Breastfeeding promotion in hospitalized infants as a non-pharmacological intervention for pain relief

Promoção do aleitamento materno em neonatos hospitalizados como intervenção não farmacológica para alívio da dor

Promoción de la lactancia materna en neonatos hospitalizados como intervención no farmacológica para el alivio del dolor

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Abstract

Objective: To verify whether breastfeeding promotion was used as a non-pharmacological intervention for pain relief in hospitalized infants.
Methods: This observational, cross-sectional, retrospective, and descriptive study was conducted with infants older than 24 hours in the Neonatal Intensive Care Unit of a tertiary hospital from 2019 to 2021. The data were subjected to descriptive and inferential analysis. Ethical precepts were respected.
Results: Fifty-three infants were included. Breastfeeding was performed in 79.2% of male infants (57.1%), without congenital malformations (92.9%), with adequate weight for gestational age (64.3%), pain assessment through the face (61.9%) and in room air (100%; p<0.001).
Conclusion: Breastfeeding was a non-pharmacological intervention performed exclusively on the infants included in this study, and further research is needed to implement this practice.

Keywords
Breast feeding; Pain; Hospitalization; Pain management; Infant newborn

Resumo

Objetivo: Verificar se a promoção do aleitamento materno foi usada como intervenção não farmacológica para alívio da dor em neonatos hospitalizados.
Métodos: Este estudo observacional, transversal, retrospectivo e descritivo foi conduzido com neonatos com mais de 24 h na Unidade de Terapia Intensiva Neonatal de um hospital terciário no período 2019-2021. Os dados foram submetidos a análise descritiva e inferencial. Os preceitos éticos foram respeitados.
Resultados: Foram incluídos 53 neonatos. O aleitamento materno foi realizado em 79,2% dos neonatos do sexo masculino (57,1%), sem má formação congênita (92,9%), com peso adequado para a idade gestacional (64,3%), avaliação da dor por intermédio da face (61,9%) e em ar ambiente (100%; p<0,001).
Conclusão: O aleitamento materno foi uma intervenção não farmacológica realizada restritamente nos neonatos incluídos neste estudo, sendo necessário continuar a pesquisa para implementar esta prática.

Descritores
Aleitamento materno; Dor; Hospitalização; Manejo da dor; Recém-nascido

Resumen

Objetivo: Verificar si la promoción de la lactancia materna se utilizó como una intervención no farmacológica para el alivio del dolor en neonatos hospitalizados.
Métodos: Este estudio observacional, transversal, retrospectivo y descriptivo se realizó con neonatos mayores de 24 horas en la Unidad de Cuidados Intensivos Neonatales de un hospital terciario entre 2019 y 2021. Los datos se sometieron a análisis descriptivo e inferencial. Se respetaron los preceptos éticos.
Resultados: Se incluyeron 53 neonatos. La lactancia materna se realizó en el 79,2% de los neonatos masculinos (57,1%), sin malformaciones congénitas (92,9%), con peso adecuado para la edad gestacional (64,3%), evaluación del dolor mediante expresión facial (61,9%) y respirando aire ambiente (100%; p<0,001).
Conclusión: La lactancia materna fue una intervención no farmacológica realizada exclusivamente en los neonatos incluidos en este estudio, y se necesitan más investigaciones para implementar esta práctica.

Descriptores
Lactancia materna; Dor; Hospitalización; Manejo del dolor; Recién nacido

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Introduction

For many years, newborns (NBs) were considered incapable of feeling pain due to the belief that their nervous system was immature. Thus, this population was subjected to several painful procedures until the mid-1980s without any type of intervention for pain relief.[1] Currently, the ability to feel, process and respond to painful stimuli during the neonatal period is recognized.[1,2] However, a systematic review showed that there are still barriers to pain relief in NBs, as the recurrence of painful procedures in neonatal units with insufficient analgesia was shown to be high.[1]

Even healthy NBs are subjected to several procedures that cause pain, such as intramuscular vaccines. Studies indicate that NBs and infants receive around 20 intramuscular vaccines during this period (up to 18 months).[3,4] The number of painful procedures in hospitalized NBs is high. A cross-sectional study recorded an average of 6.6 invasive procedures per day in NBs admitted to a Neonatal Intensive Care Unit (NICU).[5]

It is already established in the literature that inadequate pain relief in infants in the long term leads to physiological, psychological, motor, cognitive, sensory, hormonal and behavioral consequences. These are associated with NBs' low capacity to reorganize themselves after experiencing pain.[6-11] Pain in infants is a potential research topic, with investigations focusing on pain management (assessment, intervention and reassessment), its relief and the reduction of impacts being relevant.[4,6-8]

For the advancement of pain studies, nurses and their technical teams are essential figures for managing pain in clinical practice. The teams act autonomously in non-pharmacological interventions. In neonatology settings, such interventions have been increasingly recommended as a priority option for pain relief, due to the cost-benefit ratio, multidimensionality of the interventions, evidence of their effectiveness, ease of implementation, low risk and rare side effects.[2,6,10] Among these interventions, breastfeeding deserves to be highlighted.

