

## Kangaroo Method: humanization in the neonatal intensive care unit

*Método Canguro: humanización en la unidad de cuidados intensivos neonatales*

*Método Canguru: humanização na unidade de terapia intensiva neonatal*

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### Abstract

This study aimed to understand the importance of the kangaroo method, discuss its value, and highlight its benefits to preterm newborns. This is an integrative review that follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Searches were conducted in electronic health databases and portals, such as the Medical Literature Analysis and Retrieval System Online, the United States National Library of Medicine, the Scientific Electronic Library Online, the Nursing Database, and the Latin American and Caribbean Literature in Health Sciences using the following descriptors: "Kangaroo Method," "Preterm Newborn," and "Neonatal Nursing," resulting in 25 articles. Intending to provide more comprehensive neonatal care focused on humanization for newborns and their families, maternity hospitals have adapted their practices and modified their physical infrastructure. This study reinforces the importance of skin-to-skin contact in stabilizing signals involved in weight gain, thermal regulation of the newborn, and promoting the emotional bond between parents and child.

**Descriptors:** Kangaroo Method; Premature Newborn; Neonatal Nursing; Humanization of Care; Premature Birth; Neonatal Intensive Care Units.

### Resumen

El objetivo fue comprender la importancia del método canguro, discutiendo su valor, acercando los beneficios de la realización del método con recién nacidos prematuros. Esta es una revisión integradora que sigue la pauta de Elementos de informe preferidos para revisiones sistemáticas y metanálisis. Se realizaron búsquedas en bases de datos y portales electrónicos de salud, Medical Literature Analysis and Retrieval System Online, United State National Library of Medicine, Scientific Electronic Library Online, Nursing Database y Latin American and Caribbean Literature in Health Sciences con los descriptores: "Método Canguro", "Recién Nacido Prematuro", "Enfermería Neonatal"; resultando en 25 artículos. Con el objetivo de brindar una atención neonatal más integral y centrada en la humanización del recién nacido y sus familias, las maternidades han adaptado sus prácticas y modificado sus infraestructuras físicas. Este estudio refuerza la importancia del contacto piel con piel para estabilizar los signos implicados en el aumento de peso, la regulación térmica del recién nacido y la promoción del vínculo emocional entre padres e hijo.

**Descriptores:** Método Canguro; Recién Nacido Prematuro; Enfermería Neonatal; Humanización de la Asistencia; Nacimiento Prematuro; Unidades de Cuidados Intensivos Neonatales.

### Resumo

Objetivou-se compreender a importância do método canguro, discutiendo seu valor, trazendo os benefícios da realização do método com recém-nascido pré-termo. Trata-se de revisão integrativa seguindo a diretriz Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Realizadas buscas em bases e portais eletrônicos em saúde, Medical Literature Analysis and Retrieval System Online, United State National Library of Medicine, Scientific Electronic Library Online, Base de Dados de Enfermagem e Literatura Latino-Americana e do Caribe em Ciências da Saúde com os descriptores: "Método Canguru", "Recém-Nascido Prematuro", "Enfermagem Neonatal"; resultando em 25 artigos. Com o propósito de proporcionar uma assistência neonatal mais abrangente e centrada na humanização para recém-nascidos e suas famílias, as maternidades têm adaptado suas práticas e modificado suas infraestruturas físicas. Esse estudo reforça a importância do contato pele a pele na estabilização dos sinais que estão envolvidos como no ganho de peso, na regulação térmica do RN e na promoção do vínculo afetivo entre pais e filho.

**Descriptores:** Método Canguru; Recém-Nascido Prematuro; Enfermagem Neonatal; Humanização da Assistência; Nascimento Prematuro; Unidades de Terapia Intensiva Neonatal.



## Introduction

The Neonatal Intensive Care Unit (NICU) is an environment whose main objective is to ensure that newborn (NB) care is carried out comprehensively, ensuring that these treatments are humanized to reduce morbidity and mortality. In the NICU, all NBs must receive care, whether critically ill or not, thus ensuring that everyone on the team is engaged and aware of humanized care<sup>1</sup>.

According to the World Health Organization, approximately 30 million premature babies are born every year. However, the reasons and events that lead to premature birth are still unknown. However, recent studies suggest that when a pregnant woman is exposed to certain stress-related factors, whether at work and/or in her marriage/family, this may increase the likelihood of this event occurring. Some studies show that the causes may be correlated with drug use during pregnancy, repeated miscarriages, multiple pregnancies, among others<sup>2</sup>.

Adapting to the extrauterine world can be a challenging task for preterm newborns (PTNBs), because, in addition to being in a completely new environment, the PTNB suffers from numerous painful stimuli daily, with little or no comfort measures to relieve their pain, in addition to constant exposure to stress. Many factors can generate some anxiety in the PTNB, family, or professional, such as the high number of complications, frequent incidence of bright lights, loud alarms, and many other procedures that can cause harm to everyone involved in the care of the PTNB<sup>2</sup>.

The role of nursing is to promote humanization in the care of newborns and their families so that it can generate interaction in care and increase the bond between newborns and their relatives<sup>1</sup>.

Aiming to humanize care for PTNBs, the Ministry of Health made the kangaroo method a public policy, whose main objective is humanized, comprehensive, and safe care, aiming to bring positive impacts on the lives of these NBs and ensure that their families are included in this humanized care<sup>1,3</sup>.

