Non-pharmacological measures in preterm newborns submitted to arterial puncture

Medidas não farmacológicas em recém-nascidos pré-termo submetidos à punção arterial

Medidas no farmacológicas en recién nacidos prematuros sometidos a la punción arterial

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ABSTRACT

Objective: to assess pain in preterm newborns and to compare the neonatal and therapeutic variables with the total scores of the Neonatal Facial Coding System of preterm newborns submitted to arterial puncture exposed to music and 25% oral glucose. **Method**: a comparative study with 48 recordings of preterm newborns - Group 1, music (26); Group 2, glucose 25% (22) — individually analyzed by three trained nurses, after Kappa of at least 80%. **Results:** the variables and the pain scores of the groups did not present statistical significance ($p < 0.05$) according to the Neonatal Facial Coding System. 80.8% of the preterm infants in Group 1 had a higher quantitative score $\geq$ 3 in the neonatal variables (gender, type of delivery), and therapeutic variables (type of oxygen therapy, place of hospitalization, type of puncture). **Conclusion:** There was no difference when comparing the music and glucose 25% groups and the variables studied.
Descriptors: Newborn; Ache; Music, Glucose; Neonatal Nursing.

RESUMO

Objetivo: avaliar a dor em recém-nascidos pré-termo e comparar as variáveis neonatais e terapêuticas com os escores totais da Neonatal Facial Coding System de recém-nascidos pré-termo submetidos à punção arterial exposto à música e glicose 25% oral. **Método:** estudo comparativo com 48 filmagens de recém-nascidos pré-termo — Grupo 1, música (26); Grupo 2, glicose 25% (22) — analisadas individualmente por três enfermeiras treinadas, após Kappa de no mínimo 80%. **Resultados:** as variáveis e os escores de dor dos grupos não apresentaram significância estatística ($p < 0,05$) de acordo com o Neonatal Facial Coding System. 80,8% dos prematuros do Grupo 1 apresentaram um maior quantitativo de escores $\geq$ 3 nas variáveis neonatais (sexo, tipo de parto) e, variáveis terapêuticas (tipo de oxigenoterapia, local de internação, tipo de punção). **Conclusão:** Não houve diferença ao se comparar os grupos da música e da glicose 25% e as variáveis estudadas.
Descritores: Recém-Nascido; Dor; Música, Glucose; Enfermagem Neonatal.

RESUMEN

Objetivo: evaluar el dolor en recién nacidos prematuros y comparar las variables neonatales y terapéuticas con las puntuaciones totales del *Neonatal Facial Coding System* de los recién nacidos prematuros sometidos a una punción arterial expuestos a la música y glucosa al 25% por vía oral. **Método:** estudio comparativo con 48 filmaciones de los recién nacidos prematuros divididos en el Grupo 1 - música (26) y el Grupo 2 – glucosa al 25% (22). Las filmaciones fueron analizadas individualmente por tres enfermeras capacitadas después de coeficiente Kappa de al menos 80%. **Resultados:** las variables y puntuaciones de dolor de los grupos no fueron estadísticamente significativas ($p < 0,05$) de acuerdo con el *Neonatal Facial Coding System*. En el Grupo 1, 80,8% de los recién nacidos prematuros mostraron mayores cantidades de puntuaciones $\geq$ 3 en las variables neonatales (sexo, tipo de parto) y las variables terapéuticas (tipo de la terapia de oxígeno, lugar de internación, tipo de punción). **Conclusión:** No hubo diferencias cuando se comparan los grupos de música y de glucosa al 25% y las variables estudiadas.
Descriptores: Recién Nacido; Dolor; Música, Glucosa; Enfermería Neonatal.

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INTRODUCTION

Pain generates discomfort, stress, irritability and is present in people's lives, especially those who experience hospitalization in the neonatal intensive care unit (NICU), due to clinical instability, need to maintain survival through technologies, therapeutic procedures and diagnoses that demand tissue injury. In this group, the preterm newborns (PTNB) are inserted because of their fragility, neurological immaturity, a severely compromised clinical condition and the need for hospitalization for a prolonged period, being submitted to several painful procedures.

Care practice and scientific evidences show that, for a better perception of pain manifestations in newborns, it is necessary to observe the physiological and behavioral parameters, which can be modified when faced with a painful stimulus. The responses of the physiological parameters include: heart rate, respiratory rate, oxygen saturation and systolic blood pressure. Regarding the behavioral evaluation, after a painful stimulus, the following stand out: motor response to pain, facial mimicry, crying and sleep pattern and wakefulness[1].

