Original Article

Hammock position and nesting: comparison of physiological and behavioral effects in preterm infants

Rede de descanso e ninho: comparação entre efeitos fisiológicos e comportamentais em prematuros

Hamaca y nido: comparación entre los efectos fisiológicos y de comportamiento en prematuros

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How to cite this article:
Costa KSF, Beleza LO, Souza LM, Ribeiro LM. Hammock position and nesting: comparison of physiological and behavioral effects in preterm infants. Rev Gaúcha Enferm. 2016;37(spe):e62554. doi: http://dx.doi.org/10.1590/1983-1447.2016.esp.62554.

doi: http://dx.doi.org/10.1590/1983-1447.2016.esp.62554

ABSTRACT

Objective: To compare the effects of the use of hammocks versus nesting in preterm infants, after diaper changing.

Methods: quasi-experimental study, a cross-over trial with 30 preterm newborns in an intermediate care nursery (ICN) in a public hospital in Brasilia-DF, conducted from November 2011 to March 2012. The effects of the two interventions (nesting and hammock) after diaper changing were assessed. Student's t test with a confidence level of 95% ($p < 0.05$) was used in data analysis.

Results: In hammock position the preterm infants were found to be less stressed ($p = 0.002$), had fewer defining characteristics indicating nursing diagnosis "Disorganized Infant Behavior" ($p = 0.05$) and remained in a more suitable position for receiving intensive care compared to nesting ($p = 0.04$).

Conclusion: Preterm infants in hammock position, compared to nesting, were less stressed, with a more organized behavior and in a better position for receiving intensive care.

Keywords: Preterm newborn. Patient positioning. Physiological stress.

RESUMO

Objetivo: comparar os efeitos da aplicação de redes de descanso em prematuros, após a troca de fraldas, em comparação com o ninho.

Métodos: pesquisa quase experimental, *crossover*, com 30 prematuros internados em uma unidade de cuidados intermediários de um hospital público de Brasília, DF, no período de novembro de 2011 a março de 2012. Foram avaliados os efeitos das duas intervenções (ninho e rede) após a troca de fraldas. Para análise dos dados utilizou-se o teste t de Student com nível de confiança de 95% ($p < 0,05$).

Resultados: os prematuros, quando em rede, se mostraram menos estressados (p=0,002), tiveram menos características definidoras para o diagnóstico de enfermagem "Comportamento Desorganizado do Bebê" (p=0,05) e permaneceram em postura terapêutica em relação ao ninho (p=0,04).

Conclusão: quando comparado ao ninho, os prematuros posicionados em redes estiveram menos estressados, mais organizados e em melhor postura terapêutica.

Palavras-chave: Prematuro. Posicionamento do paciente. Estresse fisiológico.

RESUMEN

Objetivo: Para comparar los efectos de la aplicación de las hamacas en los bebés prematuros después de cambiarles pañales, en comparación con el nido.

Métodos: investigación casi experimental, cruzada con 30 recién nacidos prematuros en una unidad de cuidados intermedios en un hospital público en Brasilia-DF, a partir de noviembre de 2011 a marzo de 2012. Los efectos de las dos intervenciones (nido y la hamaca) después de cambiar pañales. Para el análisis de datos se utilizó la prueba t de Student con un nivel de confianza del 95% ($p < 0,05$).

Resultados: prematuros cuando posicionados en hamaca, estaban menos estresados ($p = 0,002$), tenían menos características definitorias para el diagnóstico de enfermería "Comportamiento Desorganizado del Bebé" ($p = 0,05$) y se mantuvo en la postura terapéutica en relación con el nido ($p = 0,04$).

Conclusión: en comparación con el nido, los prematuros posicionados en hamaca estaban menos estresados, más organizados y con mejor posicionamiento terapéutico.

Palabras clave: Prematuro. Posicionamiento del paciente. Estrés fisiológico.

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INTRODUCTION

Neonatal intensive care units (NICUs) and their various stimuli, such as exposure to light, loud noise and stressful interventions may interfere with the cognitive and behavioral development of preterm newborns[1-2]. Some studies showed that inappropriate care in stressful and/or painful procedures can affect behavioral and physiological parameters in preterm infants[3-4]. Diaper changing is a routine procedure, but can be stressful for preterm babies[5-6] and recent studies have recommended non-pharmacological measures to minimize possible damage[5,7].

