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REVIEW ARTICLE

Kangaroo Mother Care and skin-to-skin contact can impact maternal postpartum depression: a narrative review

O Método Canguru e o contato pele a pele podem impactar a depressão pós-parto materna: uma revisão narrativa

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ABSTRACT

Introduction: Postpartum Depression (PPD) is a severe mood disorder that compromises global maternal-infant health. This narrative review examines the role of Skin-to-Skin Contact (SSC) and Kangaroo Mother Care (KMC), a structured care model, as promising strategies to mitigate depressive symptoms. **Methods:** A literature search was conducted in scientific databases (PubMed, Scopus, Google Scholar, and SciELO) to identify studies investigating the relationship between these interventions and maternal mental health. **Results:** A favorable trend toward the reduction of PPD scores was observed in mothers who practiced SSC and KMC. The positive effect proved to be more robust in the context of KMC applied to preterm and low-birth-weight newborns (NBs), suggesting that the comprehensive nature of this method enhances its benefits. **Discussion:** The positive impact of these interventions is based on biopsychosocial mechanisms, notably the regulation of the oxytocin-cortisol axis and the strengthening of the mother-NB bond. Although methodological heterogeneity limits definitive recommendations, the low cost and safety of these strategies justify their promotion as a standard of care.

Keywords: Kangaroo mother care; Skin-to-skin contact; Postpartum depression; Maternal mental health; Oxytocin.

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RESUMO

Introdução: A Depressão Pós-Parto (DPP) é um transtorno de humor grave que compromete a saúde materno-infantil global. Esta revisão narrativa examina o papel do Contato Pele a Pele (CPP) e do Método Canguru (MC), um modelo assistencial estruturado, como estratégias promissoras para mitigar sintomas depressivos. **Métodos:** Realizou-se uma pesquisa bibliográfica em bases de dados científicas (PubMed, Scopus, Google Scholar e SciELO) para identificar estudos que investigassem a relação entre essas intervenções e a saúde mental materna. **Resultados:** Observou-se uma tendência favorável à redução dos escores de DPP em mães que praticavam CPP e MC. O efeito positivo demonstrou-se mais robusto no contexto do MC aplicado a recém-nascidos (RNs) prematuros e de baixo peso, sugerindo que a natureza abrangente deste método potencializa os benefícios. **Discussão:** O impacto positivo dessas intervenções baseia-se em mecanismos biopsicossociais, notadamente na regulação do eixo ocitocina-cortisol e no fortalecimento do vínculo mãe-RN. Embora a heterogeneidade metodológica limite recomendações definitivas, o baixo custo e a segurança dessas estratégias justificam sua promoção como padrão de cuidado.

Palavras-chave: Método canguru; Contato pele a pele; Depressão pós-parto; Saúde mental materna; Ocitocina.

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Introduction

Postpartum depression (PPD) is a condition that affects approximately 10 to 17% of women during the postpartum period worldwide, and this percentage can reach 40% in low-income countries[1]. PPD is a potentially severe mood disorder characterized by persistent sadness, loss of interest, sleep and eating disturbances, anxiety, irritability, low self-esteem, self-blame and, in the most severe cases, even suicide or homicidal ideation[2]. PPD is associated with many adverse perinatal outcomes, including health problems related to the newborn (NB), such as abnormal growth and development, sleep disturbances, and cognitive impairment, as well as impairments in maternal evolution during the puerperium (such as breastfeeding, mother-NB bonding, and NB care), maternal quality of life, and social and marital relationships[3]. Moreover, PPD also has an economic impact on families, employers, health insurers, and governments. This condition is associated with a greater dependence on public assistance programs, an overload on health systems for both mothers and children, and a decline in maternal income and productivity[4].

In recent decades, several strategies have been proposed to prevent and treat PPD. First, it is crucial to identify women at higher risk of developing PPD. In 2019, The U.S. Preventive Services Task Force (USPSTF) recommended that all pregnant and postpartum women be screened for depression, and those at increased risk should be referred for counseling interventions[5]. This includes women with a history of PPD or psychiatric illness, a negative birth experience, a lack of social support, and those living in fragile social contexts (experiencing violence, abuse, or low socioeconomic status)[6]. Regarding the prevention of PPD, there has been increased interest in strategies that focus on the mother-NB bond, such as Kangaroo Mother Care (KMC) and skin-to-skin contact (SSC).

