Measuring accuracy of plethysmography based respiratory rate measurement using pulse oximeter at a tertiary hospital in India

Alwadhi V, Sarin E, Kumar P, et al. *Pneumonia (Nathan)*. 2020;12:4. Published 2020 Jun 5.

Background: Childhood pneumonia continues to be a major infectious killer in India. WHO recommended respiratory rate and oxygen saturation (SpO2) measurements are not well implemented in Indian public health outpatient facilities with the result that treatment decision-making rely on subjective assessments from variably trained and supervised healthcare providers. The introduction of a multi-modal pulse oximeter (POx) that gives reliable measurements would mitigate incorrect diagnosis. In light of future potential use of pulse oximeter in peripheral health centres, it becomes important to measure accuracy of respiratory rate and oxygen saturation of such an instrument. The current study measures accuracy of plethysmography based respiratory rate (RR) using a pulse oximeter (Masimo Rad-G) by comparing it with a gold standard (pediatrician) measurement.

Study design: A cross sectional study was conducted in the OPD and emergency ward of Kalawati Saran Children's Hospital over a 2 week period wherein a convenience sample of 97 children (2 to 59 months) were assessed by a pediatrician as part of routine assessment alongside independent measure by a consultant using pulse oximeter. The level of agreement between plethymography based RR and pediatrician measure was analyzed along with sensitivity and specificity of fast breathing of plethymography based RR measure.

Results: Both methods of measurement show strong association (97%, $p < 0.001$) and observed values, falling on line of unity, obtained either from pulse oximeter or by pediatrician are very close to each other. Fast breathing measured by POx has a sensitivity of 95% and specificity of nearly 94%.

Conclusion: The current study provides evidence of the accuracy of a plethysmography based RR using a pulse oximeter which can potentially be of use in planning of pneumonia management in public health facilities.