



Effect on the practice of the kangaroo method on the formation and strengthening of the mother-baby bond: a systematic review


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Abstract

Objectives: a systematic review study with the objective of estimating the effect on the practice of the kangaroo method (KM) on the formation and strengthening of the mother-baby bond (MBB).

Methods: independent searches were performed in three international databases in the United States National Library of Medicine - PubMed, Scientific Electronic Library Online - Scielo and Web of Science databases. Searches were made without limit on languages and year of publication.

Results: the final selection consisted of 27 studies, 14 of a quantitative nature (nine clinical trials and five observational) and 13 qualitative. All qualitative articles and most quantitative ones (n=10) indicated the practice of the KM as favorable to the formation and strengthening of the MBB. Other quantitative studies did not show statistically significant differences in the comparisons made between groups. None of the 27 studies found unfavorable effects resulting from the practice of KM on the MBB.

Conclusion: the results suggest that the KM favors the formation and strengthening of the MBB regardless of the weight and gestational age of the newborns or the place of measurement (hospital or residence). Thus, encouraging the execution of this biopsychosocial intervention of qualified and humanized care is recommended for the promotion of children's health.

Key words Kangaroo-mother care method, Mother-child relations, Newborn, Child health, Maternal and child health, Maternal-child nursing



Introduction

Humans are born with the necessity of developing intimate emotional bond, from fetal stage to old age. This bond can be defined as an emotional connection that unites one person to another¹. The mother-baby bonding (MBB), which begins to be effectively formed on the first postpartum days, is the unique and fundamental personal interaction on the child's healthy growth and development, since it has direct influence over the physical, psychological and intellectual aspects of the baby.^{2,3} As a result, interactions between parents and children affect the structure of the emotional bond developed by the child since birth.

Touching, watching and smelling the newborn (NB) makes the mother realize it as her own child, increasing maternal awareness, proximity and attachment with the baby. Consequently, the baby may feel safer and closer to the mother, starting a positive and mutual interaction.^{4,5} To evaluate this bond, it is important to measure the understanding of the woman about her relationship with her baby and how she meets and answers to the baby's needs. Besides that, the mutual reaction of the baby to the mother's affection is also an indicator to the presence of the MBB.¹

However, there are situations that complicate the formation of the MBB, as the necessity of admitting to a neonatal intensive care unit, in cases of prematurity, low birth weight (LBW) or the presence of severe pathologies.³ The negative impact of this scenario can be reduced when mother-baby approach measures are established by a team and provided by the hospital service.⁶

Due to that, in December, 1999, Brazil released as a health public policy, the kangaroo method (KM), which targets the humanized care and damage reducing caused by hospitalization, as a strategy that unites many biopsychosocial interventions.⁷ The KM all about the skin to skin contact between parents/caregivers and the baby, especially premature ones.⁷ This can strengthen the emotional bond in short, medium and long term, improves thermo stability, helps to relieve pain, reduces crying, hospitalization and increases the effectiveness of breastfeeding (BF) and ponderal gain.⁷⁻⁹ Studies show that these benefits are extended to newborn at term (NBT) which have not been through hospitalization, which means that the KM can be practiced regardless the gestational age presenting good results, inside or out of the hospital environment.¹⁰

There are few scientific studies that investigate the effect of the KM, especially on the MBB. Although some have found positive results, there is no pattern in the starting point, number and time of the sections and a form to measure the MBB, which causes the need of benefits identified in an isolated form should be considered

carefully and therefore, the need of comprehensive scientific confirmation. Moreover, this strategy still presents resistance being added to the practice of caring and the neonatal routine unit, mainly by the nursery team, due to the lack of knowledge and awareness. Therefore, the common and comparative evaluation of the existing scientific studies provides a better dimension on the effects of the KM on the MBB and, consequently, a more effective use of it in the caring services for the pregnant women and NB.¹¹⁻¹³

In this regard, the aim of this study is to stimulate the effect of the practice of the KM in the formation and strengthening of the MBB in the first year of life, when compared to the ones that did not adhere this practice.

Methods

The following study is a systematic review of the literature based on the analysis of articles published on scientific magazines, having its last update in August, 2021.

The method used followed the Preferred Reporting Items for Systematic Reviews and MetaAnalyse¹⁴ (PRISMA) recommendations. The searches were made with no languages and date limitation, on the United States National Library of Medicine (PubMed),¹⁵ Scientific Electronic Library Online (SciELO)¹⁶ and Web of Science¹⁷ databases.

To define the research issue, to guide the investigation on the articles and to define the incorporation criteria, PICOS strategy was used: (P) the participants have been decided to be the mother-baby paring (MBP), in the first year of life; (I) the intervention studied was the practice of KM; (C) the MBP adhered the KM were compared to the ones that did not; (O) the chosen outcome was the MBB; and (S) original studies with no limitation to the design types (experimental or observational) or to the data analysis method (quantitative or qualitative).