Thus, more interventions are needed to promote the comfort of preterm infants, minimizing damage caused by exposure to stress. Some studies [7-8] describe the importance of nesting to provide comfort to preterm infants. It consists of a "U" or "O" rolled-up fabric for total containment of the baby's movements from head to foot. This method favors a more flexed posture, facilitates alignment of head in relation to the body, reduces stress, contributing to appropriate neurobehavioral and muscle development of preterm infants[7-8].

In a crossover trial with 47 preterm infants, the effects of nesting position of preterm babies before, during and after diaper changing were assessed. Heart rate and oxygen saturation measurements were monitored, and a pain assessment tool was used. The stress and pain scores associated with diaper changing were significantly lower during the nested position compared to the non-nested position ($p < 0.0001$). Heart rate was significantly higher when infants were nested ($p = 0.012$), and there were no changes in oxygen saturation. Therefore, the authors concluded that diaper changing with postural support promotes physiological and behavioral stability of preterm infants[7].

With the purpose of providing comfort to preterm babies, some NICUs also adopted the use of hammocks in incubators/heated cribs, during hospitalization of the newborn (NB)[9-10]. Hammocks are mostly used in the northeastern region of Brazil, but there is little scientific evidence about their use. Nevertheless, the use of hammocks has been investigated in preterm infants and term neonates not requiring oxygen therapy.

One study[9] aimed to determine whether the use of hammocks affects neuromuscular maturity and clinical stability of preterm infants. The study sample consisted of 20 preterm infants randomized in two groups: one group in hammocks, in supine position, and the other group in nest, in the prone position. The infants remained in these positions during 3-hour sessions on 10 consecutive days. According to the results, the hammock was well tolerated by the preterm infants and did not cause side effects such as apnea, bradycardia or fall in oxygen saturation levels. Intergroup comparison showed higher scores for heart rate ($p < 0.05$), respiratory rate ($p < 0.05$) and neuromuscular maturity scale ($p < 0.05$) in preterm infants in hammocks. Weight gain did not differ between the groups[9].

Another controlled and randomized clinical trial aimed to analyze the effects of the use of hammocks on physiological variables heart rate, respiratory rate and oxygen saturation in preterm newborns (PTNB), comparing these data with supine position with containment of baby's movements in nest. The preterm infants were maintained in these positions for two hours a day, for five days, in their groups. The sample consisted of 26 PTNBs, divided into EG (hammock group) and CG (nested group). According to the results obtained, the use of hammocks lowered heart rate (HR) (EG = 142.00 vs GC = 153.00, $p < 0.01$) and increased oxygen saturation levels (EG = 98.00 vs CG = 95.00, $p < 0.01$)[11].

In both studies, the authors recommend the use of hammocks in NICUs as a strategy of humanization of care because it provides benefits for preterm infants and is harmless.

New therapeutic strategies that promote the well-being of preterm babies during stressful procedures should be investigated. Thus, the following question was asked: is the use of hammocks beneficial for preterm infants? In view of the above, the present study aimed to compare the effects of hammocks on preterm infants after diaper changing with the nesting technique.

METHOD

Quasi experimental study with crossover design conducted in an Intermediate Care Nursery (ICN) of a reference hospital for neonatal care in Brasília-DF, from November 2011 to March 2012. In crossover design, the subjects serve as their own controls, i.e., receive both the test intervention and control intervention at different times[12].

Sample calculation was not possible due to the scarce time available for data collection. Convenience sampling was then used, and 30 preterm infants were included. The inclusion criteria were gestational age of 32-35 weeks (Capurro), as this is the stage of higher development of infant behavioral organization capacity[13]. Therefore, the sample consisted of infants that met the following requirements: born at gestational age of 32 to 35 weeks, weighing 1400 g – 1800 g, after the first 72 hours of life, admitted to the ICN for more than 24 hours, placed on a heated incubator, with enteral feeding (gastric/enteral tube), spontaneous diuresis, without phototherapy, not

requiring oxygen therapy and who have not been fed in the last 60 minutes.

