Original Article

Relationship between the kangaroo position and physiological stability and sleep-wake balance of premature newborns in the NICU and maternal perception

Relação entre a posição Canguru e a estabilidade fisiológica e equilíbrio sono-vigília de recém-nascidos prematuros na UTIN e percepção materna

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ABSTRACT | INTRODUCTION: The kangaroo position is a strategy of the Kangaroo Method that brings mothers closer to their children, promoting physiological stability. **OBJECTIVE:** To analyze the physiological stability and sleep-wake balance of premature newborn from a Neonatal Intensive Care Unit (NICU) in a public university hospital, as well as the maternal perception of the kangaroo position. **METHOD:** Observational study with analysis of qualitative and quantitative results. It developed between July and December 2017 at the NICU. Data were collected from the newborns' medical records. The physiological parameters and behavioral state of sleep wake scale, before and after 50 minutes in the kangaroo position. And the mothers answered 10 open questions about their feelings about skin-to-skin contact. **RESULTS:** 18 newborns were included and 10 mothers answered the interview. Prelatures maintained their heart rate (p = 0.28) and peripheral oxygen saturation (p = 0.77) within normal limits, body temperature showed a statistically significant difference (p = 0.01) ranging between 36.5 and 36.7o. Newborns changed their behavioral state and mothers noticed these changes during the performance of the kangaroo position and felt closer to them through skin-to-skin contact. **CONCLUSION:** Newborns positioned in a kangaroo on their mothers' thorax kept their physiological data stable and their body temperature showed a small increase within normal limits, showing that it is safe to be in the kangaroo position. The mothers realized that such an act brought them closer to their children, arousing positive feelings of joy, emotion and love, in line with what is recommended by the Kangaroo Method.

KEYWORDS: Kangaroo-Mother Care Method. Physical Therapy Department, Hospital. Newborn. NICU.

RESUMO | INTRODUÇÃO: A posição canguru é uma estratégia do Método Canguru que aproxima as mães de seus filhos, promovendo estabilidade fisiológica. **OBJETIVO:** Analisar a estabilidade fisiológica e equilíbrio sono-vigília dos RNPTs de uma Unidade de Terapia Intensiva Neonatal (UTIN) em um hospital público universitário, bem como a percepção materna quanto a posição canguru. **MÉTODO:** Estudo observacional com análise de resultados qualitativos e quantitativos. Desenvolveu-se entre julho a dezembro de 2017 na UTIN. Os dados foram coletados dos prontuários dos RNs. Os parâmetros fisiológicos e estado comportamental de escala sono vigília, antes e após 50 minutos na posição canguru. E as mães responderam à 10 perguntas abertas quanto a seus sentimentos no contato pele a pele. **RESULTADOS:** Foram incluídos 18 recém-nascidos e 10 mães responderam a entrevista. Os RNs mantiveram a frequência cardíaca (p=0,28) e saturação periférica de oxigênio (p=0,77) nos limites da normalidade, a temperatura corporal apresentou diferença estatisticamente significante (p=0,01) variando entre 36,5 e 36,7o. Os RNs mudaram o estado comportamental e as mães perceberam estas mudanças durante a realização da posição canguru e se sentiram mais próximas dele por meio do contato pele a pele. **CONCLUSÃO:** Os recém-nascidos posicionados em canguru no tórax de suas mães mantiveram seus dados fisiológicos estáveis e a temperatura corporal dos mesmos apresentou pequeno acréscimo dentro da normalidade, mostrando ser seguro estar na posição canguru. As mães perceberam que tal ato as aproximou de seus filhos despertando sentimentos positivos de alegria, emoção e amor, indo ao encontro do que é preconizado pelo Método Canguru.

PALAVRAS-CHAVE: Método Canguru. Modalidades de fisioterapia. Recém-nascido. UTI Neonatal.

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Introduction

Technological advances in the care of newborns who need neonatal care have increased survival, especially for premature infants. It is known that the adequate development of these premature infants is determined by the support that they receive, be it environmental, family and biological. Every approach to care must be continuously qualified and reviewed, considering its proper development[1,2].

With premature birth, the development is interrupted, and the newborns starts to experience the intensive care environment that is totally different from the intrauterine environment in which he was. In other words, they are exposed to handling and procedures that can be stressful and painful, in addition to exposure to excessive light and loud sounds, changing their period of continuous sleep, increasing the unpleasant experiences in which they are continuously exposed[3].