As newborns communicate non-verbally[2], pain assessment becomes a challenge because of the difficulty of measuring it. For this study, the evaluation of pain through facial mime was prioritized through the Neonatal Facial Coding System (NFCS), because it represents a more specific response to the painful stimulus when compared to the physiological parameters[3].

Some studies are carried out to verify the influence of neonatal variables, such as gender, gestational age[4]; and therapeutic variables, such as type of oxygen therapy[5] in the premature pain reaction. It is noticed that nursing has been working with methods of assistance which are increasingly focused on the relief of the pain of these children. Thus, recent research in the field of neonatal nursing highlights the use of music[6-7] and glucose 25%[8-9] as non-pharmacological techniques.

Considering that it is pertinent to know and critically evaluate the profile of the PTNBs with regard to the delivery conditions and therapeutics used to treat grievances in health, which are often imbued with painful procedures; that non-pharmacological measures are presented as a strategy for pain relief in children, it is questioned: What is the relationship of neonatal and therapeutic variables with NFCS pain scores in PTNBs under the effect of music and administration of 25% oral glucose?

In this context, the objective of this study was to evaluate pain in PTNBs and to compare neonatal variables (gender, type of delivery, birth weight, corrected gestational age, chronological age in days, period of hospitalization stay in days, Apgar 1' and 5', Cephalic perimeter, thoracic perimeter) and therapeutic variables (type of oxygen therapy, place of hospitalization and place of puncture) with the total values of NFCS scores of PTNBs submitted to arterial puncture who were exposed to music and 25% oral glucose.

METHOD

Ethical aspects

It was approved by the Research Ethics Committee of the study's locus institution and the ethical aspects provided for in Resolution 196/96 of the National Research Council were respected.

Type of study, location and period

A comparative study, conducted at a NICU of a public hospital, located in a city in northeastern Brazil. It occurred in the period from May to August 2013, with the selection of videotapes of PTNBs submitted to the music and 25% glucose groups, linked to the database of a doctoral thesis with published data[6].

Population/sample; inclusion and exclusion criteria

The population was composed of 55 films selected from said bank, of which 48 were the sample, 26 of these from Group 1; and 22 from Group 2, according to the following inclusion criteria: in the case of neonates that could be analyzed, with no impairment of visualization of the painful moment during arterial puncture, f or both groups, excluding videos with difficulty of face visualization and problems of synchronization of the images.

It was emphasized that for insertion in the filming (population), the PTNBs were submitted to arterial puncture for collection of exams as part of the clinical treatment and were allocated in Group 1 (music) and Group 2 (glucose 25%). They had gestational age > 32 weeks and < 37 weeks; Apgar $\geq$ 6 at the 5th minute; Clinically stable (heart rate and respiratory rate within the parameters of normality); neonatal screening test of hearing within normality; in any form of ventilatory support (circulating O2, Oxi-Hood, Continuous Positive Airway Pressure (CPAP) or mechanical ventilation).

Study protocol

The PTNBs from group 1 used a headset to listen to the same lullaby from the Happy Baby collection of the "Atração Fonográfica Ltda" label for 10 minutes prior to arterial puncture through a MP4 which was interconnected to the headset. Newborns from group 2 also used headphones (without music) and administered 2 mL of 25% oral glucose solution, soaked in gauze two minutes before the painful procedure.

Two instruments of collection were used, the first one to collect the neonatal and therapeutic variables: gender, type of delivery, place of hospitalization, medical diagnosis, gestational age, corrected gestational age, chronological age, birth weight, cephalic perimeter, thoracic perimeter, Apgar 1' and 5', site and puncture number and type of oxygen therapy. These data were extracted from the database, based on the information obtained through the consultation of the patient records of the PTNBs admitted to the neonatal intermediate and intensive care units.

The second instrument was the NFCS pain scale[3], coded through facial manifestations (protruding forehead, narrow eyes, deep nasolabial groove, horizontal open mouth and tense tongue), every two seconds during the initial 20 seconds of the painful moment. To obtain the NFCS scores, the following calculation was followed:

(20 seconds)= numberof activities observed in the 10 two second intervals-maximum number of activities possible or 50 (10 intervals $\times$ 5 actions) $\times$ 10.

