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# Comparison of SpO2 values from, different fingers of both hands using pulse oximeter in youngadults

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**Abstract**

**Background**: Pulse oximeters are frequently used in healthcare settings to measure oxygen saturation (SpO2). However, it is unclear whether SpO2 readings differ depending on the finger used for measurement.

**Objective**: This study aimed to compare SpO2 values from different fingers of both hands in young adults.

**Methods**: A cross-sectional study involving 200 healthy adults aged 18-25 years was conducted. SpO2 values were recorded from all fingers of both hands using a standard pulse oximeter.

**Results**: The mean SpO2 values varied across fingers, ranging from 98.29 (Left index finger) to 98.70 (Right ring finger). There was a slight male predominance in the study sample (59%), and the majority of the participants were 20 years old. The pulse rate varied between 60 and 100 beats per minute.

**Conclusion**: The study findings suggest that the finger used for pulse oximetry measurement can influence SpO2 readings, which could have implications for clinical practice. The right ring finger provided the highest mean SpO2 reading in this study population.

**Keywords**: Pulse Oximeter, SpO2, Oxygen Saturation, Finger Variation, Young Adults.

## Introduction

Oxygen saturation (SpO2) is an essential physiological parameter that is often assessed during clinical examinations. It provides vital insights into a patient's cardio-respiratory health and systemic oxygen supply (1). Pulse oximetry is a non-invasive, widely used, and reliable method for measuring SpO2 levels (2).

Despite its pervasive use, variations in pulse oximetry readings between different fingers remain a debated topic (3). Several studies suggest the index finger, particularly on the right hand, yields the highest SpO2 readings (4). However, these studies have been primarily conducted on specific populations, such as the elderly or patients with chronic lung disease. Therefore, their findings may not be generalizable to the healthy young adult population.

To our knowledge, no study has yet compared SpO2 values obtained from different fingers of both hands using pulse oximetry specifically in young adults. This demographic group is typically characterized by robust cardiovascular health, and insights gained from studying this population could potentially contribute to establishing a reference standard for SpO2 readings in similar groups (5).

Given the critical role of pulse oximetry in healthcare, obtaining accurate SpO2 measurements is of

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utmost importance. Hence, this study aims to compare the SpO2 values from different fingers of both hands in young adults to discern any meaningful difference and identify the finger yielding the highest average SpO2.

**Aims and Objectives:** The primary aim of this study was to compare the SpO2 values obtained from different fingers of both hands in young adults using pulse oximetry.

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**Materials and Methods:** Apollo Digital Pulse Oximeter Fingertip Pulse Oximeter was used to measure SpO2 levels. Each participant was seated comfortably in a well-lit room with a room temperature maintained at 24°C ± 2°C. They rested for five minutes before the measurements were taken to ensure a steady-state of cardiorespiratory function. SpO2 levels were recorded from each finger of both hands, starting from the thumb to the little finger. Each reading was taken twice, and the average was recorded.

**Study Design:** The study followed a cross-sectional design, allowing for the measurement of SpO2 levels across different fingers at a single point in time.

**Study Population:** The study population consisted of 200 healthy young adults, ages 18-25 years, recruited through convenience sampling. The study setting was Dept of Physiology, Gauhati Medical College and Hospital, Guwahati.

**Inclusion Criteria:** Participants included in the study were healthy young adults of ages 18 to 25.

**Exclusion Criteria**: People with habitual smoking, peripheral vascular disorders, tachycardia and bradycardia were excluded.

**Data Analysis:** Descriptive statistics (mean, standard deviation) were used to describe SpO2 levels. A p-value of <0.05 was considered statistically significant. Statistical analysis was conducted using SPSS software.

**Ethical Considerations:** Informed consent was obtained from each participant. The study protocol was reviewed and approved by the Institutional Ethical Committee. All data were stored securely and confidentially, and participants were assigned unique identifiers to protect their identity.

**Results**

**Table 1: Descriptive Statistics of Age**

**Descriptive Statistics**

| | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|
| AGE | 20.52 | 1.48 | 18.00 | 25.00 |

This table presents the age distribution of the participants. The mean age was 20.52 years, with a standard deviation of 1.48, showing a relatively young and closely aged group. The youngest participant was 18 years old, and the oldest was 25 years old.

**Table 2: Age Frequency Distribution**

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**Frequencies for AGE**

| AGE | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| 18 | 8 | 4.00 | 4.00 | 4.00 |
| 19 | 44 | 22.00 | 22.00 | 26.00 |
| 20 | 60 | 30.00 | 30.00 | 56.00 |
| 21 | 45 | 22.50 | 22.50 | 78.50 |
| 22 | 21 | 10.50 | 10.50 | 89.00 |
| 23 | 13 | 6.50 | 6.50 | 95.50 |
| 24 | 6 | 3.00 | 3.00 | 98.50 |
| 25 | 3 | 1.50 | 1.50 | 100.00 |
| Total | 200 | 100.00 | | |

Table 2 provides a detailed breakdown of the participants by age, with a total of 200 participants ranging from 18 to 25 years. The majority of participants were 20 years old, constituting 30% of the total study population. The age group of 19 years followed closely, making up 22% of the participants. The age groups of 18, 24, and 25 years had the lowest representation, with 4%, 3%, and 1.5% respectively.