In this context, the kangaroo method, first described in 1978 in Colombia, emerges as an alternative strategy in the care of premature or low birth weight babies. In Brazil, as of 2007, this model of qualified and humanized care was integrated into Humanized Care for Low Weight Newborns and became part of the national public health policy. Skin-to-skin contact and the kangaroo position are part of the method, which consists of positioning the newborn in a vertical position close to the chest of one of the parents for a maximum time, respecting the family member and the newborn, in a safe way with guidance from a trained health professional[3].

Two decades after the implementation of the Kangaroo Method in Brazil, there is ample scientific evidence, both national and international, showing the advantages in its use. Noteworthy is the reduction in the mother/father/child separation time, which facilitates breastfeeding, the formation of attachment and strengthening of the affective bond, in addition to increasing the parents' competence and confidence in the care of their child, even after hospital discharge[4].

The newborn benefits from the kangaroo position, as he can obtain better thermal control, better neuropsychomotor development, reduced stress and increased sensory stimulation, considered protective for an integral development[3]. In addition, it acts in the physiological control, in the regulation of the behavioral state, in the relief of pain, which results in an increase in the frequency of peaceful sleep for babies[3,5] and has a positive impact in reducing the morbidity and mortality of low birth weight newborns[6].

For the newborn, in addition to the benefits of breastfeeding, there are also those related to physiological stability. Thermal control is related to gestational age and in skin-to-skin contact with the mother, the newborn manages to maintain its temperature within the normal range. Heart rate and oxygen saturation do not suffer any deleterious effects during positioning, peaceful sleep promotes better growth rates and more positive proprioceptive experiences[7].

Premature mothers experience a high level of stress and anxiety in the NICU environment, due to the need for intensive care and an incubator, delaying mother-baby attachment and mothering[8]. These events can be quite striking and even traumatic for mothers[9] causing a breach of idealized expectations during pregnancy, accompanied by feelings of anguish and insecurity[10].

Given the above, the objective of the study was to analyze the physiological stability and sleep-wake balance of premature newborns in a NICU, as well as the maternal perception of the kangaroo position.

Method

Observational study with analysis of quantitative and qualitative results, carried out at the NICU of a university hospital. Data collection was carried out from July to December 2017. This study was conducted according to the rules of the institution's Ethics and Research Committee, according to CAAE 71352617.9.0000.0096. All individuals who meet the eligibility criteria for inclusion in the study voluntarily participated in the study, with permission from their parents, who signed a single free and informed consent form. Sampling was by convenience, determined by the data collection period of the study. The study included: newborns up to 36 weeks and 6 days of

corrected gestational age who were hemodynamically stable and the mother was available to perform the kangaroo position for at least 50 minutes. Mothers who performed the kangaroo position were invited to answer a brief interview. Malformed newborns with invasive or non-invasive mechanical ventilation and who were in the postoperative period of less than seven days were excluded.

Data regarding birth, maternal history, treatment process during hospitalization and current health status were obtained from medical records.

The observations for recording physiological parameters were made in two moments: before being positioned, that is, still in the incubator or in the cradle, and after 50 minutes in the kangaroo position. Time was controlled by the evaluator using a stopwatch

The infants, only in diapers, were positioned in a kangaroo by the researching physiotherapist, on the chest, also naked, of their mothers, promoting skin-to-skin contact. The baby's back was covered with a girdle, thus maintaining the Kangaroo position for 50 minutes.

The physiological parameters of the neonates, such as heart rate and peripheral oxygen saturation, were observed using the equipment available in the unit (Multi-parameter monitor). Body temperature was measured with the aid of an axillary thermometer and its behavioral state of sleep and wakefulness, regarding the phases of sleep and wakefulness, was analyzed using the scale of assessment of the sleep and wake cycle adapted from Brazelton (1977). This scale consists of six classifications entitled deep sleep, light sleep, drowsiness, hypoactive awake, active awake, tearful, and for each item, with only one possible alternative[11,12]. Such states were observed before and at the end of 50 minutes in a kangaroo position, and for statistical purposes two states were grouped. The state of deep sleep, light sleepy sleepiness was considered as sleeping. And awake, for the states: calm alert, agitated alert and crying.

The maternal interview took place after the kangaroo positioning and was guided by the professional who transcribed the mothers' responses to the questionnaire. From the theoretical framework of Bardin[13], the category called maternal perception was created, and it generated the following subcategories: maternal feelings when performing the kangaroo position; maternal recognition regarding the perception of behavioral status in the newborn. The interview had 10 closed and 5 open questions. It is important to note that no mother was obliged to answer such a research instrument, she only responded by free and spontaneous will, and this question was always respected at all times.

