

Skin-to-skin Contact and Parental Distress among Parents with Preterm Infant during NICU Admission: A Review

Hikmi Muharromah Pratiwi¹ ✉, Desiyani Nani²

^{1,2} Jurusan Keperawatan, Fakultas Ilmu-Ilmu Kesehatan, Universitas Jenderal Soedirman

ABSTRACT

Background: Psychological distress of parents with preterm infant also could be treated appropriately by enhancing parent's involvement in infant care, including skin-to-skin contact. A few of studies related to skin-to-skin contact have revealed can benefit from infant and parental outcomes. The previous review only explored the distress among parents with healthy infant. The effect skin-to-skin contact among parents with preterm infant is necessary to be investigated.

Objective: This article provided a review related to effect of skin-to-skin contact toward parent stress during preterm infant's hospitalization in NICU.

Methods: A literature review was performed by searching of trials using PubMed, Cochrane Library, MEDLINE, and CINAHL and published in English from 2012 to 2022, English-published, full text availability related to skin-to-skin contact, or Kangaroo Mother Care, preterm infants, and parental distress (mother and/or father) in NICU.

Result: This study involved six trials and 489 parents with preterm infant. Fours studies explored maternal stress and the others assessed parental stress during NICU admission. Five trials reported parental stress deflation after skin-to-skin contact with their infants, otherwise one trial revealed that skin-to-skin contact escalated parental stress due to a more facilitated infant progression.

Conclusion: Skin-to-skin contact benefits parents with preterm infants by decreasing the psychological distress during NICU admission.

KEYWORDS

NICU;
 Neurodevelopmental
 Care, Parental distress;
 Premature Infant; Skin-to-
 Skin Contact

BACKGROUND

Preterm birth remains as the multiproblematic life event. It not only can affect the newborn, but also can impact the family especially parents in the short-and long-term, including in psychological distress in postpartum periods (Ionio et al., 2016). Parents with preterm infant have higher vulnerable to be distressed compared to mother with full-term baby, especially during hospitalization in Neonatal Intensive Care Unit. A previous study has been conducted to examine the stress level and depressive symptoms of mother in NICU shown that fifty-two percent of mothers experienced increased stress and 38% had significant depressive symptoms (Alkozei, McMahon, and Lahav, 2014).

Psychological distress of parent with preterm baby during hospitalization can result in negative consequences to the infant's temperament (McGrath, Records, and Rice, 2008), physiological outcome including infant's stress response system (Elverson et al., 2012) and

even the parent and infant interaction in NICU (Cho, Holditch-Davis, and Miles, 2007, Korja et al., 2008). The majority interventions toward parent stress focus on emotions and active problem-solving including teach relaxation and coping mechanism to normalise their experience, as well as their emotional and practical support (Jotzo and Poets, 2005). Otherwise, Psychological distress of parent with preterm baby also could be treated appropriately by enhancing parent's involvement in infant care (Craig et al., 2015). During hospitalization in NICU, parents are provided many interventions that can encourage their participation and involvement in infant care including skin-to-skin contact program or Kangaroo mother care (KMC) that are part of developmental care (Ramachandran and Dutta, 2013).

However, majority of studies related to the developmental care particularly skin-to-skin intervention have revealed can benefit from infant outcome, rather than parental outcomes. For instance, Eveneklian and Posmontier (2017)

have reviewed systematically about the effect of Kangaroo Care toward premature infant weight gain. They stated that kangaroo care is one of the low-tech and low-cost intervention that can increase preterm weight gain, even in low-resource setting (Evereklian and Posmontier, 2017). Other studies also examined the kangaroo mother care toward repeated procedural pain in preterm infants by randomized control trial (Gao et al., 2015) and has been reviewed systematically that skin-to-skin contact can reduce pain level after intramuscular injection and during recovery (Disher et al., 2017). Previous meta-analysis study have shown that KMC can decrease the risk of neonatal sepsis, risk of hypothermia and hypoglycemia, decrease hospital readmission and increase the exclusive breastfeeding (Boundy et al., 2016).

