



Correspondence between knowledge and practices in neonatal pain among Brazilian pediatricians: survey study

Correspondência entre conhecimento e práticas em dor neonatal em pediatras brasileiros: estudo tipo survey

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ABSTRACT

BACKGROUND AND OBJECTIVES: Neonatal pain is a complex experience with short- and long-term impacts. Considering that technical knowledge influences clinical conduct, this study investigated the relationship between the level of knowledge and the practices of Brazilian pediatricians regarding pain in newborns.

METHODS: An online survey was conducted with pediatricians affiliated with the Brazilian Society of Pediatrics. The questionnaire included perceptions about the existence of pain, assessment methods, and pharmacological and non-pharmacological interventions. The analysis included descriptive statistics, Mann-Whitney test, Spearman correlation, and Multiple Correspondence Analysis (MCA), with a significance level of $p < 0.05$.

RESULTS: Among the 144 pediatricians analyzed, the median knowledge score was significantly higher than the median practice score (49.0 vs. 40.5; $p < 0.001$). Cronbach's alpha was 0.77. The lowest knowledge score was related to pain assessment without scales. A moderate correlation was observed between the perception of technical self-sufficiency and the practice of assessing pain ($r = 0.58$). The MCA demonstrated that pediatricians who consider themselves competent tend to assess pain, prescribe analgesics (opioids and non-opioids), and recommend sweetened solutions. Methods such as kangaroo care and breastfeeding did not show significant correlations.

CONCLUSION: There is a gap between knowing and doing, highlighting difficulties in knowledge translation. The perception of mastery of the subject is associated with better evaluative and pharmacological practices. The need to reinforce training in non-pharmacological methods to optimize neonatal care is emphasized.

KEYWORDS: Cross-sectional studies, Newborn, Pain management, Pediatrics.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor neonatal é uma experiência complexa com impactos a curto e longo prazo. Considerando que o conhecimento técnico influencia a conduta clínica, este estudo investigou a relação entre o nível de conhecimento e as práticas de pediatras brasileiros em relação à dor no recém-nascido.

MÉTODOS: Uma pesquisa *online* foi realizada com pediatras filiados à Sociedade Brasileira de Pediatria. O questionário incluiu as percepções sobre a existência da dor, métodos de avaliação e intervenções farmacológicas e não farmacológicas. A análise incluiu estatística descritiva, teste de Mann-Whitney, correlação de Spearman e Análise de Correspondência Múltipla (ACM), com nível de significância $p < 0,05$.

RESULTADOS: Para os 144 pediatras analisados, a mediana do conhecimento foi significativamente superior à das práticas (49,0 vs. 40,5; $p < 0,001$). O alfa de Cronbach foi 0,77. A menor pontuação em conhecimento referiu-se à avaliação da dor sem escalas. Observou-se correlação moderada entre a percepção de autossuficiência técnica e a prática de avaliar a dor ($r = 0,58$). A ACM demonstrou que pediatras que se consideram capacitados tendem a avaliar a dor, prescrever analgésicos (opioides e não opioides) e indicar solução adocicada. Métodos como posição canguru e amamentação não mostraram correlações expressivas.

CONCLUSÃO: Existe uma lacuna entre o saber e o fazer, evidenciando dificuldades na translação do conhecimento. A percepção de domínio do tema está associada a melhores práticas avaliativas e farmacológicas. Ressalta-se a necessidade de reforçar o treinamento em métodos não farmacológicos para otimizar o cuidado neonatal.

DESCRIPTORES: Estudos transversais, Manejo da dor, Pediatria, Recém-nascido.

HIGHLIGHTS

- There is a gap between knowledge of neonatal pain and current practices
- There is a preference for combined pharmacological approaches over non-pharmacological practices
- The assessment of pain, the belief that one has sufficient knowledge, recommendation and prescription of analgesics, the belief that pharmacological methods relieve pain, and the recommendation of the use of a sweetened solution with suction are all related

INTRODUCTION

Pain is a complex and subjective phenomenon shaped by biopsychosocial factors throughout life. Recently, the International Association for the Study of Pain (IASP) expanded this definition, characterizing pain as an unpleasant sensory experience associated with, or not associated with, actual or potential tissue damage¹. This definition contrasts with the previous paradigm, in which it was believed that the immaturity of the central nervous system in newborns (NBs) prevented them from processing painful stimuli^{2,3} — a misconception that, for a long time, neglected the need for neonatal analgesia.