Descriptive statistics were performed, the measures of central tendency and dispersion are expressed in means and standard deviation for continuous symmetric variables and in medians, minimum and maximum for asymmetric ones. To analyze the continuous variables of dependent samples, the Student T Test was performed for dependent samples and Fisher's exact test for categorical variables. The sample was for convenience delimited by time, a significance level of 5% was considered, a type II error of 10% and a minimum effect magnitude of 25%, obtaining a 90% test power. The qualitative analysis of the data was based on Bardin's theoretical framework.

Results

Eighteen newborns participated in this study, 8 twins. Totaling 14 mothers, of these, 4 did not want to answer the interview, agreeing only to perform the kangaroo position, and 10 mothers agreed to answer the interview after experiencing the kangaroo position during their children's hospitalization in the NICU. Maternal data are shown in Table 1.

Of the participating mothers, 7 (70%) reported some complications during pregnancy. The main complications were related to Hellp Syndrome, urinary tract infection, placental detachment, hypertension, gestational diabetes, fetal fetus transfusion and oligodramnium.

The physiological variables collected before the newborn was placed in a kangaroo and after 50 minutes are described in Table 2, there was no difference in HR and oxygen saturation at both times, however in the temperature variable there was a significant difference ($p = 0.01$), having an increase within normal limits after the period in the kangaroo position.

The change in behavioral states is shown in Table 3. The newborns who were awake went to sleep after 50 minutes of kangaroo position (p = 0.0034).

As for maternal perception, in the subcategory maternal feelings when performing the kangaroo position, in the mothers' responses, positive feelings predominated, such as joy, emotion, love, accomplishment of motherhood, happiness, greater closeness to the children, at the same time that also feelings of fear, apprehension and anxiety arose. In the subcategory maternal recognition regarding the change in the newborn's behavioral state, mothers reported that the newborns went from irritable, tearful, agitated, with many disorganized movements, to calm, deep sleep, expression of tranquility and without body movements.

Table 1. Maternal characteristics

Variables	n	Percentage	Average	± SD
Mother's age	10		31,1	± 6,64
Education level				
Complete Higher Education	2	20%		
Complete high school	8	80%		
Marital Status				
Married	9	90%		
Single	1	10%		
Number of pregnancies				
1st pregnancy	4	40%		
2nd pregnancy	2	20%		
3rd pregnancy	3	30%		
4th pregnancy	1	10%		
Prenatal care	10	100%		
Number of consultations			7	± 2,7
Intercurrence during pregnancy*	7	70%		

Notes: SD: Standard deviation

*Complications during pregnancy: Hellp's syndrome, urinary tract infection, placental detachment, hypertension, gestational diabetes, fetal fetus transfusion and oligodramnium.

Table 2. Variables of the newborn before and after 50 minutes in the kangaroo position

	Before	After	p
Heart Rate	143,4 (± 11,76)	146,3(± 12,2)	0,28
Oxygen Saturation	95,2 (±3,11)	95,4(± 2,81)	0,77
Axillary temperature	36,59 (± 0,24)	36,76(±0,27)	0,01

Statistical test: Student's t test

Table 3. Behavioral states of newborns

Moment	Awake	Sleeping	p
Before	13 (72%)	5 (28%)	0,0034
After	4 (22%)	14 (78%)	

Note: Statistical test: Fisher's exact test

Discussion

The newborns physiological data remained stable during the kangaroo position, and their mothers felt excitement and joy at being closer to them. These mothers are young adults, which, according to the literature, is a protective factor against prematurity. In a study carried out to analyze the influence of maternal age with perinatal outcomes in high-risk pregnancies, it was found that very young mothers are more likely to have children with LBW, in addition to a low Apgar score and neonatal death. Likewise, pregnant women over 36 years of age are more likely to have premature children[14].

As for education, most mothers participating in the study had completed high school, which is positive, since low education is a condition that can predispose to potentially risky situations for the mother and the newborn, in addition to preventing access to information and guidance, restrict the capacity for care and assistance, which can even lead to late start or absence to prenatal care[15].

The number of mothers who reported some complications during pregnancy (70%) drew attention. These findings are in line with those demonstrated in previous research, whose purpose was to characterize the sociodemographic profile and maternal risk factors of premature newborn hospitalized in the NICU[16].