The kangaroo method seeks to provide humanized care, promoting early skin-to-skin contact (kangaroo position) between the mother, father, and baby, favoring the emotional bond and stimulating breastfeeding and the child's development<sup>1-3</sup>.

For preterm newborns, the kangaroo method can be beneficial, since with the increased length of hospital stay due to prematurity, the mother-baby bond begins early. The method can offer even better respiratory stability in preterm newborns, since the method improves the function between the lungs and the diaphragm, allowing the hematosis process to be carried out efficiently, and may cause the team to reduce the parameters of the mechanical ventilator if the preterm newborn is using it<sup>2-4</sup>.

It recommends that this humanized care, based on the kangaroo method, be carried out from the beginning of the newborn's hospitalization, so that he or she can develop adequately, reducing the risk of infection and even the length of hospitalization<sup>1</sup>.

Therefore, this work aimed to understand the importance of the kangaroo method, discussing its value,

## Methodology

This article is an integrative literature review that aims to synthesize the knowledge obtained through reading articles focused on humanized care for preterm newborns. The integrative review is the conglomeration of studies, which are evaluated and listed to bring a conclusion regarding the subject addressed, due to the collection of studies<sup>5</sup>.

To design this study, it was necessary to follow six steps that organized the search, namely: choosing the topic and selecting the research question; establishing the criteria for inclusion and exclusion of literature; sampling; defining the information to be extracted according to the category of the study; evaluating the information included in the study; interpreting the results and reviewing/synthesizing knowledge<sup>6</sup>.

In the first stage, the research question was established for the review based on the PECO7 strategy corresponding to the acronym: P: Patient = Preterm newborn; E: Exposure = kangaroo method; C: comparison = implementation in a humanized way O: Outcome = benefits of the kangaroo method. Thus, the research question delimited was: "How to perform, in a humanized way, the kangaroo method and what are its benefits for the PTNB?".

The literature search was performed using the English descriptors: "Kangaroo-Mother Care Method", "Infant, Premature", "Neonatal Nursing" and the English keyword "Skin to Skin", to expand the search for articles published in the following databases: Scientific Electronic Library Online (SciELO), Nursing Database (BDENF), United State National Library of Medicine (PUBMED), Latin American and Caribbean Literature in Health Sciences (LILACS) and Medical Literature Analysis and Retrieval System Online (MEDLINE).

To expand the filtering system, the Boolean operators "OR" and "AND" were used. The inclusion criteria were articles from the period 2018 to 2023, in Portuguese, English, and Spanish. Exclusion criteria were review articles, articles not available in full and that did not answer the guiding question.

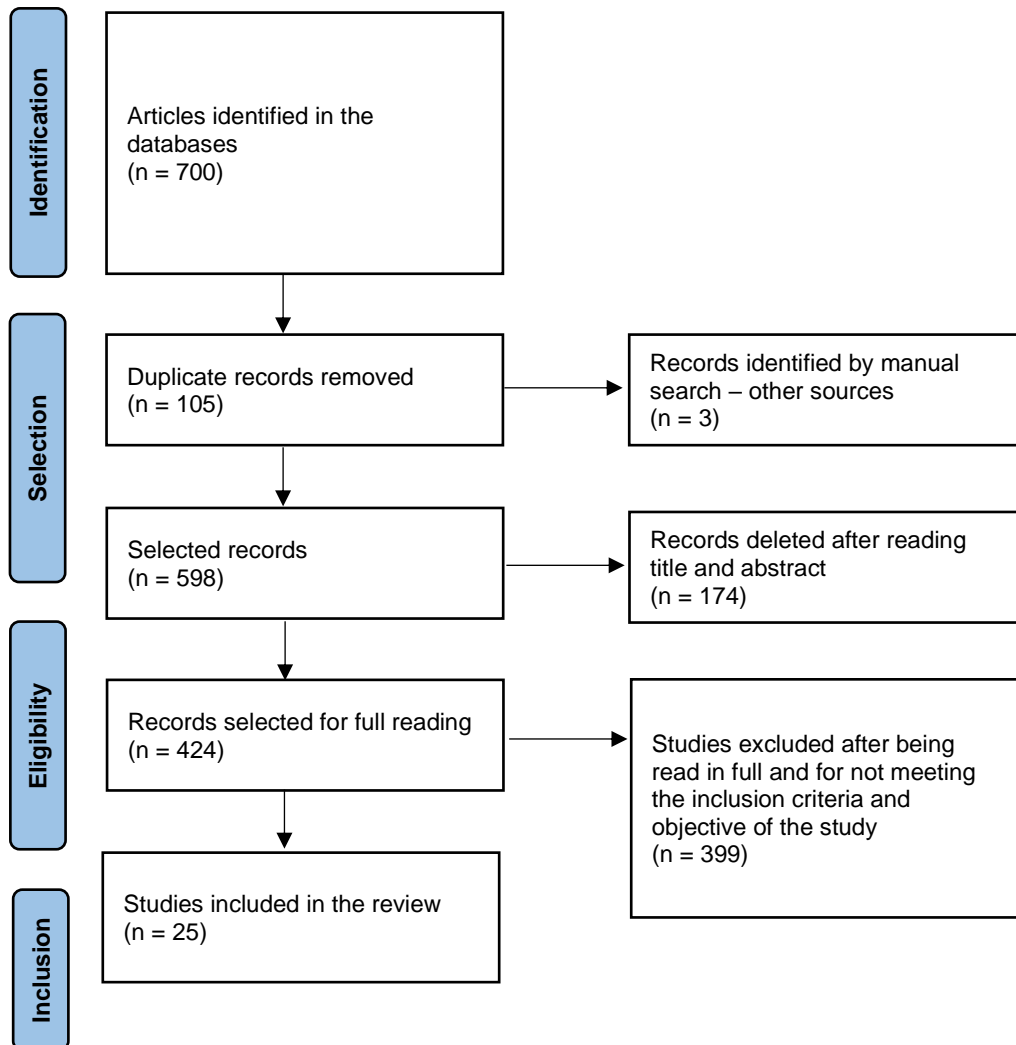
In the third stage, 703 articles were found in the following databases: 342 in MEDLINE, 310 in PUBMED, 21 through SciELO, 14 in BDENF, 13 in LILACS, and three in a manual search. Next, the titles and abstracts were read, and those that did not meet the criteria were excluded. After a complete and thorough reading of the studies, a final sample of 25 articles was obtained (Figure 1). The articles were selected independently by three researchers, and in cases of disagreement, a consensus was sought with the participation of an auxiliary researcher.

