

CARDIOPULMONARY AND BEHAVIORAL REPERCUSSIONS OF PREMATURES SUBMITTED TO SENSORY MOTOR STIMULATION IN NEONATAL UNITS

Mara Marusia Martins Sampaio Campos
Physiotherapist, Escola Maternidade: Assis
Chateaubriand-MEAC
Fortaleza - CE
<http://lattes.cnpq.br/6515305320777878>

Mariana de Sousa Lima
Physiotherapist, Centro Universitário
Christus – UNICHRISTUS
Fortaleza – CE
<http://lattes.cnpq.br/9438420443241334>

Kellen Yamille dos Santos Chaves
Physiotherapist, Escola Maternidade: Assis
Chateaubriand
Fortaleza, CE
<http://lattes.cnpq.br/9857301047308160>

Maria Valdeleida Uchoa Moraes Araújo
Physiotherapist, Hospital Geral Dr Cesar
Cals – HGCC
Fortaleza – CE
<http://lattes.cnpq.br/7314440835465770>

Raquel Emanuele de França Mendes
Physiotherapist, Universidade Federal do Rio
Grande do Norte, Natal, RN
Daniela Uchoa Pires Lima
Physiotherapist, Escola Maternidade: Assis

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



Chateaubriand
Fortaleza,CE
<http://lattes.cnpq.br/0913372177824754>

Juliana Chaves Barros de Alencar
Physiotherapist, Escola Maternidade: Assis
Chateaubriand-MEAC
Fortaleza - CE

Samira de Moraes Sousa
Physiotherapist, Hospital Infantil Albert
Sabin
Fortaleza – CE
<http://lattes.cnpq.br/1228742395776603>

Carina Santana de Freitas
Physiotherapist, Escola Maternidade: Assis
Chateaubriand
Fortaleza, CE
<http://lattes.cnpq.br/8146433884441695>

Sandra Mara Benevides Caracas
Physiotherapist, Hospital Geral Dr César
Cals – HGCC
Fortaleza,CE
<http://lattes.cnpq.br/7785982363462530>

Thiago Benevides Caracas
Medical Student, Universidade Federal do
Ceará
Sobral, CE
<http://lattes.cnpq.br/7462887765920225>

Marina Martins Sampaio Fernandes
Medical Student, Universidade Estadual de
Ciências da Saúde de Alagoas – UNCISAL
Maceió, AL
<http://lattes.cnpq.br/6425211367272888>

Abstract: **Introduction:** Prematurity is a major public health problem. The sensorimotor intervention aims at functional rehabilitation, acting in the prevention of movement disorders and dysfunctions inherent to prematurity. **Goal:** To identify the cardiopulmonary and behavioral repercussions of premature infants submitted to sensorimotor stimulation in neonatal units. **Methodology:** It was an observational, retrospective study with an intervention and a quantitative approach. Sample collection took place between February and June 2018, at the Escola Maternidade: Assis Chateaubriand (MEAC). The data were collected through a form containing the clinical data of the neonates and an evaluation of the cardiopulmonary (Heart Rate, Respiratory Rate and Oxygen Saturation) and behavioral repercussions before and after a sensorimotor intervention protocol (kinesthetic tactile stimulation and exercises/ passive mobilization), developed by the study researchers and performed by the professional physiotherapist of the sector. **Result:** A total of 32 preterm infants who met the inclusion criteria were evaluated, 58.4% of whom were female, with a gestational age between 35 and 36 weeks (43.8%), weight less than 1,500 (53.1%) and APGAR greater than 7 at birth (90.3%). When analyzing the cardiorespiratory repercussions, a slight increase was seen after sensorimotor stimulation, all neonates changed their behavioral state from sleepiness to alertness and showed no pain after handling. **Conclusion:** the results of this study show that the procedures used by the researchers changed cardiorespiratory and behavioral variables, however they do not cause pain. **Keywords:** Prematurity. Neonatal. Physiotherapy.

INTRODUCTION

In developing countries, prematurity is a major public health problem because it is a determinant of neonatal morbidity and mortality. A study proves that preterm newborns (RNpt) and low birth weight have a significantly higher risk of mortality than children born with a weight greater than or equal to 2,500g and those with gestational ages greater than or equal to 37 weeks (DA ROSA et al. al., 2021; DUARTE et al., 2021; PITILIN et al., 2021).

