ARTERIAL OXYGEN SATURATION: THE RELATIONSHIP BETWEEN PULSE OXIMETRY AND ARTERIAL BLOOD GAS ANALYSIS IN ADULT ANEMIC PATIENTS

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ABSTRACT

The purpose of this study was to compare the relationship between pulse oximetry oxygen saturation values and arterial blood gas (ABG) oxygen saturation values in the adult anemic patient. It was hypothesized that there was a significant and positive relationship ($p \leq 0.5$) between oxygen saturation levels as measured by pulse oximetry and oxygen saturation levels as measured by ABGs in the adult anemic patient. Current monitoring of blood oxygenation in patients requires analysis of ABGs, which is invasive, expensive, and provides only intermittent information. Devices like pulse oximeters measure oxygenation noninvasively and provide continuous information. Pulse oximetry is an alternative method to visual assessment and ABG analysis oxygen saturation for evaluating oxygen levels in patients. Several factors may affect pulse oximetry. One of these factors is the patient's hemoglobin. The sample consisted of 20 adult patients admitted to either the intensive care unit (ICU), coronary care unit (CCU), or the respiratory care unit (RCU) of a 300-bed acute care hospital. There were 12 females and 8 male patients whose ages ranged from 37 to 80, with a mean age of 71.35 years. Subjects considered anemic included males with a hemoglobin (Hb) less than 12 gm. and females with a Hb less than 10 gm. Several circulatory diseases may interfere with the accuracy of pulse oximetry; therefore, patients with a history of stroke, Raynaud's disease, peripheral vascular, and arterial disease, as well as patients with jaundice and decreased tissue perfusion were excluded from the study. The Ohmeda Biox Model 3740 Pulse Oximeter and the Radiometer Copenhagen ABL-300 Acid Base Laboratory or the Instrumentation Laboratory System 1303 were consistently utilized, respectively, to measure oxygen saturation determined by pulse oximetry (SpO2) and arterial oxygen saturation) determined by ABG analysis (SaO2). Half of the subjects had undergone data collection by obtaining the SpO2 first followed by obtaining the SaO2, while the other half had their SaO2 sample taken first, followed by the SpO2. Results were recorded using the two techniques and analysis was done by a 2 x 2 mixed analysis of variance to compare the average oxygen saturation level of the two techniques to test order. Additionally, a Pearson correlation was done to determine any significant relationships. The hypothesis "that there is a significant and positive relationship between oxygen saturation levels as measured by pulse oximetry and oxygen saturation levels as measured by ABG analysis in adult anemic patients was accepted ($p<0.0001$). Supplementary analysis between the average level of oxygen saturation as measured by each method also showed no significant difference. These findings suggest that nurses may utilize pulse oximetry to assess anemic patients' arterial oxygenation.