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LETTER TO THE EDITOR

Type of delivery and pain response in full-term newborns after vitamin K administration: assessment using the COMFORT Behavior and Neonatal Facial Coding System scales

Dear Editor,

Pain is considered the fifth vital sign. Although in the past newborns were thought not to experience pain, currently this concept has been rejected. Indeed, newborns can experience pain even more intensely than adults, among other factors, due to the shorter distances nerve impulses need to travel. Painful stimuli can have consequences on a newborn's behavior, both in the short and long term.¹

Assessing pain in newborns is challenging, since they do not verbalize it, and using validated scales has been recommended. Among them, the Neonatal Facial Coding System (NFCS) scale was developed in 1987, by Grunau et al.,² and has been validated for term and premature newborns. NFCS is one of the most studied one-dimensional scales in this population. The multidimensional COMFORT behavior scale (COMFORT b) derives from the COMFORT scale and has also been validated for use in newborns.³

Mode of delivery has been linked to how newborns experience pain. Bergqvist et al. demonstrated that there are differences in behavioral and physiological responses after acute painful stimuli among newborns depending on the method of delivery.⁴ Schuller et al. showed that newborns from vaginal delivery present lower expression of pain immediately after birth compared to newborns delivered by Cesarean section (C-section).⁵

An observational study using a quantitative tool approach was carried out to assess pain in newborns shortly after vaginal birth or C-section, before and after Intramuscular (IM) administration of vitamin K. The study was approved by the Research Ethics Committee of the Botucatu School of Medicine of the Universidade Estadual Paulista (UNESP) by CAAE 48553015.3.0000.5411.

The study sample comprised 83 newborns, of which 53 (63.8%) were delivered by C-section and 30 (36.1%) by vaginal birth, at the Maternity Hospital of the Irmandade da Santa Casa de Misericórdia de São Carlos.

Face-to-face data collection performed from May 2016 to April 2017 comprised data on birth method and newborns. Heart Rate (HR), and COMFORT b and NFCS scale scores were the outcomes collected, and they were obtained before (T1), immediately after (T2), and 10 minutes after (T3) IM administration of vitamin K. The percentage variation of these outcomes between T2 and T1 was calculated, and outcomes were compared at T1, T2, and T3 regarding vaginal birth and C-section. Differences between medians were compared using the Mann-Whitney test. Differences between means were compared by Student's *t*-test. Significance level was defined for $p < 0.05$.

Regarding general data, we reported a median gestational age of 39 0/7 weeks with an Interquartile Range (IQR) from 38 2/7 to 39 6/7 weeks, and the median birth weight was 3295g (IQR 3072–3540 g). Thirty-eight newborns (45.8%) were male and 45 (54.2%) were female. We found no differences between the characteristics of the newborns and the initial assessments at T1 in relation to the delivery method, showing that the groups were comparable ($p > 0.05$).

We observed that the score on both scales and HR increased after IM administration of vitamin K. There was a 38.8% and 52.9% increase in the COMFORT b scale score for newborns delivered by C-section and by vaginal birth, respectively. For the NFCS scale, a three-fold increase in the score was registered in newborns delivered by C-section, and a 1.4-fold increase in those born by vaginal birth. Regarding HR, an increase of 8.7% was registered both in newborns delivered by C-section and newborns delivered by vaginal birth.

We found no differences when the scores of COMFORT b and NFCS scales were compared at each moment (T1, T2 and T3) for C-section and vaginal delivery groups. We observed higher HR values for newborns delivered by C-section at T3, a moment that reflects the recovery of the newborn after painful stimulus. At T1 and T2, no difference was observed for HR (Fig. 1).

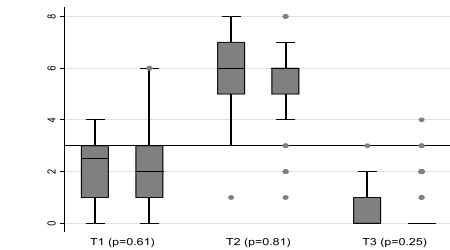
Unlike Bergqvist et al., the present study did not reveal an effect of the type of delivery on the assessments by the COMFORT b and NFCS scales. This discrepancy can be explained by the fact that Bergqvist et al. excluded many participants from their study, and because they used the NFCS scale with a reduced number of parameters.⁴ Conversely, Schuller et al. included premature and low birth

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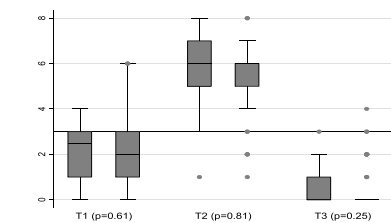
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Graph 1. COMFORT b scale, according to the type of delivery. Sao Carlos, 2016-2017.



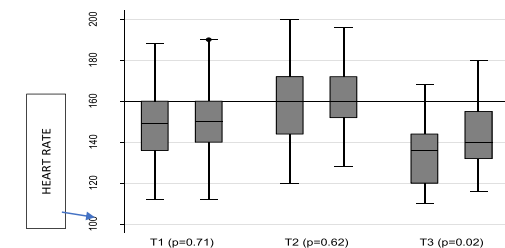
Vaginal C-section Vaginal C-section Vaginal C-section
 p value associated with Mann-Whitney test

Graph 2. NFCS scale, according to type of delivery. Sao Carlos, 2016-2017.



Vaginal C-section Vaginal C-section Vaginal C-section
 p value associated with Mann-Whitney test

Graph 3. Heart rate, according to the type of delivery. Sao Carlos, 2016-2017.



Vaginal C-section Vaginal C-section Vaginal C-section
 p value associated with Student's t test

Figure 1 Comparison between newborns delivered vaginally and by cesarean at T1, T2 and T3, for COMFORT b scale, NFCS, and heart rate parameters.

weight newborns in their sample, in addition to those submitted to vacuum extraction, and used other assessment scales.⁵ Such different methods make comparisons among studies difficult.

In the present study, higher HR at T3 were observed in the C-section group. Bergqvist et al. studied 76 newborns and observed that, after painful stimuli, there was a difference in HR depending on the delivery method. The authors evaluated the percentage variation of HR in relation to baseline HR.⁴

This study has limitations. Data was collected in a single center and from a small sample, limiting generalization of the findings. Non-blinding the observer may have influenced assessments. However, no painful stimuli other than those already recommended were used, that is, assessments were performed after IM administration of vitamin K, which is a routine procedure after birth.

Our findings indicate that IM administration of vitamin K caused pain and its expression was not influenced by the type of delivery.

Based on the results of this study, we suggest the development of a neonatal pain management protocol for routine procedures beginning at the delivery room. Pain management using non-pharmacological techniques and human breastfeeding could minimize newborn discomfort in this scenario.

Research ethics committee

Botucatu School of Medicine (*Faculdade de Medicina de Botucatu*) of Universidade Estadual Paulista (UNESP), by CAAE 48553015.3.0000.5411. Ethics Committee opinion is attached.

EQUATOR reporting guidelines

This study complied with the recommendations of the AGREE tool for clinical practice guidelines.

Conflicts of interest

The authors declare no conflicts of interest.

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