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## ORIGINAL RESEARCH

### Effects of hammock positioning in behavioral status, vital signs, and pain in preterms: a case series study

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#### KEYWORDS

Newborns;  
Prematurity;  
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Humanization

#### Abstract

**Background:** The hammock positioning (Hp) within the incubators simulates the intrauterine environment, however, there is little evidence of its benefits and possible risks.

**Objectives:** The aim of this study was to assess the effects of Hp on behavioral status, vital signs, and pain in very low birth weight preterm newborns.

**Methods:** This is a *quasi-experimental*/case series study in which premature infants (<1500 g) were positioned in supine for one hour in a hammock. The preterm newborns were assessed 10 min before, during (2, 20, 40, and 60 min), and 10 min after Hp with the Brazelton Neonatal Behavioral Assessment Scale, vital signs and pain by the Neonatal Facial Coding System.

**Results:** 28 preterm infants between 28 and 36 weeks of gestational age were evaluated. Regarding the behavioral state, the preterm newborns progressively evolved to light or deep sleep during Hp. There was a statistically significant reduction of the heart and respiratory rate from 2 to 60th minute in a hammock, which was maintained after the positioning. The oxygen saturation remained within normal values. No changes in pain scores were observed.

**Conclusion:** The Hp can be considered a safe method of positioning that can be used to reduce the stress levels in very low birth weight preterm newborns. We did not observe worsening in either pain or vital signs.

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## Introduction

The hammock positioning (Hp) refers to the positioning of newborns in a small rectangle fabric (hammock) fixed by extremities within the incubators. Hp is a simple and low-cost method for the therapeutic positioning of newborns. This technique has been used by physical therapists in several Neonatal Intensive Care Units (NICU), although little is known about Hp.<sup>1</sup>

Preterm newborns are exposed to a stressful environment and painful interventions in the NICU.<sup>2</sup> Low birth weight is also associated with increased morbidity and mortality and motor development delay in preterm infants.<sup>3</sup> The adequate therapeutic positioning of the preterm can minimize postural abnormalities and asymmetries related to prematurity and stay in NICU, also favors the development of spontaneous and functional motor abilities of newborns.<sup>4</sup> Studies indicate that the positioning directly influences the cardiovascular, respiratory, and sleep-wake states.<sup>4-6</sup>

The Hp intends to promote preterm containment, vestibular stimulus, sensory integration, tonic, and behavioral reorganization, thus reducing the noxious sensory stimuli to which the immature brain is exposed in the NICU.<sup>4,5</sup> In addition, Hp potentially simulates the intra-uterine environment, provides relaxation, stimulates the harmonization of movements, and reduces the energy expenditure of very low birth weight newborns.<sup>5</sup> Some studies indicate that the technique promotes the reduction of stress during the period of hospitalization, so it can be considered a strategy to humanize the care in the NICU.<sup>7-9</sup>

However, some Hp related outcomes such as vital signs,<sup>10</sup> pain and behavioral status<sup>11</sup> and motor development are still controversial due to low methodological quality used in most studies.<sup>6</sup> Some studies also point to the risks of apneas or desaturation during Hp.<sup>10,11</sup> Recent reviews<sup>1,12</sup> on this topic highlight the lack of scientific evidence that proves the benefits and possible risks of Hp. Therefore, the objective of this study was to evaluate the effects of Hp on the behavioral states, pain, and vital signs of very low birth weight preterm newborns.

## Methods

### Design and local of study

It consists of a *quasi*-experimental/case series study carried out in the NICU of the Hospital Sofia Feldman – a philanthropic institution linked to the Unified Health System and located in Belo Horizonte, Minas Gerais, Brazil.

### Ethical aspects

The research project was approved by the Ethics and Research Committee of the Hospital Sofia Feldman, Belo Horizonte, MG, Brazil (number 1.684.322). All mothers or legal guardians for the preterm signed the free and informed consent term to authorize their participation in the research.

## Subjects

Subjects inclusion criteria were: very low-weight preterms (infants with 1500 g or less who was born before 37 weeks of pregnancy) with more than 24h of life, respiratory and hemodynamic stability, without continuous sedation, and/or use of amines.

We excluded preterm newborns that presented neurological signs or symptoms, use of continuous diet, gastroesophageal reflux, the presence of malformations, grade 2 or higher of peri-intraventricular hemorrhage, severe heart disease, immediate postoperative period, use of surfactant in less than 72 h, phototherapy or under minimal manipulation.

### Data collection

The included preterms were positioned for one hour in the supine position in a hammock for at least 60 min after the last diet. The hammocks were made of cotton fabric 1 cm thick. A fabric was also placed between the cervical and scapular region of the NTBs so there was no hyperflexion or hyperextension of the head, which could impair respiratory function. To fix the hammocks in the incubators, the circular openings were used to pass the ropes and the ropes were tied in the upper part of the incubator as shown in Fig. 1. The behavioral state, vital signs, and pain were evaluated in newborns according to the following instruments.

The pain evaluation was performed with the Neonatal Facing Coding System (NFCS).<sup>13</sup> This scale is based on the evaluation of the presence of the following facial expression: wrinkled foreheads, compressed palpebral fissures, deep nasolabial groove, half-open lips, mouth vertical or horizontal outstretched, tense tongue, tongue protrusion, and the chin quivering.<sup>14</sup> The presence of each item scores 1 point from the maximum score of 8 points. It is considered the presence of pain when 3 or more facial movements quoted appear during the evaluation.

The sleep/wake cycle was evaluated by the Brazelton Neonatal Behavioral Assessment Scale (NBAS).<sup>15</sup> The scale scores the behavioral state respectively from 1 to 6: deep sleep, light sleep, drowsy, alert, eyes open, and crying.

The heart rate (HR) and peripheral oxygen saturation (SpO<sub>2</sub>) was monitored with a multiparametric monitor DX 2022<sup>®</sup> (Dixtal, Brazil) by a sensor positioned on the external side of one foot. The respiratory rate (RR) was assessed by visual inspection of respiratory cycles per minute.

The evaluations were performed 10 min before the positioning in hammock, at the second, twentieth, fortieth, and sixtieth minutes after the positioning of the newborn in hammock, and 10 min after the return of the newborn to your incubator.<sup>16</sup> The newborn when removed from the Hp was placed in the incubator in the same position as the baseline evaluation. Data were collected in the morning and afternoon. The NFCS and NBAS scales were applied at each evaluation, in addition to the vital signs collected.

The study would be discontinued if vital signs of the newborn presented a variation greater than 20% of the baseline or signs of respiratory effort (use of accessory muscles in the neck, intercostal, subcostal, and suprasternal retractions or nasal flaring), or constant crying.

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