After insertion of the n = 48 filming, one of the authors of the study separated and watched all the DVDs, in order to record

the real time of the beginning and end of the pain period. Two notebooks were used: one with a DVD of the face and the other with the DVD of the painful procedure. They were positioned side-by-side as follows: the audible signal regarding the marking of the actual time of the beginning and end of each filming for the painful moment through the face DVD was recorded and time recorded directly on the instrument to be analyzed.

Three nurses, specialists in Neonatology, were selected to participate in the analysis of the filming after the training of the NFCS scale performed by a pain expert. The evaluators were considered apt to perform the evaluation after the Kappa reliability reached at least 80% according to other studies[3,10]. It is emphasized that the nurses assessed the recordings on an individual computer, received a DVD recorded with the facial images of the PTNBs and the instrument of data collection already synchronized in time.

Analysis of results and statistics

The data were structured in an Excel spreadsheet (2007 version) for codification of the variables and double typing was performed in order to ensure greater reliability. After comparing the two spreadsheets and correcting the divergences, the data were exported to the Statistical Package software for the Social Sciences - SPSS (version 19), making it possible to perform the descriptive and comparative statistics of the mean of the three evaluators.

Pearson's non-parametric chi-square test with adjusted residuals was used to compare the association between qualitative variables (gender, type of delivery, type of oxygen therapy, place of hospitalization and puncture site) and, when indicated, Fischer's exact test, considering their respective assumptions. Once the overall association between the variables was verified, the adjusted residuals were calculated in order to observe if there was a local association between categories. If the adjusted residue had a positive value higher than 1.96, it could be said that there was evidence of a significant association between the categories studied. The higher the adjusted residue, the greater the association between the categories.

For the quantitative variables (birth weight, corrected gestational age, chronological age in days, length of hospitalization in days, Apgar 1' and 5', cephalic perimeter, thoracic perimeter, number of punctures), Student's t test or Non-parametric test of Mann-Whitney was used, when the assumption of normality could not be verified. The normality of the sample data was verified through the Kolmogorov-Smirnov Normality test. The level of significance was set at 5% ($p < 0.05$) for all tests.

RESULTS

Table 1 presents the categorical neonatal variables of the PTNBs according to the allocation groups, total pain scores by NFCS and respective p values of the statistical tests.

For the variables gender and type of delivery in Group 1, there was a higher number of PTNBs with NFCS scores ≥ 3, however, p was not significant. Table 2 presents the numerical variables of the newborns from Group 1.

Table 1 – Categorical neonatal variables of the preterm newborns hospitalized in the Neonatal Unit, according to the allocation group and pain scores of the Neonatal Facial Coding System (Painful moment)

Intervention	Variables	NFCS Pain Score*				Total		p†
		< 3		≥ 3				
		n‡	%	n	%	n	%	
	Gender							
Group 1§	Male	2	12.5	14	87.5	16	61.5	
	Female	3	30.0	7	70.0	10	38.5	0.271
	Total	5	19.2	21	80.8	26	100.0	
Group 2‖	Male	10	66.7	5	33.3	15	68.2	
	Female	2	28.6	5	71.4	7	31.8	0.095
	Total	12	54.5	10	45.5	22	100.0	
	Type of delivery							
Group 1	Normal	0	0.0	4	100.0	4	15.4	
	Cesarean	4	21.1	15	78.9	19	73.1	0.502
	Forceps	1	33.3	2	66.7	3	11.5	
	Total	5	19.2	21	80.8	26	100.0	
Group 2	Normal	2	40.0	3	60.0	5	22.7	
	Cesarean	10	58.8	7	41.2	17	77.3	0.457
	Forceps	0	0.0	0	0.0	0	0.0	
	Total	12	54.5	10	45.5	22	100.0	

Note: *NFCS = Neonatal Facial Coding System; †p = Pearson's Chi-square test or Fischer's exact test; ‡N = Number of newborn; §Group 1 = Music; ‖Group 2 = 25% Glucose.

