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Benefits of early intervention in premature babies

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Abstract: Early intervention in premature neonates aims to minimize complications and sequelae that are caused during their lifetime, especially in the first year of birth. The aim of this review was to analyze the benefits of early intervention in the neuropsychomotor development of premature newborns. For this, an integrative review of the literature was performed. The collection period was between September 2020 and June 2021. The search in the electronic databases resulted in the identification of 4,453 articles. After the initial analysis, 30 articles were identified and after reading the title and abstracts 22 articles were excluded because they did not meet the inclusion criteria. At the end of this process, according to the inclusion and exclusion criteria adopted, a total of 08 articles were selected for definitive inclusion in this review. In view of what was presented in this review article, it can be affirmed that early intervention is fundamental for the development of children for the facilitation of movements through stimuli.

Keywords: Newborn. Development. premature. Physiotherapy modality. Physiotherapy specialty.

1. Introduction

Preterm newborns (PTNB) are babies born before completing 37 gestational weeks. Prematurity has currently been a major concern for both family members and health professionals. Early intervention in premature neonates aims to minimize complications and sequelae that are caused during their lifetime, especially in the first year of birth[1].

The movements presented in the first six months of birth are caused by primitive reflexes, which disappear as soon as the baby develops, but if these reflexes are absent or persist for longer than age admits may indicate some neurological damage[2]. In the first years of a Newborn's life (NB) there are important motor acquisitions, such as: fine motor coordination for the apprehension of objects and thick motor coordination necessary for performing activities such as sitting, crawling, lifting and walking. If the child does not present a good development at this stage, repercussions will occur in his social, intellectual and cultural life[3].

The physiological development of a baby can be put at risk by several factors, being a series of environmental and biological complications that will influence neuropsychomotor development[4]. The low weight of one of an PTNB is one of the main causes of neonatal mortality. The maturation of the systems and organism of the body of an NB will depend on gestational age (GA), so the lower the GA and underweight, the more risk and complications the NB may present[5].

The incidence of premature infants has been increasing in recent decades. Thus, prematurity remains one of the causes of infant mortality with about 70% in Brazil and

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worldwide. Because the organism of premature newborns still has an immature metabolism, presenting risk in its development[6]. According to the World Health Organization with data from 2012 published through "Born Too Soon: The Global Action Report on Preterm Birth" ranked Brazil as the 10th country with the most premature births and 16th in relation to mortality[7].

Environmental complications may also interfere with the development behavior of premature newborns because long-term hospitalization in neonatal intensive care units (NICU) together with excessive lighting and inadequate stimuli intervene in motor delay8. Premature neonates present global hypotonia, while the flexor pattern of a full-term baby is normal and in RNP is greatly decreased. The cause of this flexor decrease is the reduction of time in which the newborn passes in the uterine environment. Because it has a more flaccid musculature and the contribution of gravity is remarkable the extension pattern[9].

In general, the early intervention of neonates aims to minimize pathological patterns and possible delays in this public, favoring improvements in their quality of life. It is important to stimulate The DNPM so that the child has greater speed in the development of his/her abilities, making them similar to those observed in a full-term NB[10].

Thus, the present study aims to evidence through the literature the benefits of early intervention in the neuropsychomotor development of premature newborns.

2. Methodology

The present work is characterized as an integrative review of the literature; data collection of the study was carried out from September 2020 to June 2021. Foram applied as inclusion criteria, tortigos published in Portuguese, English and Spanish, with the abstracts available in the selected databases, without delimiting the publication period. Published articles whose methodology adopted allowed to obtain strong evidence. Articles that portrayed early intervention as a stimulation method in premature neonates. Excluding studies such as book chapters, dissertations and theses.

3. Results and Discussions

The search in the electronic databases resulted in the identification of 4,454 articles. After the initial analysis, 30 articles were identified and after reading the title and abstracts 22 articles were excluded because they did not meet the inclusion criteria. At the end of this process, according to the inclusion and exclusion criteria adopted, a total of 08 articles were selected for definitive inclusion in this review. All selected according to the following flowchart (Figure 1).

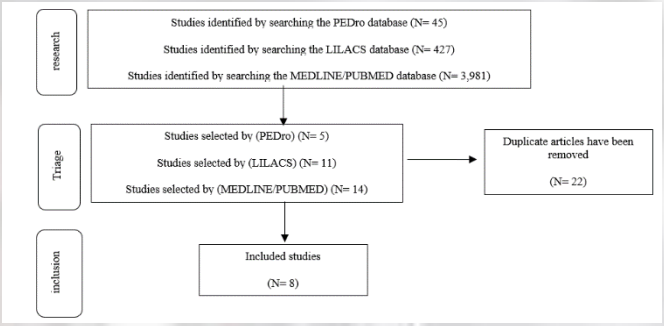

Figure 1. Flowchart of selected articles

Table 1. Presentation of the synthesis of the articles included in the integrative review.