Skin-to-skin contact proves to be effective and safe as an analgesic method for newborn pain[17]. On the other hand, pain control in premature neonates contributes to clinical stability and reduces complications. Among the proposed non-pharmacological measures are adequate positioning, containment, use of sweetened substances, suction, kangaroo position, sound, thermal and ambient light control[18].

The newborns observed in this study maintained heart rate and saturation within normal limits, showing that there was stability between before and after positioning. There was a significant difference in body temperature, (p 0.01) corroborating the proposed method, which is to stabilize the temperature of the premature newborn through skin-to-skin contact[3].

An Iranian study compared an experimental group and a control group. For both groups, the baby's physiological parameters were measured three times in each practice of the kangaroo position (before, 15 minutes after the start of the position and after the kangaroo position). After the kangaroo position, the experimental group showed a significant difference in the studied physiological parameters (heart rate, peripheral oxygen saturation and body temperature)[19].

In the study by Tenório et al., (2010) the variables heart rate, peripheral oxygen saturation and body temperature, body weight and mean arterial pressure were assessed before and 30 minutes after the kangaroo position. Before the intervention, all babies were evaluated in the supine position, using only diapers, in the incubator or heated crib. Significant improvements in heart rate, peripheral oxygen saturation, body temperature and mean arterial pressure were observed, while the heart rate and body weight variables did not show significant differences[20].

In this study it was observed by the Brazelton scale and also by the maternal perception that the NBs were awake moving spontaneously and some crying while in the cradle and at the end of 50 minutes in a kangaroo position they changed their behavioral state to sleeping, calm and with little active movement.

It is known that the NICU environment offers NBs many harmful stimuli, such as noise, intense lighting, many manipulations, consequently, changing the sleep-wake cycles so important to adequate neurological development[21]. Providing newborns with moments where they can fall into a deep sleep, protected from environmental factors and the comfort of their parents is one of the goals recommended by the kangaroo method[3].

The sleep cycles in the fetus vary from 40 to 60 minutes and full-term newborns sleep 70% of the day, pointing to a strong relationship between sleep and growth, including brain[22]. It is a challenge for the assistance teams to know how to differentiate the states of sleep wakefulness to offer newborns strategies that provide comfort and quality sleep, as sleep deprivation has a negative impact on neuronal development, breathing changes and can contribute to increased morbidities[23].

Mothers also benefit from skin-to-skin contact with their newborns, having a positive impact on maternal pain after childbirth, and reduced stress, assessed by salivary cortisol[24]. In addition, the paternal presence has represented a physical and emotional support for the mother, providing comfort, security and happiness, with a positive impact on breastfeeding. The care of the father, with the mother and with the premature child generates satisfaction for the mother, and this practice should be valued by the units of care for hospitalized newborns[25,26].

The mothers participating in this study were happy and excited about the possibility of realizing the kangaroo position with their babies and among the main benefits cited by them are newborn health, increased bonding, weight gain and the development of their premature children. These results corroborate the study by Castanhade et al (2020) in which mothers reported immunological benefits, weight gain, temperature control and affectivity[27].

The literature has shown that mothers acquire security and autonomy to care for the baby, as they have ready access to their children and are guided and encouraged to make skin-to-skin contact, evolving from touch to the kangaroo position, as well as, progressive and safe care, from changing a diaper, bathing, and administering food, whether by tube, cup or breastfeeding. Thus, the Kangaroo Method promotes parental participation and strengthens the affective bond between mother/child[28]. The small number of mothers interviewed may represent a limitation of this study, thus, future research is suggested to mitigate this aspect.

Conclusion

Reflecting on positioning newborns safely, knowing that their vital data will remain stable in the kangaroo position, validates the method in the unit studied, bringing comfort and confidence to the team to facilitate the relationship between mothers and their children. Despite the reduced number of participants, it was possible to observe that the newborns maintained their heart rate and oxygen saturation without changes between before and after positioning, and the temperature grew with a statistically significant difference. The mothers verbally expressed the positive feeling they had after staying with their babies in the kangaroo position, and realized that their children were calmer and slept.

Author contributions

Nisi KSA participated in the conception, design, data collection and review of the manuscript. Andreazza MG participated in the conception, design, search and statistical analysis of the research data, interpretation of the results and writing of the scientific article. Gomes EO participated in the collection and statistical analysis of the research data, interpretation of the results and writing of the manuscript. Soares PD participated in data collection, interpretation of results and writing of the manuscript. Motter AA participated in the conception, design, data collection, interpretation of results, writing of the manuscript and supervision of the research.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

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