Table 2 – Numerical neonatal variables of preterm newborns of Group 1 (Music) and total values of the Neonatal Facial Coding System (Painful moment)

| Variables | NFCS Value* | Mean ± DP† | IC‡ 95% | | Minimum | Maximum | p§ |
			Inferior Limit	Superior Limit			
Weight at delivery	< 3	2146.0 ± 564.7	1444.8	2847.2	1336.0	2682.0	
	≥ 3	2133.7 ± 654.4	1835.8	2431.6	1226.0	3946.0	0.970
	Total	2136.1 ± 627.4	1882.7	2389.5	1226.0	3946.0	
Cephalic perimeter	< 3	31.9 ± 2.0	29.4	34.4	29.5	34.0	
	≥ 3	31.2 ± 2.6	30.0	32.4	26.5	36.5	0.569
	Total	31.3 ± 2.4	30.3	32.3	26.5	36.5	
Thoracic perimeter	< 3	28.4 ± 3.4	24.1	32.7	23.0	31.0	
	≥ 3	27.9 ± 3.1	26.5	29.3	22.0	34.5	0.742
	Total	28.0 ± 3.1	26.7	29.2	22.0	34.5	
Number of punctures	< 3	1.0 ± 0.0	1.0	1.0	1.0	1.0	
	≥ 3	1.2 ± 0.7	0.9	1.6	1.0	4.0	0.461
	Total	1.2 ± 0.6	0.9	1.4	1.0	4.0	
Apgar 1st minute	< 3	8.0 ± 0.0	8.0	8.0	8.0	8.0	
	≥ 3	6.5 ± 2.1	5.6	7.5	2.0	9.0	0.133
	Total	6.8 ± 2.0	6.0	7.6	2.0	9.0	
Apgar 5th minute	< 3	8.8 ± 0.4	8.2	9.4	8.0	9.0	
	≥ 3	8.4 ± 0.9	8.0	8.8	6.0	10.0	0.309
	Total	8.5 ± 0.8	8.1	8.8	6.0	10.0	
Corrected gestational age (weeks)	< 3	34.8 ± 1.7	32.8	36.9	32.6	36.3	
	≥ 3	34.2 ± 1.6	33.5	35.0	32.0	36.5	0.463
	Total	34.4 ± 1.6	33.7	35.0	32.0	36.5	
Corrected gestational age (days)	< 3	245.2 ± 11.1	231.4	259.0	230.0	255.0	
	≥ 3	241.3 ± 10.9	236.4	246.3	224.0	257.0	0.483
	Total	242.1 ± 10.8	237.7	246.4	224.0	257.0	
Chronological age (days)	< 3	1.2 ± 1.8	-1.0	3.4	0.0	4.0	
	≥ 3	2.1 ± 5.4	-0.3	4.6	0.0	23.0	0.705
	Total	2.0 ± 4.9	0.0	3.9	0.0	23.0	

Note: *NFCS = Neonatal Facial Coding System; †SD = standard deviation; ‡CI = Confidence Interval; §p = Student's t test or Mann-Whitney U test

Table 3 – Numerical neonatal variables of preterm newborns of Group 2 (Glucose 25%) and total values of Neonatal Facial Coding System (Painful moment)

| Variables | NFCS Value* | Mean ± DP† | IC‡ 95% | | Minimum | Maximum | p§ |
			Inferior Limit	Superior Limit			
Weight at delivery	< 3	1,882.0 ± 536.3	1,541.3	2,222.7	918.0	2,999.0	
	≥ 3	1,853.3 ± 445.7	1,534.5	2,172.1	1350.0	2,578.0	0.894
	Total	1,869.0 ± 485.8	1,653.6	2,084.3	918.0	2,999.0	
Cephalic perimeter	< 3	29.3 ± 3.8	26.9	31.7	20.0	35.5	
	≥ 3	30.2 ± 1.7	29.0	31.3	28.0	32.6	0.530
	Total	29.7 ± 3.0	28.4	31.0	20.0	35.5	

Table 3 (concluded)