The exclusion criteria were babies with brain abnormalities; bone fractures or injuries; vomiting or regurgitation in less than 24 hours; history of apnea within the last 72 hours; preterm infants who underwent painful procedures, such as venous puncture and insertion of gastric/enteral tubes within 1 hour of the study intervention; Central Nervous System (CNS) disorders such as brain hemorrhages, syndromes, seizure and hypertonia, as well as congenital cardiopathy.

The variables measured were stress/pain level, posture and organizational status of the preterm infant.

The instrument used to evaluate the levels of stress in newborns was the N-PASS *(Neonatal Pain, Agitation and Sedation Scale* / pain scale, stress, sedation in the newborn validated for use in Brazil in 2011[14], because oit provides a comprehensive assessment of the infant's status (sedation, pain, restlessness), duration of pain (acute, chronic), gestational age (preterm and term infants) and because it contemplates psychophysical parameters, such as behavioral parameters (e.g. irritability, tone and facial expression) and physiological parameters – vital signs: heart rate (HR) and respiratory rate (RR), oxygen saturation (Sat.02) and blood pressure (BP). Another major advantage of this scale is that it can be used for both stressful procedures such painful procedures[8.14]. In this study, diaper changing was considered a stressful procedure, as well as in other studies[5-7].

The scores for pain and/or stress of the N-PASS range from 0 to 10. According to the scale, points should be added depending on the gestational age, as follows: 3 points for gestational age (GA) between 23 and 27 weeks; + 2 points for GA between 28 and 31 weeks and + 1 point for GA between 32 and 35 weeks. Thus, since the subjects in this study had gestational age of 32-35 weeks, 1 point was added for each infant. In this scale, values below zero concern sedation; a value equal to zero indicates that the infant is healthy and values greater than zero indicate infant's response to pain and/or stress. It should be noted that for the N-PASS scale, an infant with a score> 3 points is considered very stressed and in need of intervention/treatment for pain and/or stress[8.14].

The instrument used for postural assessment was prepared and implemented according to the postural therapeutic techniques of the baby, namely: hands to mouth; head in the midline; legs and arms bent (regarding flexion, one or two flexed limbs were considered); non-restrictive containment; head of bed raised approximately 30 degrees; feet at the foot end, but flexible enough to allow movement[8]. Assessment of infant behavioral reorganization was performed according to NANDA international taxonomy[15]. The nursing diagnosis was Disorganized Infant Behavior based on the Synactive Theory Of Newborn Behavioral Organization and Development[16].

Data was collected in the morning, and one health professional performed all the activities involved in the procedure (changing diapers and positioning the baby in nesting and hammocks). Data collection occurred in four stages: stage 1- diaper changing; stage 2 (intervention) – immediately after stabilization of stage 1, the preterm infant was placed in the nest; stage 3 – on the same day and 3 hours after stage 2, diaper was changed again; stage 4 (intervention): immediately after stabilization of stage 3, the infant was placed in the hammock.

In order to standardize the posture adopted and obtain the data required in stages 2 and 4, i.e. during the interventions, the preterm babies were positioned in right lateral decubitus, with the head in midline, oximeter sensor in the right hand, cuff for measuring blood pressure in the lower limbs, cushion in the subscapular region, and a cloth covering the head of the incubator to reduce exposure to light. The nesting technique adopted used "U" shaped rolled up fabric, according to the routine procedures of the unit.

Stages 2 and 4 lasted 40 minutes, and on the 2nd, 10th, 20th and 40th minutes, the vital signs (HR, RR, Sat. 02 and BP) were recorded and the baby was filmed for one minute, according to the aforementioned times, for further analysis and administration of the pain/ stress assessment scale, assessment of the infant's posture and behavioral organization capacity. The videos were analyzed by three researchers.

For data analysis and comparison, Student's t test (for paired samples) with a confidence level of 95% ($p < 0.05$) was used, i.e., the same group of babies was compared in two different situations: hammock and nest. The analyzes were performed with SPSS, version 17.0.

The requirements of the Declaration of Helsinki and Resolution No. 196/96 of the National Committee for Ethics on Research (CONEP), under number 013/12. After being informed on the procedure, the mothers of the newborns who participated in the study signed the informed consent form.

RESULTS

Thirty-four (34) preterm infants were selected for this study. Of these, one was excluded due to intercurrences during the intervention (infiltrated venous access). Two others were excluded due to equipment malfunction and one infant was transferred to another unit. So, 30 preterm infants participated in the study.