The exclusion criteria were: (1) duplicity between bases; (2) being literature review, letter to the editor or case report; (3) duplicity between searches; (4) do not show scientific content to answer the questions of the present research; and (5) low methodological quality according to the evaluative tools used.

On the identification stage, three independent searches have been made and reproduced at the three databases, leading to nine researches. The subject descriptors and the Boolean operator used at this stage were: (1) "Kangaroo-mother care method" (and) "Mother-child relations"; (2) "Kangaroo-mother care method" (and) "Bonding"; and (3) "Kangaroo-mother care method" (and) "Attachment". The keywords were chosen checking the Health Science Descriptors (MeSH), which were searched in all fields. The descriptors "bonding" and "attachment" did not show results at MeSH, but were added due to the frequent use

of these words when referring to the MBB by the authors of the articles about the theme. As the descriptors as the additional words have been used in three languages: English, Portuguese and Spanish. Specifically on PubMed, “entry terms” were not used on the searches. Besides, the searches on the gray literature were not done.

On the selection stage, a methodological assessment was done, which included the definition of the study design and, on the eligibility stage, the existence of interest content was identified. The studies selected on the inclusion stage were put through a methodological quality assessment using the scales (1) Joanna Briggs Institute (JBI) for Qualitative Studies – qualitative studies; (2) Newcastle-Ottawa Scale – cohort study; (3) Newcastle-Ottawa Quality Assessment Scale – cross-sectional study; (4) RoB 2.0 Revised tool for Assessing Risk of Bias in randomized trials – randomized clinical trial; (5) RoBINS I Risk of Bias In Non-randomized Studies of Interventions tool – non-randomized clinical trial.

These stages were performed by two examiners, who interfered independently to exclude studies that were not original, did not bring information related to the research subject or did not meet the methodological requirements described respectively by the assessment scales. The disagreements between the examiners were discussed and solved on the presence of a third investigator.

As an additional strategy in finding studies, the references mentioned on the selected articles on the inclusion stage were analyzed according to the method and content, applying the same criteria adopted in the selection and eligibility stages.

Finally, the results on the analysis on the association between the KM and the MBB were extracted from the articles included in the final stage of selection, after reading the articles completely and identifying the information of interest in the present study. These results were interpreted and compared according to the proposed intervention, the design and the estimated effect intensity.

Results

Figure illustrates the flow chart on the four stages of the selection process (identification, selection, eligibility and inclusion) of the 28 trials on KM and MBB were included in this review.

On the identification stage, 280 studies were found. Eleven of them were excluded due to duplicity between the three databases. In the selection stage, the methodological criteria of the other 269 articles were assessed, which lead to the exclusion of 105 articles which were literature reviews, letters to the editor or case report (Figure 1).

Therefore, on the eligibility stage, the 164 remaining studies were submitted to a critical reading, with a full assessment of their content. Of these, 143 did not study

the association between the practice the KM and the MBB and were excluded, ending up with 21 articles, which were selected in this stage. In addition, the 657 mentioned references on the 21 articles selected on the inclusion stage were analyzed according to method and content, which led to the inclusion of seven other studies that presented the answer to the research question, rising the selection of 28 studies (Figure 1).