Due to the instability and immaturity presented at birth, newborns are considered at risk and need special care offered in Neonatal Units (NU). These units have adequate technical conditions for the provision of specialized care, including physical facilities, equipment and human resources and are divided according to the care needs in the Neonatal Intensive Care Unit (NICU) and Neonatal Intermediate Care Unit (NICU), which is subdivided into: Conventional Neonatal Intermediate Care Unit (UCINCo) and Kangaroo Intermediate Neonatal Care Unit (UCINCa) (PORTAL DE BAS PRATICAS, 2019).

Prematurity, which is recognized as an important risk factor for motor development disorders, which, added to the insults suffered in the environment of a NU, such as the presence of noise, intense lighting, constant handling and the performance of painful procedures, can promote an interruption in the progression of the development of brain structures, which can affect important events in brain development such as synaptogenesis and myelination (MATOS; DA SILVA; BOULHOSA, 2021; VASCONCELOS et al, 2019).

In the NUs, newborns (RN) receive assistance from a multidisciplinary team composed of doctors, nurses and physiotherapists, among others, who work

together, generating an interaction between different areas of knowledge, aiming at a more specialized care. The doctor is responsible for the patients and when procedures to support the diagnosis are necessary, the rest of the team is called (SILVA et. al, 2019; OLIVEIRA, 2019; FIGUEIROLA et. al, 2018)

After a careful assessment of the newborn, the physical therapist is responsible for indicating or contraindicating the physical therapy intervention, as well as defining the resources that will be used in their respiratory conduct and/or sensorimotor stimulation (SMS). Physiotherapy can contribute to the reduction of neonatal morbidity, length of stay and hospital costs (OLIVEIRA, 2019; FIGUEIROLA et. al, 2018).

The ESM aims to stimulate neuropsychomotor development (DNPM) by preventing or minimizing the harmful effects of the environment of the NUs and their interventions. Among the procedures performed in the ESM, we mention in this study tactile kinesthetic stimulation and exercises/mobilization (passive) used to improve weight gain and reduce hospitalization time, increase parasympathetic activity during sleep, improve muscle strength and bone mineralization, optimize the performance of motor behavior, among others (JONHSTON et. al, 2021; BALDA; GUINSBURG, 2018).

Pagano, Moreira and Resck (2020) highlight that hemodynamic variation during manipulation, risk of infection and high sensitivity to pain are common characteristics of the neonatal period that are presented by the multiple conditions listed above, so the present study aimed to identify the cardiopulmonary and behavioral repercussions of premature infants submitted to MSE in Neonatal Units.

METHODOLOGY

It was an observational, retrospective study with an intervention and a quantitative approach. Sample collection took place between February and June 2018, at the Escola Maternidade: Assis Chateaubriand (MEAC), a reference in the Northeast in the care of pregnant women, specializing in obstetrics, gynecology, mastology and neonatology services, with emphasis on the service of humanized birth.

The population consisted of newborns with a gestational age (GA) greater than 34 weeks, with more than 72 hours of birth, hospitalized at UCINCO and UCINCA, clinically stable and without oxygen therapy support. Infants in a deep sleep state and who had any neurological dysfunction, syndrome or heart disease were excluded from the study.

Data collection was carried out in two moments. The selection of the population was performed through the medical records from which pre, peri and post-natal data from the Rnpt were taken and placed in a data collection form. After that moment, the mothers were sought out by the researchers in order to allow their child to participate in the study, which was given through the Free Informed Consent Term (FICT).

The second moment consisted of sensorimotor stimulation, performed by the physical therapist/researcher and accompanied by another researcher, physician or physical therapist, in order to observe and record cardiopulmonary repercussions such as Heart Rate (HR), Respiratory Rate (RR), Saturation of Oxygen (SatO₂). Before and during the intervention, the behavioral status and whether the Rnpt presented pain during the intervention were also observed, assessed using the NIPS protocol.

Two interventions of sensorimotor stimulation were used, following the

protocol: tactile kinesthetic stimulation, exercises/passive mobilization (alternate upper limb reaching, alternate lower limb kicks, pelvic and scapular girdle dissociation) and therapeutic positioning.