Stress

The N-PASS scale was used for stress pain assessment, as previously explained[8,14]. The results obtained are shown in Table 1. Mean values were used in the calculation.

The score for the nesting technique during the 2nd, 10th and 40th minutes remained above 3 points, which is the value attributed by the scale to stressed infants requiring intervention. In turn, the score for hammock position remained at all times below 3 points.

Analysis of the scale of evolution over time showed that the longer the preterm infants remained on the hammocks, the better the mean values obtained, with a mean value of 2.07 after 2 minutes compared to 1.17 after 40 minutes.

Comparison of the scores of the intervention pairs at each moment using the N-PASS scale showed that this difference was significant, indicating that the babies placed on the hammocks experienced less stress/pain compared to the babies in nest ($p < 0.05$).

Posture

For posture analysis, a mean frequency of the therapeutic posture was calculated. Table 2 contains comparison data for flexion of the upper and lower limbs for the for intervention groups.

Separate analysis, for each intervention, of upper limb flexion at all times (minutes) showed a general average

Table 1 – Results of administration of the N-PASS scale in infants in hammock and nest, at the analyzed times (minutes)

Time	Types of Intervention	Average	N	Standard deviation	Level of Significance
2nd minute	NBs – Hammock	2.07	30	1.20	0.01 *
	NBs – Nest	3.27	30	2.24	
10th minute	NBs – Hammock	1.57	30	1.01	0.00 *
	NBs – Nest	3.83	30	2.74	
20th minute	NBs – Hammock	1.47	30	0.90	0.00 *
	NBs – Nest	2.83	30	1.84	
40th minute	NBs – Hammock	1.17	30	0.38	0.00 *
	NBs – Nest	3.37	30	2.86	

Source: Research data, 2012.
NB: Newborn
*p< 0.05 (significant)

Table 2 – Results of Flexion of Lower and Upper Limbs of the preterm infants, and according to the intervention groups

Time	Type of Intervention	Flexion of Upper Limbs			Flexion of Lower Limbs		
		Mean	Standard deviation	Level of Significance	Mean	Standard deviation	Level of Significance
2 nd minute	NBs – Hammock	0.93	0.25	0.10	0.93	0.25	0.10
	NBs – Nest	0.77	0.43		0.77	0.43	
10 th minute	NBs – Hammock	0.97	0.18	0.18	1.00	0.00	0.00 *
	NBs – Nest	0.87	0.35		0.73	0.45	
20 th minute	NBs – Hammock	0.93	0.25	0.16	0.97	0.18	0.03 *
	NBs – Nest	0.80	0.41		0.77	0.43	
40 th minute	NBs – Hammock	1.00	0.00	0.00 *	0.93	0.25	0.00 *
	NBs – Nest	0.70	0.47		0.57	0.50	

Source: Research data, 2012
NB: newborn
* P <0.05 (significant)

frequency of 0.95 for flexion of upper limbs of preterm infants in hammocks. In the nested position, this frequency was 0.78.

Separate assessment (for each intervention) of lower limb flexion movements showed a a general average frequency of 0.93 in hammock and 0.77 in the nested position. Both in hammock and nesting, the infants showed a satisfactory frequency of movements of flexion of the upper and lower limbs. However, the infants in hammock position had better scores.

Regarding the criterion hands to mouth, there was no statistically significant difference at the 2nd, 10th and 20th minutes of intervention (p = 0.17, p = 0.57 and p = 0.45, respectively). At the 40th minute of intervention there was a significant difference (p = 0.01). There were more preterm infants with hands to mouth after 40 minutes of intervention, in the hammock position.

Regarding the criterion posture, restrictive containment (not allowing tactile movements and sensations), this situation was not observed in any of the preterm infants submitted to both interventions. Regarding the criterion head of bed raised approximately 30 degrees, it was observed for 100% of the babies (in nesting and hammock interventions).

Table 3 includes data for head in midline and foot support.

Separate analysis of interventions for head in midline, at all the minutes showed a general average frequency of 1.00 for hammock position, i.e. all the infants in hammock position were able to bring their heads forward through midline; As for the general average frequency for head in midline in the nesting intervention it was 0.73.