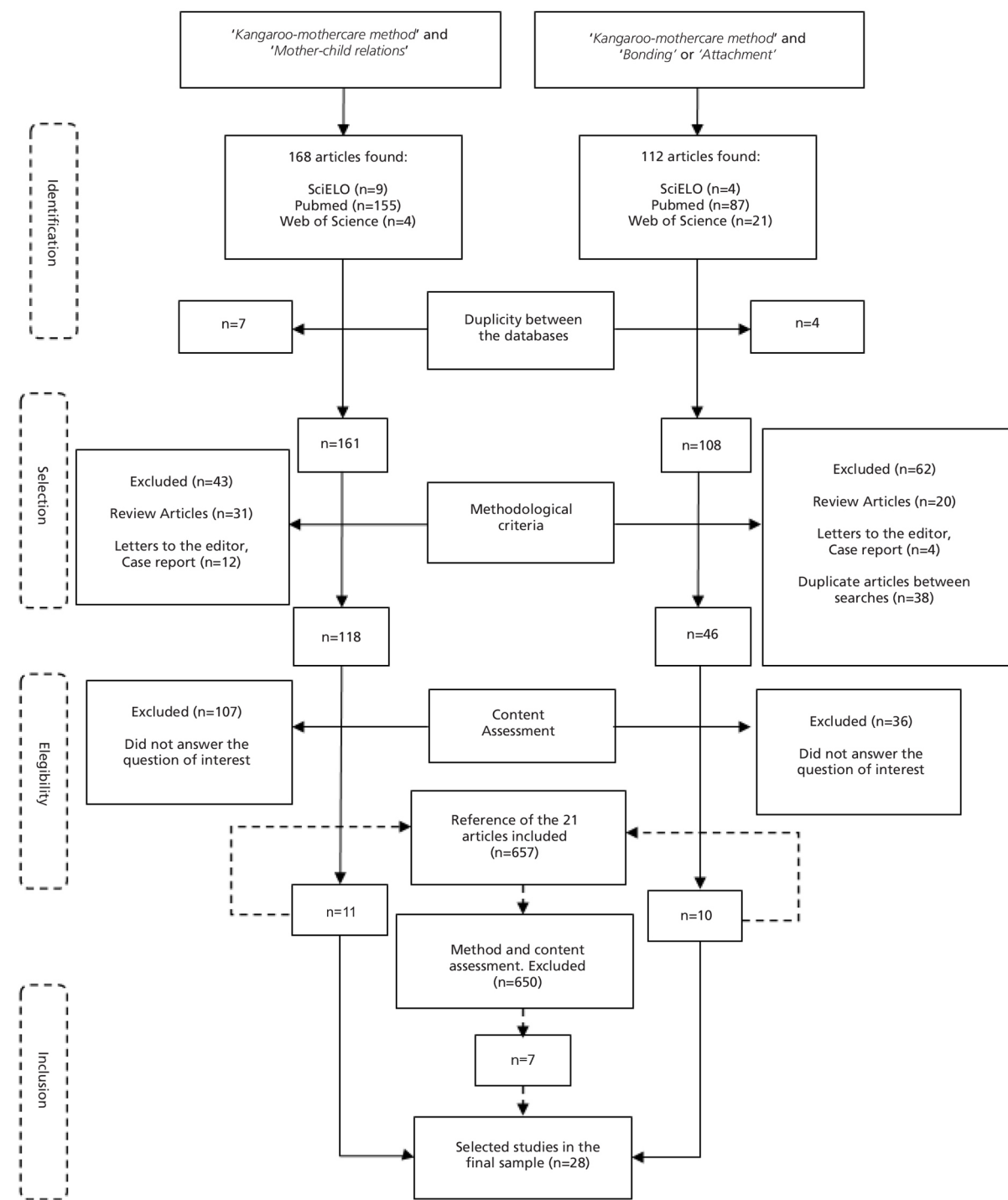
Among the 28 selected articles, 13 were qualitative (Table 1) and 15 quantitative (Table 2), five were randomized clinical trials, four non-randomized clinical trial, five cohort studies and one cross-sectional. According to the methodological criteria on quality assessment, all the qualitative studies were classified as “include”, all the cohorts and cross-sectional studies were classified as “low risk” and the randomized and non-randomized clinical trials presented low risk of bias. Thus, as they were all methodologically well classified, none of the 28 studies were excluded from the present review.

The selected studies were mainly developed in developing countries (60.7%), approximately 2/3 were published in the last ten years and nine (32.1%) received financing from institutions on distinct research support: The Health Care Delivery Initiative at the Abdul Latif Jameel Poverty Action Lab at MIT (JPAL-MIT);¹⁹ Aase and Ejnar Danielsen Foundation²⁰; Natusan and The Legacy for Medical Research at the Ostfold Hospital Trust, Fredrikstad²⁴; *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES)*;²⁶ National Service Research Award by the National Institute of Nursing Research, National Institutes of Health;²⁹ Center for Mental Health Promotion of New York and Vicerrectoría Académica;³⁴ Grand Challenges Canada, Research Council of Norway (RCN), Centers of Excellence Scheme and University of Bergen through funding to the Centre for Intervention Science in Maternal and Child Health (CISMAC);³⁸ National Research Foundation of Korea and Hallym University Research Fund;³⁹ COLCIENCIAS (Colombian government).⁴⁵

The selected studies are heterogeneous in terms of the methods used. Groups of newborns in different gestational age were assessed, mostly premature babies (gestational age inferior to 37 weeks). The effect of the KM was tested not only at the hospital environment, but also at the residence and the number of sections were also diverse (one daily section, daily during the whole hospitalization or every day at home). Besides that, the duration period of each section varied from one to 24 hours. The studied outcomes that represented the MBB were: behavior and reactions of the MBP and attachment, opinion, feelings, experience and maternal perception on the MBB.