In addition, only few studies examine the effect of skin-to-skin contact toward their preterm infant. Previous systematic review only focus on parent mood in the healthy infant (Moore et al., 2016). Athanasoupoulou and Fox (2014) have reviewed the trials related to the effect Kangaroo Mother Care and maternal mood until 2012. Therefore, this article may provide a recent review of some trials related to effect of skin-to-skin contact toward parent stress during preterm infant's hospitalization in NICU.

METHODS

The articles searched from PsycINFO (EBSCO), CINAHL, Cochrane Library, Pubmed, Medline were searched using the following MeSH (medical subject heading) term includes parent or mother or father, preterm infant or premature babies or neonatal prematurity, Neonatal intensive Care Unit or NICU or neonatology Unit (Table 1). For skin-to-skin contact, some keywords applied such as skin to skin contact, kangaroo mother Care, KMC or kangaroo holding. For initial search, the inclusion criteria of the articles are English-published, full text availability, have been published from 2012 to 2022. The first searching used keyword "skin-to-skin contact" and "psychological distress". All

potentially relevant titles and abstracts were retrieved and assessed independently for eligibility. The result of initial search are Pubmed (n=345), CINAHL (n=12), Cochrane (n=38), Medline (n=32), PsycInfo (n=147). After using initial keyword and initial search criteria, the duplicated articles were remove (n=77) by using Endnote software.

After finding the trials, the studies have been further selected involving the inclusion criteria including; (1) the participants were parents (mothers and/or fathers) with preterm infant (less than 37 weeks gestational age); (2) the intervention aimed to alleviate psychological distress of parent that measured by standardized instruments (BDI-II, PSS:NICU, PSQ, and others), (c) onset intervention: during hospitalization in NICU, (d) the study design are randomized control trial (RCT) and/or quasi-experimental study in which the intervention program was compared with routine care or non-intervention control group.

After finding the trials, the studies have been further selected involving the inclusion criteria including; (1) the participants were parents (mothers and/or fathers) with preterm infant (less than 37 weeks gestational age); (2) the intervention aimed to alleviate psychological distress of parent that measured by standardized instruments (BDI-II, PSS:NICU, PSQ, and others), (c) onset intervention: during hospitalization in NICU, (d) the study design are randomized control trial (RCT) and/or quasi-experimental study in which the intervention program was compared with routine care or non-intervention control group.

RESULT AND DISCUSSION

This study finally found six articles that meet inclusion criteria including 4 RCTs and 2 quasy studies. Total parents were recruited are 486 parents (mothers and/or fathers) with preterm infants. Most studies examine parental stress to the mothers (n=4), parents (n=1), and fathers (n = 1). Four of six studies reported that skin-to-skin contact have significant effect to parental distress

reduction (Chen et al., 2022; Cho et al., 2016; Wang et al., 2020). However, two articles stated that skin-to-skin contact have no significant effect toward parental distress (Mörelus, et al., 2014; Samra et al., 2015). (See Table 2)

Most studies carried out the skin-to-skin contact on Premature infants with >33 weeks of gestational age. Duration of skin-to-skin contact in all studies minimum 60 minutes a day. In addition, all studies reported no adverse effect of Kangaroo Mother Care or SSC. However, there were 2 studies have unpowerful samples because of high-attrition rate (> 20%) (Mörelus, et al., 2014; Samra et al., 2015).

Responden Characteristic

The majority studies have shown significant difference in parental distress after skin-to-skin contact. A systematic review has shown positive effect of skin-to-skin contact with effect size of SSC is - 0.49 (Feldman et al., 2002), it means that SSC can decrease psychological distress of parent in medium effect. Moreover, Tallandi et al (2006) found that SSC significantly decreased the parental stress with the p value <0.0000, ES = 6.88.

