

Factors associated with skin-to-skin contact less than 180 min/day in newborns weighing up to 1,800 g: multicenter study

Fatores associados ao contato pele a pele inferior a 180 min/dia em recém-nascidos com peso até 1.800 g: estudo multicêntrico

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Abstract *This article aims to evaluate the factors associated with a skin-to-skin contact time <180 min/day in newborns weighing up to 1,800 g during neonatal hospitalization. Prospective observational cohort study conducted in neonatal units of reference for the Kangaroo Method in Brazil. Data from 405 dyads (mother/child) were analyzed from May 2018 to March 2020. Maternal and neonatal explanatory variables were collected from medical records and interviews. Skin-to-skin contact was recorded in forms posted at the bedside, filled out by parents and staff. The outcome variable was the mean time of skin-to-skin contact < 180 min/day. Hierarchical modeling was performed by Poisson regression with robust variance. The variables associated with the outcome were “without easy access to the hospital”, “without previous knowledge of the kangaroo method” and “having had morbidities during pregnancy”. Mothers without easy access to the hospital and who are unaware of the kangaroo method should be priority targets for health policies to develop strategies that promote greater exposure to skin-to-skin contact during the hospitalization period of their children.*

Key words Kangaroo method, Low birth weight newborn, Neonatal units

Resumo *O objetivo deste artigo é avaliar os fatores associados ao tempo de contato pele a pele < 180 min/dia em recém-nascidos com peso até 1.800 g durante a internação neonatal. Estudo observacional tipo coorte prospectivo conduzido em unidades neonatais de referência no Brasil. Foram analisados dados de 405 díades (mãe/filho), no período de maio de 2018 a março de 2020. As características da mãe e do recém-nascido foram coletadas em prontuários e entrevistas, a realização do contato pele-a-pele era registrada em fichas anexadas ao leito, preenchidas pela equipe e pelos pais. A variável desfecho foi o tempo médio diário de contato pele-a-pele inferior a 180 minutos. Foi realizada modelagem hierarquizada utilizando a regressão de Poisson com variância robusta para cálculo das razões de prevalência. As variáveis que permaneceram independentemente associadas foram: “não ter fácil acesso ao hospital” (morar longe ou ter dificuldade de transporte), “não possuir conhecimento prévio sobre o método canguru” e “ter apresentado morbidades durante a gestação”. Mães sem fácil acesso ao hospital e que desconhecem o método canguru devem ser alvos prioritários das políticas de saúde para desenvolver estratégias que promovam maior exposição ao contato pele a pele durante o período de internação de seus filhos.*

Palavras-chave Método Canguru, Recém-nascido de baixo peso, Unidades neonatais

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Introduction

Skin-to-skin contact (SSC) allows an exchange of body sensations between mother and child that help control all different parts of the physiology of the newborn (NB), favoring its regulation¹. When the mother provides this regulation through her own body, the NB will use this energy for its neurodevelopment, which favors better neonatal results^{2,3}.

Studies have confirmed the benefits of SSC in low birth weight NBs, such as the reduction of nosocomial infections⁴⁻⁶, greater weight gain⁷, reduction of stress levels⁸, in addition to promoting breastfeeding⁹⁻¹¹. Systematic reviews and multicenter studies corroborate the results of the SSC in the reduction of neonatal morbidity and mortality¹²⁻¹⁵.

However, few articles attempt to clarify the elements involved regarding the duration of SSC. What influences or determines whether a mother or father will spend more or less time with their child in this position? Studies have described facilitators and barriers to the adherence to SSC^{16,17}, but there is still a need to investigate the factors related to the quantity of time spent performing SSC.

Fear of touching the newborn, maternal/paternal stress, issues with the high-tech environment, and insufficient space and privacy are some of the barriers reported in the literature¹⁸. Other studies have highlighted low income, the existence of other young children, little or no social support, and transportation problems¹⁹⁻²¹ as complicating factors.

The literature does not establish a relationship between the factors described above and the time of exposure to SSC. It is worth pointing out that the lack of consensus as to the ideal time may be one of the reasons for this gap.