All the qualitative studies used different ways to identify the existence and intensity of the MBB. Five different analysis techniques were applied: inductive,

Figure 1
Study selection process on the Kangaroo Method and the mother-baby bond.



thematic, phenomenological, theory-based data and convergent care. Independently of the tool used, all of them found benefits from the KM on the studied outcomes (Table 1).

All the qualitative articles and most of the quantitative (n=11) pointed out that the KM has positive formation and strengthening of the MBB. The others quantitative studies did not show significant statistical differences when comparing between the groups. None of the 28

studies found unfavorable effects caused by the practice of the KM on the MBB.

The qualitative studies showed as a predominant result that most mothers feel closer to their babies. Independently of the technique used on the data analysis, all the articles pointed out that mothers believed that the KM promoted and increased the MBB and helped affection exchange during and after the hospitalization. Furthermore, the effectiveness of the KM linking to the

Table 1

Author (year)	Methodology				Results
	Country	Sample	Intervention	Outcome	
Lewis <i>et al.</i> ¹⁹ (2019)	USA	n=20 MBP (GA 30-37 wks)	KM on H	Maternal experiences (SEI on HD)	I 75% of the mothers felt closer to the baby
Maastrup <i>et al.</i> ²⁰ (2017)	Denmark	n=13 MBP (GA <28 wks)	1 sec KM on H	Maternal opinion (SEI)	I Mothers pointed out the SSC is essential for the formation of the MBB
Flicking <i>et al.</i> ¹⁰ (2016)	Europe MuC	n=23 MBP (GA <37 wks)	KM on H	Maternal experience (OI on H)	T Mothers affirmed that the KM has promoted the MBB
Hagen <i>et al.</i> ²¹ (2016)	Norway	n=8 MBP (GA <32 wks)	KM on H	Maternal experiences (SEI 1 and 6 months after H)	P Mothers affirmed that the KM was more effective than holding on the strengthening of the MBB
Cooper <i>et al.</i> ²² (2014)	USA	n=50 MBP (GA 26-35 wks)	KM 1sec 1h/d for 6d + EI	Opinions and feelings (Mother registers on H)	TB Mothers reported feeling a stronger MBB "during" KM
Borck ²³ (2012)	Brazil	n=6 MBP (GA <37 wks)	KM during and after H	Maternal opinion (SEI after HD)	CC Most mothers affirmed that the KM helped with the affection
Dalbye <i>et al.</i> ²⁴ (2011)	Europe MuC	n=20 MBP (GA 37-41 wks)	KM on H and after HD	Maternal experiences (OI 1wkpostpartum)	P Mothers affirmed that the KM increased the MBB
Arivabene e Tyrrell ²⁵ (2010)	Brazil	n=13 MBP (GA <37 wks)	KM on H and after HD	Maternal experiences (OI with FG after HD)	T Mothers affirmed that the KM increased the MBB
Guimarães e Monticelli ²⁶ (2007)	Brazil	n=3 MBP (GA <37 wks)	KM on H	Maternal opinion (OI on H)	CC Mothers affirmed that the KM promotes the MBB during H
Johnson ²⁷ (2007)	USA	n=18 MBP (XGA 28,8 wks)	KM 1 sec of 1h/d for 3d	Maternal opinions and feelings (OI)	T Mothers reported the increase of attachment and connection with the baby
Flicking <i>et al.</i> ²⁸ (2006)	Sweden	n=23 MBP (GA <32 wks)	KM on H	Maternal opinion (SEI after 2 wks of HD)	TB Mothers affirmed that the KM increased the MBB
Roller ²⁹ (2005)	USA	n=10 MBP (GA 32-36 wks)	KM on H	Maternal experiences (OI on H)	P Mothers affirm that the KM is more effective than B to the MBB
Neu ³⁰ (1999)	USA	n=8 MBP (XGA 27,2 wks)	KM 2 sec (1h)	Maternal opinion (OI on H and after 4 m)	T Most of the mothers affirmed that the KM increased the MBB

USA = United States of America; MBP = Mother-baby pairing; GA = Gestational age; wks = Weeks; KMCM = Kangaroo-mother care method; H = Hospitalization; SEI = Semi structured interview; HD = Hospital discharge; I = Inductive; SSC = Skin to skin contact; MBB = mother-baby bond; MuC = Multicenter; OI = Open interview; T = Thematic; P = Phenomenological; sec. Sections: h = Hours; d = Days; EI = Educational intervention; TB = Theory-based; CC = Convergent care; X = average; B = Breastfeeding.