Decreased parental stress especially in mother after skin-to-skin contact is due to parent have more time to contact with their babies, adapt with NICU environment, have better communication with health care team, and monitor more closely their infant during skin-to-skin contact (Cho et al., 2016). During KMC, parents and their baby can contact intimate and communicate with eyes and words continuously. In addition, skin-to-skin contact give mother to touch and hug their baby, and this feeling is extremely real. It not only reduces parental stress and negative emotion, but also increases positive parent-child relationship (Ionio et al., 2021; Kuo et al., 2022).

Also, medical team can provide education and guidance of effective breastfeeding during skin-to-skin contact. Health care team listen parent's feeling and emotional needs, give and answer information related premature infant care

while doing skin-to-skin contact. These become as parents' support that can guide parent adapt into their new role, give comfort, and trust, prevent parent self-blaming, and provide reassurance (Bry and Wigert, 2019; Verbiest et al., 2016). Moreover, Johnson (2007) interviewed a group of 18 primiparous mothers who experienced 60 minutes of SSC with their preterm infants three times in the first two weeks post-birth. These infants were either receiving ventilator support or oxygen therapy. After SSC, mothers expressed their feelings as "heart-warming," "being needed," and "having confidence in knowing" how to care for her infant. It may indicate that skin-to-skin contact can reduce parental distress.

This finding also was supported by physiological parameter reduction of parental stress after undergoing skin-to-skin contact. Parental distress can be measured by physiological measures including enzyme or hormonal status inside the body. Skin to skin contact is associated with lower cortisol level in parents' salivary and higher oxytocin hormone activated and released (Mirnia et al., 2017; Morelius et al., 2015; Scatliffe et al., 2019; Vitnerr et al., 2018). Beside that, after skin-to-skin contact, parental heart rate and blood pressure become lower (Butruille et al., 2017; Kommers et al., 2017). Those all parameters indicate as the lower stress level of parent after SSC intervention.

There were two studies show no significant effect of skin-to-skin contact toward parental stress (Samra et al., 2015; Mörelus, et al., 2014). This this might happen because insufficient duration and frequency of SSC. Samra et al (2015) conducted skin-to-skin contact in each session less than 1 hour with 3times a week, while standardized Kangaroo Mother Care or skin-to-skin contact is at least 1 hour in every day for 14 days (Miles et al., 2006). In Addition, high attrition rate in both studies also might contribute to no significant effect of skin-to skin contact. High attrition rate caused unpowerfull sample that contribute to no significant result. It might be

caused by long period of follow-up and unexpected of physical condition of preterm infant. For instance, Mörelius, et al (2014) conducted a follow-up at 1 and 4 months of corrected age of preterm infant, so it can high possibility for parents to get droup out from the intervention. Samra et al (2015) reported that 20% of preterm infant was droup out because of complex psycosocial issue and unexpected of physical condition of preterm infant.

There was no side effect of skin-to-skin contact that reported in studies. During skin-to-skin contact, neonatal cardiorespiratory was reported remain stable (Gupta et al., 2021). Skin-to-skin contact also maintains infants' oxygen saturation and heartbeat in normal range. (Ludington-Hoe et al). Skin-to-skin contact is the safe and low-cost intervention because no negative responses that were found and no need much money to carry out the procedure (Boundy et al., 2016). However, the majority in this study performed skin-to-skin contact with infants with late preterm births (>33 weeks of GA), so further research is needed on the effect of skin-to-skin on extremely preterm babies.

It should be fixed firstly about the protocol for KMC or SSC, especially determining characteristics of infant and parent that might be most beneficial for premature baby, infant and parent preparation and the supportive environment during KMC or SSC. Also, implementation of the SSC and KMC need some considerations including the duration and the amount of SSC (from minutes to hours and from once a day to several times a day), continuous starting immediately after birth or not.