A study conducted in France²², with a sample of preterm NBs, observed an association with a reduction in late infections and better rates of breastfeeding at hospital discharge, with the daily SSC of $\geq 3\text{h}$ (180 min). These same positive results were observed in a study in Ukraine⁵ among the preterm NBs that also performed SSC $\geq 3\text{h/day}$. A Brazilian study also demonstrated association with exclusive breastfeeding at hospital discharge in preterm NBs that received more than 149.6 min/day¹⁰ of SSC.

The Brazilian standard recommends that SSC lasts at least 60 minutes at a time²³, but there is no recommendation on the total daily time to which the NB should be exposed. Based on the studies cited, it can be considered that perform-

ing SSC at least three times, totaling 180 minutes/day, constitutes a reasonable minimum goal to be achieved in the country's health services, and on the other hand, knowing the associated factors which make this daily time impossible an important issue to be clarified for its use in public health policies.

Thus, the aim of this article was to identify and analyze the factors associated with skin-to-skin contact exposure of less than 180 min/day in newborns with birth weights of up to 1,800g, during hospitalization in neonatal units.

Methods

This is an observational study of the prospective cohort type that is part of a multicenter research entitled "Effect of exposure time to skin-to-skin contact on clinical outcomes in low-birth-weight newborns". Five reference units for the kangaroo method in various regions of Brazil participated in this research, two from the Northeast, two from the Southeast and one from the South. Data collection was conducted from May 2018 to March 2020 after approval by the Ethics Committee (CAAE no. 83803817.0.1001.5086). Parents who accepted participation signed the Free and Informed Consent Term.

The health centers of the study are a reference for the teaching and practice of the kangaroo method in Brazil and where the care of newborns is addressed in 3 stages: the first stage is the hospitalization in the Neonatal Intensive Care Unit (NICU) and conventional intermediate care unit; the second stage in the Kangaroo Intermediate Care Unit and the third stage in the outpatient clinic after discharge, until the NB reaches a weight of at least 2,500g. Thus, they adopt the criterion of progressive care. All newborns in the study were followed up from hospitalization until discharge, passing through these sectors of the Neonatal Unit. Therefore, the protocol for performing SSC in the studied centers was based on the same ordinance of the Ministry of Health, which regulates the Kangaroo Method in Brazil²³.

All live births in these institutions during the study period that met the following criteria were considered eligible: single delivery, birth weight up to 1,800g, no malformations, severe perinatal asphyxia, or genetic syndromes. Non-inclusion and exclusion criteria, as well as losses, are detailed in the sample flowchart (Figure 1).

Although the WHO recommends the practice of SSC with the father, mother and other

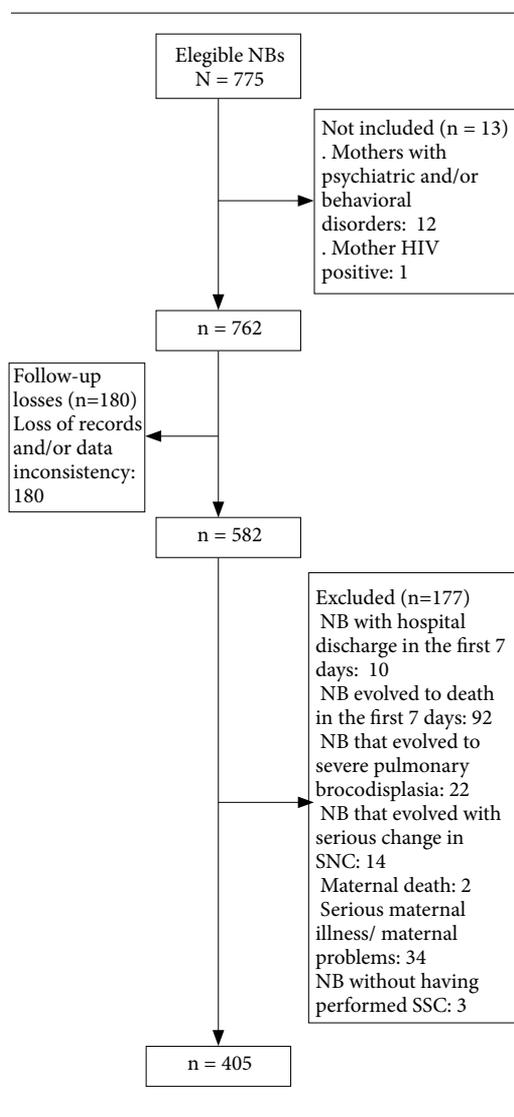


Figure 1. Flow chart of sample.

