


Analysis of stress reduction therapy in neuropsychomotor development in preterm infants addressing physical therapy in an intensive care unit: Literature review

 <https://doi.org/10.56238/sevned2024.002-048>

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ABSTRACT

Introduction: Prematurity is defined as when a baby is born between 22-37 weeks of gestation, being called premature and considered low birth weight, less than 2,500 g. Stress reduction therapies become essential in minimizing the stressful stimuli caused in the NICU. **Objective:** To analyze the effects of stress reduction therapy on the neuropsychomotor development of preterm newborns, addressing the physical therapy performance in the neonatal intensive care unit. **Methodology:** This is a descriptive literature review conducted through the PubMed, Lilacs, and Scielo databases, between 2010-2022, from September to November. **Results:** 30 studies were selected and addressed stress reduction therapies in an individualized way in view of their impact on the NPMD of premature infants in the NICU, showing their effects and contributions to the newborn. **Discussion:** Stress reduction therapies act as strategies to stimulate NPMD early. Therapeutic touch, hot tub bath, kangaroo method, music therapy, hammock and nest are some of the techniques used by physiotherapists, which act by reducing vital signs promoting a better prognosis for the baby. **Conclusion:** Therefore, the techniques act significantly in minimizing the external stimuli caused to the preterm infant. In this way, the physiotherapist within the multidisciplinary team provides a more effective program of positioning, stimuli and care aimed at the progression of NPMD in premature infants, reducing the chances of possible complications and length of hospital stay. It is also necessary to further study the techniques in order to obtain more results.

Keywords: Prematurity, Therapies, Physiotherapy, Preterm newborn, Neonatal ICU and neuropsychomotor.

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INTRODUCTION

Prematurity consists of birth before the estimated 40 weeks of gestation, born in a period between 22-37 weeks. According to the World Health Organization (WHO), every child is considered premature before 37 weeks of gestation, and is called a premature or preterm newborn (SILVA, et al., 2021). Regarding birth weight, preterm newborns may be considered low birth weight when they are less than 2500 g at birth, regardless of gestational age (SILVA, et al., 2020).

According to Souza, et al., (2018), 75% of pregnant women have a positive evolution of their pregnancy, and in the remaining 25% there is the appearance of diseases arising (or not) from pre-existing diseases, as well as pregnancy-specific disorders, which, added to several factors, can cause such pregnancy to take a negative course, posing a risk to both the mother and the fetus. Thus, the factors associated with a higher chance of prematurity are: lower family income, previous premature child, primiparity, victim of violence against the pregnant woman (greater focus), cesarean section, few prenatal consultations (DEFILIPO, et al., 2022).

The environment of a neonatal intensive care unit (NICU) is very different from the mother's womb. In the womb, the newborn (NB) is enveloped in a warm liquid and is contained by the uterine wall, maintaining a feeling of comfort and security. However, when born prematurely, the premature newborn is placed in an incubator, in a position that favors manipulation, with arms and legs extended, a fact that does not contribute to its organization. In addition, the contact is frequent and usually intrusive, and the manipulation focuses on the recovery of the physiological body of the newborn, with few affectionate interventions, which usually come from the parents (PEREIRA, et al., 2013).

In this sense, the neonatal ICU becomes a stressful environment due to several factors, such as intense light, noise, handling performed by professionals, and little social interaction, among others (JORDÃO, et al., 2016). The necessary assistance exposes the newborn to constant handling of pain and other sensory stimuli, such as intense lighting, noise, and material handling; Thus, the neonate suffers the interruption of their sleep cycles, which can contribute to the emergence of stress and iatrogenesis, hindering the process of organic development and increasing the risk of death (PINTO, et al., 2008).

The newborn in the NICU may become unstable due to the underlying disease itself or due to the treatment to which it is exposed. The impact of the neonatal ICU environment raises concerns about the neuropsychomotor development of the neonate, as stress, pain, inadequate sensory stimulation and invasive procedures are routine during this hospitalization period. This generates a need for specialized care, in order to mitigate the sequelae of the baby's hospitalization time (THEIS, et al., 2016).