A clinical guideline of Kangaroo Care or skin-to-skin contact for preterm infant has been provided to guide the health care provider. Ideally, the clinical guideline consisted of the assessment (infant readiness, parent readiness, institutional readiness), transfer position, kangaroo care position, monitoring vital sign during sin-to-skin contact (Ludington-Hoe et al., 2008). Infant's stable heart rate, respiratory rate, good oxygen saturation, normo-thermal, normal

activity for his/her gestational age can be as signals of infant readiness to KMC or SSC. Parent readiness for KMC or SSC includes parental willingness and parental emotional readiness, maternal feeding intension and maternal health. Physical resources (space, chair with foot support, gown, etc.), human resources (trained nurses), educational resources (video or leaflet about SSC or KMC) also can support the readiness of hospital to facilitate the KMC or SSC. Transfer position also should be considered in KMC procedure whether standing position or intubated infant to the parent's chest ad cover the babies with the warn blanket. KMC can be provided at least 1 hour every day for 14 day by accompanied with monitoring vital sign of preterm infant every 30 minutes and as needed (Vanderbilt, 2007).

The majority studies did not report any risk or harmful effect from KMC or SSC. This practice is safe and low-cost intervention (Boundy et al., 2106). To support the positive effect of skin-to-skin contact between parent and their infant, the Kangaroo mother care or skin-to-skin contact can be combined with another intervention, such as music therapy during KMC or skin-to-skin contact. Lai et al (2006) involved 30 mothers-preterm infant dyads to skin-to-skin contact with 3 types of lullaby music played for 3 days resulting significant lower anxiety score at 3 days after combination KMC and music therapy. Those condition may create the relax environment and emotional feeling during the SSC by reducing the neuroendocrine and sympathetic nerves system that resulting in decrease anxiety, heart rate, and RR (Lai et al., 2006).

CONCLUSION

Skin-to-Skin contact benefits to parents in stress reduction during NICU admission. Implementation of skin-to skin contact need some considerations inculding the infant and parent preparation, duration, and frequency of skin-to-skin contact, and suppotive environment during SSC. Further studies are needed that focus

on skin-to-skin contact to preterm infants of varying gestations. Need review to other mother's mood such as Depression and anxiety, or physiological stress parameter.

