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INVESTIGATION OF THE RELATIONSHIP BETWEEN OXYGEN SATURATION LEVEL AND BODY MASS INDEX IN MIDDLE-AGED SEDENTARY FEMALES

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ABSTRACT

This study explores the relationship between oxygen level and body mass index in middle-aged sedentary females.200 volunteer housewives residing in the center of Gaziantep were participated in the study. The participants' BMI values were determined through calculating the ratio of body weight to square meters in height (weight/height2). Besides, the values of oxygen saturation weremeasured via a pulse oximeter. In the comparison of the oxygen saturation of the subjects in the study to the body mass index, the oxygen saturartion value of the subjects with a body mass index of 35 and above was significantly lower than the saturation value of the subjects with a body mass index of 30-34.9, 25-29.9, and 24 and less (P<0,05). Additionally, oxygen saturation values of subjects with a body mass index of 24 or less were significantly higher than those with a body mass index of 30-34.9 and body mass index of 35 or above (P <0.05). In conclusion, it has been determined that oxygen saturation levels in sedentary females are closely related to inflammation in metabolism caused by weight problems deriving from inactivity and irregular nutrition. It is fairly obvious that there will be significant improvements in the desaturations of oxygen saturation as a result of the positive effects of weight loss thanks to the exercises on the metabolism.

Key Words: Obese, Oxygen, Saturation, Body mass index

1. INTRODUCTION

In recent years, overweight and obesity due to unbalanced nutrition and inactivity has become a threatening disease all over the world. It can be evaluated whether an individual is overweight or normally overweight based upon his /her body mass index values. Body mass index is the standart value approved by WHO and obtained as a result of weight / height² calculation. However, factors such as age, gender, muscle mass, and pregnancy are considerably significant in BMI measurement. This is because individuals with any of these conditions do not have correct BMI values. Obesity, whichcaused by excess weight and is becoming more common in the World, has become an important health problem in the developed countries. Obesity is an important risk factor for the development of coronary artery disease (CAD) (Janssen ve ark 2002).

Excessive rise of fat tissue having important functions in the body has resulted in obesity. As an overweight problem, obesity provokes social, systemic, organic, metabolic, psychological, aesthetic, hormonal and physiological problems. Additionally, the effects of overweight on our metabolism include cardiovascular diseases such as hypertension, diabetes, dyslipidemia and obstructive sleep apnea(Coppack2003).

In recent years, oxygen saturation has been accepted as a life sign such as breathing, blood pressure, pulse and body temperature (Simon&Clark 2002).

Oxygen saturation is the amount of hemoglobin that has reached oxygen saturation.The normal level of oxygen saturation in the blood at sea level is around 94% (95-99%) of SpaO2 (Kratz ve Lewandrowski 1998, O'driscoll ve ark 2008). At a medium elevation above sea level, the blood oxygen saturation level is between 93-98%.I n other words, oxygen saturation values are inversely related to elevation, and as we go up higher, we will see decreases in oxygen saturation values in our blood. When the decreases in oxygen levels, so-called desaturation, fall below 90%, the alarming situation arises. Some symptoms that may accompany low oxygen saturation are; cyanosis, dyspnea, confusion, headache, fatigue and weakness (Mau ve ark 2005, Balasubramanian ve ark 2008).

Oxygen levels in the blood have a very important role in performing body functions in the living. Oxygen in our body is transported to tissues by binding to hemoglobin in our blood. One gram of hemoglobin is transported by binding to 1.34 ml O2 1 gram hemoglobin and 0.003 ml of oxygen is dissolved in 100 ml of blood.

Which is important for the functions in our body isthe heart flow and oxygen content in the arteriesaffecting the formation of oxygenation in the tissues. These are essential for the regular functioning of metabolism and energy production pathways. This is becuse if the oxygen level in the blood is not sufficient, the working speed of the lymph system will be slowed down and consequently, there will be problems in the discharge of the waste materials continuously being formed in our body. As a result, metabolism will become cumbersome and become a dump, and it will become a body that becomes difficult to control (Karaböcüoğlu and Demirkol 2013).

