

## Pulse oximeter and different skin tones in Pakistan

Fatima Azam<sup>1</sup>, Aroosa Roshan<sup>2</sup>, Laiba Siddiqui<sup>3</sup>

*Madam*, A recent retrospective cohort study found that 3069 patients of Asian, Black, and Hispanic racial origin were associated with lower average oxygen delivery rates than white patients using the pulse oximeter in the intensive care unit.<sup>1</sup> It is well known that these readings are affected by skin melanin pigmentation, which affects light absorption and scattering, resulting in unreliable readings in non-white patients.<sup>1</sup> This can increase the risk of hidden hypoxaemia, which is established as falsely elevated SpO<sub>2</sub> readings, usually 92% or greater when the blood haemoglobin oxygen saturation is < 88%.<sup>2</sup> This, in turn, is associated with higher mortality rates.<sup>2</sup> The Pakistani population has a variety of skin tones making this a concerning matter for people of all age groups. According to data analyzed from 18 different hypoxaemic studies over the last three years which included studies analyzing the performance of pulse oximeter brands, employing both transmission and reflectance, with 3 sensor types (reusable finger clip, disposable adhesive finger, disposable adhesive forehead) found a slight positive bias in readings on skin with darker pigmentation.<sup>3</sup>

The current ongoing situation with COVID-19 makes it even more important to investigate the matter of the pulse oximeter's performance. A retrospective study on 117 COVID-19 patients found that those with increased fibrinogen, increased ferritin and decreased lymphocyte count were risk factors for those with significant difference (>4%) in SpO<sub>2</sub> and SaO<sub>2</sub> suggesting that the pulse oximeter alone isn't enough to accurately and precisely assess COVID-19 patients with those conditions.<sup>4</sup> It is also important to note that the performance of the pulse oximeter devices differ in a clinical vs ideal laboratory setting.<sup>3</sup> During the pandemic in Pakistan, many hospitals and homes have used the pulse oximeter as a reliable

portable device without being aware of the discrepancies in the precision of its readings.

The Pakistani population should have a pulse oximeter device that works ideally in all settings and on a variety of skin tones to reflect the diversity of its population. The regulatory agencies and leading hospitals in Pakistan should analyse and change their standards for measuring the accuracy and precision of the pulse oximeter on patients with darker pigmentation, especially in low-perfusion and hypoxaemic states.<sup>3</sup>

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<sup>1,2</sup>3rd Year MBBS Student, Dow International Medical College, Dow University of Health Sciences, Karachi, Pakistan; <sup>3</sup>5th Year MBBS Student, Dow International Medical College, Dow University of Health Sciences, Karachi, Pakistan.

**Correspondence:** Fatima Azam. e-mail: [fafsheen111@gmail.com](mailto:fafsheen111@gmail.com)

ORCID ID: 0000-0002-8212-9099