REFERENCES

- Alkozei, A., McMahon, E. and Lahav, A., 2014. Stress levels and depressive symptoms in NICU mothers in the early postpartum period. *The Journal of Maternal-Fetal & Neonatal Medicine*, 27(17), pp.1738-1743. doi:10.3109/14767058.2014.942626
- Akl, E.A., Briel, M., You, J.J., Sun, X., Johnston, B.C., Busse, J.W., Mulla, S., Lamontagne, F., Bassler, D., Vera, C. and Alshurafa, M., 2012. Potential impact on estimated treatment effects of information lost to follow-up in randomised controlled trials (LOST-IT): systematic review. *Bmj*, 344. doi:10.1136/bmj.e2809
- Athanasopoulou, E. and Fox, J.R., 2014. Effects of kangaroo mother care on maternal mood and interaction patterns between parents and their preterm, low birth weight infants: a systematic review. *Infant mental health journal*, 35(3), pp.245-262. doi:10.1002/imhj.21444
- Boundy, E.O., Dastjerdi, R., Spiegelman, D., Fawzi, W.W., Missmer, S.A., Lieberman, E., Kajeepeta, S., Wall, S. and Chan, G.J., 2016. Kangaroo mother care and neonatal outcomes: a meta-analysis. *Pediatrics*, 137(1). doi:10.1542/peds.2015-2238
- Bry, A. and Wigert, H., 2019. Psychosocial support for parents of extremely preterm infants in neonatal intensive care: a qualitative interview study. *BMC psychology*, 7, pp.1-12. doi:10.1186/s40359-019-0354-4
- Butruille, L., Blouin, A., De Jonckheere, J., Mur, S., Margez, T., Rakza, T. and Storme, L., 2017. Impact of skin-to-skin contact on the autonomic nervous system in the preterm infant and his mother. *Infant Behavior and Development*, 49, pp.83-86. doi:10.1016/j.infbeh.2017.07.003
- Cho, E.S., Kim, S.J., Kwon, M.S., Cho, H., Kim, E.H., Jun, E.M. and Lee, S., 2016. The effects of kangaroo care in the neonatal intensive care unit on the physiological functions of preterm infants, maternal-infant attachment, and maternal stress. *Journal of pediatric nursing*, 31(4), pp.430-438. doi:10.1016/j.pedn.2016.02.007
- Craig, J.W., Glick, C., Phillips, R., Hall, S.L., Smith, J. and Browne, J., 2015. Recommendations for involving the family in developmental care of the NICU baby. *Journal of Perinatology*, 35(1), pp. S5-S8. doi:10.1038/jp.2015.142
- Disher, T., Benoit, B., Johnston, C. and Campbell-Yeo, M., 2017. Skin-to-skin contact for procedural pain in neonates: Acceptability of novel systematic review synthesis methods and GRADEing of the evidence. *Journal of Advanced Nursing*, 73(2), pp.504-519. doi:10.1111/jan.13182
- Elverson, C.A., Wilson, M.E., Hertzog, M.A. and French, J.A., 2012. Social regulation of the stress response in the transitional newborn: A pilot study. *Journal of Pediatric Nursing*, 27(3), pp.214-224. doi:10.1016/j.pedn.2011.01.029
- Evereklian, M. and Posmontier, B., 2017. The impact of kangaroo care on premature infant weight gain. *Journal of pediatric nursing*, 34, pp.e10-e16. doi:10.1016/j.pedn.2017.02.006
- Feldman, R., Eidelman, A.I., Sirota, L. and Weller, A., 2002. Comparison of skin-to-skin (kangaroo) and traditional care: parenting outcomes and preterm infant development. *Pediatrics*, 110(1), pp.16-26. doi:10.1542/peds.110.1.16
- Gao, H., Xu, G., Gao, H., Dong, R., Fu, H., Wang, D., Zhang, H. and Zhang, H., 2015. Effect of repeated Kangaroo Mother Care on repeated procedural pain in preterm infants: A randomized controlled trial. *International journal of nursing studies*, 52(7), pp.1157-