Breastfeeding is an effective, natural, free, easily accessible intervention with several nutritional, immunological, social and psychological advantages for infants.[1,4] Although breastfeeding is a simple intervention, its mechanism of action is considered multifactorial, as it combines skin-to-skin contact, mother-baby communication, familiar maternal smell, direct sucking on the breast, the sweet odor and taste of milk, in addition to endogenous opiates and other chemical components present in breast milk. Moreover, breastfeeding can divert NBs' attention from the painful stimulus, reducing their painful experience.[12,13]

Despite the effort observed in the literature to ensure breastfeeding to alleviate pain, there are still several challenges that deserve attention.[13] In Finland, a cross-sectional study conducted with 422 nursing staff members showed that 74.1% of them did not advise mothers to breastfeed during painful procedures.[10] In Brazil, a qualitative study conducted with primary care nursing staff showed that these professionals had restrictive beliefs about the use of breastfeeding during painful procedures, discouraging and preventing mothers from breastfeeding during this handling.[4] Therefore, this study aimed to verify whether breastfeeding was used as a non-pharmacological intervention to alleviate pain in hospitalized infants.

Methods

This was a cross-sectional, retrospective, descriptive, observational study with a quantitative approach. The study was a subproject linked to a project entitled "*Boas práticas em neonatologia para o alívio da dor de recém-nascidos hospitalizados: Estudo transversal*".

The study was carried out with medical records of NBs hospitalized in the NICU of a public hospital in Paraná, Brazil, from 2019 to 2021. Medical records of premature and full-term NBs aged 0-28 days of life (corrected) admitted to the aforementioned NICU, with more than 24 hours of hospitalization and record of pain, were included. Medical records in use by other researchers and/or employees (considering the unavailability of medical records for an indefinite period) or incomplete medical records were excluded.

After authorization from the Research Ethics Committee, medical records were selected through a survey of all hospitalizations from 2019 to 2021 in the institution's electronic system. We opted for a simple random sampling based on the assumption of a 50% sample size, a 5% margin of error, and a 95% confidence level. A total of 386 medical records of infants undergoing good practice in neonatology were col-

lected. However, we chose to use only the data of infants with pain (53 medical records) in the scope of this study. The established exclusion criteria did not influence data collection, as it was conducted by random sampling. In case of medical records being excluded, a new draw was performed and another medical record was sized to compose the sample.

The NICU had the Neonatal Infant Pain Scale (NIPS) available for consultation by professionals. However, during the initial search of medical records, we noticed that the scale was not used in the documentation. Therefore, we chose to use the nursing and/or medical team records, with identification of pain by professionals' record and analysis of the documentation of subjective parameters used in assessment (variables recorded in this study such as crying, agitation and/or facial pain). Moreover, breastfeeding documentation as a non-pharmacological intervention for pain relief was considered as "breastfeeding promotion". As an illustration, the nursing note could have been written as follows: "At 7:00 p.m., pain was identified in the infant through crying, and breastfeeding was encouraged."

Data collection was carried out between January and July 2022, and was conducted by a nurse working at the institution. A collection instrument developed by the authors was used to address the following: characterization of infants, mothers, and births; painful procedures performed; ventilatory devices used; pain management; and breastfeeding documentation (dependent variable).

Data were assessed using descriptive analysis, with percentiles, measures of central tendency (mean) and dispersion (standard deviation). Inferential analysis was performed using Person's chi-square test and Fisher's exact test, with a 95% confidence interval considering p-value<0.05 (5%) as a statistical difference.

The study was approved by the Research Ethics Committee (Opinion 5.115.621). The Informed Consent Form was waived by signing the Liability Form. The ethical precepts of Resolutions 466/12 and 510/16 were respected.

Results

The medical records of 53 infants were included. Of these, 56.6% were male, who were hospitalized due to extreme prematurity (22.6%), respiratory distress (20.8%) and preterm birth (17%), with a mean time of 46.8 days. As for maternal gestation and birth of infants, the mean maternal age (26.9 years), gestational age (32.2 weeks) and prenatal age (6.1 consultations) were calculated. At birth of infants, the mean APGAR score was calculated for the 1st (5.0) and 5th (7.4) minutes. They were born by cesarean section (64.2%) with adequate weight for gestational age (66%) (Table 1).