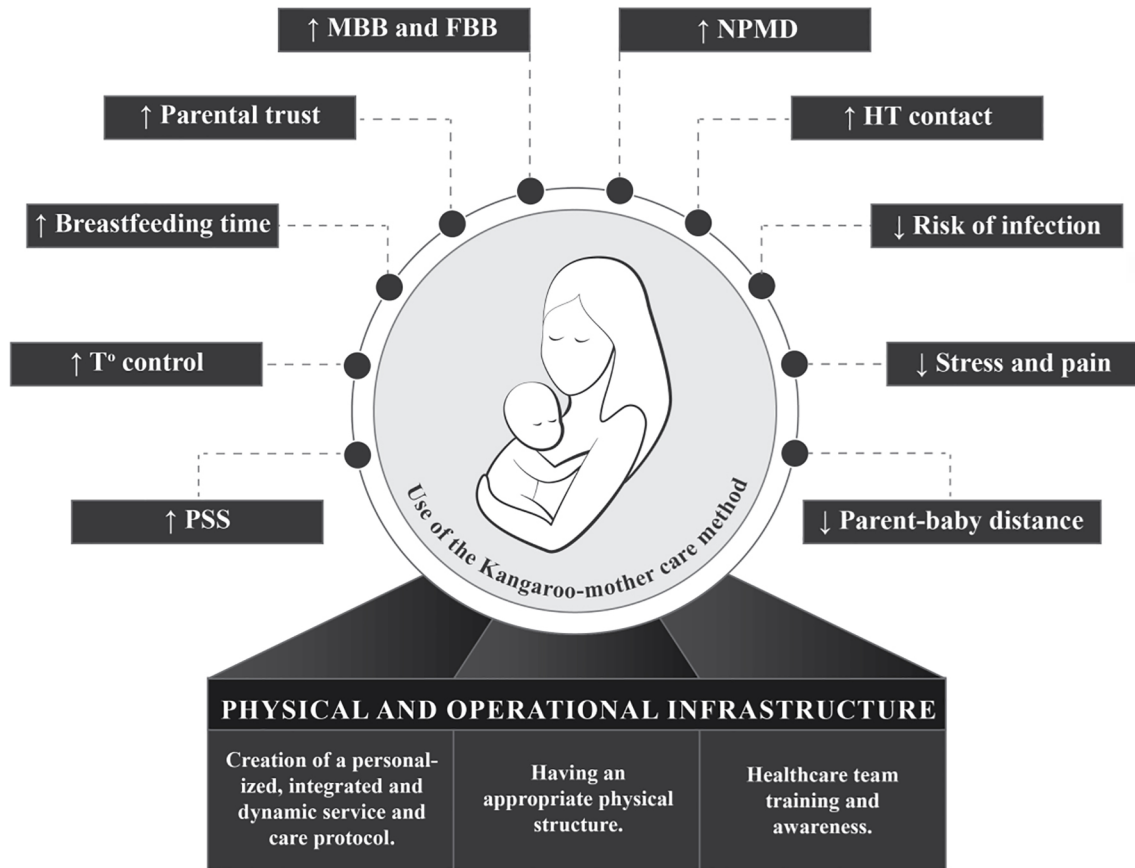
Table 2
Quantitative studies on the Kangaroo method and the creation of the mother-baby bond selected by the searching process on the databases.