1165. doi: 10.1016/j.ijnurstu.2015.04.006
- Gupta, N., Deierl, A., Hills, E. and Banerjee, J., 2021. Systematic review confirmed the benefits of early skin-to-skin contact but highlighted lack of studies on very and extremely preterm infants. *Acta paediatrica*, 110(8), pp.2310-2315. doi:10.1111/apa.15913
- Ionio, C., Ciuffo, G. and Landoni, M., 2021. Parent–infant skin-to-skin contact and stress regulation: A systematic review of the literature. *International journal of environmental research and public health*, 18(9), p.4695. doi:10.3390/ijerph18094695
- Ionio, C., Colombo, C., Brazzoduro, V., Mascheroni, E., Confalonieri, E., Castoldi, F. and Lista, G., 2016. Mothers and fathers in NICU: the impact of preterm birth on parental distress. *Europe's journal of psychology*, 12(4), p.604. doi:10.5964/ejop.v12i4.1093
- Kommers, D.R., Joshi, R., van Pul, C., Atallah, L., Feijs, L., Oei, G., Oetomo, S.B. and Andriessen, P., 2017. Features of heart rate variability capture regulatory changes during kangaroo care in preterm infants. *The journal of pediatrics*, 182, pp.92-98. doi: 10.1016/j.jpeds.2016.11.059
- Korja, R., Savonlahti, E., Ahlqvist-Björkroth, S., Stolt, S., Haataja, L., Lapinleimu, H., Piha, J., Lehtonen, L. and PIPARI Study Group, 2008. Maternal depression is associated with mother–infant interaction in preterm infants. *Acta Paediatrica*, 97(6), pp.724-730. doi:10.1111/j.1651-2227.2008.00733.x
- Kuo, S.F., Chen, I.H., Chen, S.R., Chen, K.H., Fernandez, R.S., Dowling, D., Schierholz, E. and Parker, L., 2022. The Effect of Paternal Skin-to-Skin Care: A Systematic Review and Meta-analysis of Randomized Control Trials. *Advances in Neonatal Care*, 22(1), pp.E22-E32. doi:10.1097/ANC.0000000000000890
- Lai, H.L., Chen, C.J., Peng, T.C., Chang, F.M., Hsieh, M.L., Huang, H.Y. and Chang, S.C., 2006. Randomized controlled trial of music during kangaroo care on maternal state anxiety and preterm infants' responses. *International journal of nursing studies*, 43(2), pp.139-146. doi:10.1016/j.ijnurstu.2005.04.008
- Ludington-Hoe, S.M., Morgan, K. and Abouelfetoh, A., 2008. A clinical guideline for implementation of kangaroo care with premature infants of 30 or more weeks' postmenstrual age. *Advances in Neonatal Care*, 8(3), pp.S3-S23. doi: 10.1097/01.ANC.0000324330.25734.b6
- McGrath, J.M., Records, K. and Rice, M., 2008. Maternal depression and infant temperament characteristics. *Infant behavior and development*, 31(1), pp.71-80. doi: 10.1016/j.infbeh.2007.07.001
- Miles, R., Cowan, F., Glover, V., Stevenson, J. and Modi, N., 2006. A controlled trial of skin-to-skin contact in extremely preterm infants. *Early human development*, 82(7), pp.447-455. doi:10.1016/j.earlhumdev.2005.11.008
- Mirnia, K., Bostanabad, M.A., Asadollahi, M. and Razzaghi, M.H., 2017. Paternal skin-to-skin care and its effect on cortisol levels of the infants. *Iranian Journal of Pediatrics*, 27(1). doi:10.5812/ijp.8151
- Moore, E.R., Bergman, N., Anderson, G.C. and Medley, N., 2016. Early skin-to-skin contact for mothers and their healthy newborn infants. *Cochrane database of systematic Reviews*, (11). doi: 10.1002/14651858.CD003519.pub4
- Mörelus, E., Örténstrand, A., Theodorsson, E. and Frostell, A., 2015. A randomised trial of continuous skin-to-skin contact after preterm birth and the effects on salivary cortisol, parental stress, depression, and breastfeeding. *Early human development*, 91(1), pp.63-70. doi: 10.1016/j.earlhumdev.2014.12.005
- Ramachandran, S. and Dutta, S., 2013. Early developmental care interventions of preterm very low birth weight infants. *Indian*

- pediatrics*, 50, pp.765-770. Doi: 10.1007/s13312-013-0221-y
- Samra, H.A., Dutcher, J., McGrath, J.M., Foster, M., Klein, L., Djira, G., Hansen, J., Wallenburg, D. and Dowling, D., 2015. Effect of skin-to-skin holding on stress in mothers of late-preterm infants. *Advances in neonatal care*, 15(5), pp.354-364. doi:10.1097/ANC.0000000000000223
- Scatliffe, N., Casavant, S., Vittner, D. and Cong, X., 2019. Oxytocin and early parent-infant interactions: A systematic review. *International journal of nursing sciences*, 6(4), pp.445-453. doi:10.1016/j.ijnss.2019.09.009
- Tallandini, M.A. and Scalembra, C., 2006. Kangaroo mother care and mother-premature infant dyadic interaction. *Infant mental health journal*, 27(3), pp.251-275. doi:10.1002/imhj.20091
- Vanderbilt, D., Wang, C.J. and Parker, S., 2007. The do's in premie neurodevelopment. *Contemporary Pediatrics*, 24(9), pp.84-93.
- Verbiest, S., Bonzon, E. and Handler, A., 2016. Postpartum health and wellness: A call for quality woman-centered care. *Maternal and child health journal*, 20, pp.1-7. doi:10.1007/s10995-016-2188-5
- Vittner, D., McGrath, J., Robinson, J., Lawhon, G., Cusson, R., Eisenfeld, L., Walsh, S., Young, E. and Cong, X., 2018. Increase in oxytocin from skin-to-skin contact enhances development of parent-infant relationship. *Biological research for nursing*, 20(1), pp.54-62. doi:10.1177/1099800417735633
- Wang, F., Li, Y., Li, S., Liu, Y., Sun, C. and Hu, Y., 2020. Effects of kangaroo mother care on anxiety and parenting stress in premature mothers. *Chinese Journal of Behavioral Medicine and Brain Science*, pp.74-78.