Source: Authors.

responsible family members of the NB²⁴, the Brazilian standard recommends that this contact is preferably with the parents²³. In special cases, such as maternal death, another person may be chosen for this function, however this outcome was a criterion for exclusion of the study. Thus, SSC was only performed by the mother or father of the NB. However, paternal participation in the performance of SSC was minimal in this study (median of 35 minutes during the total hospitalization period, while the mothers performed a median of 2,296 minutes). Therefore, only maternal characteristics were used for the model in the statistical analysis.

The SSC was recorded on cards attached to the bed, which were filled out by the health team and the parents, who were also encouraged to take notes. The start time, the end time, and the period of the day of each SSC were recorded on this card, as well as who performed the contact (mother or father). These records were checked daily by previously trained assistant researchers, who contacted the parents and professionals and consolidated the data on a specific form. The average time of SSC per day was calculated by dividing the total time (minutes) during hospitalization by the number of days this contact was made.

For the purpose of analysis, the average outcome variable of daily exposure time of the newborn to SSC was transformed into two categories: time < 180 minutes (low time) and time \geq 180 minutes (adequate time). This cutoff point was based on previous studies that investigated the effect of SSC exposure time on neonatal outcomes, showing favorable results with a time greater than 180 minutes/day^{5,10,22}. The sample size calculation was based on a risk difference between exposed and unexposed of 13%, 95% confidence level (CI), and 80% power. The final number needed was 342 individuals.

The option of not including the studied health centers as independent variables was because the factors investigated as hindering the minimum daily SSC time are not directly related to the hospitalization location of the NB.

The independent variables were grouped into four hierarchical levels based on previous studies in the literature according to Figure 2^{25,26}.

The distal block was composed of socioeconomic and demographic variables: maternal education (No education; Elementary school; High school; Higher education); Having a religion (Yes; No); Economic classification according to the Brazil Economic Classification Criterion: (A/B; C; D/E); Maternal age in years (< 20; 20 to 34; \geq 35); having easy access to the hospital (living near the hospital or having adequate transport conditions to go to the hospital) (Yes; No); Having a partner (Yes; No); Maternal color (White; Black and Brown; Other).

Intermediate block I was composed of characteristics of reproductive history and maternal experience with SSC: Parity (Primipara; Multipara); Previous child with low birth weight (Yes; No); Knowledge about SSC (Yes; No).

Intermediate block II included variables related to maternal health and prenatal care: Pregnancy morbidities (Yes; No), considering the oc-