Variables	NFCS Value*	Mean ± DP†	IC‡ 95%		Minimum	Maximum	p§
			Inferior Limit	Superior Limit			
Thoracic perimeter	< 3	26.9 ± 3.6	24.6	29.2	20.0	32.0	
	≥ 3	27.9 ± 3.2	25.6	30.1	23.0	34.0	0.529
	Total	27.3 ± 3.4	25.9	28.8	20.0	34.0	
Number of punctures	< 3	1.0 ± 0.0	1.0	1.0	1.0	1.0	
	≥ 3	1.2 ± 0.4	0.9	1.5	1.0	2.0	0.114
	Total	1.1 ± 0.3	1.0	1.2	1.0	2.0	
Apgar 1st minute	< 3	6.6 ± 1.5	5.6	7.5	4.0	9.0	
	≥ 3	6.1 ± 2.8	4.1	8.1	2.0	9.0	0.615
	Total	6.4 ± 2.2	5.4	7.3	2.0	9.0	
Apgar 5th minute	< 3	8.3 ± 0.7	7.9	8.7	7.0	9.0	
	≥ 3	8.2 ± 1.0	7.5	8.9	7.0	9.0	0.716
	Total	8.3 ± 0.8	7.9	8.6	7.0	9.0	
Corrected gestational age (weeks)	< 3	33.4 ± 1.8	32.3	34.5	32.0	36.6	
	≥ 3	34.2 ± 1.6	33.1	35.3	32.4	36.6	0.274
	Total	33.8 ± 1.7	33.0	34.5	32.0	36.6	
Corrected gestational age (days)	< 3	234.5 ± 12.8	226.4	242.6	224.0	258.0	
	≥ 3	240.4 ± 11.6	233.1	248.7	228.0	258.0	0.275
	Total	237.2 ± 12.3	231.7	242.7	224.0	258.0	
Chronological age (days)	< 3	4.3 ± 11.5	-3.0	11.5	0.0	40.0	
	≥ 3	1.7 ± 2.4	0.0	3.4	0.0	8.0	0.499
	Total	3.1 ± 8.5	-0.7	6.9	0.0	40.0	

Note: *NFCS = Neonatal Facial Coding System; †SD = standard deviation; ‡CI = Confidence Interval; §p = Student's t test or Mann-Whitney U test

Table 4 –   Therapeutic variables used in preterm newborns admitted to the Neonatal Unit, according to the allocation groups and pain scores of the Neonatal Facial Coding System

Intervention	Variables	NFCS Pain Score*				Total		p†
		< 3		≥ 3				
		n‡	%	n	%	n	%	
	Type of oxygen therapy							
Group 1§	Mechanical ventilation	1	16.7	5	83.3	6	23.1	
	Continuous Positive Airway Pressure	2	20.0	8	80.0	10	38.5	
	Oxi-Hood	2	28.6	5	71.4	7	26.9	0.888
	Ambient air	0	0.0	3	100.0	3	11.5	
	Total	5	19.2	21	80.8	26	100.0	
Group 2‖	Mechanical ventilation	3	75.0	1	25.0	4	18.2	
	Continuous Positive Airway Pressure	4	50.0	4	50.0	8	36.4	
	Oxi-Hood	4	66.7	2	33.3	6	27.2	0.474
	Ambient air	1	25.0	3	75.0	4	18.2	
	Total	12	54.5	10	45.5	22	100.0	
	Admission location							
Group 1	High risk	4	16.7	20	83.3	24	100.0	
	Medium risk	1	50.0	1	50.0	2	8.3	0.250
	Total	5	19.2	21	80.8	26	108.3	

Table 4 (concluded)

Intervention	Variables	NFCS Pain Score*				Total		p†
		< 3		≥ 3				
		n‡	%	n	%	n	%	
Group 2	High risk	10	58.8	7	41.2	17	77.3	0.406
	Medium risk	2	40.0	3	60.0	5	22.7	
	Total	12	54.5	10	45.5	22	100.0	
	Puncture location							
Group 1	Right radial	2	16.7	10	83.3	12	46.2	0.853
	Left radial	3	25.0	9	75.0	12	46.2	
	Right brachial	0	0.0	1	100.0	1	3.8	
	Left brachial	0	0.0	1	100.0	1	3.8	
	Total	5	19.2	21	80.8	26	100.0	
Group 2	Right radial	6	50.0	6	50.0	12	54.5	0.626
	Left radial	5	55.6	4	44.4	9	41.0	
	Right brachial	0	0.0	0	0.0	0	0.0	
	Left brachial	1	100.0	0	0.0	1	4.5	
	Total	12	54.5	10	45.5	22	100.0	

Note: *NFCS = Neonatal Facial Coding System; †p = Pearson's Chi-square test or Fischer's exact test; ‡N = Number of newborn; §Group 1 = Music; ||Group 2 = 25% Glucose

No statistically significant difference was observed in Group 1 between the variables studied in relation to having and not having pain. Table 3 shows the numerical neonatal variables of the PTNBs from Group 2.

There was no statistical significance for the numerical neonatal variables of the PTNBs for Group 2 and total NFCS values. Table 4 shows the therapeutic variables and pain scores of the PTNBs investigated in the allocation groups.

There was no association between the presence of pain, with values (≥ 3), and the therapeutic variables used in PTNBs, according to Group 1 and Group 2. However, a greater number of newborns in Group 1 were more reactive to pain.