KMC was developed empirically in the late 1970s in Bogotá, Colombia, by Edgar Rey and Hector Martinez[7]. Initially, it was a response to high mortality rates among preterm NBs, with its essential practice inspired by the way kangaroos carry their young. It involves placing the naked NB in continuous skin-to-skin contact on the mother's bare chest[8]. Although the definition of KMC presents some heterogeneity, it is currently understood as a comprehensive set of interventions that encompasses not only SSC but also parental education, exclusive breastfeeding, early hospital discharge, and rigorous follow-up of preterm and/or low-birth-weight infants. Recognized as a public health policy since the early 2000s by the Brazilian Ministry of Health[9], the KMC program was primarily targeted at preterm NBs; however, its essential component, SSC, is highly recommended for all infants, regardless of gestational age at birth[10-12].

Thus, it is of paramount importance to differentiate between the two concepts. While SSC refers strictly to the placement of the naked NB on the maternal or paternal chest for a variable duration, KMC constitutes a structured neonatal care model that involves, in addition to SSC, pillars such as the promotion of breastfeeding, parental education, and assisted hospital discharge. KMC and SSC are strongly associated with a range of favorable perinatal outcomes, including decreased neonatal mortality, reduced incidence of neonatal sepsis, hypothermia, and hypoglycemia, and lower rates of hospital readmission[13,14]. Furthermore, KMC and SSC have been shown to increase rates of breastfeeding and exclusive breastfeeding, reduce the risk of moderate-to-severe PPD symptoms, decrease maternal stress and anxiety levels, and improve the mother-infant bond[13,14]. Both approaches are low-cost, feasible, and accessible.

Therefore, the objective of this narrative review is to survey the literature on the potential role of KMC and SSC in reducing maternal PPD. This review also aimed to summarize current evidence, explore potential underlying mechanisms, and identify gaps for future research.

Methods

This narrative review utilized a comprehensive and non-systematic bibliographic search to explore the association between KMC, SSC, and postpartum depression. The search was performed across four databases (PubMed, Scopus, Google Scholar, and SciELO) using a combination of the following keywords: 'kangaroo mother care', 'skin-to-skin contact', 'depression', and 'postpartum depression'. To ensure objectivity, articles were first screened based on their titles and abstracts, and relevant data were then independently selected and extracted by two authors.

Current evidence on KMC/SSC and PPD

Data regarding the most recent evidence from original research studies on KMC, SSC, and PPD are presented in Table 1[15-30].

As demonstrated in Table 1, the scientific literature is not unanimous regarding the impact of KMC/SSC on reducing PPD in mothers, most likely because the studies present very distinct scenarios, interventions, and populations.

Table 1. Summary of research articles on Kangaroo Mother Care (KMC) or Skin-to-Skin Contact (SSC) and Postpartum Depression (PPD).

Author/year	Population	Intervention	Main findings
Ahn (2010)[15]	20 mothers (10 KMC group; 10 control) of preterm NBs (<36 weeks)	Not detailed	After three weeks of KMC, both groups showed a decline in depression scores, but the difference was not statistically significant. However, KMC mothers showed significantly higher attachment scores compared to control.
Alencar (2008)[16]	177 mothers of preterm NBs (BW <2000g)	KMC started with stable NBs after NICU discharge; SSC using a special wrap as often as possible, day and night (min. 1–2h sessions).	PPD rate dropped significantly from 37.3% at NICU admission to 16.9% at discharge (p<0.001); no new cases of PPD developed during the KMC program.
Bigelow (2012)[17]	90 mothers (30 SSC group; 60 control) of term NBs (>37 weeks)	6 cumulative hours of SSC/day during the 1st week; 2 hours/day until the NB reached one month of age.	SSC group had significantly lower depression scores after one week and a greater reduction in cortisol levels over the first month compared to control (p<0.001).
Bigelow (2014)[18]	77 mothers (26 SSC group; 51 control) of term NBs (>37 weeks)	6 cumulative hours of SSC/day during the 1st week; 2 hours/day until the NB reached one month of age.	SSC group had significantly lower depression scores at the one-week visit compared to control (p=0.029).
Cañadas (2022)[19]	112 mothers (56 KMC group; 56 control) of preterm NBs (GA 28–34 weeks)	KMC sessions of at least 90 min/day for 12 days.	KMC group showed significant improvement in PPD (p=0.02), lower cortisol levels, and better weight gain in NBs compared to control.
Chen (2022)[20]	126 mothers (63 KMC group; 63 control) of preterm NBs (GA 28–34 weeks)	1-hour KMC sessions every morning, 3x/week, for four consecutive weeks.	KMC group demonstrated significantly lower levels of depression compared to control after the intervention (p<0.001).