In the fourth stage, the selected studies were organized in a spreadsheet by the authors with the aim of guiding the evaluation of the included studies, containing the following information: author, country, year, objective, methodology and main findings. The fifth stage consisted of the analysis and interpretation of the results and discussion



and in the last stage, the review, synthesis of the knowledge produced, and presentation of evidence were organized.

**Figure 1.** Flowchart of search and selection of studies according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)<sup>8</sup>. Campinas, SP, Brazil, 2023



**Results**

Of the 25 articles included in this study, 64% were found in PUBMED, 28% in MEDLINE, 4% in SciELO, and 4% in LILACS, 8% of the articles were published in 2018, 16% in 2019, 20% were published in both 2020 and 2021, 24% in 2022 and 12% in 2023.

Of the findings, 84% of the articles come from international research and only 16% from national research.

As for the international research, 20% are from publications in Asian countries, 27% from North and South American countries, 33% from Europe, 6.7% from Africa, 6.7% from Oceania, and 6.6% from Turkey, which is located partly in Europe and partly in Asia. To carry out the verification of the articles in the final sample, a spreadsheet was used to better interpret the articles found, which was arranged as follows: article title, authors, year, database, and countries (Chart 1).

**Chart 1.** Description of selected articles, according to the year of authorship, target country, methodology, and outcome. Campinas, SP, Brazil, 2023

Author, Year and Country	Objective	Methodology	Main Findings
Sales, et. al 2018 <sup>9</sup> Brazil	Understand the main care measures taken by the nursing team in the second stage of the Kangaroo Method that contribute to the newborn's hospital discharge and the continuity of care at home, and to prepare an explanatory	Qualitative, convergent care study.	The nursing team emphasizes the importance of the Kangaroo Method (KMC) and highlights the need for continuous monitoring in the unit. Studies highlight that the relevance of this method should be communicated to mothers through appropriate guidance. Maternal awareness, achieved through this guidance, represents an extremely important factor, as it contributes to a broader understanding of the method, promoting its frequent adoption and offering substantial benefits to the institution.



	folder to guide professionals in managing hospital discharge.		
Norén, et. al 2018 <sup>10</sup> Sweden	Describe mothers' experiences of providing their premature babies with Kangaroo Mother Care (KMC).	Qualitative and descriptive study.	In countries with high per capita incomes, skin-to-skin contact is practiced intermittently for a few hours a day. However, the frequency of this practice varies depending on the infant's medical condition and, in certain circumstances, may constitute an alternative to the conventional care provided by the incubator, which lasts 24 hours a day. The separation of mother and newborn is commonly perceived as a potentially highly stressful event by mothers, and the Kangaroo Method has emerged as an effective strategy for preventing this separation, consolidating the parental role as the primary provider of care for the baby.
Dawar, et. al 2019 <sup>11</sup> India	Identify facilitators and barriers related to the home adoption of the Kangaroo Method (KMC) after hospital discharge.	Exploratory and observational study.	In a prospective cohort study involving low birth weight infants, it was observed that those who received KMC for more than 12 hours per day during their hospital stay had superior weight, head circumference, and length gains compared with those who received KMC for less than 12 hours per day.
El-Farrash, et. al 2019 <sup>12</sup> Egypt	Evaluate the effect of KC and its duration on neonatal neurobehavioral performance, salivary cortisol, and breastfeeding success in preterm infants.	Prospective, double-blind, randomized, controlled clinical trial.	We conducted a comprehensive analysis of the effects of Kangaroo Care (KMC) and its duration on critical variables, including vital signs, Neurobehavioral Assessment of the Preterm Infant (NANNBS) scores, breastfeeding success, and salivary cortisol levels. The NANNBS assessment, conducted in the Neonatal Intensive Care Unit (NICU) at 37 weeks postconception, revealed that premature neonates, with gestational ages between 31 and 35 weeks, who underwent KMC for 60 or 120 minutes daily for at least 7 consecutive days, showed improved quality of movement, showing greater amplitude, smoothness, and harmony.
Mehler K, et. al 2019 <sup>13</sup> Germany	Investigate the effects of 60 minutes of skin-to-skin contact in the delivery room (DR-SSC) compared with 5 minutes of visual contact (VC) on mother-child interaction (MCI), salivary cortisol, maternal depression, stress, and bonding at 6 months corrected age.	Single-center randomized controlled trial.	The practice of skin-to-skin contact during childbirth is associated with an improvement in maternal motor skills and a significant increase in the combined score of maternal and infant-responsive behavior. Mothers involved in this practice had a lower risk of early postpartum depression and impaired maternal-infant bonding.
Sohail, et. al 2019 <sup>14</sup> India	To describe the improvement in quality of life and reduction in mortality in premature babies who used the kangaroo method.	Descriptive case study.	Every year, around 30 million preterm infants are born, making this one of the main causes of morbidity and mortality.
Blomqvist, et. al 2020 <sup>15</sup> Sweden	Assess physiological stability during SSC and incubator care in a group of premature infants born with a gestational age (GA) equal to or less than 32 weeks and receiving respiratory support.	Prospective cohort study.	Skin-to-skin contact (SSC) has been shown to provide appropriate thermal stability in high-tech environments, specifically in extremely preterm infants. However, despite these advances, a comprehensive understanding of how SSC influences several basic physiological parameters in preterm infants remains limited, and additional studies are needed to address significant gaps in this knowledge.
Zhang, et. al 2020 <sup>16</sup> China	Investigate the association between the provision of intermittent KMC and breastfeeding practices for late preterm infants in four hospitals in different provinces.	Analytical, qualitative, descriptive study.	Implementation of Kangaroo Mother Care (KMC) has been shown to result in a significant increase in the rate of exclusive breastfeeding in extremely or very preterm infants. For late preterm infants receiving care in postnatal wards with their mothers, relatively brief intermittent exposure to KMC during the hospital stay was associated with a substantial increase in the prevalence of exclusive breastfeeding at both discharge and post-discharge follow-up.