The HR and SatO₂ variables of the newborns who were at the UCINCO were measured by the vital signs monitor (hospital oximeter) and those at the UCINCA by the portable pulse oximeter. RR was always measured by the same researcher and in 60 seconds, through thoraco-abdominal movements and use of a stethoscope. Behavioral characteristics and presence of pain were analyzed using the Neonatal Behavioral Assessment Scales and the Neonatal Infant Pain Scale (NIPS) respectively.

Guimarães (2016) highlights that pediatrician T. Berry Brazelton in 1973 (BRAZELTON, 1973) was one of the first authors to create resources to advance beyond the physical examination of the APGAR and the neurological evolution in the evaluation of the newborn, recognizing that neonates have a rich variety of behaviors that express their abilities classifying them into 6 behavioral states.

The NIPS is an approved scale for the assessment of acute pain in procedures in term and preterm infants, applied from the 24th week of gestational age and in the postoperative period. This scale assesses six parameters, five of which are behavioral (facial expression, crying, upper limbs, lower limbs, wakefulness) and one physiological (breathing) (LAWRENCE, 1993).

Data were tabulated in Microsoft Office Excel Version 2009, then descriptive statistical analysis was performed using frequencies, means and standard deviation, using Statistical Package For The Social Science Software (SPSS) version 20.0. The results were displayed in tables. The comparative

analytical statistics of the HR, RR, SatO2 and temperature variables were performed using the paired T-student test. The behavioral state variable was assessed by the Mann Whitney test. The comparison between the two interventions was performed using the T-student test for independent samples. Thus, observing the significance value $P=0.05$.

To carry out this research, all ethical precepts of research with human beings were obeyed, which govern confidentiality, secrecy, anonymity, autonomy, beneficence, non-maleficence, justice and equity, regulated by Resolution 466/12 of the National Health Council / Ministry of Health/ MS (BRAZIL, 2013). The project was approved by the Ethics Committee of Escola Maternidade: Assis Chateaubriand (MEAC) under number: 1,783,099.

RESULTS AND DISCUSSION

The analyzed population consisted of 32 PTNB who were hospitalized in the NICUs, among which 22 were in the UCINCO and 10 in the UCINCA. Table 1 shows the clinical data of the neonates.

Variables	N (%)
Genre	
Male	13 (40,6%)
Feminine	19 (59,4)
Gestational Age at birth (GA)	
($\leq 30s$)	13 (40,6%)
(31s – 34s)	5 (15,6%)
(35s – 36s)	14 (43,8%)
Weight	
<1.500	17 (53,1%)
>2.000	5 (15,5%)

2.200 - 2800	9 (28,3%)
do not inform	1 (3,1 %)
APGAR in the 5th min.	
< 7	2 (6,3 %)
> 7	29 (90,3 %)
do not inform	1 (3,1%)
Comorbidities	
HPIV	5 (15,6%)
DBP	1 (3,1%)

HPIV: Peri-Intraventricular Hemorrhage;

DBP: Bronchopulmonary Dysplasia

TABLE 1: Premature newborn data.

Source: Authors, 2018.

The predominance of females found in this study differs from the study by Mendes et. al (2020), where among the 17 babies studied, nine (53%) were male and eight (47%) were female.

Almeida, Couto and Junior (2019) analyzed the prevalence of short-term deaths and the main associated complications in preterm infants born at the Hospital Regional de São José Dr. Homero de Miranda Gomes (HRSJ) from January 2011 to December 2017 and observed a higher proportion of late preterm births, with a Gestational Age between 34 weeks and 36 weeks and 6 days of gestation, corresponding to 58.5% of preterm infants, which corroborates what was found in the present study.

When evaluating possible maternal and fetal risk factors correlated with premature births born in the Municipality of Franca-SP in 2018, Duarte et. al (2020) found in their sample described as “cases”, a weight with a mean of $2,360.88 \pm 676.6$ g and Apgar in the fifth minute with a mean of 9.19 ± 4.02 , data that partially diverge from that found in this study. It is noteworthy that the GA and weight

described here refer to that found at birth, as in the study by Belez et. al (2019), who also had a sample gestational age of about 172 days (24 weeks and 5 days) and weight between 570g and 4,100g for birth weight.

Borges et. al (2018) when studying clinical conditions and metabolic profile of preterm infants observed that the main comorbidities presented during the hospitalization period were respiratory distress syndrome (n=36/97.3%), early sepsis (n=27/72.9 %), late sepsis (n=16/43.2%), data that do not corroborate with this study.