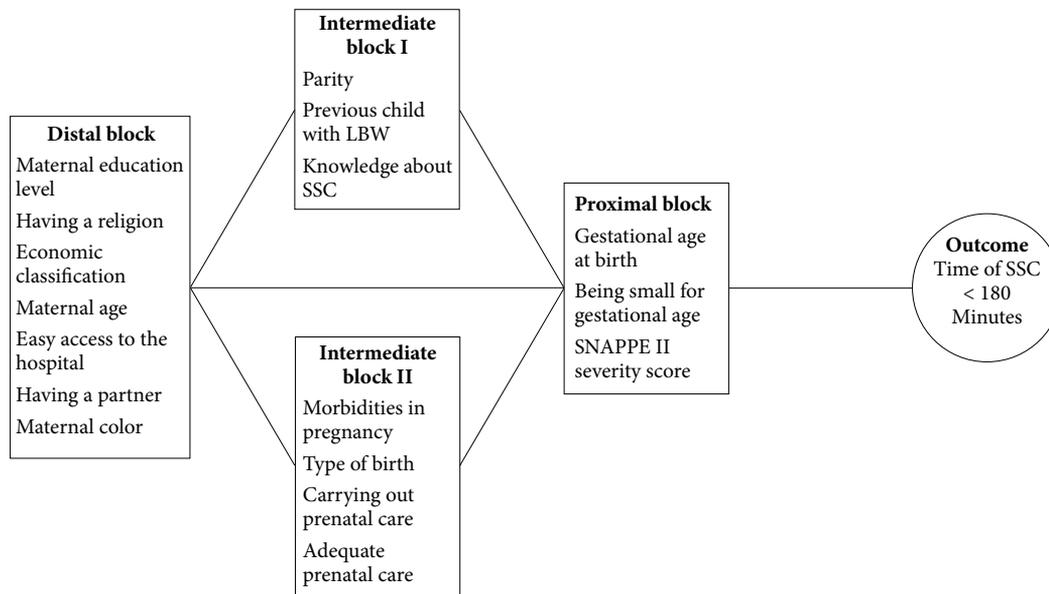


Figure 2. Theoretical model of the hierarchy among the variables studied.

Source: Authors.

currence of hypertensive disorders in pregnancy and/or gestational diabetes mellitus²⁷; type of delivery (vaginal; cesarean); prenatal care (Yes; No); adequate prenatal care (Yes; No). The adequacy of prenatal care was established based on an adaptation of the study by Goudard *et al.* (2016), adopting the following classification: if the beginning of the first consultation occurred until the 4th month of gestation and if the total number of consultations was thus contemplated: 3 consultations until 29 weeks; 4 consultations from 30 to 33 weeks, 5 consultations from 34 to 36 weeks, and 6 consultations for 37 or more weeks of gestation²⁶.

In the proximal block, variables related to the health conditions of the neonate were included: gestational age at birth (< 32 weeks; ≥ 32 weeks); Being Small for Gestational Age according to the Intergrowth Classification (Yes; No) and the Score for Neonatal Acute Physiology – Perinatal Extension II (SNAPPE II), scored from 0 to 162. Infants with greater severity were considered those who scored above 37 and less severe below this score²⁸, so this variable was categorized into < 37 and ≥ 37 points.

The data collected was organized in a Google Forms instrument and later exported to a Microsoft Office Excel spreadsheet, version 2016.

The prevalence of the outcome in the sample was high, thus Poisson regression with robust variance was chosen as the statistical analysis method. Regression was done in a hierarchical manner, in steps, starting the modeling with the inclusion of all variables at the distal level. Variables with p value < 0.1 remained in the model, and the variables of the next hierarchical level were introduced simultaneously. This procedure was carried out until all blocks were inserted. The final model was composed of the variables with p value < 0.05. All analyses were performed with the help of the statistical program R Studio, version 1.2.1335.

Results

The sample consisted of 405 newborns (Figure 1). Maternal characteristics and neonatal conditions are presented in Table 1. From the total sample, 248 dyads (61.23%) had a mean skin-to-skin contact time of less than 180 min/day.

In the first step of hierarchical modeling, the variables of the distal block were included and the variable “without easy access to the hospital” remained in the model (PR = 2.08; 95%CI: 1.01 - 4.27; p < 0.1). Then, with the inclusion

Table 1. Maternal demographic and socioeconomic characteristics and clinical characteristics of newborns (n = 405), May 2018 to March 2020, Brazil.

Variables	n	%
Age (years)		
< 20	66	16.29
20-34	257	63.45
≥ 35	82	20.24
Color		
White	96	23.70
Black and Brown	294	72.59
Other	15	3.70
Economic classification		
A/B	47	14.64
C	136	42.36
D-E	138	42.99
Education		
Without education	47	11.69
Complete ES/complete HS	108	26.86
CHS/incomplete higher education	200	49.75
Complete higher education	43	10.69
Marital status		
Married	119	29.38
Stable union	211	52.09
Without partner	72	17.77
Religion		
Yes	298	84.65
No	54	15.34
NB gender		
Female	197	48.64
Male	208	51.36
Weight at birth		
< 1.000 g	60	14.82
1.000 g-1.499 g	183	45.18
1.500-1.800 g	162	40.00
Gestational age		
< 32 weeks	230	56.80
≥ 32 weeks	175	43.20
Relation BW/GA*		
SGA	139	34.32
AGA	257	63.45
LGA	9	2.22
Apgar in the 5 th minute		
≤ 7	59	14.57
> 7	346	85.43

* Birth weight/gestational age; SGA – small for gestational age; AGA – adequate for gestational age; LGA – large for gestational age.