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Author/year	Population	Intervention	Main findings
Cho (2021)[21]	101 mothers of term NBs	KMC sessions for at least 1 hour/day for 14 days.	Mean maternal depression score showed a significant reduction (p<0.001). This decrease was directly associated with KMC duration: for every additional daily hour, depression scores decreased by 4.02 points on the EPDS.
Erduran (2023)[22]	60 mothers (30 KMC group; 30 control) of preterm NBs	Intermittent KMC for 30 min once daily for 10 days.	No statistically significant difference in PPD scores between experimental and control groups (p>0.05).
Feldman (2002)[23]	146 mothers (73 KMC group; 73 control) of preterm NBs	KMC sessions for at least 1 hour/day for at least 14 consecutive days.	At 37 weeks corrected age, KMC mothers reported significantly fewer depressive symptoms (p<0.05). Effect was stronger for mothers of low-risk NBs; no significant difference for high-risk NBs.
Kronborg (2025)[24]	2142 mothers and 1582 fathers of preterm or term NBs	Observational study measuring SSC duration performed by parents during the first 72h postpartum.	Higher SSC duration in the first 3 days was associated with reduced maternal depression symptoms (p=0.02). No effect found for fathers. For each additional hour of SSC, MDI score decreased by 0.04 (p=0.02).
Kucukkaya (2025)[25]	136 mothers (34 per group: control, half-swaddling only, KMC only, and combination) of term NBs	Two 30-min KMC sessions/ day for 6 months.	KMC interventions led to significant and sustained reduction in PPD scores at all follow-up points. Combined KMC and half-swaddling had the most pronounced effect.
Miles (2006)[26]	78 mothers (46 SSC group; 32 control) of extremely preterm NBs (<32 weeks)	20-min SSC sessions once daily for 4 weeks.	No significant difference in maternal depression symptoms between groups at any point, including discharge and 1-year follow-up.
Morelius (2015)[27]	37 families (18 SSC group; 19 control) of late preterm NBs (32–35 weeks)	SSC aimed for 24h/day; control group performed SSC as desired.	At 4 months corrected age, no significant differences in depressive symptoms were found between groups for either mothers or fathers.
Rao (2019)[28]	100 mothers (50 pre-KMC; 50 post-KMC) of preterm NBs	Minimum 4 hours of KMC daily for one week.	Total HADS score (anxiety and depression) was significantly lower after KMC (p=0.012). The mean depression subscale score also decreased, but without statistical significance.
Sinha (2021)[29]	1950 mothers (1047 intervention; 903 control) of LBW NBs	Community-initiated KMC (ciKMC), including SSC (avg. 12h/day) and exclusive breastfeeding, for up to 28 days.	Significant 25% reduction in risk of moderate-to-severe PPD symptoms in the ciKMC group compared to control.
Taneja (2020)[30]	552 mothers (276 intervention; 276 control)	Community-initiated KMC (ciKMC), including SSC (avg. 12h/day) and exclusive breastfeeding, for up to 28 days.	No significant effect of ciKMC on maternal depressive symptoms at either 6-week or 6-month follow-up.

Subtitle: BW = birth weight; ciKMC = community-initiated Kangaroo Mother Care; CPP = skin-to-skin contact; GA = gestational age; KMC = Kangaroo Mother Care; LBW = low birth weight; NB = newborn; NICU = Neonatal Intensive Care Unit; PPD = Postpartum Depression.

However, there appears to be an overall trend of reduced PPD scores in mothers subjected to these interventions, even in studies where the effect was not statistically significant.

Two studies stand out for showing a possible dose-response relationship in the implementation of KMC and the reduction of PPD scores. Cho and Jeong (2021)[21] attributed

that for each additional daily hour of KMC, depression decreased by 4.02 points on the Edinburgh Postnatal Depression Scale (EPDS), a validated tool for PPD screening. Similarly, Kronborg (2025)[24] found that for each additional hour of SSC, the maternal depression score decreased by 0.04 points (p=0.02). Furthermore, the association of KMC with other perinatal care methods has also been investigated. Kucukkaya et al. (2025)[25] detected a significant reduction in PPD scores in patients who combined half-swaddling with KMC, compared to groups that used KMC alone, half-swaddling alone, and the control group.