NBs experience pain, and this is a reality that must be managed and avoided^{4,5}. Some studies show that the structures involved in pain processing are anatomically established around the 20th to 24th week of gestation, but functional maturation occurs after birth and is strongly influenced by the external environment the NB will face^{4,5}. Unfortunately, the period of functional maturation often coincides with the performance of potentially painful procedures, especially in those requiring intensive care, exposing the NB to the risk of impaired neurodevelopment, hyperalgesia, and prolonged hospitalization^{4,5}.

It is worth noting that even low-risk NBs are subject to painful procedures such as neonatal screening, blood glucose monitoring, vaccination, and other injections². Exposure to painful stimuli is particularly frequent among those requiring prolonged hospitalization, such as preterm infants, with the number of procedures being inversely proportional to gestational age and birth weight^{6,7}. These situations require objective pain assessment using a scale.

The application of a neonatal pain scale is the first step in pain management. Currently, there are many validated scales, and none is inherently better than another; rather, the most appropriate in each case depends on the specific context^{8,9}. Correctly applying these scales requires appropriate human and institutional resources, such as an adequate number of professionals, training, and standardization by the institutions¹⁰. Increased knowledge about pain, which includes assessment scales, is consistent with improved practices and, consequently, with adequate analgesia and comfort^{11,12}.

Therefore, the present study's objective was to investigate the association between knowledge and practices regarding neonatal pain among Brazilian pediatricians.

METHODS

An online survey study was conducted on the association between knowledge of neonatal pain and neonatal pain management practices among pediatricians. The study's hypothesis was that knowledge of pain is related to clinical practices and that analyzing these relationships could contribute to a deeper comprehension of this topic. The knowledge questions included the possibility of pain in NBs, how to assess pain, whether respondents felt they had sufficient knowledge, and pharmacological and non-pharmacological methods. The practices investigated included the recommendation and promotion of breastfeeding, the use of

oral glucose or sucrose with or without non-nutritive suction, kangaroo care, facilitated holding, and the use of analgesics for pain control. Using the analytical method described below, the authors analyzed various practices and knowledge-related questions simultaneously to identify the association between them.

The Brazilian Society of Pediatrics (SBP - *Sociedade Brasileira de Pediatria*) invited its member pediatricians to participate in this study. The inclusion criteria were: being a member pediatrician and working with NBs. The exclusion criteria were incomplete or duplicate forms.

Data collection

An invitation was sent via e-mail to the contact list of pediatricians affiliated with the SBP, including a link to the REDCap (Research Electronic Data Capture) questionnaire, on two dates: August 15 and September 30, 2024. In this way, the sample was non-probabilistic. The questionnaire consisted of two parts. The first part contained information on the professionals' characteristics (biological sex, age, years of training). The second part consisted of knowledge questions (eight questions: C1, C2, C3, C4, C5, C6, C7, C8) and practices (eight questions: P1, P2, P3, P4, P5, P6, P7, P8) related to neonatal pain. This questionnaire was adapted from another study, following authorization from the authors, and responses were rated on a seven-point Likert scale, such that a higher score indicates a better outcome¹⁰. Thus, negative questions had their scores reversed. This study was approved by the institution's Human Research Ethics Committee, and informed consent was obtained from all participants. No sample size calculation was performed, as this was a convenience sample. CAAE 79823924.7.0000.5504, year 2024.