Source: Authors.

of the intermediate block I factors, the variable that met the criterion for remaining in the model was “without knowledge about SSC” (PR = 2.26; 95%CI: 1.08 - 4.71; p < 0.1). Afterwards, the vari-

ables of intermediate block II were inserted, with a significant association for the variable “morbidity during pregnancy” (PR = 0.48; 95%CI: 0.26 - 0.88; p value < 0.1).

In the last step, the variables on neonatal conditions at birth were added, and no significant association was evidenced: gestational age; being small for gestational age and SNAPPE II severity score, all with p value > 0.1 (Table 2).

Finally, the variables that remained significant (p < 0.05) were “without easy access to the hospital” (PR = 2.11; 95%CI: 1.01 - 4.41; p-value = 0.044), “without previous knowledge about SSC” (PR = 2.33; 95%CI: 1.39 - 3.91; p-value = 0.001) and “having presented morbidities during pregnancy” (PR = 0.57; 95%CI: 0.36 - 0.93, p-value = 0.024), as presented in Table 3.

Discussion

This study found that for every ten newborns admitted to the units, six had low mean SSC min/day (< 180 min), as defined in this study. The factors associated with reduced SSC time were the lack of conditions facilitating access to the hospital and previous lack of knowledge about SSC. The presence of gestational morbidities was identified as a factor that increased the chance of longer SSC exposure times.

The growing recognition regarding the influence of social determinants both in the opportunity to obtain access and in the benefits resulting from health care has been evidenced in the literature. The association between adverse social contexts and non-participation and non-adherence to care actions in prenatal and postnatal care, as found in this study, may explain the occurrence of these effects during hospitalization in the neonatal unit^{29,30}.

The lack of conditions which facilitate access to the hospital implied double the chances of practicing less SSC, which is an obstacle to continuous and sustained practice. A systematic review study identified the difficulty of transportation to the hospital among the factors that prevent adherence to kangaroo care, especially in low- and middle-income countries¹⁶.

The limitations imposed by the unfavorable conditions of transportation to the unit may result in the underutilization of care technologies and in the increase of indirect costs related to lack of accessibility, thus causing a major barrier to the frequency of SSC and consequently in reduced exposure time to this technology^{17,31,32}. In

Table 2. Multivariate analysis from the hierarchical model with the distal, intermediate I and intermediate II block variables associated ($p < 0.1$) included the proximal block variables, May 2018 to March 2020, Brazil.

Variables	Outcome n (%)		PR*	95%CI	p value
	< 180 min	≥ 180 min			
DISTAL BLOCK					
Easy access to the hospital					0.081
Yes	144 (42.85)	138 (41.07)	1		
No	39 (11.60)	15 (4.46)	2.08	1.01-4.27	0.044
INTERMEDIATE BLOCK I					
Knowledge of the Kangaroo Method					0.0027
Yes	36 (11.00)	63 (19.26)	1		
No	136 (41.59)	92 (28.13)	2.12	1.05-4.30	0.035
INTERMEDIATE BLOCK II					
Morbidities during pregnancy					0.030
No	127 (31.51)	57 (14.14)	1		
Yes	121 (30.02)	98 (24.31)	0.48	0.26-0.88	0.018
PROXIMAL BLOCK					
GA at birth					0.163
< 32 weeks	139 (34.32)	91 (22.46)	0.75	0.43-1.32	0.328
≥ 32 weeks	109 (26.91)	66 (16.29)	1		
SGA**					0.263
Yes	87 (21.48)	52 (12.83)	1.32	0.73-2.37	0.349
No	161 (39.75)	105 (25.92)	1		
Snappe II***					0.271
≤ 37	233 (57.96)	153 (38.05)	1		
> 37	13 (3.23)	3 (0.74)	2.24	0.65-7.71	0.201

* Prevalence ratio; ** small for gestational age; *** score for neonatal acute physiology – perinatal extension II.

Source: Authors.

Table 3. Result of the final multivariate analysis including the variables of the hierarchical model associated with the outcome ($p < 0.05$) according to the hierarchical level, May 2018 to March 2020, Brazil.