Neuropsychomotor development (NPMD) is a process of physical and neurological changes, which begins from conception and involves biological, social, affective and psychic aspects for the construction of brain architecture. It can be understood as a vital process that encompasses several factors, such as physical growth, followed by the neurological, behavioral, cognitive, and socio-emotional maturation of the child. Therefore, impaired development in the first year of life may interfere with the individual's health and, consequently, trigger cognitive impairments, learning disability, language problems, and behavior and language disorders (FREITAS, et al., 2022).

According to the Ministry of Health (2022), in order to improve the quality of life of patients hospitalized in the neonatal intensive care unit, the concept of humanization of care emerged, established in the unified health system as a national policy of integrative and complementary practices (PNPIC) through Ordinance GM/MS No. 971, of May 3, 2006, in which care and respect for everyone's time and space are valued, advocating less technical and mechanical care, valuing the touch and interaction of the multidisciplinary health team with the patient. In this sense, integrative therapy measures, such as stress reduction techniques, have emerged as a new ally to the therapeutic approach aimed at improving the clinical prognosis.

Stress reduction therapy or stress reduction techniques (ERT) were developed by David Berceles and began to be practiced in Brazil in 2009, being used in preterm newborns in the neonatal ICU with the objective of reducing the factors that interfere with the neuropsychomotor development of the neonate, reducing pain, their length of hospitalization and improving psychoaffective contact with parents. Among the techniques performed, we can mention therapeutic touch, a healing method, in which through the hands, energy, warmth and love are transferred from a donor to the body of a recipient. Because tactile stimuli reach the brain before painful stimuli, this method promotes the release of endorphins and enkephalins, which generate the feeling of pleasure. This technique in premature neonates acts to relieve pain and stress, in addition to strengthening bonds between the baby and their families (RAMADA, et al., 2013).

The kangaroo care method is an alternative for neonatal care that provides a better quality of care, prioritizing humanization in the care of preterm and low birth weight newborns. The contact between mother and baby provides improvement in vital signs and body temperature, reducing apnea, improving sleep quality and breastfeeding, favoring weight gain (FILHO & SANTOS, 2016).

Music therapy as a therapeutic resource is a non-pharmacological practice that addresses the application of music with the aim of inducing physiological and psychological changes in preterm newborns that contribute to the cognitive development of the newborn. Its use takes place in several ways: in a passive way that happens through musical recordings, in an active way that is performed by the voice of the mother, the father or the multiprofessional and combined team that is an integrated form of both mentioned (RODRIGUES, et al., 2018).



Premature newborns within neonatal intensive care units are often exposed to continuous noise, which can interfere with development, since excessive auditory stimulation creates negative physiological responses, such as apneas and fluctuations in heart rate, blood pressure, and oxygen saturation (SatO₂), as well as making patients more vulnerable to hearing loss. abnormal sensory development and speech and language problems. Reducing noise levels in the NICU can improve the physiological stability of sick newborns and therefore amplify the developmental potential of the infant brain. Thus, music therapy can modify the physiological responses of hospitalized preterm newborns in the short term (SILVA, et al., 2013).

The hot tub bath is a technique in which the baby is placed in a bucket of water heated at a temperature of 36.5° to 37.5° capable of promoting an adaptive improvement to the environment, pain relief, colic, weight gain, decreased heart rate and irritability (SILVA, et al., 2020). In the swing and nest net, it consists of the use of a roll of cloth flexed in a "U" or "O" shape in such a way that promotes the restraint of the baby along its entire length, from head to toe. This method promotes the adoption of flexor postures, facilitates the alignment of the head in relation to the trunk and reduces stress, elements that contribute to the neurobehavioral and muscular development of premature infants (COSTA, et al., 2016).

Newborns entering the neonatal intensive care unit should be cared for by a multidisciplinary team (GIMENEZ, et al., 2020). Physical therapy is part of this multidisciplinary care provided in the neonatal ICU, where they perform various procedures as part of their care routine; The presence and continuous participation of physical therapists in this environment provides this population with the best technologies, techniques and resources to assist in the reduction of neonatal morbidity, length of hospital stay and hospital expenses. Neonates in the NICU may become unstable due to the underlying disease itself, the treatment to which they are exposed, or the impact of exposure to the environment, which generates the need for specialized care in order to alleviate sequelae such as stress, pain, and consequently a delay in neuropsychomotor development (THEIS, et al., 2016).