Table 1. Characterization of hospitalized infants (n=53)

Variables	Means(min.-max.)	95% CI
Length of hospital stay (days)	46.8(6-193)	38.5-59.3
Maternal age	26.9(16-45)	25.1-29.0
Gestational age	32.2(24-41)	31.0-33.4
Number of prenatal consultations	6.1(0-14)	5.3-7.0
APGAR at 1st minute	5.0(1-9)	4.3-5.6
APGAR at 5th minute	7.5(3-10)	7.0-7.8
Sex		
Female	23(43.4)	30.9-56.7
Male	30(56.6)	43.2-69.0
Main diagnosis*:		
Extreme prematurity (<28 weeks)	12(22.6)	13.3-35.6
Prematurity 28-36 weeks	9(17.0)	8.9-29.4
SGA	7(13.2)	6.2-25.1
LGA	4(7.5)	2.4-18.3
Respiratory distress	11(20.8)	11.8-33.6
Hyaline membrane disease	3(5.7)	1.3-15.9
Perinatal anorexia	2(3.8)	0.3-13.4
Neonatal asphyxia	2(3.8)	0.3-13.4
Fetal centralization	1(1.9)	0.0-10.8
B24 exposure	1(1.9)	0.0-10.8
Hypoglycemia	1(1.9)	0.0-10.8
Congenital malformation	3(5.7)	1.3-15.9
Type of delivery		
Normal	19(35.8)	24.2-49.3
Cesarean	34(64.2)	50.6-75.7
Birth weight classification:		
SGA	13(24.6)	14.8-37.6
AGA	35(66.0)	52.5-77.3
LGA	5(9.4)	3.6-20.6

*Some newborns had more than one diagnosis. AGA - adequate for gestational age; LGA - large for gestational age; SGA - small for gestational age

Table 2 characterizes the number of devices used by children throughout hospitalization. The mean number of peripheral venous accesses (PVA) was 8.7, and the values varied between 1 and 32 accesses. Other means were as follows: umbilical catheterization (UC): 0.7; peripherally inserted central catheter (PICC) 1.0; orogastric (OG) or nasogastric (NG) tubes: 1.0; and oroenteral (OE) or nasoenteral (NE) and indwelling bladder (IB) catheters: 0.1. Regarding the

ventilatory device, infants predominantly used room air (92.5%), but had previously used other devices. Among the parameters used to assess pain in infants, the following were observed: facial pain (60.4%), crying (43.4%) and agitation (26.4%). Some infants did not receive intervention for analgesia (14), although pain was documented in medical records. Pharmacological interventions varied between dipyrone and/or paracetamol (34.0%), fentanyl (63.3%) and midazolam (18.9%) when prescribed (Table 2).

Table 2. Characterization of devices used by infants throughout hospitalization (n=53)

Variables	Means (min.-max.)	95% CI
Peripheral venous access	8.7 (1-32)	7.2-10.9
Umbilical catheterization	0.7 (0-1)	0.5-0.8
Peripherally inserted central catheter	1.0 (0-3)	0.8-1.3
OGT or NGT	1.0 (1-1)	–
OET or NET	0.1 (0-1)	0.0-0.2
IUC	0.1 (0-1)	0.0-0.2
Ventilatory devices*:		
Room air	49 (92.5)	81.6-97.5
Nasal catheter	33 (62.3)	48.7-74.0
Hood box	24 (45.3)	32.6-58.5
Non-invasive ventilation	42 (79.2)	66.3-88.1
Invasive ventilation	32 (60.4)	46.9-72.4
Pain documentation	53 (100)	91.9-100
Lack of use of assessment scales	53 (100)	91.9-100
Parameters used for assessment*:		
Crying	23 (43.4)	30.9-56.7
Agitation	14 (26.4)	16.3-39.6
Facial pain	32 (60.4)	46.9-72.4
Pharmacological interventions:		
Dipyrone and/or paracetamol	18 (34.0)	22.6-47.4
Continuous and/or intermittent fentanyl	33 (62.3)	48.7-74.0
Continuous and/or intermittent midazolam	10 (18.9)	10.3-31.5
Breastfeeding promotion	42 (79.2)	66.3-88.1

* Some infants used more than one device during hospitalization and pain assessment was conducted with more than one parameter. NET: nasoenteral tube NGT: nasogastric tube; OET: oroenteric tube; OGT: orogastric tube; IUC: indwelling urinary catheter

Table 3 characterizes breastfeeding promotion in relation to characteristics of infants and pain management. The children who received the intervention were male (57.1%), had no congenital malformations (92.9%), had adequate weight for gestational age (64.3%), received room air (100%) and were assessed for pain (61.9%). After inferential analysis, it was possible to know that the infants with the most breastfeeding were those who were on room air at some point during hospitalization (p=0.001), and intervention was rarely used for infants with a ventilator device. Other associations did not show statistical significance. In addition, infants did not have their pain reassessed (76.2%) even with the prescription of pharmacological and non-pharmacological interventions for pain.