Statistical analysis

A descriptive analysis was performed, including calculations of medians, interquartile ranges (IQR), frequencies, and percentages. Data normality was assessed using the Shapiro-Wilk test. Differences between medians were analyzed using the Mann-Whitney test. To investigate the correlations between pain knowledge and practices, Spearman's correlation coefficient was calculated for all questions. Correlations greater than 0.3 and with a p-value <0.05 were identified. To analyze how the variables of pain knowledge and practices relate simultaneously, multiple correspondence analysis (MCA) was performed for variables with a correlation >0.3. These variables were categorized based on agreement (yes/no). This method allows for the simultaneous and descriptive processing of three or more categorical variables, enabling spatial visualization of the data and showing the association between the categories of multiple variables. The categories were therefore separated so that the most related ones are plotted close together and the least related ones are distant from one another, creating homogeneous subgroups¹³. For this analysis, responses were grouped according to agreement.

For all analyses, the Stata software (Stata Corp, L.C; version 18.0) was used, and a p-value of <0.05 was considered statistically significant. The present study followed the CROSS guidelines for survey studies¹⁴.

RESULTS

This study included 144 participants, of whom 55 (38.2%) reported using a neonatal pain assessment scale. Cronbach's alpha was 0.77. The median age of participants was 46.5 years (IQR 37–54), the median time since graduation was 21 years (IQR 10.5–29), and 88.2% reported being female. The median score for knowledge was 49.0 (IQR 47.0–51.0) and for practices, 40.5 (IQR 34.5–47.0), with a significant difference ($p < 0.001$).

Pain knowledge is shown in Figure 1, and the lowest score was observed for item 2 (C2), which refers to the possibility of assessing neonatal pain without the use of scales. For pain management practices, lower scores were observed for items 7 and 8 (P7 and P8), referring to the pharmacological treatment of pain (Figure 2).

Spearman's correlation analysis between the variables related to pain knowledge and pain assessment practices identified those with a correlation coefficient > 0.3 and a p -value < 0.05 (Table 1). The strongest correlation observed (0.5843) was between believing one had sufficient knowledge (C5) and assessing pain in practice (P1).

(C1-Full-term and preterm NBs feel pain; C2-Neonatal pain can be assessed without the use of pain scales; C3-Pain can alter a NB's heart rate and oxygen saturation; C4 - It is important to assess pain in NBs; C5 - Do you consider that you have sufficient knowledge to assess pain in NBs?; C6 - Pharmacological methods relieve pain in NBs; C7-The use of opioid analgesics in the treatment of acute pain in NBs can trigger apnea; C8-Non-pharmacological methods relieve pain in NBs; P1 - Do you assess pain in NBs in the neonatal unit?; P2 - I recommend and favor breastfeeding to relieve pain in NBs before and during painful procedures; P3 - I recommend and favor oral glucose or sucrose through suction to relieve pain before and during painful procedures; P4-I recommend

and favor oral glucose or sucrose with non-nutritive suction to relieve pain before and during painful procedures; P5-I favor the kangaroo position to relieve pain before and during painful procedures; P6-I favor facilitated holding to relieve pain before and during painful procedures; P7 - I recommend and prescribe non-opioid analgesics to relieve pain before painful procedures; P8 - I recommend and prescribe opioid analgesics to relieve pain before painful procedures).

Among the correlations greater than 0.3, the belief that it is important to assess pain was correlated with actually assessing pain. The belief that pharmacological methods relieve pain was correlated with assessing pain and with recommending and prescribing opioid analgesics. There was a correlation between the belief that one has sufficient knowledge and four practices (Figure 3).

The MCA revealed a correlation between prescribing opioid and non-opioid analgesics, the belief that one has sufficient knowledge, and assessing pain (Figure 4). Variable C4 (it is important to assess the NB's pain) did not yield any disagreeing responses (all responses were "agree" or "strongly agree") and, for this reason, was not tested in the MCA.