Authors/ Year / Country	population	Samples	Eligibility Criteria	Intervention/ Comparison	findings
Valizadeh L et al. (2017) Iran	76 Premature	GI: 19 GII: 19 GIII: 19 GIV: 19	They were selected with GA at birth between 25 and 30 weeks, minimum weight of 800g at birth, without congenital anomalies, submitted to mechanical ventilation, sedative drugs and muscle relaxants.	GI – daily passive ADM at all ends, based on the Moyer-Mileur protocol. GII – received hydrotherapy with exercises for the shoulders and pelvic region every day. GIII – received physical activity programs in and out of the water on alternate days. GIV - were kept in a fetal position.	The analysis revealed that there were no significant differences in TIMP in the pre-treatment. All children improved their gross TIMP scores in the post-intervention period.
Ohgi S et al. (2004) Japan	23 Premature	EIP: 12 GC: 11	Inclusion criteria were birth weight less than 2500 g, single birth, cranialabnormality.	She used NBAS to facilitate mother-baby interaction. And counseling mothers on how to deal with their babies according to development skills and needs.	The scores were significantly improved in the IPE group, but not in the control group.
Kaaresen P et al. (2008) Norway	136 Premature	GC: 67 GI: 69	Infants with birth weight 2000 g were included treated at the University Hospital of Northern Norway.	The intervention was MITP. It consisted of an initial session in which parents share experiences of hospitalization. Bayleys child development scales were administered to test cognitive and motor outcomes at 2 years of corrected age.	The intervention group consistently lower on all scales, but no difference was significant. There was no difference between the groups in the motor outcome measured by Bayley's psychomotor.

Dusing S. et al. (2018) USA	14 Babies	SPEEDI: 7 CH: 7	Infants born less than 29 weeks of gestation and or with a neonatal diagnosis of brain injury were examined for eligibility.	The SPEEDI group participated in 5 collaborative sessions of parents, therapists and child interventions in the NICU and 5 at home. Babies enrolled in the usual care group received only usual care in the NICU and in the community.	There was a significant effect of initial exploratory behaviors with children in the SPEEDI group, demonstrating greater exploration at the end of the intervention, at the 1 and 3 months after the intervention.
Wu YC et al. (2014) Taiwan	178 Babies	CBIP: 57 HBIP: 63 UPC: 58	The critandrivers were birth weight and GA less than 1500 g and 37 weeks, first child of twins or multiples, and absence of congenital anomalies or severe neonatal diseases.	Infants in the UCP group received standard development care consisting of child-focused hospital interventions and visits to neonatal clinics. Cbip and HBIP infants received hospital and post-discharge interventions.	Results showed that the infants in the CBIP group presented cognitive composite scores and lower motor delay rate than infants in the PCU group. However, the infants of the HBIP group and the UCP group did not differ in scores or rates of developmental delay.
MEDEIROS et al. (2013) Brazil	90 Premature newborns	Water group: 46 Sucrose Group:44	Inclusion criteria were selected newborns with stable conditions at the time of the test, corrected GA of up to 36 weeks and one day of life, and adequate intrauterine growth curve for GA.	The subjects were allocated in two groups of substances, water and sucrose, where the test had 15 minutes that were divided into three periods of 5 minutes each, which corresponded to seven moments without intervals between them. The baby observed with the camera in order to show the face and upper limbs throughout the experiment.	Right hand suction in whole and in sucrose initially presented a strong correlation in the sleepy state, going to moderate at the end. In the alert state there was initially a weak correlation in both stimuli.
BOLZAN et al. (2015) Iran	30 premature babies	GI: 8 GC:7	Were included born with pregnancy 26 to 29 weeks, Apgar index from 6 to 5 minutes after birth.	The Piomi. Performed in 4-5 neonates under the supervision of the group director and filmed, after improvement, the intervention applied to the intervention group. The control group did not receive any stimulation.	The intervention group reached the first oral feeding and earlier than the control group. The time of hospitalization in the intervention group was significtively shorter.
TANEJA et al. (2020) India	552 Premature babies	GI=276 GC=276	Included in premature babies, without any problem at birth and weighing 1,500 – 2,250 g at birth.	The ciKMC, which was supervised through home visits, was performed in the intervention group, which was supervised through home visits, and directed that skin-to-skin contact should be made as long as possible. And in the control group performed prolonged SSC. They were evaluated in children aged 6 to 12 months using the Bayley Scale and unilateral equivalence tests.	No significant results were found development during childhood. In the TOST analysis, the composite scores for the cognitive, language and motor domains at 12 months were statistically equivalent.