For separate analysis of interventions regarding feet at the foot end but flexible enough to allow movements, a general average frequency of 0.95 in the net and of 0.61 in the nest was obtained. Comparison of the means of these criteria in preterm infants, in hammocks and nest, at each one of the times assessed showed that the infants in hammocks maintained their feet at the foot end but allowing movements. The differences were significant at all the times (p = 0.00 – 2nd minute, 10th minute, 20th and 40th minutes, respectively).

Disorganized infant behavior

Regarding behavior disorganization, the average occurrence of the defining characteristics of the nursing diagnosis "Disorganized Infant Behavior" in the subgroups was calculated[15]. Table 4 shows the results of the nursing diagnosis disorganized infant behavior at the 2nd and 10th minutes of intervention (hammock and nest), for each subgroup.

At the 2nd and 10th intervention minutes there was a significant difference in the defining characteristics "attention-interaction system", "behavioral system of organization" and "motor system". There were less defining characteristics for the diagnosis "Disorganized infant behavior" in infants in hammock compared to those in nesting at these minutes.

The results of the defining characteristics for the nursing diagnosis disorganized infant behavior at the 20th and 40th minutes are shown in Table 5.

At the 20th minute, there was a significant difference between the means for the following groups of defining characteristics: "physiological"; "Attention and interaction

Table 3 – Results obtained for head in midline and feet at the foot end in hammock and nesting during the assessed minutes

Time	Type of Intervention	Head in midline			Feet at the foot end		
		Mean	Standard deviation	Level of Significance	Mean	Standard deviation	Level of Significance
2nd minute	NBs – Hammock	1.00	0.00	0.08	1.00	0.00	0.00 *
	NBs – Nest	0.90	0.31		0.67	0.48	
10th minute	NBs – Hammock	1.00	0.00	0.01*	0.97	0.18	0.00 *
	NBs – Nest	0.80	0.41		0.67	0.48	
20th minute	NBs – Hammock	1.00	0.00	0.00*	0.93	0.25	0.00 *
	NBs – Nest	0.70	0.47		0.63	0.49	
40th minute	NBs – Hammock	1.00	0.00	0.00*	0.90	0.31	0.00 *
	NBs – Nest	0.53	0.51		0.47	0.51	

Source: Research Data, 2012.
NB: newborn
* P <0.05 (significant)

Table 4 – Results of the Nursing Diagnosis Result – 2nd and 10th minutes, for infants in hammock and nest at the analyzed minutes

Defining Characteristics	Type of Intervention	2nd minute			10th minute		
		Mean	Standard deviation	Level of Significance	Mean	Standard deviation	Level of Significance
Physiological System	NBs – Hammock	0.53	0.29	0.21	0.40	0.28	0.12
	NBs – Nest	0.63	0.32		0.55	0.38	
Regulation Problems	NBs – Hammock	0.00	0.00	0.10	0.02	0.09	0.06
	NBs – Nest	0.07	0.22		0.15	0.35	
Attention-interaction system	NBs – Hammock	0.00	0.00	0.04 *	0.00	0.00	0.00 *
	NBs – Nest	0.13	0.35		0.27	0.45	
System of behavioral state organization	NBs – Hammock	0.13	0.12	0.01 *	0.07	0.11	0.00 *
	NBs – Nest	0.19	0.10		0.17	0.11	
Motor system	NBs – Hammock	0.12	0.15	0.00 *	0.12	0.21	0.00 *
	NBs – Nest	0.26	0.18		0.31	0.18	

Source: Research data, 2012.
NB: newborn
* P <0.05 (significant)

Table 5 – Result of the Nursing Diagnosis – 20th and 40th minutes for infants in hamock and nest at the assessed minutes

Defining Characteristics	Type of Intervention	20th minute			40th minute		
		Average	Standard deviation	Level of Significance	Average	Standard deviation	Level of Significance
Physiological System	NBs – Hammock	0.27	0.31	0.02 *	0.20	0.31	0.00 *
	NBs – Nest	0.47	0.35		0.42	0.32	
Regulation Problems	NBs – Hammock	0.00	0.00	0.33	0.00	0.00	0.03 *
	NBs – Nest	0.02	0.09		0.13	0.32	
Attention-interaction system	NBs – Hammock	0.00	0.00	0.04 *	0.00	0.00	0.01 *
	NBs – Nest	0.13	0.35		0.20	0.41	
System of behavioral state organization	NBs – Hammock	0.05	0.11	0.14	0.02	0.06	0.00 *
	NBs – Nest	0.09	0.10		0.13	0.11	
Motor system	NBs – Hammock	0.10	0.12	0.00 *	0.07	0.09	0.00 *
	NBs – Nest	0.25	0.18		0.28	0.23	

Source: Research data, 2012.
RN: newborn
* P <0.05 (significant)

system" and "motor system". Again, the infants placed on hammocks showed less defining characteristics for the nursing diagnosis disorganized infant behavior.