Both the physiotherapist and other neonatal professionals should seek to base their care on comprehensiveness and respect for life, humanized care combines the best of technology with the promotion of welcoming linked to responsibility, well-being, respect for the particularities of each person, and especially promoting comprehensive care for the baby and the family (MARTINS, et al., 2020).

In view of the above, the present study aims to analyze the effects of stress reduction therapy on the neuropsychomotor development of preterm newborns, addressing the physical therapy performance in the neonatal intensive care unit.



METHODOLOGY

The descriptive bibliographic survey was carried out in the PubMed (National Library of Medicine), LILACS (Latin American and Caribbean Health Sciences Literature), Scielo (Scientific Electronic Library Online) databases with the following health science descriptors (DeCS): prematurity; therapy; physiotherapy; preterm newborn; Neonatal and neuropsychomotor ICU, aiming to cover the national and international literature, using the Boolean operators "and" and "or", in Portuguese and English.

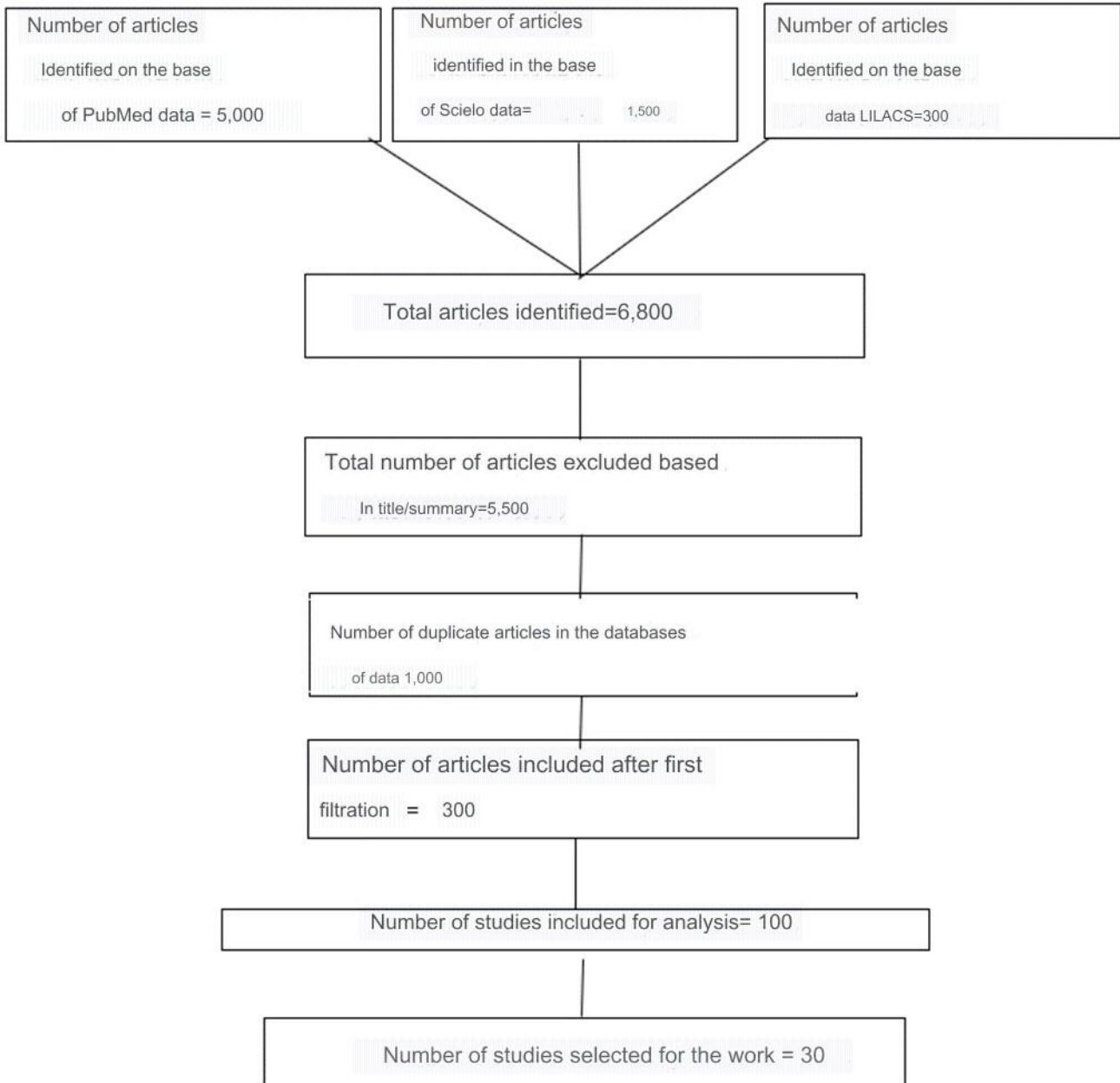
After the previous selection of the studies, duplicate articles and case studies were excluded, continuing with the reading of the abstracts of the other studies, seeking to verify whether they met the eligibility criteria. Subsequently, the studies were read in full and included those that met the inclusion criteria: full texts, available in Portuguese and English, journal impact factor, keywords, and number of citations published between the years 2010 and 2022, selected in the period from September to November, with the objective of addressing the effects of stress factors in newborns in the neonatal intensive care unit (NICU) and the techniques used to reduce them, in addition to the importance of physical therapy within the multidisciplinary team.

