTs).

The studies were identified from 2011 to 2021, with each article having a Mean and SD statistical outcome. Based on the results of the analysis of 10 primary studies conducted by systematic reviews and meta-analyses, it was shown that there was high heterogeneity between experimental studies ( $I^2=93\%$ ;  $p<0.001$ ) so the analysis used the Random Effect Model (REM). High heterogeneity is based on the variation or diversity between populations that can be seen from the number of different samples between the experimental group and the control group. The results of a meta-analysis of 10 articles related to the effect of Skin-to-Skin Contact (SSC) on the success of the first breastfeeding showed that SSC intervention after delivery increased the success of the first breastfeeding compared to treatment with Routine Care (RC) (SMD = 1.10; 95% CI= 0.63 up to 1.58;  $p<0.001$ ). There are 7 primary research articles that show a significant value in the Skin-to-Skin Contact (SSC) study on the success of the first breastfeeding marked by not touching the horizontal line of each study with the vertical line on the forest plot, including the research of Thukral et al., 2012, Nahidi et al., 2014, Srivastava et al., 2014, Essa et al., 2015, Khadivzadeh et al., 2017, Jabraeili et al., 2017 and Kaewkeetakinu et al., 2018. This study explains that

mothers and babies who being given a Skin-to-Skin Contact (SSC) intervention can have an effect on the success of breastfeeding, namely 1.10 times that of mothers and babies who are only given Routine Care (CI 95%= 0.63 to 1.58) and statistically significant  $p<0.001$ . This meta-analysis study provides evidence that there is an effect of Skin-to-Skin Contact (SSC) on the success of the first breastfeeding, in this study there was no tendency for publication bias indicated by the funnel plot with a symmetric distribution of the plot.

Skin to skin contact in infants is a condition where the baby is in direct skin contact with the mother's skin (Moore et al., 2016). Skin to skin contact is generally carried out by mothers after the baby is born which is carried out at the time of early initiation of breastfeeding (IMD) (Ionio et al., 2021). Early skin to skin contact is carried out on postpartum mothers, both normal postpartum and Sectio Caesarea. Mothers giving birth perform SSC, it is not only beneficial for newborns, but also for mothers who have just given birth, namely reducing the risk of bleeding after delivery and increasing the bounding attachment between mother and baby. Skin to skin contact between mother and baby is able to stabilize the baby's body temperature so that it can avoid hypothermia. Skin-to-skin contact provides a strong psychological effect between mother and baby (Mohamed et al., 2022). According to the ethological point of view, the early hours after birth when the fetus is transmitted to external life and undergoes rapid and profound physiological changes, is a critical period in which the baby needs to adapt in a short time to survive. Researchers believe that the first hour after birth is the ideal time to initiate infant nutritional behaviors, such as seeking and sucking, and is a sensitive and critical period for breastfeeding during



which most infants respond to touch, warmth, and smell (Sharma et al., 2016).

A similar study conducted in Istanbul, Turkey, found that kangaroo care given to newborns encouraged newborns to suckle faster, more often, and for a longer time. The results also showed an increase in their breastfeeding skills (Mean= 8.38; SD= 0.95 in the KMC group and Mean = 8.36 SD = 1.02 in the RC group) this difference was statistically significant ( $p < 0.001$ ) in both parameters (Oksuz et al, 2021). In a study conducted in Egypt, skin-to-skin contact between mother and neonate at birth had a positive effect on increasing breastfeeding initiation and improving the quality of the first breastfeeding in the experimental group ( $p < 0.001$ ) (Mohamed et al., 2022).

This study was conducted in Brazil. Skin-to-skin contact is a strategy that has an impact on successful breastfeeding, bringing benefits that have an impact throughout the life cycle of the child. Cross-sectional study of 727 pregnant women sampled 84.6% of respondents successfully breastfeeding their baby for the first time. This period is important for breastfeeding, as most infants may respond to olfactory receptors, leading to the mother's nipple (Araújo et al., 2021). The Columbian study, reported that SSC compared to separation at birth increased exclusive breastfeeding between 3 and 6 months of age (relative risk [RR] 1.97; 95% CI 1.37 to 2.83).

Given the positive effects of SSC, in the care of the mother-child partner will contribute to the goal of increasing the prevalence of exclusive breastfeeding and reducing neonatal and infant mortality (Agu-deló et al., 2021). A retrospective cohort study from Colombia, of newborns undergoing SSC compared with habit management was performed. A total of 816 infants were included, 672 (82.3%) in the SSC group and 144 (17.6%) in the RC group.

Direct SSC of the newborn at birth has a protective effect on the risk of hospital admission in the first hours of the newborn's life (Diaz et al., 2020).

The importance of SSC stimulation as a hands-on practice for newborns who are in adequate clinical condition is emphasized, placing other treatments secondary, as one seeks to ensure humane care during delivery and the puerperium. Research conducted in India, Neonates undergoing SSC have been shown to have higher stability of the cardiovascular system, increase the duration of breastfeeding and maintenance of temperature. It also facilitates self-regulation and reduces stress associated with birth. SSC also has maternal benefits in terms of decreasing the mean time to expulsion of the placenta and decreasing the need for analgesics after delivery (Mukherje et al., 2020).

SSC in the first 2 hours after birth, when infants are most responsive to touch, temperature, and smell cues from their mothers, was defined as the optimal time for them to initiate breastfeeding behaviors, such as rooting and sucking (Ali et al., 2021). The SSC creates an optimal environment for the newborn's adaptation to extra-uterine life. Apart from providing warmth, it facilitates attachment to the breast and has been shown to promote a more efficient sucking pattern. A significantly higher proportion of neonates were exclusively breastfed at 6 weeks in the SSC group compared to the control group (72% vs 57.6%,  $p= 0.040$ , relative risk: 1.3 95% CI confidence interval: 1.0 to 1.6). An important additional effect was a reduction in the amount of pain experienced by mothers in the SSC group (Sharma et al., 2016). The limitations of this study are that it only uses four databases, and the language used only uses English articles.

### AUTHOR CONTRIBUTION

Mumpuni Intan Pertiwi as the main researcher who chose the topic, conducted a search for data collection in this study. Bhisma Murti and Uki Retno Budihastuti conducted data analysis and reviewed research documents.

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This study is self-funded.

### CONFLICT OF INTERESTS

There is no conflict of interest in this study.

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