Tabel 1. Keywords based on MeSH for searching methods.

Clinical question	MeSH
Parents with preterm baby during hospitalization in NICU	Parent OR mother OR father; preterm infant OR premature babies OR neonatal prematurity; Neonatal intensive Care Unit OR NICU OR neonatology Unit
Skin-to skin contact	Skin-to-skin contact OR skin to skin contact OR Kangaroo mother Care OR KMC OR kangaroo holding OR Kangaroo Care
no skin-to-skin contact/ routine care	routine care
Stress level	Psychological distress, or Stress level, or parental distress
RCT, quasi-experimental study	RCT, quasi-experimental study, randomized study

Table 2. Data extraction

Author	N (total)	IG (n)	CG (n)	GA	Protocol	Follow up	Measurement	Major finding	AR
Salmani & Champiri (2016) Iran	25 dyads	25	-	< 37 week's GA	60 min every day over two weeks after feeding the infants and changing their diaper	none	Parental Stress Scale Neonatal Intensive Care Unit (PSS-NICU)	122.64±11.00 before the intervention and 90.72±13.04 after the intervention (p<0.001)	0%
Mörelis et al (2014) (Sweden)	Beginning: N = 42 → N=32 (final follow up)	17	15	32-36 weeks	Procedure: no detail information	1 month of CA and 4 months of CA	The Swedish Parenthood Stress Questionnaire	Parental stress: <u>1 months:</u> Mother: IG vs CG = n.s Father: IG vs CG = n.s <u>4 months:</u> Mother: IG vs CG →n.s Father: IG vs CG →n.s	24%
Samra et al (2015) (United Stated)	N total =40 → final follow up= 30 dyad	19	11	34 -36 weeks's GA	IC: min 50 min in 3x/week during NICU stay CG: wrapped baby+ hold for 50 min in 3x/week	At before discharge	PSS NICU	mean±SD PSS-NICU: (pre-test): IG (2.34 ± 0.86) and CG (2.94 ± 0.87) → n.s post-intervention= IG (2.55 ± 0.95) and CG (2.78 ± 0.90) → n.s	25%
Cho et al (2016), Korea	40	20	20	corrected gestational ages of ≥33 weeks	kangaroo care was provided in 30-min. sessions conducted thrice a week for a total of 10 times	none	Parental Stress Scale (Miles et al., 1993)	lower maternal stress scores (F = 47.320, p < .001) IG = Pre= 4.67 ± 0.30 Post = 3.76 ± 0.23 CG Pre = 4.49 ± 0.30 post =4.40 ± 0.33	0%

Chen et al (2022) China	132	63	63	premature infants at 28–34 weeks of gestation	performed between 9:00 and 12:00 every morning, 1 h each time, three times a week, for four consecutive weeks.	none	the Symptom Check List 90 (SCL-90)	the total SCL-90 score and factor scores such as coercion, interpersonal relationships, depression, anxiety, hostility and additional factors, were lower in the experimental group than those in the control group ($P < 0.05$).	4,5%
Wang et al (2022) China	230	114	116	> 33 week of gestational ages	2 hours per day of kangaroo mother care was performed from the 2 nd day incharge to discharge.	none	Parental Stress Scale Neonatal Intensive Care the 2 nd day and the 14 th day of hospitalization	In 2 nd day = no difference In day 14 th = were lower than those in the control group (first part (2.41±0.78) vs (3.81±0.73), second part (2.61±0.71) vs (3.14±0.83), third part (2.75±0.86) vs (3.57±1.06), fourth part (2.49±0.80) vs (3.35±0.94))($P < 0.01$).	0%