The analysis of systematic reviews shows a scenario of uncertainty regarding the impact of these perinatal interventions on reducing PPD. For SSC, the evidence is particularly weak. One systematic review that included full-term NBs submitted to SSC did not find a clear effect on PPD[31], while another study with preterm NBs reported a small protective effect, but likely with minimal clinical relevance[32]. In contrast, KMC presents more promising, albeit conflicting, results. A large systematic review conducted by Pathak et al. (2023)[14] including more than 7,700 preterm or low-birth-weight NBs, concluded with high certainty that KMC substantially reduced maternal PPD symptoms. However, this finding is complemented by the systematic review by Anwar et al. (2023)[33] performed with preterm and low-birth-weight NBs, which, despite observing a moderate reduction in overall depression scores, found no significant difference between groups when using the EPDS. Methodological differences between studies may limit definitive conclusions, highlighting the need for more uniform research.

Given these results, it is essential to explore the biological and psychological mechanisms that may explain the potential beneficial effect of KMC and SSC on PPD.

Potential mechanisms of PPD reduction in KMC and SSC

There are several hypotheses regarding the role of KMC and SSC in reducing maternal PPD. One of the primary hypotheses involves changes in hormonal pathways linked to KMC and SSC, especially associated with oxytocin and cortisol. During SSC, higher maternal oxytocin levels have been associated with lower levels of ACTH and cortisol, which may reduce PPD rates[34-39]. In this context, Handlin et al. (2009)[36] demonstrated that the duration of skin-to-skin contact before breastfeeding is inversely associated with maternal plasma cortisol levels. This regulatory effect is corroborated by the systematic review of Schneider-Schmid et al. (2025)[39] which confirmed a consistent increase in oxytocin levels in parents of preterm newborns in response to bonding interventions, suggesting an anxiolytic and stress-reducing effect that favors maternal mental health. Furthermore, studies with preterm NBs have found that SSC increased salivary and plasma levels of oxytocin while decreasing cortisol in both parents and infants. These hormonal changes are believed to promote parental involvement and strengthen the relationship between parents and infants[40-43].

Oxytocin is a peptide hormone produced in the hypothalamus and released by the pituitary gland, widely known for its role in uterine contraction and lactation. Although its synthetic form has been used to induce labor, endogenous oxytocin has evolved over millions of years to become essential for mammalian sociality, strengthening the mother-infant bond by promoting safety, resilience, and emotional stability[44,45]. The release of oxytocin during SSC is driven by the activation of low-threshold mechanoreceptors. These receptors respond to gentle stroking and light pressure, exciting unmyelinated C-tactile afferent fibers, a specific type of cutaneous nerve[39]. This neural response is considered the fundamental pathway for oxytocin release in these therapies. Given its central role in bonding and emotional regulation, the involvement of oxytocin in PPD has been widely investigated.

Systematic reviews have demonstrated that the use of exogenous oxytocin in reducing or preventing PPD remains uncertain and controversial. However, there appears to be a trend toward an inverse relationship between plasma oxytocin levels and depressive symptoms[46,47]. The precise mechanism of oxytocin's effect on reducing depression has not yet been fully elucidated. Nevertheless, oxytocin may act through multiple pathways, promoting neuroplasticity, regulating key neurotransmitters such as serotonin and dopamine, reducing chronic stress via the hypothalamic-pituitary-adrenal (HPA) axis, and providing anti-inflammatory and antioxidant protection to the brain[48,49].

The effectiveness of KMC and SSC in reducing PPD rates appears to be influenced by how oxytocin impacts stress markers, especially through the inhibition of the HPA axis and the decrease in cortisol production and release. Oxytocin's ability to act on brain regions rich in glucocorticoid receptors suggests it may actively suppress neuroendocrine stress responses, a key mechanism by which it helps restore elevated cortisol levels to normal after a stressful event such as childbirth.[50,51] This mechanism is intact in patients without PPD but appears to be unregulated or suppressed in women with PPD. Studies suggest an association between higher cortisol concentrations and lower oxytocin levels in PPD, indicating a breakdown in oxytocin's normal stress-modulating effect, even at 12 weeks postpartum[52].