Author (year)	Methodology			Results
	Design	Sample	Kangaroo Strategy	
Cho e Jeong ³¹ (2021)	Co South Korea	n=101 MBP2 MT: 14 d during H	KM \bar{X} 58min/d	Mother perception over the MBB (MAS)
Kurt et al. ³² (2020)	RCT Turkey	n=60 MBP (GA <37 wks) x CG 30	KM5 sec. 1h/d for 5d	Mother perception over the MBB (MAS)
Taneja et al. ³³ (2020)	RCT India	n=552 MBP (BW 1500-2250g)2IG 276 x CG 276	EI: KM + EB until 28 d of life	Mother perception of herself and her baby (PHQ-9)
Nuneset al. ³⁴ (2017)	Co Brazil	n=32 MBP (GA 28-32 wks) FP: H	Total KM time on H	MBP interaction on the HD (Film) (POIMB 0-6)
Cho et al. ³⁵ (2016)	CT South Korea	n=40 MBP (GA 33-37 wks) x CG 20	KM 30min 3x/wk (10 wks)	Maternal perception over the MBB (MIA)
Kritzinger and Rooyen ³⁶ (2014)	RCT South Africa	n=30 MBP (GA <37 wks) IG1 10 x IG2 10 x CG 10	IG1: 1 sec KM+EI IG2: 1 sec KM	Mother and baby's reaction (Film) (KB)
Muudduet al. ³⁷ (2013)	Co India	n=46 MBP (GA 28-37 wks)	KM for 1h 1 sec	Maternal perception (Interview)
Ahn et al. ³⁸ (2010)	CT South Korea	n=20 MBP (GA < 36 wks) x CG 30	KM for 1h 10 sec in 3 wks	Maternal attachment (MA) (Interview)
Carbonell et al. ³⁹ (2010)	Controlled Co Colombia	n=94 MBP (TM) (GA>30 wks) KMG 49 x CG 44	KMG: PT+, LBW+ KM in H (does not describe the number of sec) CG: PTNB	MBP behavior (MBQS at 3mCAG) (EQCTM at 7m)
Jang e Young ⁴⁰ (2009)	CT South Korea	n=53 MBP (GA<35 wks) IG 24 x CG 29	KM for 1h 10 sec - 3sec/wk	Maternal attachment (MA) (interview)
Parmar et al. ⁴¹ (2009)	T India	n=135 MBP (GA 26-37 wks)	KM 4h/d at least on the H (\bar{X} 7 d)	Maternal opinion (KM/Q)
Gathwala et al. ⁴² (2008)	RCT India	n=100 MBP (BW<1800g) IG 50 x CG 50	KMfor at least 6h/d on H 4 sec	MBP behavior (ASFU 3mCAG)
Ortiz et al. ⁴³ (2006)	Controlled Co Colombia	n=40 MBP LSL KMG1 10 x KMG2 10 x CG1 10 x CG2 10	KMG1: PT+TM+KM KMG2: PT+KM GC1: PTNB+TM GC2: 10 PTNB	MBP behavior at home Attachment Q-sort
Tallandini and Scalembra ⁴⁴ (2006)	CT Italy	n=40 MBP (BW<1800g) IG 19 x CG 21	KM 1h/d (during H) (\bar{X} 24,4d)	MBP behavior (Film) (NCAFS)
Tessier et al. ⁴⁵ (1998)	RCT Colombia	n=488 MBP 2 (BW<2001g \bar{X} GA=33wks) IG 246 x CG 242	MC 24h/d (around 3 wks during H)	MBP behavior (Film with 1 wk CI) (NCAFS)

Co = Cohort; MBP = Mother-baby pairing; 2 = Newborns that overcome all extra-uterine life problems; MT = Monitoring time; d = Days; H = Hospitalization; KM = Kangaroo method; \bar{X} = Average; min = Minutes; MBB = Mother-baby bond; RCT = Randomized clinical trial; GA = Gestational age; wks = Weeks; IG = Intervention group; CG = Control group; sec = Sections; h = Hours; BW = birth weight; g = Grams; EI = Educational intervention; EB = exclusive breastfeeding; FP = Follow-up period; H = Hospitalization; HD = Hospital discharge; r = Pearson's lineal coefficient (=0 the variables are not linearly correlated, >0 there is a positive linear relation, <0 there is a negative linear relation); CT = clinical trial; NB = Newborn; CI = Confidence interval; TM = Teenage mother; KMG = Kangaroo-mother group; PT = Premature; LBW = Low birth weight; PTNB = Preterm newborn; m = months; Cag = corrected age; T = transversal; LSL = Low social-economic level. Measurement tools/scales: MAS = Maternal Attachment Scale, interview points vary from 26 to 104; PHQ-9 = Patient Health Questionnaire, 9 items; interview, points vary from 0 to 90; POIMB 0-6 = Protocolo de interaçãomãe-bebê 0 to 6 months, points vary from 20 to 100 (20 behavior items); MIA = maternal-infant attachment, attachment survey, points vary from 24 to 120 (24 items); KB = Klein and Briggs (punctuation to 10 questions classified as: (1) rarely or never, (2) sometimes, (3) frequently and (4) ideal frequency according to the interaction observed between the MBP; MA = Mother attachment survey, points vary from 23 to 92; MBQS = Maternal behavior scale observational instrument with 90 items; EQCTM = Mother Behavior Qualitative Scale, divided into 11 subscales, points vary from 1 to 7 each; KM/Q = Maternal opinion on the KM with 15 questions (no way, no, I'm not sure, yes, a lot); ASFU = Attachment Score at Follow Up, structured interview with 9 items, points vary from 0 to 2 each; Q-sort = Paired observation instrument-describes the natural environment and the MBP behavior (average applied at 21 months old); NCAFS = Nursing Child Assessment Feeding Scale, 76 binary items divided into 6 subscales.