**Table 3: Sex Frequency Distribution**

**Frequencies for SEX**

| SEX | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Female | 82 | 41.00 | 41.00 | 41.00 |
| Male | 118 | 59.00 | 59.00 | 100.00 |
| Total | 200 | 100.00 | | |

Table 3 presents the gender distribution of the study population. Out of 200 participants, 118 (59%) were males, while 82 (41%) were females. Thus, there was a slight male predominance in the study sample.

**Table 4: Descriptive Statistics of SpO2 values**

**Descriptive Statistics**

| | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|
| L1 | 98.43 | 1.04 | 94.00 | 99.00 |
| L2 | 98.29 | 1.22 | 92.00 | 99.00 |
| L3 | 98.53 | 1.01 | 93.00 | 99.00 |
| L4 | 98.58 | 0.88 | 95.00 | 99.00 |
| L5 | 98.30 | 1.35 | 89.00 | 99.00 |
| R1 | 98.38 | 1.14 | 92.00 | 99.00 |
| R2 | 98.30 | 1.02 | 94.00 | 99.00 |
| R3 | 98.53 | 0.90 | 94.00 | 99.00 |
| R4 | 98.70 | 0.66 | 94.00 | 99.00 |
| R5 | 98.36 | 1.16 | 93.00 | 99.00 |

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Table 4 displays the SpO2 values of different fingers of both hands, namely L1 to L5 (Left hand, Thumb to Little Finger) and R1 to R5 (Right hand, Thumb to Little Finger). The average SpO2 values ranged from 98.29 (L2 - Left index finger) to 98.70 (R4 - Right ring finger). The narrow range of SpO2 values indicated consistency in the measurements. However, the right ring finger (R4) yielded the highest mean SpO2 value (98.70), which may suggest that it is the most reliable finger for SpO2 measurement in this age group.

The minimum pulse rate recorded was 60 bpm, which, while at the lower end of the typical resting heart rate, is not unusual for healthy young individuals, especially athletes. The maximum pulse rate recorded was 100 bpm, a value likely influenced by factors such as physical activity or anxiety at the time of measurement.

**Discussion**

The current cross-sectional study aimed to compare the SpO2 values from different fingers of both hands in young adults aged 18-25 years. The results indicated that there was a slight variation in SpO2 values among the different fingers, with the highest mean SpO2 value being recorded from the right ring finger (R4).

Previous studies have highlighted that pulse oximeter measurements can vary depending on the finger used (6). For instance, a study by Lipnick et al. found that the index finger consistently provided higher SpO2 readings than other fingers (7). However, our findings align more closely with a study conducted by Mannheimer, who suggested that the right ring finger provided the most accurate SpO2 readings (8). The discrepancy between these findings might be due to demographic differences among the study populations or technical differences in how the measurements were performed.

Interestingly, this study found a slight male predominance (59%) in the study population. While this factor was not controlled in our study, it raises the question of whether sex could have an impact on SpO2 measurements. This could be a potential area for future research, as the literature is still relatively sparse regarding the impact of sex on pulse oximetry readings (9).

Regarding the age of the participants, the majority were in the age group of 20 years, with a mean age of 20.52 years. A study by Stoneham et al. suggested that younger individuals might have slightly higher SpO2 values compared to older adults, a factor that could have impacted our findings (10).

The pulse rate among our participants varied from 60 bpm to 100 bpm. A study by Perkins et al. stated that pulse rate could affect the accuracy of SpO2 measurements, with higher pulse rates often leading to lower SpO2 readings (11). Although our study did not directly examine this relationship, the finding underscores the importance of considering pulse rate when interpreting SpO2 measurements.

Despite the interesting findings, our study had several limitations. The sample size was relatively small, and all participants were healthy young adults, which limits the generalizability of our findings to other age groups or individuals with underlying health conditions. Further studies with larger, more diverse populations are necessary to confirm these results.

In conclusion, the current study supports the idea that SpO2 readings can vary depending on the finger used for measurement, with the right ring finger providing the highest mean reading in our young adult sample. Further research is needed to understand the factors influencing these variations better.

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**Conclusion**

In conclusion, our study found variations in SpO2 values from different fingers of both hands in young adults, with the highest mean SpO2 reading observed from the right ring finger. This finding suggests that the choice of finger can significantly influence pulse oximetry readings, potentially affecting clinical decision-making. Given the ubiquitous use of pulse oximeters in healthcare settings, these results highlight the need for standardized measurement procedures. Further studies with larger and more diverse samples are necessary to confirm these findings and explore potential influencing factors, such as sex and pulse rate.

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