Variables	PR	95%CI	p-value
DISTAL BLOCK			
Easy access to the hospital			
No	2.11	1.01-4.41	0.044
INTERMEDIATE BLOCK I			
Knowledge of the kangaroo method			
No	2.33	1.39-3.91	0.001
INTERMEDIATE BLOCK II			
Morbidities during pregnancy			
Yes	0.57	0.36-0.93	0.024

PR – prevalence ratio.

Source: Authors.

addition, the potential of SSC to reduce hospital length of stay could decrease hospital expenses.

It is worth mentioning that this study included reference centers for highly complex neonatal care and, therefore, received patients living in more distant places and from other municipali-

ties. A previous study that assessed factors associated with maternal visits and SSC in an intensive care unit showed that geographical distance did not show a significant association, which was probably due to the presence of programs specifically aimed at addressing this situation³³.

Joint efforts to bridge the gap of supporting the mother's presence, either by ensuring transportation or by ensuring mothers stay close to the institution full time, in a lodging house or in the institution (maternal housing), can minimize the challenges imposed on women who live far from the hospital³⁴.

In addition to contact with the child, interaction between mothers of hospitalized preterm infants and other mothers who are more experienced and have faced similar moments has shown promise in strengthening breastfeeding and the social support network³⁵. Thus, mothers counseling other mothers about SSC may be equally beneficial.

The lack of knowledge about SSC contributed to a reduced duration of its performance. Prenatal care is an opportunity to share knowledge and care practices with families. The existence of an association between knowledge and the duration of SSC reinforces the need for early and intense actions from health educational institutions, enabling better communication between health professionals and parents^{36,37}.

At the same time, education aimed at health professionals, the involvement of other sectors resulting in community participation, visibility in social media and the use of digital resources through campaigns and the dissemination of materials are also strategies for transmitting this information³⁸. Involving the teams that share the care with the family in these educational initiatives is essential, since the presence of trained professionals who encourage skin-to-skin contact can reflect positively on its duration³⁹.

Longer times performing SSC was identified in mothers who had morbidities during pregnancy. The development of a pathology during pregnancy may imply a more premature and low-birth-weight birth, conditioning a longer hospital stay, with greater chances of prolonged SSC.

Mothers who were diagnosed early and referred to the maternity hospital for high-risk prenatal care, may have received more guidance on the possibilities of pregnancy outcomes, were exposed to the hospital environment and the nec-

essary neonatal care earlier, which also points to the effect of the dissemination of kangaroo care since pregnancy, as recommended in Brazil²³.

In addition, subjective issues may be related, such as the perception that premature birth implies a greater need for care resulting in greater maternal disposition, leading to positive attitudes towards the newborn⁴⁰. In fact, studies have shown that high-risk pregnant women experience feelings such as anguish, fear, sadness, and anxiety, arising from the concern with the outcome of pregnancy⁴¹, and these emotional difficulties can be perceived as an opportunity for greater connection with the newborn⁴² and reflect a greater participation in care in the neonatal unit.

One possible limitation of this study was the lack of direct observation of SSC. However, research assistants visited the wards daily to ensure the correct annotation, reducing memory bias and gathering unrecorded data from mothers, fathers, and professionals. It is important to highlight the inclusion of units from several regions of the country in this study sample, even though it is not nationally representative. We also emphasize the participation of neonatal reference centers and teaching hospitals, demonstrating that the practice of SSC in these places still requires improvement in several aspects.

Conclusion

The early identification of mothers without good access to hospitals and who are unaware of SSC are priority targets for health teams and determines the need for the implementation of strategies beginning with prenatal care in order to promote the engagement of these families in the care of the newborn requiring hospital care. The importance of adequate prenatal care is corroborated by the results found that women diagnosed with pregnancy morbidities had longer time of SSC with their children, which may be the result of a more specific follow-up care and early interventions.

Collaborations

AN Souza, MJF Goudard, ZC Lamy, F Lamy Filho, S Marba, VMGO Azevedo, R Costa and LN Caldas participated in the conception of the project, data collection and analysis and elaboration and revision of the manuscript.

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