DISCUSSION

The findings showed that there were no statistically significant associations for the studied variables, although in Group 1 premature newborns, there was a greater presence of pain (≥ 3), and in Group 2 there was no pain (< 3) according to the NFCS.

Regarding the gender variable, there has been a long time difference between men and women, because they have lower pain thresholds than men, when provoked by nociceptive stimuli such as heat, cold, pressure and electrical stimulation[11]. Thus, pain threshold is emphasized as that of the minimal intensity of the stimulus perceived as painful, varies from individual to individual, subjective experience[12].

A literature review analyzed the effect of gender, gestational age, and severity of neonatal disease on the reactivity of pain in preterm newborns, and in two studies an influence of gender on pain responses was observed. It was also found that males were more reactive to pain than females in 40 preterm newborns with gestational age between 28-36 weeks (mean = 32

weeks), during the painful procedure of venous puncture for blood collection, as well as in the comparison of two groups of neonates with different gestational ages (< 30 weeks versus ≥ 30 weeks and 24-32 weeks), with 54 premature newborns during puncture of the calcaneus[4]. In this context, the information explained resembles those of the present investigation, since 14 (87.5%) of the male preterm newborns were the most reactive to the pain in the music group, compared to the female, although not statistically significant (p > 0.05).

A randomized, multicenter clinical trial, although not working with pain, assessed the effect of pacifier-activated lullaby (PAL) on probe feeding termination due to the initiation of oral feeding for 15 minutes, activated on the PAL pacifier (one or three times) for five days in 68 PTNBs hospitalized in the Neonatal Intensive Care Unit (NU), with a gestational age of 32, 34, 36 weeks. The results showed that the music activated in the pacifier (three times) can shorten the days of feeding by catheter and length of hospital stay in PTNBs with 34 weeks. Female preterm newborns started breastfeeding faster when compared to males[13].

It should be noted that a survey conducted in the NU of a public hospital linked to the University of São Paulo (USP) with 52 PTNBs of gestational age ≤ 37 weeks and weight ≤ 1,500g showed that gender is variable with little influence on the pain responses of boys and girls, that is, they reacted to the pain stimulus and recovered with a similar pattern, with no statistically significant difference, by NFCS at the blood collection point. In addition, it was found that the mean birth weight of newborns — 3.190 g for those placed immediately after delivery in skin-to-skin contact with the mother; and 3.325 g for those who were referred directly to the heated crib — had no association between the groups with p = 0.29[14].

This study corroborates the research results[14], since there was no statistically significant difference for the variable weight

in the PTNBs group of the music group and of the 25% glucose group, with (p = 0.970) and (p = 0.894), respectively. However, it should be noted that all preterm newborns in the sample presented low weight, and those in the music group were more sensitive to pain, with a mean value of 2,133.7 $\pm$ 654.4 g.

Exploratory, observational study, performed at a NU of a federal public institution in Rio de Janeiro, evaluated the presence of pain in PTNBs submitted to aspiration of the tracheal cannula. The sample consisted of 10 PTNBs with gestational age < 37 weeks, four of them considered extremely low weight (<1,000 g); five, very low weight (<1,500 g); and a low weight (<2,500 g). The results indicated that newborns presented pain during the orotracheal cannula aspiration procedure, identified from the Premature Infant Pain Profile (PIPP), through behavioral and physiological reactions such as frowning, squeezed eyes and deep nasolabial folds, change in heart rate and oxygen saturation[15].

A study carried out in the United States of America — focusing on the analysis of medical records of low birth weight newborns (< 2.499 g) and gestational age less than 36 weeks, hospitalized at the NU in 2006, who received music therapy or not - showed that the administration of music benefited the newborns in weight gain and hospitalization time[16].

An important aspect to be emphasized regarding the pain of the newborn is that the intensity of responses is related to their gestational age[17]. While evidences show that the PTNBs with lower gestational age are the most vulnerable to the effects of the painful procedure due to the immature nervous system[18], 59 premature newborns, with a gestational age $\geq$ 30 and $\leq$ 36 weeks, were submitted to the Teste do Pezinho collection, it was identified that there was no interference in the pain scores through the NFCS for corrected gestational age at the puncture and milking periods[19], as well as in this painful moment.

