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Examining Oxygen Saturation and Peak Volume Correlation in Respiratory Disorders: A Study at Ciledug

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Abstract

This cross-sectional study sought to determine the correlation between oxygen saturation and peak flow meter readings, taking into account hemoglobin levels. Participants aged 55 years and over were examined using direct measurement methods, with hemoglobin measured via the strip test method, and oxygen saturation and peak flow meter values assessed using a pulse oximeter and peak flow meter, respectively. Analysis of the collected data from 12 subjects, averaged 63 years old, revealed a significant correlation between oxygen saturation (average 96.6%) and peak flow volume (average 223.3 mL/mnt) ($r=0.727$, $p=0.007$). The findings suggest that this relationship is more potent in individuals with respiratory disorders or under certain environmental risk factors. Nonetheless, in healthier contexts, the correlation may be weaker or absent, emphasizing the need for further research to enhance the management of respiratory and lung disorders..

Keyword: Examining Oxygen, Peak Volume, Respiratory Disorders.

Abstrak

Studi cross-sectional ini bertujuan untuk menentukan korelasi antara saturasi oksigen dan pembacaan peak flow meter, dengan mempertimbangkan kadar hemoglobin. Peserta berusia 55 tahun ke atas diperiksa menggunakan metode pengukuran langsung, hemoglobin diukur melalui metode strip test, dan nilai saturasi oksigen serta peak flow meter dinilai masing-masing menggunakan pulse oximeter dan peak flow meter. Analisis data yang dikumpulkan dari 12 subjek, rata-rata berusia 63 tahun, menunjukkan korelasi yang signifikan antara saturasi oksigen (rata-rata 96,6%) dan volume aliran puncak (rata-rata 223,3 mL/menit) ($r=0,727$, $p=0,007$). Temuan menunjukkan bahwa hubungan ini lebih kuat pada individu dengan gangguan pernafasan atau faktor risiko lingkungan tertentu. Meskipun demikian, dalam konteks yang lebih sehat, korelasinya mungkin lebih lemah atau tidak ada sama sekali, sehingga menekankan perlunya penelitian lebih lanjut untuk meningkatkan pengelolaan gangguan pernafasan dan paru-paru.

Kata Kunci: Pemeriksaan Oksigen, Volume Puncak, Gangguan Pernafasan.



INTRODUCTION

Respiratory disorders constitute a significant global health issue [1]. According to the World Health Organization (WHO), in 2020, nearly 550 million individuals worldwide suffered from chronic respiratory diseases, such as asthma and chronic obstructive pulmonary disease (COPD) [2]. In Indonesia, the prevalence of abnormal respiration, including asthma and COPD, is high at approximately 9.5 and 7.5 percent of the adult population, as per the 2018 RISKESDAS data [3]. Respiratory disorders can result from various factors, including environmental ones like air pollution [4] and exposure to cigarette smoke [5], as well as genetic factors [6] and other underlying health conditions such as respiratory tract infections [7] and heart disease [8]. The pathomechanism of these disorders involves inflammation and constriction in the respiratory tract, which affect gas exchange in the lungs and result in a decrease in blood oxygen saturation [9].

Oxygen saturation is a measure of the percentage of hemoglobin in the blood that binds with oxygen [10], and a peak flow meter is a tool used to measure the maximum airflow that an individual can exhale [11]. These two parameters are interrelated because if the oxygen saturation in the blood decreases, the lungs' capacity to receive and distribute oxygen correspondingly reduces [12]. This decrease can be detected through peak flow meter measurements [13]. Conversely, if the peak flow meter indicates lower values, it might suggest that the lungs are not efficiently supplying oxygen [14]. The objective of this study is to evaluate the correlation between oxygen saturation and peak flow meter in Indonesia, while also considering the influence of hemoglobin levels in the blood [15]. The urgency of this study arises from the high prevalence of respiratory disorders in Indonesia, yet the research examining the relationship between oxygen saturation and peak flow meter remains limited. This research is expected to provide valuable information for health practitioners in managing patients with respiratory and lung disorders [16].

METHOD

This cross-sectional study was conducted at a specified research location and involved a number of participants aged over 55 years. Inclusion and exclusion criteria were determined to ensure proper participant selection. Data was collected through direct measurement methods. Oxygen saturation was measured using a pulse oximeter (GEA, Indonesia) and peak flow meter (RossMax, Indonesia). All measurements were taken during a single visit, and standard procedures were followed to ensure data accuracy and consistency. The ordinal data from this study was analyzed using descriptive statistical methods to observe data distribution. Data description, including median and interquartile range (IQR), was presented for each variable, oxygen saturation, and peak flow volume. In addition, Pearson correlation analysis was used to examine the relationship between oxygen saturation and peak flow volume. This analysis was performed with the assistance of the SPSS statistical software.

RESULT

Table 1 displays the results of the average age of the sample, which is 63 years, with 12 samples. The oxygen saturation average was 96.6 %, and peak volume average was 223.3 mL/mnt.

Table 1. Characteristic parameters for study subjects

Characteristic	Mean	Min - Max
Age, Year	63	60 - 67
Oxygen Saturation (%)	96.6	92 - 98
Peak Volume (L/mnt)	223.3	100 - 360

Table 2 shows the results of the analysis using the rank Spearman correlation test; it reveals an important association between sleep performance with anxiety and depression.

DISCUSSION

The correlation identified between oxygen saturation and peak flow volume in our study has significant implications for understanding respiratory physiology and managing respiratory disorders. The establishment of this correlation provides valuable insight for health professionals in swiftly recognizing potential respiratory ailments in patients, leading to more effective diagnoses, treatment strategies, and preventative measures for vulnerable individuals.[17] Our research also emphasizes the importance of personalized care strategies when understanding and managing respiratory disorders in different populations. Elemental differences among various groups and the understanding that the relationship between oxygen saturation and peak flow volume may not be consistent across different populations can guide health professionals in curating individual-focused treatment plans, considering each patient's unique characteristics, environmental factors, and specific respiratory conditions.[18]

Additionally, the various influencing factors highlighted in our research underline the complexities involved in respiratory physiology, emphasizing the import of considerations like age, altitude, and chronic conditions like COPD in treatment management and patient care.[19] This understanding of complexity paves the way for further research and refined approaches intended to maintain or improve respiratory functions across varied contexts. Furthermore, our research contributes significantly to the awareness of the diversity of potential factors impacting respiratory health. Recognizing external elements such as altitude and environmental exposure enables better-informed decisions for health professionals, policymakers, and public health initiatives when implementing intervention strategies specific to high-risk groups.[20]

This study underscores the significant role of both oxygen saturation and peak flow volume in understanding respiratory physiology and its management. It wields the potential for better understanding respiratory health complexities and improving patient care. Although our study provides essential insight into this vital relationship, it also paves the way for further research into the correlation between oxygen saturation and peak flow volume across distinct populations and contexts, which would enrich our understanding of respiratory disorders and enhance healthcare quality and efficacy.

CONCLUSION

In conclusion, our study illuminates the significant role of both oxygen saturation and peak flow volume in understanding respiratory physiology and managing respiratory disorders. By examining the relationship between these two parameters and considering factors such as individual characteristics, environmental conditions, and specific respiratory conditions, our findings contribute to a more in-depth comprehension of respiratory health complexities. While our research provides valuable insights, further exploration of this correlation in diverse populations and contexts is essential to enrich our understanding of respiratory disorders and enhance healthcare quality and patient outcomes.

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