Figure 2

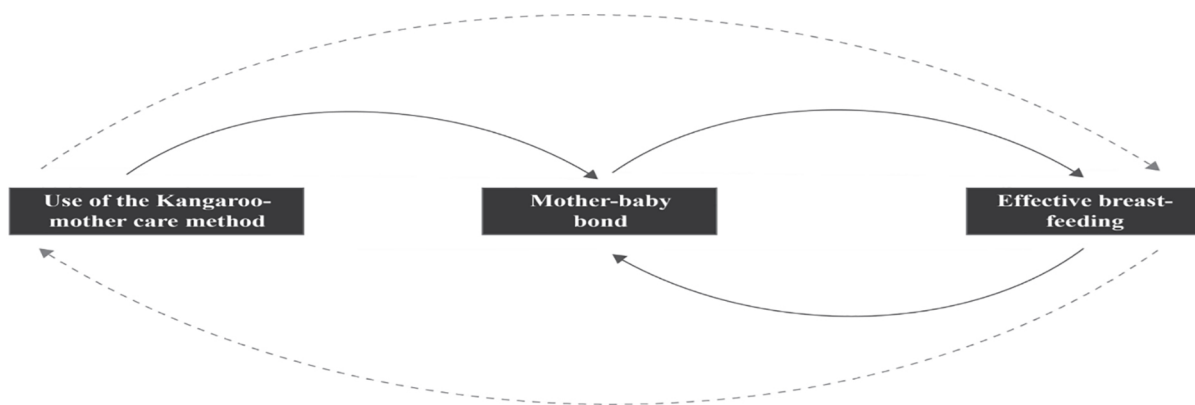
The minimum physical and operational infrastructure to practice the KM at the hospital environment and its potential benefits to newborns, breastfeeding women and their families.



MBB = Mother-baby bond; FBB = Father-baby bond; To = Temperature; PSS = Protective sensorial stimulation; NPMD = Neuro psycho motor development; HT = Healthcare team.

Figure 3

Virtuous cycle relating to the practice of the Kangaroo method, the mother-baby bond and effective breastfeeding.



MBP was considered superior to the conventional holding by one of the trials²¹ and to basic breastfeeding by another²⁹ (Table 1).

The cohort studies, which evaluated the effects of KM on preterm newborns (PTNB) in comparison to newborn at term did not practice this section did not find

statistically significant differences on the MBP behavior between groups.^{39,43} Two clinical trials using the Nursing Child Assessment Feeding Scale to measure the MBB during hospitalization, differing from the KM using time, identified that carrying the baby in the kangaroo position during an hour a day was more positive on the formation

of the MBB than 24 hours per day. Another finding was observed by a clinical trial that the association between the KM with educative interventions benefits the formation of the MBB³⁶ (Table 2).

The Tables 1 and 2 describe the characteristic of the 28 selected studies, showing its respective authors, publication year, study design, country of origin, interventions made, studied outcomes and obtained results.

Discussion

The performance of the KM was identified as positive to the presence and strengthening of the MBB by most of the studies and none of them showed unfavorable effects on this subject resulting from its practice of bonding mother with her child. The number of quantitative studies was similar to the qualitative ones. Both designs were performed predominantly at the hospital and the number, the duration and frequency of the sections were variable. The MBB were measured in 4 ways: (1) MBP behavior and (2) opinion, (3) experience and (4) maternal perception.

The KM was created in Colombia in 1978 with the aim of overcoming the shortage of incubators and reduce the high hospital infection rate, which were caused by overcrowding of the neonatal services.⁴⁶ The kangaroo position consists of keeping the newborn in skin to skin contact to their parents in vertical position, wearing nothing but diapers, for the minimal necessary time to comfort (clinical stabilization) the newborn, with indefinite maximum time.

Although it is possible to practice the KM at home, it is recommended the presence of a physical and operational infrastructure that comply with the Brazilian Health Ministry norms for a hospital unit should be considered capable of practicing the KM. The intention of this standardization is to guarantee a holistic, personalized, dynamic and good quality care, integrated to basic care, in order to minimize the health risks and to offer the necessary support to the newborn and the development of his/her family, optimizing all the benefits that the method could bring, making it easier to establish and have an affective bond between the parents and the baby. The basic physical and operational infrastructure to practice the KM at the hospital and its possible benefits for the newborns, breastfeeding women and their families are shown in Figure 2.^{7,47}

After birth, the newborn receives multiple external stimulations, which are new and possibly disturbing and stressful.⁸ In this context, the touch and cuddling, resulting from safe and early contact (during the first hour of life), potentially help on the extrauterine adaptations and, consequently, provide better conditions to the newborn's healthy development.⁹

The most significant proximity between the mothers and their babies was reported on the qualitative studies, possibly occurred due to the direct contact of most of the newborn's skin and their mother's. This contact promotes the exchange of heat, coziness, better perception of respiratory and cardiac movements, eye contact and the perception of smells between the mother and newborn. This greater interaction has the power of bringing them closer together.^{7,48} In fact, qualitative studies, which intend to listen and understand experiences and personal feelings, help people to express their deepest emotions.⁴⁹ In this MBB context, the maternal perspective and the recognition of these emotions are very important, once the way the mother sees her newborn and their existing relationship impact the establishment of this bond.⁴⁸