RESULTS

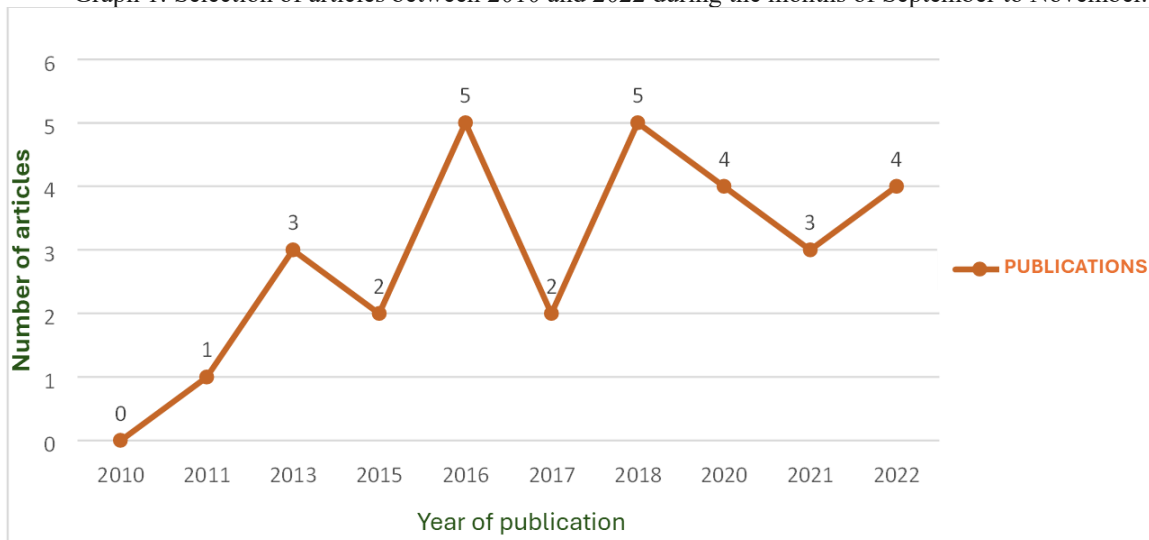
The articles went through a filtering process, as shown below in the flowchart and graphs, which were built based on the number of articles used in the research in the period from 2010 to 2022. It is observed that there is a higher peak of publications between 2016 and 2018, including a higher rate of original studies.