DISCUSSION

The present study, which included pediatricians affiliated with the Brazilian Society of Pediatrics (SBP), allowed us to observe that knowledge of neonatal pain was positively correlated with clinical practices. Knowledge had a higher median score than practices, revealing a gap between the two. Correspondence was observed in the following concordant responses: assessing pain, considering that they have sufficient knowledge, recommending

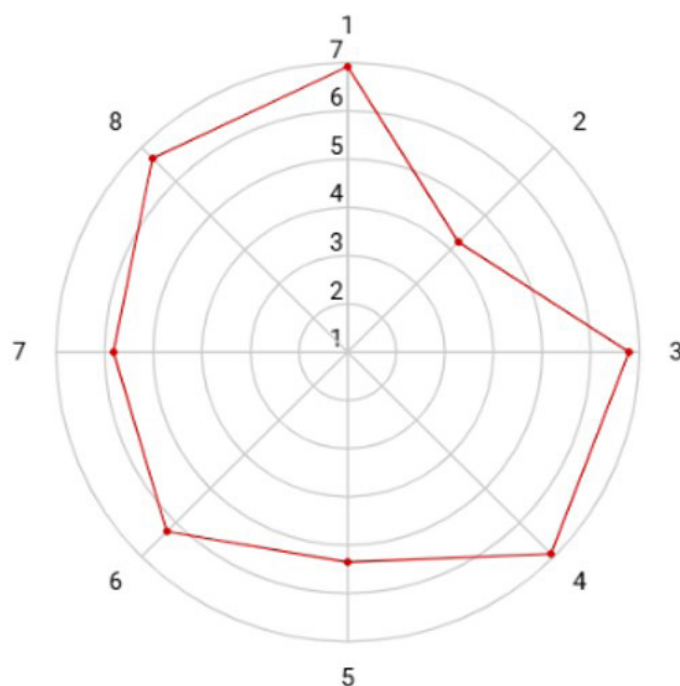


Figure 1. Radar of the professionals' knowledge regarding neonatal pain.

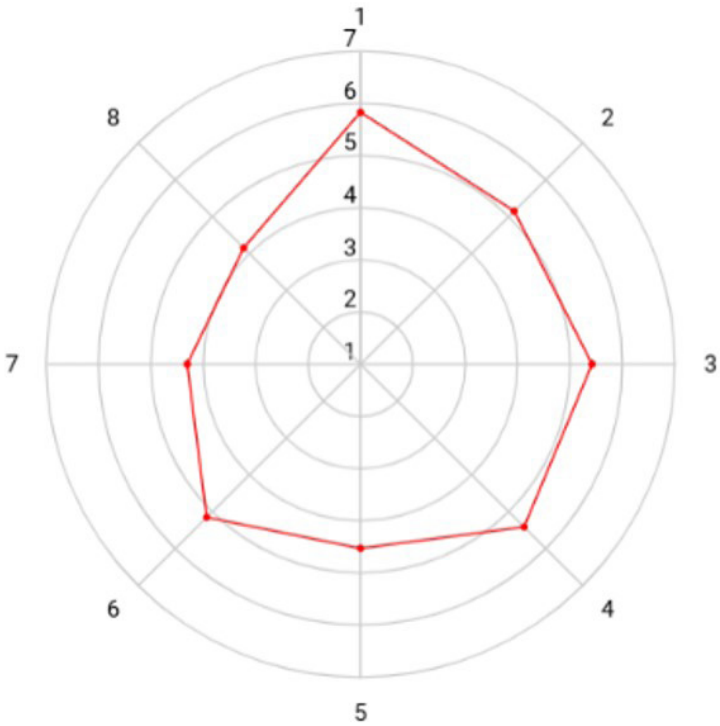


Figure 2. Radar of the professionals’ practices regarding neonatal pain.

Table 1. Correlation matrix between variables related to knowledge and practices regarding neonatal pain.

