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Saturation Oxygen Pressure Index for Assessment of Pulmonary Disease in Neonates on Non-invasive Ventilation

This prospective observational study on 36 neonates aimed to estimate the correlation between the new **S**aturation **O**xygen distending **P**ressure **I**ndex (SOPI) and Oxygenation index. SOPI had high correlation (r=0.94) with oxygenation index. SOPI of <2, 2, and 3.7 represented mild, moderate and severe pulmonary disease, respectively with high sensitivity and specificity.

Keywords*: Acute lung disease, Newborn, Noninvasive ventilation, SOP index.*

Neonates with respiratory distress need continuous distending pressure to achieve adequate functional residual capacity. Any change in the severity of pulmonary disease is reflected as a change in need for the distending pressure or fraction of inspired oxygen (FiO_2) or both. A tool incorporating these parameters would potentially help in objectively assessing the severity of the pulmonary disease.

Current assessment of pulmonary disease is with blood gas, chest *X*-ray and Oxygenation index (OI). OI cannot be calculated for babies on Continuous Positive Airway Pressure (CPAP) and Non-invasive Positive Pressure Ventilation (NIPPV), and has resource implications. A non-invasive assessment tool would allow clinicians to use it more frequently. Non-invasive tools such as Oxygen saturation index and Respiratory severity score [1,2] cannot be used in babies on CPAP or non-invasive ventilation. Saturation (SPO_2), Oxygen (FiO_2) and distending Pressure (PEEP) index, or SOP index, attempts to objectively score respiratory disease with parameters available in babies on CPAP or non-invasive ventilation.

This was a single-centre prospective observational study undertaken in a Canadian tertiary care Neonatal intensive care unit (NICU). Our primary objective was to evaluate if the SOP index correlates with Oxygenation index in neonates. Secondary objective was to find the cut-off values of SOP index for mild, moderate and severe pulmonary disease. Both term and preterm neonates on conventional mechanical ventilation were enrolled. Babies with severe congenital anomalies and congenital heart disease and SPO_2 above 98% were excluded from the study. Consent waiver for the study was provided by the McMaster Research Ethics Board.

SOP index was calculated by the formula, PEEP X FiO_2/ SpO_2. PEEP, FiO_2 and SpO_2 on the monitor was recorded prior to arterial blood gas sampling. SPO_2 was recorded when there was a good waveform.

Thirty-six patients were recruited and total of 72 data sets were obtained. The first obtained value for each patient was separately tabulated. Pearson product moment correlation between SOP index and Oxygenation index was calculated. All the data sets combined were analyzed using linear mixed model effect with random intercept for predictive equation. We calculated sensitivity and specificity of SOP index corresponding to oxygenation index of <5, 5 -15 and >15 using ROC curve. We did not stratify the patients according to gestational age.

Pearson product moment correlation (r) of 0.94 (P=0.001) was noted between SOP index and Oxygenation index (***Fig*.1**). The calculated predictive equation for SOP index was *0.28 X* OI + *0.87*. SOP indices corresponding to OI <5 (mild), 5-15 (moderate) and >15 (severe lung disease) are <2, 2 to 3.7 and >3.7, respectively. With 89% sensitivity and 94% specificity. The sensitivity and specificity of SOP index for mild, moderate and severe pulmonary disease was 89.5% and 94.1%, 89.5% and 94.1%, and 100% and 94.6%, respectively.

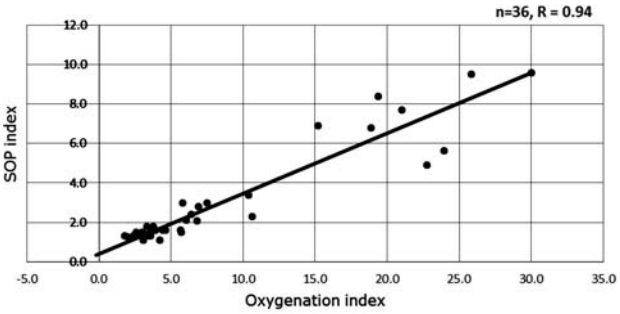

FIG. 1 *Linear correlation between SOP index and Oxygenation index.*

SOPI is calculated with PEEP. This makes it possible to use SOP index in babies who are on CPAP or NIPPV, where only PEEP is reliable. Lung injury assessment with PaO_2:FiO_2 [3] and Oxygenation index, which has been successfully used in neonates [4], can only be measured by an arterial puncture or indwelling catheter.

SOP index has very good correlation with oxygen index. SOPI of <2, 2 to 3.7 and greater than 3.7 indicates pulmonary disease with high sensitivity and specificity. SOP index has potential to be used for assessment of the severity of acute pulmonary disease in babies on CPAP and NIPPV.

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Cord Blood Vitamin D Levels of Term Neonates

We estimated cord blood 25-hydroxy vitamin D levels of 50 term healthy neonates born in a tertiary care center of Kozhikode, Kerala, India. Vitamin D levels were normally distributed with a mean (SD) value of 11.36 (4.75) ng/mL and median (range) values of 10.85 (3.9-24.9) ng/mL. Majority of babies had values between 5 to 15 ng/mL. This study shows that even in tropical climates most of our neonates are born with deficient vitamin D levels.

Keywords: *25 hydroxy vitamin D, neonate, rickets.*

A routine supplementation of vitamin D in neonates is being increasingly endorsed by various international organizations [1]. We conducted this study to determine the cord blood 25-hydroxy vitamin D levels of term healthy neonates born in Malabar Institute of Medical sciences, Kozhikode, Kerala during the summer months of March and April 2013.

Fifty neonates, born at term, whose mothers (mean age 28 yrs) were on antenatal follow up from this institution enrolled for the study. They had received a daily supplementation of 1000 mg calcium and 200 IU vitamin D from 12 weeks of gestation onwards. We excluded neonates with asphyxia, those needing admission to intensive care unit, and those with congenital anomalies. Cord venous blood (5 mL) was collected immediately and 25-hydroxy vitamin D levels were analyzed by Chemiluminescent micro particle immunoassay using DiaSorin liaison equipment. Maternal data were collected using electronic medical records and a questionnaire. Birth weight, sex and mode of delivery were recorded at the time of sample collection. All babies were supplemented with vitamin D at discharge. Prior informed consent was obtained from the parents and clearance was obtained from Institute ethical committee. Statistical analysis was