Association of Carboxyhemoglobin Levels with Clinical Measures of Acute Asthma Severity.

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Introduction

Carboxyhemoglobin (COHb) is an indicator of both acute airway inflammation and second-hand smoke (SHS) exposure, both of which are known to be associated with worse asthma control. The objective of this study was to determine if COHb is associated with measures of acute asthma severity.

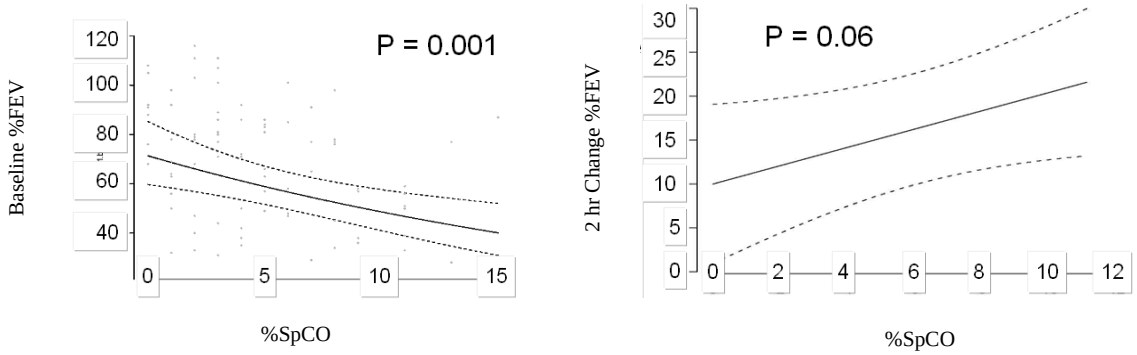
Methods

We prospectively studied children ages 5 to 10 years of age with acute asthma exacerbations at a tertiary children's hospital emergency department. COHb was measured using a Masimo multiwavelength pulse CO-Oximeter (Radical-7 with SpCO) at baseline and 2-hr after initiation of corticosteroid and bronchodilator treatment. SHS exposure was ascertained from the parent. Methemoglobin (SpMet) levels by multi-wavelength CO-Oximeter above 1.3% affects the accuracy of SpCO, and subjects with SpMet > 1.1% were excluded. Univariate and multiple linear regression analyses were performed to assess the independent relationships between SpCO and measures of asthma severity, including exhaled nitric oxide (eNO), spirometry and clinical symptoms.

Results

90 subjects who had SpCO performed and SpMet < 1.1% were included for analysis. Mean age was 9.3 yr (SD 3.3), 59% were male, 62% were African-American, 50% had a parent with asthma, and 53% had SHS exposure. In multivariable analysis, SpCO was independently associated with presenting %FEV_1 (n=47); for every 5% increase in SpCO, there was a 79 percentage decrease in presenting %FEV_1 (p=0.015). SpCO level was not associated with the pediatric asthma score (p=0.38), airway resistance (p=0.25) or eNO level (p=0.83).

Relationship of %SpCO and %FEV at baseline and 2 hours after treatment.



Conclusions: SpCO captured non-invasively during an acute asthma exacerbation in a pediatric emergency department population significantly correlates with %FEV_1, such that as SpCO increases, the %FEV_1 decreases. SpCO may represent a non-invasive, effort-independent measure of acute asthma disease severity as assessed by physiologic measures (%FEV_1), but not symptom scores nor indirect measures of airway inflammation in this small study sample.