Sehgal, et. al 2020 <sup>17</sup> Australia	Assess the impact of skin-to-skin contact between parents and babies on cardiac function and cerebral blood flow in premature babies.	Prospective cohort clinical study.	We recorded a significant and beneficial circulatory adaptation in a neonate, corroborating previous findings on the physiological benefits related to cardiorespiratory stability and heart rate, especially in preterm infants. This adaptation demonstrates consistency with common practice in neonatology. Furthermore, the results suggest a possible mediation of these effects through modulation of the autonomic nervous system.
Diniz, et. al 2020 <sup>18</sup> Brazil	Verify the short-term influence of the kangaroo position (PC) on the electromyographic activity of premature newborns.	Randomized clinical trial.	It is highlighted that SSC was initiated on average 0.4 hours after birth, reflecting the complexity and hesitation of medical teams when faced with this intervention in very premature babies. The research highlights that, in terms of thermoregulation, partners, especially fathers, are suitable for providing immediate SSC, suggesting that they can be effective substitutes for mothers in this regard.
Lisanti, et. al 2020 <sup>19</sup> United States	Estimate the effect of skin-to-skin contact (SSC) on biobehavioral measures of stress (anxiety and salivary cortisol) and attachment (attachment scores and salivary oxytocin) in mothers before and after neonatal cardiac surgery of their infants.	A prospective, interventional, matched pilot study with baseline response.	The findings highlight the benefits of SSC for mothers of infants with congenital heart defects (CHDs) before and after neonatal cardiac surgery. The findings support the relationship between altered parental role and maternal stress response, as proposed by the PICU Parental Stress Model. Skin-to-skin contact should be integrated into the care of infants before neonatal cardiac surgery, with continuation postoperatively when the infant is safe to do so.
Goudard, et. al 2021 <sup>20</sup> Brazil	Evaluate the association between skin-to-skin contact (SSC) dose per day and onset time with the occurrence of deaths in newborns weighing up to 1,800g.	Prospective multicenter cohort study.	Neonatal deaths account for 45% of under-5 mortality rates globally, with 18% of these deaths attributable to complications related to prematurity. In this study, the analysis focused not only on the practice or absence of skin-to-skin contact but also on the specific duration of this practice, establishing a cut-off point of 146.9 minutes/day.
Li, et. al 2021 <sup>21</sup> China	Compare and evaluate the effects of skin contact combined with breastfeeding.	Single-center, randomized controlled clinical trial.	The oral feeding process represents a significant challenge influenced by several factors in the context of sensorimotor development. The brains of premature infants, due to their incomplete neural maturation, face limitations in the capacity for sucking, swallowing, and respiratory coordination, associated with an immature behavioral state. During the stay in the Neonatal Intensive Care Unit (NICU), feeding premature infants commonly requires the use of a nasogastric or orogastric tube, with the transition to oral feeding being postponed until the infants reach adequate physiological maturity.
Shukla, et. al 2021 <sup>22</sup> India	Compare maternal and paternal skin-to-skin care (SSC) for preterm neonatal pain management using the Preterm Infant Pain Profile (PIPP) score.	Descriptive, quantitative study.	Preterm neonates, who undergo a plethora of painful procedures and interventions during neonatal intensive care, face a phase of rapid brain maturation in the neonatal period. Such painful interventions during this crucial period can trigger irreversible changes in the developing brain, adversely impacting the developmental process.
Lee, et. al 2021 <sup>23</sup> Finland	Investigate whether SSC stabilizes breathing compared to incubator care in mechanically ventilated preterm infants.	Prospective analytical observational study.	Preterm newborns receiving ventilatory support exhibited lower respiratory demand, demonstrating more stable neural respiration during skin-to-skin contact (SSC) compared with those maintained in incubators. These beneficial effects attributable to SSC were more pronounced after 28 weeks of gestational age and during invasive ventilation, as opposed to noninvasive ventilation.
Lilliesköld, et. al 2021 <sup>24</sup> Sweden	Explore parents' experiences of immediate skin-to-skin contact after the birth of their very preterm newborn and their perceptions of staff care and support.	Qualitative and descriptive study.	The immediate establishment of Skin-to-Skin Contact (SSC) at the time of birth, aimed at extremely premature newborns, proved to be an invaluable and strengthening experience for parents, culminating in the optimization of the establishment of early bonds and relationships. Care for parents of extremely premature newborns demands a holistic approach, considering their vulnerable condition. SSC, therefore, should be recognized by the team as an interactive and dynamic procedure.