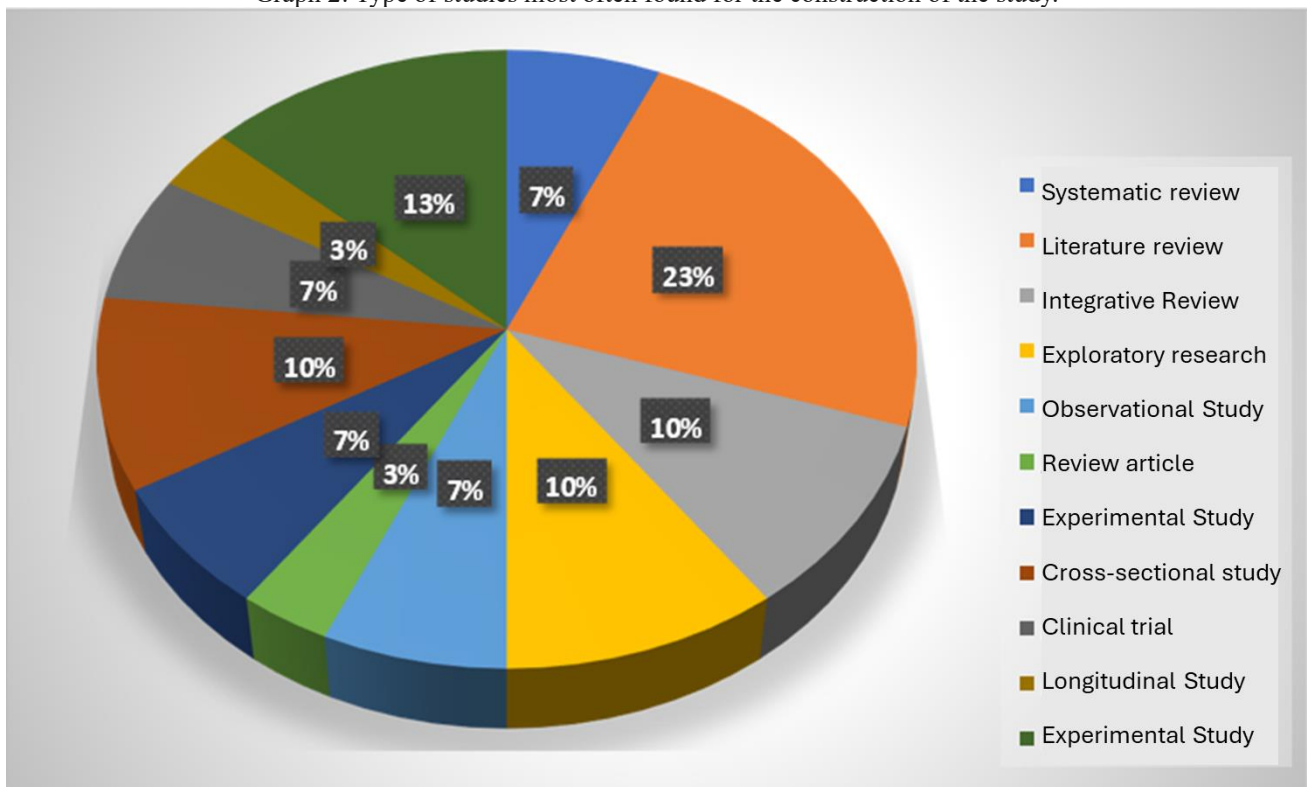
Flowchart 1: Selection of articles in databases



Graph 1: Selection of articles between 2010 and 2022 during the months of September to November.



Graph 2: Type of studies most often found for the construction of the study.



DISCUSSION

The NICU is an aggressive, impersonal environment that is difficult to adapt to. This environment is full of intense/constant lights, noise, temperature changes, and interruption of the sleep cycle, due to repeated evaluations and necessary procedures at greater or lesser frequency, depending on the severity of the newborn, according to Jordão, et al., (2016).

In their study, Pereira, et al., (2013) say that the high risk index to which preterm newborns are exposed from their extrauterine life both for their growth and development, so the manipulation



techniques, the procedures performed, the constant need for light and noise during care cause a series of adverse effects that trigger changes in the development of premature newborns, becoming even more stressful factors, where the above corroborates what Jordão, et al., (2016) expresses.

According to Oliveira, et al., (2015) regarding the effects caused in the body of the preterm newborn, respiratory disorders correspond to the most common complications in this period, resulting from the immaturity of the respiratory system and the inability to produce surfactants, where the Acute Respiratory Distress Syndrome (ARDS) continues to be the highest incidence of complications among neonates weighing 1,500 g or less. Neurological complications are also recurrent, but not as common as respiratory disorders. Thus, the complications of prematurity can also weaken the central nervous system (CNS). And as a result of exposure to several risk factors for neurological injuries, it is expected that premature newborns will present delayed neuropsychomotor development, impairment of motor, cognitive, perceptual, and language skills, among others, which is a predictor of complications in child growth and development. The stress caused to premature newborns as a result of these events can lead to changes such as physiological and behavioral disorganization, exhaustion and the expenditure of energy reserves, which should be saved for their growth and weight gain. Therefore, the professional's concern with minimizing any unpleasant sensation to the newborn should be stimulated in order to ensure excellence in care, adds Silva, et al., (2020).

