

## ABSTRACT

### VALIDATION OF CRY ACOUSTIC PATTERN AS POSTOPERATIVE ACUTE PAIN INDICATOR IN INFANTS

Pain is a subjective experience and no objective tests exist to measure it, and IASP decided patient's self-report as gold standard of pain assessment. Unfortunately, infants cannot provide a self-report of pain verbally. Observe of behaviour recognized as indicators of pain in this population, but this assessment also subjective. A drawback of most behaviour instruments is not feasible and cannot be used in the daily practice. Difficulty to assess pain has been cited as one of the important reasons for inadequate pain management in infant. FLACC pain scale have been validated for assessing postoperative pain in 1- to 7-year-old children.

To test the validity the dynamic of cry acoustic in infants as diagnostic tool of surgical acute pain the correlation with the increasing of salivary cortisol as a standard.

The study design was cross sectional. 23 infants, 41-274 days old met the inclusion criteria and included for the analysis. The cry sound and behaviour were recorded preoperatively and postoperatively for cry density, inspiratory phonation density and FLACC. The saliva was collected in the morning between 07.00 - 08.00 and after surgery for salivary cortisol. Data analysis was performed by Pearson and Spearman statistical test. Sensitivity, specificity, cutoff point of cry density were analysed by ROC procedure.

There were strong correlation between the increasing of salivary cortisol and increasing of cry density ( $p = 0.000$ ,  $r = 0.771$ ). There were no correlation between the increasing of salivary cortisol and increasing of FLACC and inspiratory phonation density ( $p = 0.298$ ,  $r = -0.227$ , for FLACC and  $p = 0.708$ ,  $r = 0.083$  for inspiratory phonation). Salivary cortisol increased more than 100% in 22 cases. Percentation of the increasing salivary cortisol also moderately correlated with increasing of cry density ( $p = 0.045$ ,  $r = 0.422$ ). Pain was ranked to mild pain, moderate pain and severe pain, depend on significant value of percentation increased of salivary cortisol related with the increase of cry density based on ROC procedures. For cutoff point percentation increased of salivary cortisol between mild pain and moderate pain the relation was significant if salivary cortisol increased more than 1300% ( $p = 0.016$ ), cutoff point cry density = 0.16 (sensitivity = 85.7%, positive predictive value = 80%, specificity = 75%, negative predictive value = 92.3%). For cutoff point percentation increased of salivary cortisol between moderate pain and severe pain the relation was significant if salivary cortisol increased more than 1500% ( $p = 0.017$ ), cutoff point cry density = 0.185 (sensitivity = 83.3%, positive predictive value = 55.6% specificity = 76.5%, negative predictive value = 92.9%).

**Keyword:** acute pain, cry, FLACC, cortisol, saliva, infant, signal, spectrogram, digital, analog.