Cañadas, et. al 2022 <sup>25</sup> Spain	Estimate the effect of the kangaroo mother method (KMC) on the physiological and biochemical parameters of premature infant stress and maternal stress in neonatal intensive care.	Cohort study.	Among the benefits of the kangaroo mother method, we can also mention the reduction of stress in preterm newborns. Studies show that skin-to-skin contact for 1 hour a day, in the first 14 days of life, considerably reduces cortisol levels in the blood and metabolism. With this reduction, the baby will remain off-alert for longer, thus helping to relieve stress levels, which can help with weight gain.
Samsudin, et. al 2022 <sup>26</sup> Malaysia	Evaluate the effectiveness of the kangaroo maternal education program for 1 month and 3 months on the mother's perception, knowledge, perceived barriers, and stress.	Experimental longitudinal control study.	It is noteworthy to note that all mothers stated that the practice of KM not only strengthened emotional bonds, but also provided them with a sense of fulfillment, accomplishment, and satisfaction for actively contributing to the care of their babies. Overall, it is empirically corroborated that KM can transform maternal perception regarding its application and the quality of care provided to premature newborns when admitted to the NICU.
Lode-Kolz, et. al 2022 <sup>27</sup> Scandinavia	Investigate the impact of immediate skin-to-skin contact with parents after birth on the thermal regulation of very premature infants.	A randomized clinical trial of superiority with two parallel arms.	Very preterm infants, regardless of clinical stability, do not develop hypothermia during immediate skin-to-skin contact after birth. Immediate skin-to-skin contact is protected against hyperthermia events. Concerns about thermal regulation should not limit the implementation of immediate skin-to-skin contact in resource-rich settings.
Landry, et. al 2022 <sup>28</sup> Canada	Documenting preliminary results of Mindful Kangaroo Care (MKC) on maternal stress, anxiety, depression, and mindfulness.	Non-blind, prospective, observational, randomized, controlled pilot study.	Parents of infants admitted to the Neonatal Intensive Care Unit (NICU) experience a substantial level of psychological adversity. Emerging evidence suggests that the practice of mindfulness, which promotes full awareness of the present moment, can mitigate stress levels in these parents. The Kangaroo Care (KMC), established in NICUs globally, emerges as a modality that significantly mitigates parental stress.
Charpak, et. al 2022 <sup>29</sup> Colombia	Determine whether KMC provision in childhood affected brain volumes in early adulthood.	Randomized clinical trial with multivariate analysis.	Studies have shown that the beneficial effects of the kangaroo mother method extend into adulthood and are beneficial for the development of areas of the brain responsible for memory and fine and gross motor coordination. Therefore, we can say that the kangaroo mother method is not only a way to replace incubators or encourage breastfeeding, but also to use the method as a long-lasting neuroprotector against the adversities of premature birth.
Liu X, et. al 2022 <sup>30</sup> China	Review facility capacity to provide KMC, characteristics of preterm infants admitted to NICUs, the proportion receiving KMC, weight gain, and patterns of KMC provision.	Multicenter descriptive qualitative study.	Kangaroo Mother Care (KMC) is recommended by the World Health Organization as a recommended care approach for preterm and low birth weight newborns. Substantial evidence has shown that implementation of KMC results in significant increases in survival rates and quality of life for these neonates, as evidenced by improved clinical outcomes, weight gain, and thermal regulation compared to conventional care.
Çaka, et. al 2023 <sup>31</sup> Türkiye	Revealing the impact of KMC on AI in preterm infants.	Randomized clinical trial.	Enteral feeding plays a crucial role in the survival of premature infants, especially those born before 34 weeks of gestation, who are at high risk of aspiration due to lack of coordination between sucking, swallowing, and breathing. Consequently, predominant administration of gavage feeding is recommended to minimize this risk. Providing nutritional support that matches the rate of growth and development in the intrauterine period is a primary goal of the care team during this critical phase.
Adejuyigbe, et. al 2023 <sup>32</sup> India	Assess the overall impact of KMC by investigating the long-term effect on neurodevelopmental impairment in survivors.	Descriptive cohort study.	Immediate Kangaroo Mother Care (KMC) has the potential to mitigate complications associated with low birth weight, including but not limited to respiratory disease, hypothermia, hypoglycemia, and infections. Such complications, if not adequately managed, may result in impaired neurocognitive development. The neuroprotection provided by KMC may be mediated through more efficient physiological stabilization, which in turn contributes to more effective maturation of neural pathways and a reduced risk of hypoxia.