According to Lino, et al., (2015), the use of advanced intensive care technologies such as incubators, radiant heat cradles, and ventilatory assistance equipment have contributed to significant advances in the neonatal area, allowing longer survival of preterm newborns, with the objective of making the stay of newborns in the neonatal ICU less stressful and painful. In this way, the incubator makes it possible to keep the environment warm for preterm newborns or neonates with certain pathological conditions, preventing hypothermia, one of the problems associated with increased neonatal morbidity and mortality. Therefore, its use generates other benefits for the newborn, such as providing a humidified environment, isolation from contaminating agents, and complete visualization and access to the newborn, corroborating Costa, et al., (2017).

As expressed by Gimenez, et al., (2020), one of the ways to reduce these effects are stress reduction therapies, which are highly necessary to contribute to the good development of the baby during the time of hospitalization. In this sense, among the stress reduction techniques, Leonel, et al., (2018), in their study evaluates the use of the swing network in neonatal ICUs, a technique performed inside the incubators, with a significant reduction in irritability, less heat loss and energy expenditure being noticeable, providing weight gain. He says that during the handling with this technique, relaxation of the preterm newborn was observed, with improvement in behavioral responses, in addition to the organization of sensory-motor activities.



In their research, Jesus, et al., (2018) reiterate that the swing network potentially simulates the intrauterine environment, so it provides relaxation, stimulates the harmonization of movements and reduces the energy expenditure of very low birth weight newborns and points out some studies that indicate that the technique promotes stress reduction during the hospitalization period, Therefore, it can be considered a strategy for humanization.

Barcellos, et al., (2021), state that music therapy is defined as the use of music and its elements in order to promote therapeutic benefits and purposes, a complementary tool to health promotion that has been explored as a non-pharmacological and unconventional method of inducing psychological and physiological changes in preterm newborns, contributing positively to cognitive development. Vianna, et al., (2011) point out and add through their study that music therapy influences not only the behavior of the infant, making him calmer, less crying, providing longer periods of sleep, but also reflects on maternal health, reducing the anxiety of mothers with newborns hospitalized in the neonatal ICU.

For Bieleninik, et al., (2020), in their study found that music therapy in the NICU caused a significant effect on reducing children's respiratory rate, while for Mohan, et al., (2021), through their observational study showed that music therapy not only has a significant effect on reducing respiratory rate, but also found a reduction in heart rate, oral feeding volume, stress level, and anxiety.

Filho & Santos, (2016), in this same perspective, bring the kangaroo method (CM) as an ally in the attempt to reduce infant morbidity and mortality, also in order to solve the problem of overcrowding in neonatal intensive care units in relation to preterm newborns. In his studies Filho & Santos (2016); together with Caetano, et al., (2022) state that the method was idealized in Colombia and is based on the conception of a more holistic and humanized care model where the mother's skin-to-skin contact with the premature baby is promoted in order to keep the newborn warm with the mother's body heat, In this way, an improvement in the thermal stability of these newborns was verified, because the mother's body temperature replaces the heat generated by the incubators and in this way an affective bond is built in the short, medium and long term between mother and child, as long as both are in hemodynamically stable clinical conditions to develop the method.

According to the Ministry of Health, (2018) the method was implemented in Brazil as a national health policy that integrates a set of actions aimed at the qualification of newborn care, inserted in the context of the humanization of neonatal care, being a strategy that brings together several biopsychosocial interventions.

Filho & Santos (2016) also present in their studies that in Brazil, the kangaroo care method is divided into three stages: the first in the neonatal ICU, the second in the kangaroo intermediate care unit (NICU) and the third stage is performed after hospital discharge, at home and outpatient care



until the infant reaches a minimum weight of 2,500 g. In the same study, they also demonstrated that the participation of the parents was a beneficial and important factor in the development of the premature child during painful handling and also found that during kangaroo therapy the episodes of apnea decreased significantly, as well as there was also an improvement in the response to the stimuli of neuropsychomotor development, being of total importance for this method.