In the literature, there are studies related to exercise of oxygen saturation;however, there are no studies on the relationship between body mass index and SpO2. It is thought that investigating the desaturation levels of SpO2 in parallel with the effects of obesity on metabolism caused by increasing body mass index will contribute to the literature. The aim of this study was to investigate the relationship between oxygen saturation and body mass index.

2. MATERIAL METHOD

200 housewives living in Gaziantep city center participated in the study voluntarily. The females who participated in the study were informed in detail about the measurement protocols and they are warned not to take drinks such as alcohol in the previous 24 hours.

Height Measurement: The height measurements of the subjects were taken in accordance with the measurement technique with a stadiometer (SECA, Germany) with a sensitivity degree of 0.01 (Lohman et al. 1988).

Weight Measurement: Subjects' body weights were measured according to 0.1 kg precision (SECA, Germany) electronic scales (shorts, T-shirt).

Body Mass Index Measurement: BMI values of the subjects were obtained by using weight / height2 formula (Ergün and Ertan 2004).

Oxygen Saturation Measurement (SpO2): Oxygen saturation measurements were performed with a pulse oximeter (Spirolab III, Medical International Research). Oxygen saturation is calculated by the ratio of oxygenated hemoglobin to total valid hemoglobin or functional hemoglobin. Pulse oximeters work on the principle that infrared light can be measured with only two wavelengths by

absorbing the pusatile frequency of infrared light, considering that the pulse in the tissue is generated by arterial blood (Pole 2002, Tosun and Tutluoğlu 2000). Oxygen saturation values above 95% are considered normal, whereas values less than 93% indicate that oxygen therapy is necessary and require closer monitoring (Akansel and Yıldız 2010).

In our measurements, the oximeter probe was checked and cleaned before each measurement. In order to minimize measurement margins, it was paid attention that if there were any substances restricting the measurements such as nail polish on the nails of the subjects to be measured, they were cleaned and bright fluorescent lamps were not used in the measurement environment. Subjects were allowed to rest before measurements were taken and then the oximeter probe was placed on the index fingers of the subjects (Hakverdioglu 2007, Andersson et al 2002). Each subject was measured for 10 minutes (Çalışkan et al 2008).

Statistical Analysis

SPSS statistical package program was used in the evaluation and calculation of the data. Parametric tests were used according to the normality distribution of the data. One-way analysis of variance (ANOVA) was used to compare oxygen saturation according to body mass index. In order to determine which body mass caused the difference, the Tukey test was used in multiple comparison tests. In this study, the error level was accepted as 0.05.

3. FINDINGS

Table 1. Comparison of oxygen saturation of the subjects according to body mass index

	Body Mass Index (BMI)			
	≤24,9	25-29,9	30-34,9	35≤
Variables	Mean±Sd (P=50)	Mean±Sd (P=50)	Mean±Sd (P=50)	Mean±Sd (P=50)
Age (year)	43,96±2,91	44,86±2,91	44,30±2,78	43,92±3,18
Height (cm)	159,04±5,29	157,48±5,70	158,62±4,83	159,44±4,63
Body weight (kg)	54,40±3,38	69,36±5,87	83,26±4,11	95,48±5,71
SPO_2	96,62±1,26[a]	95,62±1,99[b, c]	95,48±1,83[a]	93,34±2,89[a, b, c]

[a, b, c]: The difference between the averages is significant at 0.05 level (P<0,05).

When the Table 1 is examined the oxygen saturartion value of the subjects with a body mass index of 35 and above was significantly lower than the saturation value of the subjects with a body mass index of 30-34.9, 25-29.9, and 24 and less (P<0,05).

Additionally, oxygen saturation values of subjects with a body mass index of 24 or less were significantly higher than those with a body mass index of 30-34.9 and body mass index of 35 or above (P <0.05).

4. DISCUSSION AND CONCLUSION

In the present study, when we compared oxygen saturation according to body mass index values, it was found that oxygen saturation value of subjects with a body mass index of 35 and above was significantly lower than the saturation value of subjects with a body mass index of 30-34.9, 25-29.9, and 24 and less. At the same time, the oxygen saturation value of subjects with a body mass index of 24 or less was significantly higher than the saturation value of subjects with a body mass index of 30-34.9.