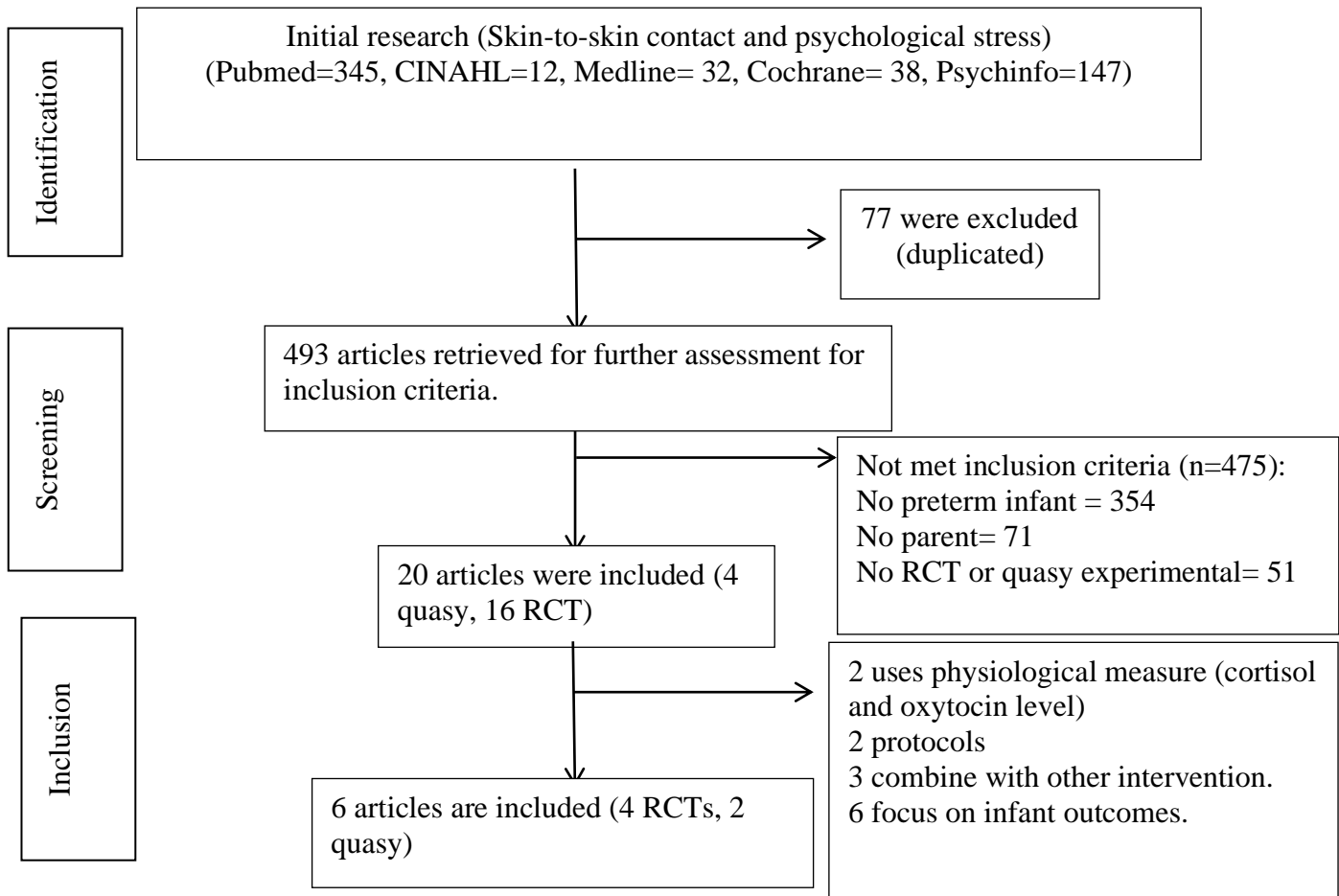


Figure 1. PRISMA Flow Diagram