Therapeutic touch according to Ramada, et al., (2013) is a technique that provides effects to the newborn, such as reducing stress, pain, fear and anxiety, thus promoting a better and more peaceful sleep for the newborn. It was also noticeable that they act in neurobiological development and, above all, determinants of the organization of functional neural networks, in addition to regulating responses to situations of pleasure and frustration. The results reinforce, once again, the importance of therapeutic touch as an effective strategy, as it provides comfort to the newborn and, at the same time, tranquility to the mothers, by enabling them to participate more effectively in the care of the child, as they also interact with it during therapy.

According to the research by Silva, et al., (2020), it brings the analysis of the hot tub bath and defines the method on the premise that the immersion of the preterm newborn (PTNB) in water heated up to the neck, without exposure to the air current and with containment of the flexor pattern through the wrapping with a diaper-towel, It contributes to the reduction of stress, weight loss, length of hospital stay, acting as an adjuvant in motor disorganization and the baby's energy expenditure in order to provide relaxation and pleasure. The study states that the technique brings a sensory-motor organization to the preterm newborn in relation to the midline, it was also found that the hot tub bath is a resource that can provide stability in the vital signs of neonates, contributing not only to well-being and relaxation, but, with a great significance in the evolution of pain, irritability, and heart and respiratory rates, reducing the length of hospital stay, and consequently favoring better neonatal outcomes, as Ataíde, et al., (2016) contribute.

Theis, et al., (2016) analyze the participation of physical therapists as part of the multidisciplinary care provided in the neonatal ICU. In their studies, they found that the continuous development of physical therapy treatment in neonatal ICUs led to better techniques and resources for this population, which contributed to a reduction in neonatal morbidity, shorter hospital stays, and lower hospital costs. Among the data obtained in the research, motor physiotherapy is among the most used procedures, so it is noticeable that these professionals are concerned in order to reduce the delay in the neuropsychomotor development of newborns. The physiotherapist together with the unit's team can promote a better environment for the newborns, through techniques that stimulate vestibular, visual and tactile perception within the tolerance limit of each child, in addition to positioning programs and reduction of harmful stimuli that favor motor and behavioral activity, contributing to minimize possible developmental disorders in premature infants hospitalized for a



long time. such as the use of stress reduction techniques that will favor the reduction of disorders such as pain and stress, due to excessive manipulations, invasive processes, noise and constant lighting, processes that interfere with the self-regulation systems of preterm newborns, imbalance in homeostasis mechanisms and cognitive and learning development.

In this sense, Gimenez, et al., (2020) add that premature newborns admitted to neonatal units should be assisted by a multidisciplinary team. He also analyzes the role of the physiotherapist within the team and states that the various handling is part of clinical practice during his care routine. Therefore, the professional's concern to minimize any unpleasant sensation to the NB should be stimulated in order to ensure excellence in care.

FINAL THOUGHTS

Therefore, it is notorious, according to the correlated authors, that the use of stress reduction therapies acts significantly in mitigating these impacts caused to the preterm newborn from the external stimuli present in the neonatal ICU environment.

The most relevant data in this research, according to the results and discussion of this research, show a significant improvement in the reduction of the main symptoms of stress, pain and irritability, due to the manipulations, procedures performed, constant need for light and noise, and the treatment is associated with some therapeutic techniques that have shown results such as reduction of the parameters of the vital signs of the preterm infant, improvement in symptoms of respiratory distress, decrease in respiratory and heart rate, decrease in energy expenditure in order to maintain weight gain, reduction in anxiety levels, improved sleep and oral feeding.

Thus, it is seen that the physiotherapist is a professional of great importance within the multidisciplinary team, because although some literatures focus on the nursing professional, it is essential for him to participate in his even more precise and effective treatment, being responsible for a program of positioning, stimuli, in addition to promoting a better evolution of the baby's neuropsychomotor development due to his concern with reducing motor delays and possible disorders, minimizing the chances of any unpleasant sensation to the preterm newborn, favoring its progression and reducing the length of hospital stay, ensuring excellence in the care of the baby. Further studies on the techniques presented are needed in order to obtain even more results on their effects.



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