Table 2 shows cardiopulmonary repercussions, behavioral status before and after sensorimotor stimulation.

Variables	EMSA* Mean (±SD)	DESM** Mean (±SD)
FR (rpm)	56,6 (10,2)	58,2 (9,4)
FC (bpm)	154,7 (14,7)	157,28 (18,6)
SO2 (%)	94,0 (4,8)	99,3 (11,0)
Est. Comp	Sonolento	Alerta
NIPS	2	3

TABLE 2: Comparison of the variability of vital signs, behavioral status and NIPS variables before and after ESM.

Source: Authors, 2018; * Data found before ESM; ** Data found after ESM.

According to the table, a slight increase in cardiopulmonary variables is observed after MSE, but within the normal range. In the behavioral state, the Rnpt went from state 3 (drowsiness) to 4 (alert) and absence of pain was demonstrated, as described by Andrade (2021), who highlights that NIPS as a scale that has the function of evaluating of acute pain in preterm (gestational age < 37 weeks) and term (gestational age from 37 weeks to six weeks of life) newborns and only considers pain when the total is greater than 3.

Kessler, Barduzi Netto and Alcará (2019) described in their review study on physiotherapy in neonatal intensive care research on the repercussions after respiratory physiotherapy procedures, considering that these behaviors did not have significant influences on cardiopulmonary function, not compromising clinical stability of PTNB. Still in this study, another research analyzed the implications of the manual vibrocompression technique and nasotracheal aspiration, in 20 infants in the postoperative period of cardiac surgeries, on the cardiorespiratory parameters of HR and RR, SpO² and on pain evaluated through the NIPS protocol, in it was seen that these handlings did not harm the parameters evaluated and did not trigger pain, data that partially diverge from this study.

Regarding ESM, the first Brazilian recommendation of physical therapy for sensorimotor stimulation of newborns and infants in the intensive care unit (JOHNSTON et. al, 2021) highlights that all modalities had good ratings for pain or stress control, however the only modality within the ESM with a high degree of scientific certainty was skin-to-skin stimulation, followed by multisensory stimulation.

CONCLUSION

The present study showed that the majority of newborns participating in this study had an increase in cardiopulmonary repercussions, change in behavioral status and absence of pain sensation. Studies with more robust samples and with a longitudinal design are suggested so that results such as those here found are better studied and verified, so that ESM is safely indicated in premature neonates and in other populations.