	C1	C2	C3	C4	C5	C6	C7	C8
P1	0.1736	-0.0122	0.2492	0.3252	0.5843	0.3859	-0.0665	0.2368
	p = 0.0375	p = 0.885	p = 0.0026	p = 0.0001	p < 0.0001	p < 0.0001	p = 0.4286	p = 0.0043
P2	0.1004	0.0485	0.0969	0.0875	0.2305	0.1981	0.1746	0.1605
	p = 0.2312	p = 0.5639	p = 0.248	p = 0.2969	p = 0.0054	p = 0.0173	p = 0.0364	p = 0.0546
P3	0.1009	0.0393	0.1985	0.2071	0.2831	0.2382	0.0881	0.0981
	p = 0.2287	p = 0.6397	p = 0.0171	p = 0.0127	p = 0.0006	p = 0.004	p = 0.294	p = 0.2419
P4	0.1749	0.0148	0.2322	0.2659	0.3111	0.2126	0.0594	0.145
	p = 0.0361	p = 0.8599	p = 0.0051	p = 0.0013	p = 0.0001	p = 0.0109	p = 0.4792	p = 0.0829
P5	0.026	0.0175	0.1641	0.0814	0.2859	0.0859	0.1446	0.0488
	p = 0.7574	p = 0.8353	p = 0.0494	p = 0.332	p = 0.0005	p = 0.3059	p = 0.0837	p = 0.5613
P6	0.1662	0.1083	0.2239	0.2077	0.2353	0.152	0.0834	0.1258
	p = 0.0465	p = 0.1965	p = 0.007	p = 0.0125	p = 0.0045	p = 0.0689	p = 0.32	p = 0.1331
P7	0.2263	0.154	0.1657	0.2192	0.3105	0.2227	0.0401	0.222
	p = 0.0064	p = 0.0653	p = 0.0472	p = 0.0083	p = 0.0002	p = 0.0073	p = 0.6335	p = 0.0075
P8	0.2584	0.0471	0.1981	0.2797	0.3936	0.3788	0.0599	0.1302
	p = 0.018	p = 0.5751	p = 0.0173	p = 0.0007	p < 0.0001	p < 0.0001	p = 0.4754	p = 0.1198

and prescribing analgesics (opioids and non-opioids), believing that pharmacological methods relieve pain, and recommending the use of a sweetened solution with suction.

The study highlighted a gap between theoretical knowledge about pain and clinical practice, revealing difficulties in translating knowledge into direct patient care. It was also observed weaknesses

in responses regarding pain assessment without the use of scales. In this context, standardizing concepts, combined with accurate assessment and appropriate intervention, emerges as a way to reduce this disparity¹⁰. Although health professionals recognize the importance of assessment and perceive themselves as competent, the data suggest a disconnection between this perception and

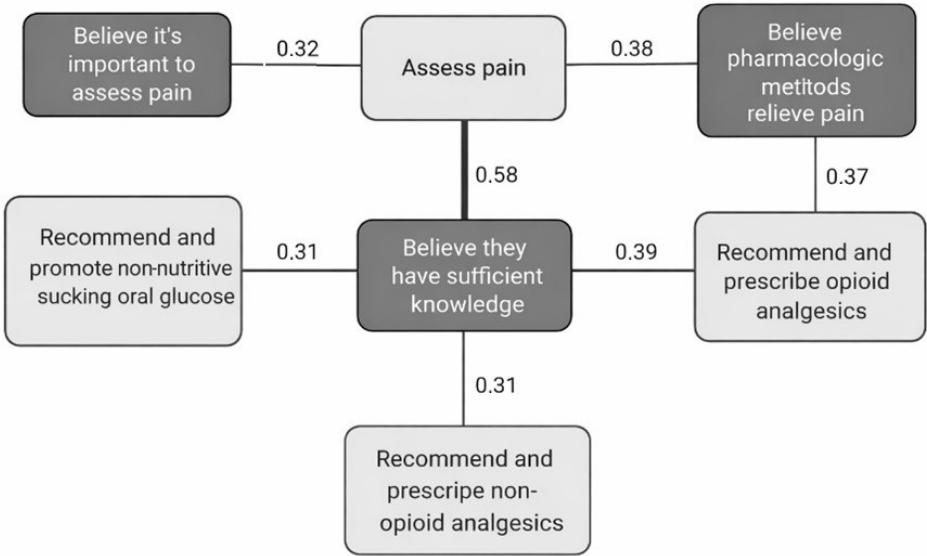


Figure 3. Diagram showing correlations greater than 0.3 between knowledge and practices.

