Title: Does SpO\textsubscript{2} correlate with SaO\textsubscript{2} in stable COPD patients?

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Body: Background: Pulse oximetry is commonly used to measure oxygen saturations (SpO\textsubscript{2}) in assessment of patients with stable COPD. This is considered to be equivalent to oxygen saturations measured on a blood gas analyser (SaO\textsubscript{2}). The ATS, ERS and GOLD guidelines for COPD define suitability for long term oxygen therapy with PaO\textsubscript{2} less than 7.3kPa or SaO\textsubscript{2} of less than 88%. Aim: To confirm if SpO\textsubscript{2} correlates to SaO\textsubscript{2} in stable COPD patients. Methods: Retrospective study of patients with stable COPD attending oxygen clinics in an acute teaching hospital. Results: N=73, Male 29\% , Mean Age 70 (range 53 - 93), Mean FEV1 0.89 L, current smokers 29\%, 26\% on oxygen, mean MRC grade 4, mean BORG score at rest 2 and mean hematocrit (HCT) 0.41. On‘t’ paired testing in all patients, no statistically significant difference was noted between SpO\textsubscript{2} and SaO\textsubscript{2} (p value: 0.972), the mean SpO\textsubscript{2} - SaO\textsubscript{2} is -0.012\% (95\% CI of -0.71 to 0.69). However, in current smokers subgroup (N=21) high variation between these values was noted, with the mean SpO\textsubscript{2} - SaO\textsubscript{2} 1.067\%. There was a tendency for SpO\textsubscript{2} to be higher than SaO\textsubscript{2} (95\% CI of -1.038 to 3.171). There is no statistically significant relationship between SpO\textsubscript{2} and SaO\textsubscript{2} in COPD patients in relation to sex, age, severity of COPD, smoking status, MRC grade, BORG score, and HCT levels. Conclusions: As the difference between SpO\textsubscript{2} and SaO\textsubscript{2} is high in current smokers, SpO\textsubscript{2} reading using pulse oximetry might not be reliable. Further studies with larger sample size are needed to evaluate this further.