Table 3. Characterization of breastfeeding in relation to characteristics of hospitalized infants and pain management (n=53)

Variables		Breastfeeding promotion		p-value
		Documented	Not documented	
		n(%)	n(%)	
Sex	Female	18 (42.9)	5 (45.5)	0.878*
	Male	24 (57.1)	6 (54.6)	
Congenital malformation	Yes	1 (2.4)	2 (18.2)	0.096**
	No	39 (92.9)	8 (72.7)	
Weight classification	SGA	10 (23.8)	3 (27.3)	0.753**
	AGA	27 (64.3)	8 (72.7)	
	LGA	5 (11.9)	0 (0.0)	
Ventilatory devices	Room air	42 (100)	7 (63.6)	0.001**
	Nasal catheter	25 (59.5)	8 (72.7)	0.426*
	Hood box	21 (50.0)	3 (27.3)	0.182*
	NIV	32 (76.2)	10 (90.9)	0.289*
	MV	24 (57.1)	8 (72.7)	0.351*
Pain assessment (behavioral parameters)	Crying	17 (40.5)	6 (54.6)	0.406*
	Agitation	10 (23.8)	4 (36.4)	0.405*
	Facial pain	26 (61.9)	6 (54.6)	0.660*
Pain reassessment	Yes	10 (23.8)	1 (9.1)	0.289*
	No	32 (76.2)	10 (90.9)	

* Person's chi-square test; ** Fisher's exact test. AGA: adequate for gestational age; LGA: large for gestational age; SGA: small for gestational age; MV: mechanical ventilation; NIV: noninvasive ventilation

Discussion

In this study, infants were hospitalized for several days and ventilators were inserted with painful procedures. In this scenario, breastfeeding promotion was limited to 42 infants, and was associated only with infants in room air (p<0.05).

To assess pain, professionals are expected to use validated scales.[1] However, this study showed that only the parameters of crying, agitation and/or facial pain were used for assessment. They were used subjectively (in isolation or together) by the evaluator who defined which infants presented (or not) pain, ignoring the use of scales. This aspect agrees with a descriptive cross-sectional study carried out with 294 nurses in Finland, where the majority of them reported having used "never or very rarely" pain assessment scales in NBs.[10] However, it is possible that the low use of breastfeeding was

influenced by the low number of documents on infant pain.

Many devices were inserted into infants during hospitalization, and many of these were inserted using painful procedures such as PVA, UC, and PICC. An umbrella review illustrates this by pointing out that hospitalized infants may experience up to 26.1 acute pain events daily.[2] Therefore, it is important to relate the procedures performed on NBs with the pain they may have felt.[1] Although adequate pain relief is considered a fundamental human right by the Brazilian National Council for the Defense of the Rights of Children and Adolescents,[4] previous findings show that it remains a challenge, as 14 infants did not receive any intervention for analgesia and the recording of breastfeeding was low even with the recording of pain in medical records.

In this scenario, the use of pharmacological and non-pharmacological interventions in invasive procedures in NBs was recommended.[6] Although the literature shows advances in evidence-based knowledge about the effectiveness of non-pharmacological interventions in relieving pain in NBs, they are not being translated into clinical practice.[10] As seen in this study, newborns continue to feel pain unnecessarily due to inadequate pain management practices by healthcare professionals even though there are options for relief.[4]

Breastfeeding can be used to reduce acute pain during several invasive procedures in NBs. This was shown in a clinical trial with 150 neonates, in which breastfeeding was effective in reducing pain during heel puncture for neonatal screening.[6] However, breastfeeding in this study was restricted to 42 neonates. The inferential analysis showed that the use of ventilatory devices acted as a limiting factor for breastfeeding, thus affecting the outcome. Therefore, the NBs who received this stimulus the most were those who were in room air at least at some point during hospitalization ($p<0.001$).