Synthesized in the adrenal cortex, cortisol is a steroid hormone whose release is mediated by ACTH, a product of the anterior pituitary. Cortisol plays a crucial role in various physiological functions, including the modulation of immune and stress responses, metabolism, and inflammation[53]. Unipolar major depression is frequently associated with elevated cortisol levels and increased inflammation[54]. Similarly, PPD has also been linked to high cortisol levels, although findings remain conflicting[52,55].

The efficacy of KMC and SSC methods in reducing PPD has been attributed to the modulation of the hormonal response and its consequent positive psychosocial and behavioral effects. By modulating the oxytocin-cortisol axis, KMC and SSC directly promote beneficial changes,

including improved breastfeeding, enhanced sleep quality, a stronger mother-NB bond, and greater maternal self-efficacy, all of which reduce stress, anxiety, and depressive symptoms.

KMC and SSC have been consistently associated with favorable breastfeeding outcomes, leading to improvements in exclusive or near-exclusive breastfeeding rates, duration, and self-reported maternal satisfaction[56-58]. Historically, the relationship between PPD and breastfeeding has been viewed as unidirectional, with PPD decreasing breastfeeding rates and increasing the risk of early cessation. However, recent evidence suggests that breastfeeding and PPD have a bidirectional relationship: PPD negatively affects breastfeeding outcomes, but breastfeeding may also reduce PPD rates or mitigate its symptoms[59]. This bidirectional theory also finds biological plausibility in the regulation of the oxytocin-cortisol axis. Breastfeeding is directly associated with a significant increase in oxytocin, which promotes feelings of care and relaxation while leading to a marked decrease in cortisol[59,60]. Therefore, by facilitating breastfeeding, KMC and SSC may reduce PPD rates or alleviate its symptoms. Additionally, KMC and SSC significantly increased maternal sleep quality and reduced symptoms of anxiety and stress, factors associated with the improvement of PPD symptoms[18,61].

KMC and SSC can also improve the mother-NB bond[35,62,63], which is severely impaired in PPD[64-66]. In a qualitative study conducted by Feng and Zhang (2024)[62] with 64 postpartum women, mothers reported a significant change in their perception of motherhood and their connection with NBs after undergoing SSC. This physical and sensory experience was described as a powerful catalyst, transforming a previously abstract relationship into a tangible bond. Furthermore, SSC enhanced the mothers' sense of competence and self-efficacy, actively promoting feelings of purpose and confidence in their new role.

Gaps for future research in KMC/SSC and PPD

KMC and SSC may play a beneficial role in reducing PPD, but this conclusion cannot be drawn with absolute certainty due to the significant heterogeneity in existing evidence. To clarify this issue, large studies with standardized and homogeneous interventions in the same population should be conducted to define the optimal timing and duration for both approaches to improve PPD. Future studies also need to investigate whether other biological and metabolic pathways, beyond the oxytocin-ACTH-cortisol axis, may influence the effects of KMC and SSC.

Conclusion

KMC and SSC emerge as promising, accessible, and non-pharmacological strategies to mitigate PPD symptoms. Current evidence, though heterogeneous, indicates a consistent trend toward a reduction in maternal depressive scores associated with these methods. Notably, the main effects were observed with KMC for preterm and/or low-birth-weight infants, suggesting that the comprehensive nature of this method may have contributed to its beneficial effects. KMC often includes not only SSC but also parental education, support for exclusive breastfeeding, early hospital discharge, and rigorous follow-up.

The proposed central mechanism involves the regulation of the neuroendocrine axis, where increased oxytocin and decreased cortisol levels promote the strengthening of the mother-NB bond, facilitation of breastfeeding, improved sleep quality, and increased maternal self-efficacy, all factors that contribute to mental health in the postpartum period.

Despite the encouraging results, the lack of standardization among studies limits the formulation of definitive recommendations. However, given the low cost, safety, and multiple proven benefits for the mother-NB dyad, implementing KMC and SSC as a standard of care in the postpartum period may be an effective public health tool to protect maternal well-being.

Authors' Contribution

We describe contributions to the papers using the taxanomy (CRediT) provided above:

Conceptualization, investigation and writing – original draft: CRV Leal. *Writing – review and editing – and investigation (literature review)*: JVA Sousa. *Validation and supervision (critical review and final approval)*: ACS Silva. All authors contributed substantially to the conception and execution of the manuscript.

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