Legend: **IG**: Gestational Age; **ADM**: Range of Motion; **TIMP**: Child Motor Development Test; **GI**: Intervention Group; **IpE**: Early Intervention Program; **CG**: Control Group; **NBAS**: Neonatal Behavioral Assessment; **GI**: Intervention Group; **MITP**: The Mother-Baby Transaction Program; **SPEEDI**: Exploration and Early Development Al- Intervention; **NICU**: Neonatal Intensive Care Unit; **CBIP** : Clinical Intervention Program; **HBIP**: Home Intervention Program; **UCP**: Program of Habitual Care; **PIOMI**: Premature Infant Oral Motor Intervention; **ciKMC: Kangaroo** Mother Method initiated by the community; **TOST:** unilateral equivalence tests; **SSC:** Skin-to-skin contact.

Source: Author (2021)

The objective of this review was to highlight through the literature the benefits of early intervention in the neuropsychomotor development of premature newborns.

Researchers conducted a study of 76 preterm infants that were randomly divided into four groups. They were stimulated by means of range of motion in all extremities through the Moyer-Mileur protocol, where hydrotherapy exercises for shoulder and pelvic region were performed daily, physical activity in and out of the water and fetal position for 30 minutes for 14 days and the infantile motor development test (TIMP) was performed for early identification of motor development. The analysis revealed that there was no difference in TIMP and the babies improved after the intervention without difference in motor performance[11].

Another study was composed of a group of 23 nb of high risk and low birth weight. They were treated at the neonatal intensive therapy unit and randomly divided into two groups being evaluated by the Neonatal Behavioral Assessment Scale (NBAS) which was designed to facilitate the monitoring of children's development and mother-baby interaction. The development index was higher in the intervention group than the control group[12].

Other authors conducted a study to verify the effects of a Mother-Baby Transaction Program (MITP) on cognitive, motor and behavioral outcomes, evaluating infants with the Bayley Child Development Scales. During the MITP, parents shared experiences of hospitalization and reported greater family participation during intervention sessions, but there was no difference between the groups in the motor result measured by this scale[13].

Other researchers conducted a study with 14 premature babies that aimed to observe exploratory behaviors. Early Development Intervention (SPEEDI) babies participated in interventions with parents and therapists, who trained parents to perform daily interventions on newborns in the NICU, helping them to identify the ideal moments to interact and provide adequate stimuli to

development, facilitating the diagnosis of motor skills and self-correction of movements. The group of babies in the usual care received only usual care in the NICU. There was better performance in the exploration at the end of the intervention between 1 and 3 months after the SPEEDI intervention[14].

Through their analysis Wu *et al*. [15], in a research carried out with the objective of examining the effects of the Clinical Intervention Program (CBIP) and the Home Intervention Program (HBIP), compared the two methods and showed better cognitive performance in the CBIP and lower motor delay rate. However, the infants of the HBIP group and the UCP group did not differ in the rate of developmental delay.

The study by Medeiros *et al*. [16], analyzed 90 premature Newborns that were divided into two groups to be stimulated. One group received water and the other sucrose where the test was filmed for 15 minutes that were divided into 3 periods of 5 minutes each, which corresponded to seven moments without intervals between them. The baby was placed in the transparent crib in a supine position, were observed with the camera in order to show the face and upper limbs throughout the experiment. Both the right and left hands in the mouth initially had a moderate correlation, and the hand in the right mouth remained stronger at the end and the hand in the left mouth ended with moderate and strong correlation, according to each behavioral state. Right hand suction in whole and in sucrose initially presented a strong correlation in the sleepy state, going to moderate at the end. In the alert state there was initially a weak correlation in both stimuli.

Bolzan *et al*. [17], conducted a study where PIOMI was performed which is a motor-oral protocol performed for 5 minutes and administered by a therapist. Performed in 4 to 5 newborns under the supervision of the group director. In this protocol, facial and oral structures were stimulated at a certain time and frequency according to the manual, including winding, stretching of the lips, cheeks, lateral massage and middle edges of the tongue, gums, palate and cheeks. The control group did not receive any stimulation. It was evidenced that the intervention group reached the first oral feeding earlier than the control group. The time of hospitalization in the intervention group was significantly shorter.

In another study conducted with 552 low birth weight premature babies, they were allocated into two groups, the intervention group was submitted to the kangaroo method initiated by the community to promote skin-to-skin contact. In the control group, the most prolonged skin-to-skin contact between the mother and the baby was made in exclusive breastfeeding, with guidance and home visits to evaluate cognitive, language, motor and socio-emotional results, and were evaluated in children from 6 to 12 months of age through the Bayley Scale of Child Development and Unilateral Equivalence Test. No significant results of child development were found during childhood. In the TOST analysis, the composite scores for the cognitive, language and motor domains at 12 months were statistically equivalent[18].

4. Conclusions

In view of what was presented in this review article, it can be evidenced that early intervention is fundamental for the development of children facilitating movement through stimuli. It is possible to affirm that early intervention minimizes developmental disorders and favors more physiological motor sensorial acquisitions, close to those of full-term newborns. Further studies are needed to prove the efficacy and benefits of interventions.

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