At the 40th minute of nest and hammock interventions, comparison of signs of disorganization showed they were less frequent in hammock intervention. These differences were statistically significant for all the groups of defining characteristics,

In short, assessment of the five subsystems that define infant organization showed that at the 2nd, 10th, 20th and

40th minutes of comparison of nest and hammock interventions, the latter had lower incidence of defining characteristics at all the assessed minutes, and three defining characteristics were statistically significant at the 2nd, 10th and 20th minutes totaling 9 characteristics, and 5 were significant at the 40th minute.

DISCUSSION

Stress

Assessment of stress using the N-PASS scale in this study showed that hammocks were more effective in reducing infant stress than the nesting technique.

An exploratory and descriptive study aimed to evaluate the clinical status of newborn infants (term and preterm infants) admitted to the NICU and placed on hammocks inside the incubator. For this purpose, a semi-structured questionnaire and a scale designed to assess stress levels were used. The infants were evaluated for seven days and remained on the hammock for different periods. There were no differences in HR and SpO2 (p> 0.05 for both), with or without the use of hammocks, and the mean of the stress scores was better with the rest network, with an average on the first day of 9.4 (± 1.1) in the network vs 7.5 (± 2.0) without the use of the network. On the other hand, on the last day of the assessment, the mean score was 10 (± 0.0) in hammock vs 9 (± 0.0) without hammock. In conclusion, the authors recommended that the use of hammocks in NICUs because this method ensures more humanized care to the infants and is harmless[17].

Another study[18] assessed the degree of stress of babies during eye examination. The study involved 38 preterm infants. Of these, 19 infants were nested (intervention group) and 19 infants were placed in a crib and not nested. Assessments were made two minutes before, during, and two minutes after eye screening. The pain caused by eye examination was significantly lower in the group of nested infants compared with the non-nested infants, both regarding neurobehavioral activity (p <0.01) and crying (p <0.01).

According to the two referred studies, nest and hammock were found to be two important tools to promote the comfort of preterm infants, reducing the levels of stress and pain during the procedures performed in the NICU. However, the present study found lower levels of stress in preterm infants positioned in hammocks.

Posture

Premature birth deprives babies of the aquatic environment where the absence of gravity facilitates movements and a more flexed posture, under vestibular stimuli of maternal movement and with the containment provided by the uterine walls and the placenta. The less developed motor subsystem of preterm infants and gravity action make it difficult for them to maintain a flexed posture, resulting in uncoordinated movements of limbs and the trunk, in an attempt to touch a hard surface or a limit[19].

In the present study, the hammocks favored a flexed posture, promoting better infant organization. Regarding the general positioning, at the initial minutes of the two interventions, the babies bent legs and arms, the head was in the midline and feet at the foot end, probably because they were placed in a favorable position by the caregiver after the procedure. However, over time, the nest allowed greater changes in position, perhaps because the nesting technique used was U" shaped rolled up fabric, that may favor changes in position. O-shaped nest, in turn, does not favor changes in position, and, thus, infants tend to remain in a flexed position and are less likely to show disorganized behavior.

No studies were found on the posture of preterm infants in hammock position. However, a study[9] comparing the supine position in preterm infants in prone position in hammocks, assessed its impact on neuromuscular maturity. In this case, dorsal decubitus positioning in hammock was associated with greater neuromuscular maturity.

However, in contrast with this finding, and aimed to assess the influence of the hammocks on the neuromotor development of infants up to six months of age, one study[11] showed that the neuromotor development of the babies placed on hammocks was worse than the one of infants not placed on hammocks (p <0.03). However, it should be stressed that the referred study involved a population of term newborns and six-month old infants: (19 infants placed and 7 infants not placed on hammocks). The frequency of use of hammocks was not assessed, which may have limited the stimulation provided by new postures and movements.