REFERENCES

- ALMEIDA, B., COUTO, R.H.M., JUNIOR, A.T. Prevalência e fatores associados aos óbitos em prematuros internados. **Arq. Catarin med.**, v. 48, p. 4, P. 35-50, 2019.
- ANDRADE, S. R.F. de. **Métodos utilizados para avaliação da dor durante a realização de procedimentos dolorosos em UTI neonatal: Uma revisão integrativa** / Sara Regina Ferreira de Andrade ; Érica Brandão de Moraes Vieira, orientadora ; Eny Dórea Paiva, coorientadora. Niterói, 2021
- BALDA, R. de C.X.; GUINSBURG, R. **A linguagem da dor no recém nascido**. São Paulo, Documento científico do departamento de neonatologia da Sociedade Brasileira de Pediatria, 2018.
- BELEZA, L. de O. et al. Perfil de recém-nascidos de risco atendidos por enfermeiros em seguimento ambulatorial: estudo de coorte retrospectiva, **Rev. Latino-Am. Enfermagem**, v. 27, 2019.
- BRASIL. Resolução CNS nº 466, 12 de dezembro de 2012. Aprova diretrizes e normas de pesquisa envolvendo seres humanos. **Diário Oficial da União**, Brasília, DF, nº 12, seção 1, p. 59, 13 jun. 2013.
- BRAZELTON, T.B. **Neonatal Behavioral Assessment Scale**. London, Willian Heinemann Medical Books; 1973.
- BORGES, A.I.G. et al. Condições clínicas e perfil metabólico de prematuros do nascimento aos seis meses de idade corrigida. **Rev. Eletr. Enf.**, v.20, n.30, 2018.
- DA ROSA, N. P. et al. Fatores de riscos e causas relacionados à prematuridade de recém-nascidos em uma instituição hospitalar. **Research, Society and Development**, v. 10, n. 9, 2021.
- DUARTE, I.L. et al. Fatores preditores maternos e neonatais relacionados à prematuridade: estudo caso controle de base populacional em um município do interior de São Paulo. **Revista Brasileira de Ciências da Saúde**, v. 25, n. 2, p. 205-216, 2021.
- FIGUEIROLA, K.A. et. al. Fisioterapia na UTI Neonatal: As razões médicas utilizadas para prescrição de fisioterapia. **Saúde (Santa Maria)**, v. 44, n. 1, p. 1-6, jan./abril, 2018
- JOHNSTON, C. et al. Primeira recomendação brasileira de fisioterapia para estimulação sensorio-motora de recém-nascidos e lactentes em unidade de terapia intensiva. **Rev Bras Ter Intensiva**, n.33, v.1, p. 12-30, 2021.
- GUEDES, R.R.L. et al. Perfil de prematuridade e adequação neonatal de peso em maternidade de Minas Gerais e comparação com literatura médica. **Residência Pediátrica**, 2020.
- GUIMARÃES, M.A.O. **O comportamento de recém-nascidos de risco: adaptação transcultural e utilização clínica da Neonatal Behavioral Observation (NBO)**. [manuscrito] /Marina Aguiar Pires Guimarães – 2016. 125f., enc.: il.Orientador: Lívia de Castro Magalhães. Coorientadora: Ana Amélia CardosoDissertação (dissertação) – Universidade Federal de Minas Gerais, Escola de Educação Física, Fisioterapia e Terapia Ocupacional.
- KESSLER, R.M.G.; BARDUZZI NETTO, T.V.L.; ALCARÁ, L.P. Revisão integrativa: fisioterapia em terapia intensiva neonatal. **Revista Interdisciplinar de estudos em saúde da UNIARP**, v.9,n.2,2019.
- MATOS, J DA S.; DA SILVA, L. T.; BOULHOSA, F. J. DA S. Abordagem da fisioterapia neonatal em uma unidade de cuidado intermediário. **Revista CPAQV – Centro de Pesquisas avançadas em Qualidade de Vida**, v. 13, n.2, p. 1- 6, 2021.
- LAWRENCE, J. et al. **“The development of a tool to assess neonatal pain.”** Neonatal network : NN v.12, p: 59-66, 1993.
- MENDES, L.J. et al. Avaliação motora para prevenção de deficiências do bebê pré-termo e em risco de atraso no desenvolvimento. **Rev. Interinst. Bras. Ter. Ocup.**, Rio de Janeiro, v.4, n. 5, p.774-784, 2020.
- OLIVEIRA, A. M. et al. Benefícios da inserção do fisioterapeuta sobre o perfil de prematuros de baixo risco internados em unidade de terapia intensiva. **Fisioter Pesqui.** v.26, n.1, p.51-57, 2019.
- PAGANO, L.M.; MOREIRA, D. da S.; RESCK, Z.M.R. Utilização da técnica broken needle para punção venosa periférica na assistência a recém-nascidos prematuros. **R. pesq.: cuid. fundam.** Online, v.12, p.6-11, jan/dez 2020.

PITILIN, E.B. et al. Fatores perinatais associados à prematuridade em unidade de terapia intensiva neonatal. **Texto & Contexto-Enfermagem**, v. 30, 2021.

PORTAL DE BOAS PRÁTICAS EM SAÚDE DA MULHER, DA CRIANÇA E DO ADOLESCENTE (Brasil). Unidades Neonatais. In: **Portal de boas práticas em saúde da mulher, da Criança e do adolescente**, 2019. Disponível em: <https://portaldeboaspraticas.iff.fiocruz.br/atencao-recem-nascido/principais-questoes-sobre-ambiencia-em-unidades-neonatais/>.

SILVA, A.F.P. et al. A integração da equipe multiprofissional na unidade de terapia intensiva: revisão sistemática. **Revista CPAQV – Centro de Pesquisas Avançadas em Qualidade de Vida**, v.11, n.3, p.2, 2019.

VASCONCELOS, L. T de S. et al. Estimulação precoce multiprofissional em crianças com defasagem no desenvolvimento neuropsicomotor: revisão integrativa. **Rev. Pesqui. Fisioter.**, Salvador, v.9, n.2, p.24-292, maio 2019.