

# **PAIN IN NEONATES – ABSTRACT**

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## **1. INTRODUCTION**

The Neonatal Intensive Care Unit is a place that provides life-saving medical care for increasing number of patients each year. Neonates are subjected to numerous painful diagnostic and therapeutic procedures without sufficient analgesia. Early and cumulative pain exposure in newborns at the critical period of their development has been associated with many adverse long-term complications. Therefore the great concern about these consequences gives the motivation to use the best, reliable tools to assess pain in newborns accurately and start the optimal and individually tailored treatment.

## **2. AIMS OF THE STUDY**

The overall aim of the study was to establish the utility of the NIPE pain monitor in different clinical situations and to assess its reliability to monitor pain in newborns. The objective of the first phase of the study was to compare different methods of pain assessment in preterm neonates experiencing acute prolonged pain: the Newborn Infant Parasympathetic Evaluation (NIPE) index; the Neonatal Pain, Agitation and Sedation Scale (N-PASS); the Premature Infants Pain Profile (PIPP) and the Neonatal Pain and Discomfort Scale (EDIN). The objective of the second part of the study was to evaluate of the level of pain in neonates caused by an acute procedural noxious event and to assess their sensitivity to pain depending on gestational age using the NIPE index.

## **3. MATERIAL AND METHODS**

This was a prospective observational study. It consisted of two phases. In the first part of the study preterm neonates experiencing acute prolonged pain – ventilated newborns were included. In the second experimental group neonates at different gestational age subjected to acute procedural pain were enrolled for the assessment. Exclusion criteria for both phases of the study were: neurological or cardiac congenital anomalies, arrhythmias, circulatory failure requiring infusion of vasopressive drugs or fluid resuscitation and severe encephalopathy. The control group consisted of healthy newborns not subjected to any noxious stimuli.

Preterm ventilated infants were evaluated with three behavioral scales: the N-PASS scale, the PIPP scale, the EDIN scale and with the NIPE index. In the second sub-study newborn at different gestational age were assessed with the NIPE pain monitor.

#### **4. RESULTS**

40 patients (21 male neonates and 19 female neonates) were included in the study of pain: The analysis of results of the first experimental group of neonates assessed with behavioral scales and with the NIPE pain monitor confirmed that ventilated patients may potentially feel pain. The correlation analysis showed that there is very strong and high significant correlation between the pain scales scores and the NIPEm results. Calculated accuracy confirmed very high agreement between all of the evaluation tools.

Neonates subjected to acute procedural pain were assessed only with the NIPE pain monitor. There was statistically significant difference in the minimum NIPEi results during the evaluation between full term, moderate or late preterm, very preterm and extremely preterm neonates with procedural pain ( $p$ -value = 0,033). The decrease of NIPE index was generally higher in neonates born prematurely than in term newborns which would suggest that preterm babies are more sensitive to pain than term-babies. Moreover there was statistically significant difference in the NIPEm scores 20 min. after painful procedures ( $p$ -value = 0.032) between different age groups of newborns. It could mean that the youngest children feel pain more severely with longer nociceptive effects of performed painful procedure.

#### **5. CONCLUSIONS**

The study proved that the NIPE pain monitor is a reliable tool for pain assessment in preterm newborns experiencing acute prolonged pain and to assess the level of pain caused by acute noxious procedure in neonates. The NIPE results were significantly correlating with the pain assessment scales scores. Additionally study findings confirmed that premature infants are more sensitive to pain than full-term neonates. The NIPE pain monitor has the potential of becoming the gold standard in pain evaluation for newborns born at different gestational week in various clinical situations, nevertheless more research is necessary to conclude that.

**KEY WORDS:** pain, newborns, pain assessment, pain management