Goudard, et. al 2023 <sup>33</sup> Brazil	Describe the onset, duration, location and who performs skin-to-skin contact in Brazilian neonatal units.	A multicenter descriptive and longitudinal study.	This study highlighted the almost exclusive participation of mothers in the practice of SSC (93.6%). Despite the replacement of the term "Kangaroo Mother Method" by "Kangaroo Method" in Brazil, aiming to encourage paternal participation in this care, several factors can influence this dynamic. Sociocultural contexts play a crucial role in the cultural constructions of gender and in the roles attributed to the father and mother in the care of the child. The limitation in the participation of fathers may also be related to challenges in the institutional organization and to prejudices of the team, which, although recognizing changes in the role of the father in the family context, still faces difficulties in involving him in this care process.
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**Discussion**

The main objective of the kangaroo method is to humanize care for preterm newborns and aims to have positive impacts on both the newborn and the family, favoring the bond between mother/father and newborn.

In this review study, of 703 selected articles, only 25 addressed the humanized implementation of the kangaroo method and its benefits to preterm newborns, and these were grouped into four categories: role of nursing, benefits for the newborn, breastfeeding, and benefits for parents.

**Role of Nursing**

The nursing team plays a very important role in implementing the Kangaroo Method (KMC) and the need for continuous monitoring in the unit is highlighted. It is important to note that the relevance of this method must be communicated to mothers through appropriate guidance. Maternal awareness, achieved through this guidance, is an extremely important factor, as it contributes to a broader understanding of the method, promoting its frequent adoption and offering substantial benefits to the institution.

In this context, the relevance of the role of the nursing professional, responsible for caring for the newborn, promoting their maintenance and recovery during the hospitalization period, is evident. This role aims to train the family to assume continuity of care after discharge, highlighting the importance of the nursing professional in supporting the transition of care to the home environment<sup>9</sup>.

The systematic implementation of the Kangaroo Method may constitute an effective measure to improve maternal perception in hospital settings focused on premature babies in the NICU. Given this finding, it is argued that the Kangaroo Method should be established as a standard practice and an evidence-based nursing intervention approach for the systematic care of premature babies in the hospital setting. This perspective aims to solidify the role of the Kangaroo Method as a normative intervention based on empirical results to improve the quality of neonatal care, reinforcing the importance of its adoption in the future<sup>26</sup>.

At the time of birth, the immediate implementation of KM, aimed at extremely premature newborns, proved to be an invaluable and strengthening experience for the parents, culminating in the optimization of the establishment of early bonds and relationships. Care for parents of extremely premature newborns demands a holistic approach, considering their vulnerable condition. KM, therefore, must be recognized by the team as an

interactive and dynamic procedure<sup>24</sup>.

Effective support is achieved by establishing a strong bond between the healthcare team and parents, providing them with a safe platform to interact with their newborns. This process is mediated by the behavior and readiness of the team. It is important to emphasize that recently delivered women require postpartum care in addition to the care given to their extremely premature newborns<sup>24</sup>.

Regarding nutritional care, these emerge as vital measures for preserving the health of premature babies, with proper positioning becoming one of the central strategies adopted by nurses. However, it is important to note that there is a significant gap in the literature regarding the impacts of different body positions applied to premature and low birth weight babies regarding residual gavage volume and gastric emptying time. The results of the few studies available in this area are the subject of ongoing debate<sup>31</sup>.

Additionally, some studies in the literature indicate that the application of the Kangaroo Care (KMC) position during gavage feeding in neonatal clinics may result in increased breast milk production and breastfeeding volume. These findings highlight the relevance of exploring and understanding more deeply the potential benefits of this approach for the nutrition and development of preterm newborns<sup>31</sup>.

To enable the effectiveness of Kangaroo Care (KMC), it is essential that professionals involved in direct and indirect care of preterm infants fully support the needs of parents. It is essential to provide ongoing education and guidance about KMC for families with infants in such conditions. Subsequently, prospective programs can foster the dissemination and adoption of KMC, focusing particularly on the facilitators and barriers associated with the extension of KMC implementation in the home environment<sup>11</sup>.

**Benefits for the newborn**

Every year, around 30 million preterm newborns (PTNBs) are born, which is one of the main causes of morbidity and mortality<sup>14</sup>.

Experimental results from a study carried out between 05/2018 and 03/2020 indicated that neonatal deaths constitute 45% of mortality in children under 5 years of age globally, and 18% of these deaths can be attributed to complications related to prematurity<sup>20</sup>.

Studies carried out between 2018 and 2020 show a decrease in the absolute number of deaths, from 13 to 3,



among preterm newborns who experienced a daily average of KM greater than 146.9 minutes, which is a clinically relevant finding, representing a reduction of 10 deaths in this specific population and emerging as an effective strategy to mitigate these neonatal mortality rates<sup>20</sup>.

These data show that the effectiveness of KM is maximized when initiated early in the postnatal period, thus early initiation of KM is recommended, which is corroborated by the multicenter study that highlights the importance of early KM by finding a 25% reduction in the probability of neonatal death among newborns with birth weights between 1,000 and 1,799 g who underwent KM before clinical stabilization. This study also included newborns weighing less than 1,000 grams and/or presenting respiratory problems under ventilatory support. However, research converges in pointing to early exposure without clinical stability of the preterm newborn as a determining factor for the occurrence of death, regardless of whether it occurs before or after clinical stability is achieved. In contrast, the present study maintains the current recommendation of implementing KM only after the clinical stability of newborns<sup>20</sup>.