Therefore, because of the advantages of hammocks over nesting techniques regarding the maintenance of a therapeutic posture, it is believed that the use of this intervention in preterm infants may result in short and long term benefits: reduces stress, promotes comfort, increases muscle tone, reflexes, motor agility, improves breathing mechanics and gastric function, among others, and the following long term benefits of this intervention, namely: prevents external rotation contractures of baby's extremities and abnormally shaped heads and consequences on brain growth[8-9].

Disorganization

Systematization of Nursing Assistance (SNA) is defined by most Brazilian nurses as a tool used in nursing and daily care focused on the patient, family or community. The steps involved in SNA are: (1) data collection; (2) nursing diagnosis; (3) evolution; (4) nursing prescription and (5) assessment. Another step is nursing diagnosis (ND), which consists in a *"clinical judgment concerning a clinical response to health conditions/life processes, or a vulnerability for that response, by an individual, a family, a group or community"*[15].

The nursing diagnosis "Disorganized Infant Behavior" was based on the Synactive Theory of Newborn Behavioral Organization and Development created to shed light on these behaviors of newborn infants[16]. This theory is based on 5 subsystems, namely: autonomic/physiological system; Regulation problems; Attention-interaction system; System of behavioral state organization and motor system.

Therefore, baby's behavioral organization or neonatal self-regulation is the key aspects and its concept is consistent with these five subsystems. It is also conceptualized the ability of these subsystems permeate all newborn interactions with the environment that directly affect your brain[13.16]. Care should therefore be regulators and supporters of the newborn.

This study found that hammocks resulted in a more appropriate behavioral organization of preterm infants. A similar result was found in a study of 20 preterm infants, which compared the supine position of preterm infants, in hammocks, with the prone position in nest, regarding the impact on autonomic stability and concluded that maintaining preterm infants in supine position on a hammock can have a positive effect on their autonomic stability, ensuring a better self-regulation[9].

Therefore, it was observed that the infants who underwent the hammock intervention had fewer defining characteristics of the diagnosis "Disorganized Infant Behavior". Thus, the importance of this position for self-regulation and behavioral organization of this population has been demonstrated. This may have a positive influence on the growth and development, as well as on the future quality of life of neonates.

The identification of a nursing diagnosis requires knowledge, practice and awareness of the importance of choosing a specific intervention for patient treatment. Thus, the main nursing diagnoses used in a NICU were indicated in a retrospective study [20] that involved the analysis of the records of 118 preterm infants. The nursing diagnosis 'disorganized infant behavior" was not among the 21 diagnoses surveyed, showing that the nurses were unable and/or unwilling to identify this diagnosis which was very frequent in the literature survey, according to the results.

CONCLUSION

The benefits of the use of hammocks and nesting techniques in preterm infants were compared. Significant improvements in stress, posture and disorganization of neonates were observed with the use of hammocks.

However, some infants may not adapt to the hammock. Therefore, in the selection of the most appropriate intervention, caregivers should take into consideration the individual aspects of each patient, paying attention to physiological and behavioral signs expressed by the infants.

This study suggests the use of hammocks as one measure aimed to provide comfort to the baby, and not to replace the nest. The hammock showed some benefits compared to the nest, but should not be recommended as a Permanente and standard measure, as it is the case of the case of the nest, because the nesting technique concerns a greater variety of measures aimed to provide comfort to infants such as positioning the infant in the prone position, make use of pillows of a silicone material and water, ventral positioners, cushions, among others.

Another important aspect concerns the use of a cushion under the shoulders to favor mild neck extension. As in the nest, cushions are needed because the hammock has elevated extremities that may favor a flexed neck posture, increasing the risk of lower SpO2, pauses in breathing and apneas.

The main limitation of this study is the lack of research on the use of hammocks in NICUs and the impossibility of randomization.

This study provided new insights on clinical practice by indicating the benefits of the use of hammocks to provide comfort to preterm infants. However, further studies on the duration and quality of sleep, weight gain in preterm infants in hammocks; the use of hammocks in term newborns and babies who underwent surgery and even the use of this method during painful procedures are suggested.

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Received: 03.19.2016
Approved: 10.26.2016