Specifically, the fact that the KM may be pointed out as more beneficial to the MBB than breastfeeding could be explained by the possibility of breastfeeding generates some negative experiences for the mother, as a result of pain while breastfeeding and the uncertainty of providing the right amount of milk.⁵⁰ On the other hand, the KM tends to be more joyful and peaceful, because normally it is performed in a relaxing context and with the exclusive intention of narrowing the affective bonds, demanding no action besides keeping the baby close to her body.⁷

An integrative literature review regarding the impact of the KM on maternal breastfeeding has shown that the KM increases the interaction between the mother and baby, helping on the breastfeeding. Besides that, it narrows the MBB, which influences the maternal milk production and the desire to exclusively breastfeed.⁵¹ This finding points out a formation of a virtuous cycle, in which the effective breastfeeding resulting from the practice of the KM can be direct, but mainly goes through the existence of the MBB, bringing the MBP closer together, generating a bigger maternal self-confidence and in favor of the maternal infant health (Figure 3).

Although the KM was developed to assist the necessities of the PTNB and LBW,^{7,46} the benefits for the formation of the MBB were found by some studies independently on the gestational age and birth weight. These findings corroborate to the idea that regardless of the child's current or past situation, the direct body contact arouses positive feelings of love, well-being and bond involving both.^{24,31} When comparing preterm newborns that performed the KM and the newborn at term that did not perform the KM, found that there was no significant difference, indicating that the KM minimized the difficulty in forming the MBB inherent to the unfavorable impact of prematurity over it.³

About the duration to perform the kangaroo position, it was possible to analyze that, when practiced uninterruptedly, the mothers had a social isolation feeling, due to the time spent at the hospital, which could

have limited the emotional factor when establishing the bond, once the mother does not feel fully supported and, consequently, have difficulty in giving herself to the moment of exchanging feelings with her newborn during all day.⁴⁵

Besides this situation, other factors have been pointed out as things that make the MBP connection harder: the stress caused by the premature childbirth, the distortion between the ideal baby and the real baby, the sense of guilt due to the baby's current health condition, the physical recovery from the postpartum and the fear of hurting the baby when holding or taking him/her from the incubator.¹⁹ For the benefit of the KM to be fully noticed, it is essential that it is not practiced as an obligation, but as a result of pleasure for both.⁷ In case of a long-term hospitalization of the NB, it must be clear to the mother that her stay at the hospital, despite being very important, is not mandatory and it is the assistance team to evaluate the benefits and also offering accommodation and appropriate emotional support, so that the mother could stay next to her child emotionally balanced for as long as possible.⁷

The KM can have its benefits widen when performed holistically, considering the MBP on multiple caring angles. It is important that the NB's parents are aware of the aims, the advantages and the correct way of performing the kangaroo position, providing the mothers the best conditions in care to the NB, bringing safety to the care and increasing the use of the technique. In addition, comprehending the method makes the benefits more visible, due to the awareness to seek for on the improvement signs of the baby, inherent to the care method.⁵² Following this, the nursing team has a very important role on the formation of maternal security, once encouraging them to proceed with the KM based on the ability, trust and acquired knowledge.⁵³

This present study performed a wide and systematical search of articles in a referred database in the health area using no filters. This broad strategy, which permitted the inclusion of different outlines, potentially provided a meeting of the main existing information about the theme. On the other hand, different and diverse methodologies were identified among the studies (sample characteristics, intervention types, measurement tools, forms of analysis and outcomes chosen to define the MBB). These differences may have interfered on the comparability and interpretation of the results of this present study, even though no negative effect on the practice of the KM have been evidenced.

Despite of the multifactorial characteristic established of the MBB, which includes a desired pregnancy,⁵⁴ normal labor childbirth,⁵⁵ the skin to skin contact on the first hours of the baby's life⁵⁶ and the existence of a family support network,⁵⁷ the results found show that the KM

strengthen the MBB or, at least, does not make it difficult in its formation.

In this context, besides the multiple benefits already attributed in the practice of KM given by the scientific literature, the results of this review reinforce the hypothesis that this strategy helps the formation and the strengthening of the MBB independently of the location, the weight and the gestational age of the NB. Thus, the incentive to implement this biopsychosocial intervention of qualified and humanized care is recommended for the promotion of the child's health in both hospital and home environments. Although, different methods were used such as time, location, number and the duration of sections should be future research subjects to define the best application of the KM.

Author's contribution

Caetano C: Conception, writing, collecting and dataanalyzing. Pereira BB: collecting and dataanalyzing. Konstantyner T: conception, writing, collecting and dataanalyzing and critical review. All authors have approved the final version of the article. The authors declare no conflict of interest.

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