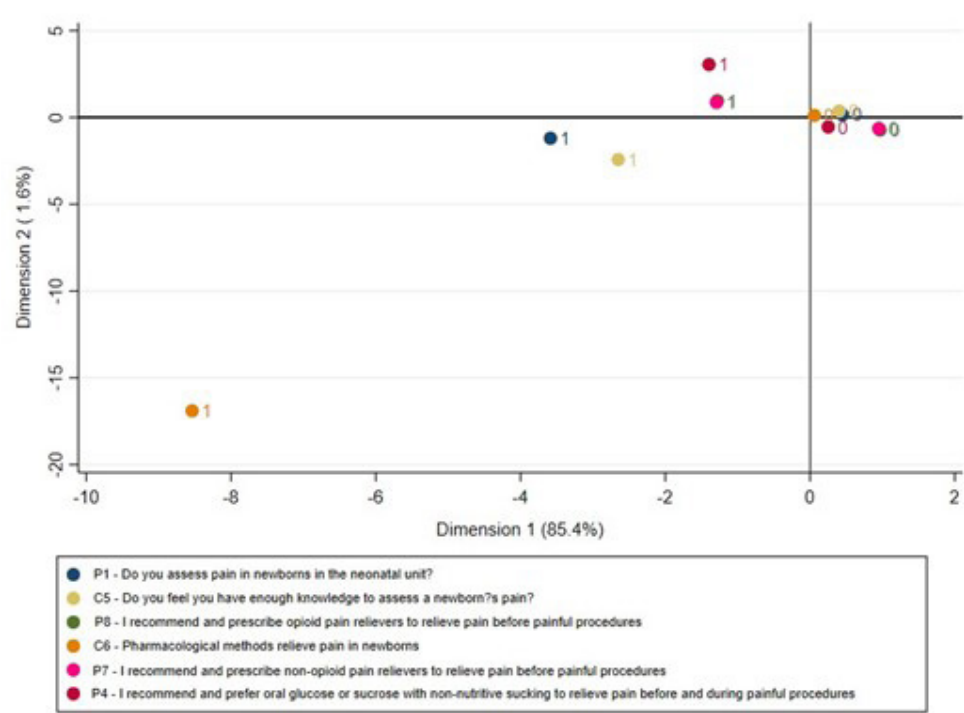


Figure 4. Correlation matrix for the correlated variables (0 = agree; 1 = disagree).

practical reality. This finding is consistent with the literature, as there is a gap between knowledge and practice, indicating that practices have not kept pace with growing knowledge^{2,3,12}. As justification, according to the literature, health professionals believe that the use of scales is time-consuming and that adequate training and protocols are not provided^{8,15}. Furthermore, this finding suggests that health professionals, while recognizing the importance of assessing pain in NBs, are receptive to strategies

for improving practices. The use of assessment scales should be considered an integral part of these professionals' work processes and thus not viewed as "additional time." Further studies on this topic are needed in order to identify the factors associated with this gap and how to mitigate it, to ensure the management of neonatal pain and the use of scales. The strongest correlation observed was between assessing pain and the belief that one has sufficient knowledge. In fact, the

belief that one has sufficient knowledge was correlated with four practices: assessing pain; prescribing pharmacological treatment (opioid and non-opioid); and prescribing non-nutritive suction with a sweetened solution. This highlights the importance of the pediatrician's confidence in their knowledge for the implementation of these practices. Knowledge represents a paradigm shift that still faces some resistance. The lack of alignment between knowledge and practices compromises the quality of neonatal care^{2,6}. Assessing and treating pain only become part of a healthcare professional's daily practice when, first and foremost, they recognize that neonatal pain exists and care about it. In the present study, non-nutritive suction with a sweetened solution was also associated with greater knowledge. This is an effective and widely used intervention in practice, considered in some studies as a non-pharmacological strategy^{16,17}. This practice requires fewer resources, but must be performed with caution regarding dosage and frequency, as it is not free from potentially negative effects and, for this reason, has more recently been considered a pharmacological strategy^{18,19}.