Infant mortality remains a significant public health concern, particularly affecting low-income countries disproportionately. Standard intervention for low-birth-weight infants occurs in hospital settings equipped with highly specialized equipment and trained healthcare professionals. The timing of KM implementation is identified as the most prevalent determinant of growth improvement in low-birth-weight infants<sup>20</sup>.

Substantial evidence has demonstrated that implementation of KM results in significant increases in survival rates and quality of life of these neonates, evidenced by improved clinical outcomes, weight gain, and thermal regulation compared to conventional care<sup>30</sup>.

Regarding the benefits of thermoregulation, compared to conventional care, a higher incidence of hyperthermia events was observed in the first 6 postnatal hours. In settings with ample resources, the implementation of immediate KM with one of the parents in the first hours of life emerges as an effective measure to prevent hyperthermia and its possible adverse effects in premature infants<sup>27</sup>.

Very preterm infants who underwent immediate KM with a parent within the first few hours of life demonstrated adequate thermoregulation. Therefore, immediate KM not only offers protection against hyperthermia but also appears to be safe concerning thermoregulatory concerns. In resource-rich settings, thermoregulatory concerns should not limit the implementation of immediate KM<sup>27</sup>.

The KM, in addition to its role in thermoregulation, may have substantial implications in aspects such as cardiorespiratory regulation and neurosensory development<sup>15</sup>.

Regarding respiratory function, preterm infants undergoing ventilatory support exhibited lower respiratory demand, demonstrating more stable neural respiration during KM practice compared to those maintained in

incubators. These effects attributable to KM are more pronounced after the 28th week of gestational age and during invasive ventilation, as opposed to noninvasive ventilation. Notably, ventilatory support, often perceived as a barrier to KM implementation in frail preterm infants, not only demonstrates safety during KM practice, but also presents physiological benefits, especially in cases of invasive ventilation<sup>23</sup>.

Several explanations support the contribution of KM to improving respiratory function. The intimacy of skin contact has been shown to have an attenuating effect on pain perception and stress reactivity, mediated by increased oxytocin and reduced cortisol release during KM. Additionally, it has been shown that sleep and behavioral states play a relevant role in modulating breathing in premature neonates, inducing a propensity for deeper sleep and less stress responses, notably in the supine position<sup>23</sup>.

Regarding newborn development, a prospective cohort study conducted in public hospitals in India involving low-birth-weight infants found that those who received KM for more than 12 hours per day during their hospital stay had superior weight, head circumference, and length gains compared to those who received KM for less than 12 hours per day. A subsequent analysis, conducted six months after hospital discharge, indicated that infants who continued to receive KM at home demonstrated additional growth compared to those who did not receive home care<sup>11</sup>.

Difficulties in public hospitals related to limited resources, such as the lack of specialized hospital units, overcrowding, and early discharges, among other issues, make it imperative to implement KM in the home environment to ensure the survival of low birth weight or premature babies<sup>11</sup>.

Furthermore, factors such as the difficulty in keeping the mother hospitalized for a prolonged period and the apprehension of performing KM while the newborn is on ventilatory support also interfere with the precocity of this first contact. Therefore, it is imperative to recognize and promote KM as a safe intervention, capable of providing greater physiological stability for the newborn<sup>33</sup>.

KM has also been studied as a non-pharmacological method for pain relief in premature neonates, demonstrating that in PTNBs KM is indicated as the best choice for pain control<sup>34,35</sup>.

It has been proven that the beneficial effects of the kangaroo method are prolonged into adulthood, being beneficial for the development of areas of the brain responsible for memory, fine and gross motor coordination. Therefore, we can affirm that the kangaroo mother method is not only to replace incubators or encourage breastfeeding but also to use the method as a long-lasting neuroprotector against the adversities of premature birth<sup>29</sup>.

### Breast-feeding

Frequent KM between mother and baby is crucial for the successful transition to direct breastfeeding in preterm infants. Specifically, early KM, ideally within the first hour after birth, has been shown to facilitate breast milk production. Furthermore, continued daily KM practice





contributes to the accelerated neurophysiological development of the preterm infant, promoting the formation of an effective sucking mechanism. In the context of breastfeeding, KM has the potential to improve breast milk production, facilitate the establishment, and prolong the duration of breastfeeding<sup>16</sup>.

Research indicates that external interventions, such as music, olfactory stimulation of breast milk, and the application of the Kangaroo Mother Care, can facilitate the acquisition of full oral feeding before 34 weeks of gestation. In the context of breastfeeding, Kangaroo Mother Care has the potential to improve breast milk production, facilitate the establishment, and prolong the duration of breastfeeding. Babies submitted to the Kangaroo Mother Care exhibited greater intelligence and psychomotor development at 12 months of corrected gestational age. Additionally, it was observed that these babies had less severe infections and reduced hospital stays. The Kangaroo Mother Care emerges as a significant contributor to the development of the nervous system in premature neonates<sup>21</sup>.