Dietary habits as a result of fastfood-style nutrition seen in obese people and organic problems such as vascular diseases result in imbalance on oxygen saturation. With insufficiency of oxygen and glucose transported to brain, imbalance oxygen saturation leads individuals to have thought disorders in time. As a result, confusion in the mind and weakness in hand skills may occur. Excess weight causes damage to all organs of the body, especially the endocrine and cardiovascular system, causing various disorders and even leading to death. (Sugerman, 1992).

Obesity causes great damage to our respiratory system. Obesity Hypoventilation Syndrome and Sleep Apnea Syndromes may be the first of these damages. In the absence of oxygen levels in our blood, which we call desaturation, conditions such as shortness of breath occur. The result of shortness of breath has been called as Hypoxemia. In Obesity Hypoventilation Syndrome (OHS), poor airflow and chemoreceptor functions (decreased upper airway tone and asphyxia response) are associated with increased upper airway loading and decreased lung volumes. In addition, the most prominent finding in polysomnography in OHS patients is severe long-term oxygen desaturation (Sugerman 1992).

Obstructive sleep apnea (OSAS), which is associated with oxygen saturation, is common in obese patients. Patients with OSAS have a physical barrier that makes it difficult to breathe in the upper respiratory tract. We need a message from the brain to breathe. No matter how much the respiratory muscles respond to these messages, there is an obstruction in the upper airways. The reason for this malfunction is the blockage of the airway as the soft palate muscles under the tongue and small tongue loosen and loose their tension. This situation makes breathing difficult to breathe, causing breathing to become noisy over time. Breathing, ie periodic pauses in breathing, causes a decrease in the oxygen level in our blood (Browman et al. 1984, Smith et al. 1985, Suratt et al. 1987, Thomas et al. 1989, Wittels and ITELS, E., AND Thomson, 1990). Decreases in regular airflow to 30% of normal are seen in patients with apnea. These decreases in airflow cause oxygen saturation loss of approximately 3-4% (Fairbanks 1994).

It has been shown that ¾ of the patients with OSAS are obese (Smith et al 1985). In patients with OSAS, changes in the function of the upper airways rather than the structure of the upper airways were found after weight loss in patients with a high body mass index (Rubinstein et al 1988).

As a result of a study on patients with OSAS, it was found that the increase in apnehipopnea index was closely related to weight gain (Paul et al 2000). This shows that changes in oxygen saturation levels will occur as a result of complications in our body due to excess weight.

Furthermore, COPD (Chronic Obstructive Pulmonary Disease), which is more common in obese people, leads a situation in which include number of lung diseases that make it difficult to breathe and obstruct airways that are important for breathing. Desaturation status will be seen in all patients complaining of this situation. In a study on asthma, which is closely related to obesity, 76% of asthmatic patients were overweight and obese (Basyigit et al 2004).

In the situations where the body mass index is above 30, the fat accumulated on the abdominal and rib cage mechanically makes breathing difficult, and diaphragm movements are limited. Many volumetric vital capacity decreases occur in the lungs whose elasticity and mobility decreases. Decreases in excess weight, which have a negative effect on respiratory functions and respiratory muscles, play an important role in the correction of these functions. In a study of 34 female patients, an 18% decrease in BMI was found to be associated with a decrease in ventilatory requirement and a moderate increase in ventilatory capacity (Sugerman, 1992). In another study; Obese children aged 10-12 years underwent aerobic exercise for 8 weeks and significant improvements in oxygen saturation were observed (Taşkın et al 2017).

Examining the literature, we find that the results of the comparison of body mass index values and oxygen saturation levels in our study are in parallel with the literature.

Apart from the aforementioned reasons, some drugs used also cause a decrease in the level of oxygen saturation in the blood. Considering drug use, obese women are exposed to much more drug use than thin women. In conclusion, we believe that regular exercise and balanced nutrition and decreases in body mass index will improve positive oxygen saturation levels within the scope of treatment methods to correct the effects of desaturation at oxygen saturation level.

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