In this study, infants had extreme prematurity (22.6%) and prematurity (17.0%) as their main diagnosis. Therefore, it is worth reflecting on the challenges that exist in breastfeeding premature babies. This may occur slowly, as it depends on the gestational age of NBs. The more premature the NB, the more immature their gastrointestinal system and the lower their skills necessary for breastfeeding.[14] This is possible even with pain, as the number of painful procedures in premature babies is greater than that in full-term NBs.[7] Breastfeeding may not have been carried out as the introduction to breastfeeding is subject to the influence of many variables.

The Ministry of Health recommends at least six prenatal consultations during pregnancy. At some point during these consultations, healthcare professionals should provide guidance and encourage breastfeeding.[15] However, prenatal consultations ranged from 0 to 14 consultations in our findings, i.e., some mothers did not have any prenatal consultations. We can therefore consider that this lack of professional support during pregnancy (including lack of guidance and encouragement for breastfeeding) may have generated effects during hospitalization. Thus, breastfeeding promotion in these mothers may have been impacted, and further research in this area is therefore necessary.

Regarding the use of ventilatory devices during hospitalization, at some point during hospitalization, infants received noninvasive (79.2%) and invasive (60.4%) ventilation, although they were kept on room air (92.5%). In NBs on mechanical ventilation, feeding is usually given via OGT or NGT, thus preventing breastfeeding.[16] Therefore, it is important that mothers are guided and encouraged by the team to express their milk. However, in a study conducted with 19 mothers of preterm NBs, they reported difficulties in producing and expressing milk themselves, even though they recognized that breast milk is the best for their children.[16,17] Encouraging milking can be a factor that favors breastfeeding when possible.

Among the stages of pain management, reassessment deserves attention, as it is through this that the effectiveness of the selected interventions is assessed. Thus, it is possible to verify the need for changes in the care plan so that pain relief occurs effectively. However, only 23.8% of NBs in this study were breastfed and had their pain reassessed. Given the absence of this reassessment, the cycle of stages is broken and, therefore, pain management is not performed efficiently, directly impacting neonatal pain relief.[18]

The recommendation of breastfeeding as a non-pharmacological intervention allows parents to be more actively involved in relieving their chil-

dren's pain, in addition to its importance in promoting well-being and the bond between mothers and NBs.[19] Research has shown that mothers who were encouraged to breastfeed during painful procedures were satisfied with the pain relief method and the opportunity to comfort their NBs during the procedure.[11] Additionally, parents report their desire to learn more about pain and be involved during painful procedures.[13] However, they are often prevented according to a qualitative study.[20]

Furthermore, medical records of newborns hospitalized from 2019 to 2021, when the COVID-19 pandemic began, were included. Environmental conditions and support for NBs' mothers have a strong relationship with the success in establishing breastfeeding in a NICU. However, during this period of public health emergency, maternal stress related to NBs' recovery increased sharply, as there were substantial changes in the NICU routine and restrictions on visits to NBs in addition to restrictions on activities of daily living. In this scenario, a study conducted in a NICU showed that pandemic-induced stress and related restrictions had an impact on the availability of expressed breast milk.[21] Therefore, it is essential to reflect on the influence of this scenario on breastfeeding promotion.

To change this scenario, it is necessary to consider strategies. The literature has shown the following possibilities: encouraging interprofessional collaborative practice; training leaders involved in pain management; continuous educational strategies, training on pain management and updating on new practices identified in the literature, as well as medical record auditing, with institutional accountability for documentation of actions.[22] Therefore, translation and knowledge exchange research are essential and are recommended for future studies.

This study had two limitations: (1) lack of pain assessment using scales, which may have reduced the number of infants who actually presented pain (due to documentation in nursing notes and progress notes); and (2) retrospective approach, which limited the description to infants with breastfeeding documentation promotion (without observation by the researcher). This study can contribute to the literature by showing the gap regarding breastfeeding promotion in clinical practice, and may also initiate a wide range of research on this subject.

Conclusion

Breastfeeding as a non-pharmacological intervention is still underused in clinical practice, but its promotion is a possibility for effective pain relief in neonates. Breastfeeding promotion as a non-pharmacological intervention for pain relief was documented in medical records and was conducted in 42 of the 53 infants. A higher prevalence of infants who received breastfeeding was observed among those who were male, without congenital malformations, and with adequate weight for gestational age. Breastfeeding is associated with newborns who were in room air at some point during hospitalization.

Contributions

Yamamoto MEP, Souza DM, Rossato LM declare that they contributed to study design, data collection, analysis and interpretation, article writing, relevant critical review of intellectual content, and approval of the final version to be published. Monteiro CK declares that she contributed to study design, data collection, analysis and interpretation, and approval of the final version to be published.

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