Implementation of Kangaroo Care (KMC) has been shown to result in a significant increase in the rate of exclusive breastfeeding in extremely or very preterm infants. For late preterm infants receiving care in postnatal wards with their mothers, relatively brief intermittent exposure to KMC during the hospital stay was associated with a substantial increase in the prevalence of exclusive breastfeeding at both discharge and post-discharge follow-up<sup>16</sup>.

**Benefits for mothers and fathers**

The separation between mother and newborn is commonly perceived as a potentially highly stressful event by parents, and KM emerges as an effective strategy in preventing this separation, consolidating the parental role as the main provider of care for the baby.

In high-income settings, mothers are willing to engage in continuous skin-to-skin contact, or for a significant portion of the day, provided that the required support and assistance are provided. The body of evidence regarding the benefits of KM and skin-to-skin contact between parents and their babies has been expanding, encompassing a variety of positive effects on infant brain development, parent-infant bonding, and parental psychological well-being<sup>10</sup>.

The practice of KM during labor is associated with an improvement in maternal motor skills and a significant increase in maternal-infant interaction. Mothers involved in this practice had a lower risk of early postpartum depression and impaired maternal-infant bonding. In addition to regular intermittent maternal care, the implementation of KM has been shown to stimulate the development of maternal-infant behavior, resulting in a significant reduction in the risk of maternal depression and complications in establishing bonding<sup>13</sup>.

Research has shown that implementing KM over four weeks results in a significant reduction in symptoms of stress, anxiety, and depression in mothers of premature newborns. Additionally, there was a significant increase in

mindfulness scores over the same period, compared to a control group. Longitudinal analysis showed a marked reduction in stress levels over time for the group undergoing KM, consolidating the role of this approach in promoting the psychological well-being of parents in challenging neonatal hospitalization situations.<sup>28</sup>.

The implementation of KM in postnatal wards not only minimizes the time of separation between mother and baby but also positively correlates with a substantial increase in breastfeeding practice, reinforcing the relevance of this approach for the promotion of neonatal health, especially in the context of premature babies<sup>16</sup>.

KM not only strengthens emotional bonds, but also provides a sense of fulfillment, accomplishment, and satisfaction for actively contributing to the care of their babies. Overall, it is empirically corroborated that KM can transform maternal perception regarding its application and the quality of care provided to premature newborns when admitted to the Neonatal Intensive Care Unit (NICU). In this context, the systematic implementation of KM can constitute an effective measure to improve maternal perception in hospital settings focused on premature babies in the NICU<sup>26</sup>.

The almost exclusive participation of mothers in the practice of skin-to-skin contact (93.6%) stands out. Despite the replacement of the term "Kangaroo Mother Method" with "Kangaroo Method" in Brazil, aiming to encourage paternal participation in this care, several factors can influence this dynamic. Sociocultural contexts play a crucial role in the cultural constructions of gender and the roles attributed to the father and mother in the care of the child. The limitation in the participation of fathers may also be related to challenges in the institutional organization and prejudices of the team, which, although recognizing changes in the role of the father in the family context, still faces difficulties in involving him in this care process<sup>33</sup>.

Regarding paternal presence, studies highlight that KM is usually initiated on average 0.4 hours after birth, reflecting the complexity and hesitation of medical teams when faced with this intervention in very premature babies. The research highlights that, in terms of thermoregulation, partners, especially fathers, are suitable for providing immediate KM, suggesting that they can be effective substitutes for mothers in this regard<sup>18</sup>.

The findings also highlight the benefits of KM for mothers of infants with congenital heart defects (CHDs) before and after neonatal cardiac surgery. The findings support the relationship between altered parental role and maternal stress response, as proposed by the NICU Parental Stress Model. KM is recommended for infants before neonatal cardiac surgery and continued postoperatively when the infant is safe to do so. However, more research is needed to determine whether regular KM among mothers and infants with CHDs results in long-term mental health benefits and promotes increased attachment during infancy and childhood<sup>19</sup>.

**Final Considerations**

The kangaroo method has emerged as a fundamental approach in the care of preterm newborns,



standing out for its effectiveness in promoting neonatal development and supporting families. Growing evidence supports its effectiveness in improving health outcomes for premature babies, including short- and long-term physical, emotional, and cognitive benefits. This practice offers a series of very significant advantages.

Kangaroo care not only benefits premature babies but also plays a crucial role in promoting parental well-being. By providing skin-to-skin contact, it strengthens the emotional bond between parents and their baby, providing a unique experience of involvement and care. This practice not only relieves parental anxiety, but also promotes confidence and a sense of competence in parenting.

Comparative studies have demonstrated a significant decrease in infection and morbidity rates in babies undergoing the kangaroo method compared to traditional approaches. In addition, the application of the kangaroo method has proven to be economically

advantageous, reducing hospital costs and associated complications.

Furthermore, there is consistent evidence that the kangaroo method favors breastfeeding, resulting in faster weight gain and promoting neurobehavioral development. It also reinforces the importance of skin-to-skin contact in stabilizing signals that are involved in weight gain and thermal regulation of the newborn. For the newborn, this practice promotes faster development.

Given these positive impacts, kangaroo care continues to play a crucial role in scientific research and clinical practice, shaping the way we approach neonatal care and promoting global health. In conducting this study, we encountered certain challenges, including the substantial predominance of restricted-access articles and the lack of complete availability of some articles. In addition, we observed the presence of data whose reliability is questionable.

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