A preference for pharmacological methods was observed, as these showed higher correlation values, such as believing one has sufficient knowledge and recommending the use of opioids. Opioid analgesics have long been used for the management of neonatal pain and are the first-line treatment for severe pain, particularly in intensive care settings²⁰. However, it should be noted that NBs have physiological peculiarities regarding the metabolism of certain drugs, which increases the risks associated with their use²⁰. The emphasis placed by pediatricians on pharmacological methods warrants further exploration in future studies.

It was noteworthy that non-pharmacological methods such as kangaroo care, facilitated holding, and breastfeeding did not show significant correlations. These methods do not require a medical prescription, and they are effective, safe, and low-cost². This finding aligns with the current literature, which increasingly points to the benefits of non-pharmacological methods in reducing pain scores, heart rate, and oxygen saturation oxigênio²¹⁻²³, as well as promoting parental involvement in care^{24,25}. In this sense, the results point to the need to reinforce the relevance of these methods both in neonatal pain management protocols and in the training of pediatricians. It is essential to challenge the perception that such strategies are secondary, promoting a critical alignment between the importance attributed to the topic and clinical practice.

Multiple correspondence analysis revealed that the responses regarding sufficient knowledge, assessing pain, recommending and prescribing opioid or non-opioid analgesics, and recommending the use of a sweetened solution with suction (which are pharmacological methods) showed a correlation. This suggests that pediatricians who report having sufficient knowledge are those who tend to assess pain and recommend pharmacological treatment. In fact, having knowledge of pain is essential for assessing and identifying NBs who are in pain and require analgesia, and this depends on the training and qualification of the entire team, as previously mentioned^{10,12,26}. However, this almost exclusive correlation with pharmacological treatment warrants reflection. Pharmacological analgesia in neonatology, although widely used, must be approached with caution, especially regarding safety^{20,27}. A longitudinal study²⁸ analyzed 50 NBs admitted to a public maternity hospital and the procedures performed during

the first two weeks of life, including punctures, catheterizations, and others, correlating the procedures with pain relief strategies. These authors considered suction with a sweetened solution as a non-pharmacological strategy and performed correlation analyses, but not correspondence analyses, which would allow for the observation of more than two strategies simultaneously. They also did not make comparisons between the strategies. The authors noted difficulties with pharmacological treatment and the underutilization of non-pharmacological strategies in procedures involving severe pain²⁸. This finding, once again, raises the question of why non-pharmacological methods are not prioritized. No additional studies were found that conducted correspondence analysis to support this discussion.

One potential limitation of the present study is regarding its online survey design, in which the professionals who agree to complete the questionnaire are those who feel most comfortable doing so—possibly those with greater knowledge of the subject. Another limitation is that the study included only pediatricians and did not reflect the opinions of other professionals in a multidisciplinary team. Finally, since it is unknown how many member pediatricians work with NBs, it was not possible to calculate the response rate. Therefore, caution should be exercised when generalizing the results herein. On the other hand, the study's strengths include the absence of missing data and the use of correspondence analysis, allowing for the simultaneous observation of a set of variables. Therefore, this study contributed to the body of evidence regarding the associations between knowledge and practices in neonatal pain.

CONCLUSION

The present study's results confirm the relationship between knowledge of pain and neonatal practices among Brazilian pediatricians. The gap between these two factors highlights difficulties in translating knowledge into practice. Non-pharmacological methods for pain relief deserve to be emphasized in the training of these professionals. When pediatricians consider that they have sufficient knowledge, they tend to assess pain, recommend and prescribe analgesics (opioids and non-opioids), believe that pharmacological methods relieve pain, and recommend the use of a sweetened solution.

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AUTHORS' CONTRIBUTIONS

Pedro Henrique Teixeira Bottaro: Statistical Analysis, Funding Acquisition, Data Collection, Resource management, Project Management, Methodology, Writing - Preparation of the Original, Writing - Review and editing, Software

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