A comparative quasi-experimental study, carried out in the Maternity of the interior of the state of São Paulo, evaluated 40 full-term newborns, with gestational age between 37 and 41 weeks, during the procedure of vaccination against Hepatitis B, through the NFCS. The sample consisted of newborns of suitable weights for gestational age in Group A (15 minutes in contact with their mothers) and Group B (they waited in the warm crib at the beginning of the data collection). The results identified that the statistical difference between gestational age in days (p = 0.02) was not clinically relevant, since the two groups were composed of term newborns[20].

Differently from the data cited, the p value for the variable "gestational age" did not demonstrate significance during the arterial puncture procedure for the music and glucose group at 25%. However, it is noteworthy that the PTNBs who presented scores ($\geq$ 3) by means of the total NFCS scores in the music group were the lowest gestational age mean (34.2 $\pm$ 1.6 weeks and 241.3 $\pm$ 10.9 days), in contrast to Group 2, with the highest mean gestational age (34.2 $\pm$ 1.6 weeks and 240.4 $\pm$ 11.6 days) when compared to preterm newborns who scored < 3 for both groups, respectively.

For the cephalic perimeter variable, in a study that evaluated 63 PTNBs with gestational age between 28 and 33 weeks - who listened to classical music (Mozart) and lullaby for 20 minutes during two consecutive days (experimental group) and others who did not were submitted to the musical stimulus (control group), the growth of the cephalic perimeter was evaluated during four moments focusing on the first day, the last day and one week after the musical stimulus, and the results showed that there was no statistically significant difference in cephalic growth of the newborns studied[21].

Regarding the Apgar score and the number of punctures, a study with 89 newborns submitted to puncture of the calcaneus, which compared the pain of the newborns who were born with up to 32 weeks of gestation with those born four weeks before, on the NFCS scale, he found that the Apgar score contributes less than the frequency of invasive procedures for the presence of facial expressions of pain[22]. In the present study, the PTNBs that showed scores with $\geq$ 3 were the ones with the lowest mean and standard deviation of the Apgar, both at the 1st and at the 5th minutes.

When analyzing the therapeutic variables, a clinical trial with a comparison between the sucrose group and the sterile water group, it was found through the NFCS scale analysis that there was no statistically significant difference between groups and intragroup in relation to the number of attempted punctures, duration of puncture and type of puncture at the time of blood collection[23].

It should be noted that it was not possible to make a comparison with the aforementioned research because the therapeutical variables were different, concluding, therefore, similarity only in the number of attempts to puncture, causing stress. This culminates in increased metabolic expenditure and depletion of energy reserves, discouraging weight gain, slowing the recovery of newborns and worsening their clinical conditions[24-25]. Thus, in the impossibility of eliminating the painful procedures resulting from the need for clinical treatment in hospitalized newborns, preventing the negative effects is of paramount importance to protect them[25].

A study with 20 PTNBs indicated that, when nasal CPAP is installed, 100% of the newborns feel pain, however, when they are offered non-nutritive suction (minimum gloved finger in the oral cavity of the newborn), premature newborns reacted to Stimulus without reaching an indicative pain score by the Neonatal Infant Pain Scale (NIPS)[26]. In this study, eight of the 10 newborns in Group 1, four of the eight newborns in Group 2 who underwent nasal CPAP, reached pain scores on the NFCS scale, although there was no statistically significant difference between the groups, including to the other variables of oxygen therapy, such as mechanical ventilation and Oxi-Hood.

Limitations of the study

Amongst the limitations of this study, the relatively small number of PTNBs filmings in the group with music and/or glucose 25% stand out. Future researches that meets such limitation are necessary.

Contributions to the area of nursing and health

It is believed that the present study contributed to the elucidation of important aspects related to the assessment of the PTN pain submitted to arterial puncture. Thus, it is expected that the results will provide subsidies for a more humanized care practice, with health professionals and committed to improving the quality of life of premature newborns hospitalized

at the NU, with the minimization of pain and the use of non-pharmacological measures like music and 25% glucose.

CONCLUSION

Neonatal and therapeutic variables for PTNBs exposed to music and glucose 25% at the time of arterial puncture for blood collection did not present statistically significant associations. However, in the neonatal variables of gender and type of delivery in Group 1 (music), a greater number of PTNBs with presence of pain ≥ 3 were found, as well as in the therapeutic variables "type of oxygen therapy", "place of hospitalization" and "type of puncture". It is concluded that there was no difference in comparing the groups of music and glucose 25% and the variables studied.

FUNDING

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