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Obstructive sleep apneea (OSA) and risk factors

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ABSTRACT

Introduction. Obstructive Sleep Apneea (OSA) is a common condition and its predominance is directly related to the explosion of obesity in western society. Obstructive Sleep Apneea is manifested by recurring episodes of collapse of the upper airway during sleep. Obesity and the increase of neck circumference, as well as visceral fat are risk factors for OSA. OSA is more common in men than in women, although women have higher rates of obesity.

Objectives. The goal of this article was to show the correlation between OSA and obesity, adipose tissue in the abdomen and neck, sex and background of the patients in the study group.

Materials and methods. In this article we present the results of a test group of 101 patients diagnosed with OSA, in the records of the "Marius Nasta" National Institute of Pneumophthisiology, patients being evaluated at 2, 6, 12 months.

Comparative results and discussion. In this study can be observed a higher frequency of male patients (82.17%) compared to female patients (17.83%). Patients go to a doctor when they are in an advanced stage of the disease (from 101 patients, 88 display the severe form OSA). Most patients were obese (100 patients out of 101) in various stages of obesity. A larger number of patients come from urban areas (89 patients) compared with the patients from the rural areas (12 patients).

Conclusions. As a conclusion of this study, can be seen that obesity is closely correlated with the severity of OSA and the distribution of fat in the neck and abdomen has an important role. The disease is more common in men than women, and there is a higher number of patients from the urban areas who seek help from a doctor.

Keywords: OSA, obesity, sex, visceral fat, neck fat

INTRODUCTION

Sleep is a naturally recurring state, characterized by temporary unconsciousness. Sleep is necessary for the development and functioning of the human body. The number of hours required for sleep depends on the age of the individual (1,2). Sleep apneea is one of more than one hundred types of sleep disorders that a person may develop.

Sleep apneea is divided in: Obstructive Sleep Apnea, Central Sleep Apnea and Mixt Form. Accordinging to the apnea – hypopnea index (AHI), there are three types of Obstructive Sleep Apneea: mild form (AHI = 5-15), moderate (AHI = 15-30) and severe (AHI > 30). Obstructive Sleep Apneea is a chronic disease, common in Western society. Its prevalence is estimated at 2% of women and 4% of men in the general population (3-5), characterized by recurrent upper airway obstruction, leading to oxyhaemoglobin desaturation and cessation of breathing during sleep (6).

A number of risk factors, including obesity, gender and place of origin have been associated with an increased prevalence of Obstructive Sleep Apnea (7,8).

Although obesity was considered in the past a problem only in high income countries, currently it is a problem in low and middle income countries, with a big increase especially in the urban areas.

Obesity is defined as abnormal or excessive fat accumulation, presenting an increased risk for cardiovascular disease, diabetes, even cancer. The measure unit for obesity is body mass index - BMI: BMI=Weight (Kg)/Height² (m). A person with a BMI equal to or greater than 25 is considered overweight and a person with a BMI greater than 30 is considered obese.

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It has been estimated worldwide that the prevalence of obesity doubled between 1980 and 2014. In 2014, more than 39% of the adult population, 1.9 billion people over 18 years old, of which 38% are men and 40% are women, were overweight. Of these, more than 600 million, or 13% of the population, were obese. Moreover, an alarming increase of obesity in children was seen. In 2014, a total of 41 million children under 5 years old were found to be overweight or obese (9).

In Europe, according to the results obtained from the study MONICA (Multinational Monitoring of Trends and Determinants in Cardiovascular Disease), over 50% of the population is overweight and obese and over 20% are obese. At least 15% of men and 22% of women suffer from obesity with a substantial increase occurring in the last 10 years (10-40%) (10).

In Romania, a recent study by the Computer Center of Health Statistics of the Ministry of Public Health shows that 40% of children and 55% of adults are overweight and of the adults, approximately 24% are obese (11). Data released by the Romanian Association for the Study of Obesity in research ORO (Obesity in Romania) in the summer of 2014 showed that 21.3% of Romanians aged over 18 are obese. Another important observation in the same study establishes that the rate of obesity increases with age. More specifically, in adults up to 39 years of age, obesity has a prevalence of 9.9%, the percentage rises to 30.1% for the age group of 40-59 years and to 41.7% in the elderly over 60 years of age (12).

Obesity is considered a major risk factor for the development and progression of OSA (13-15). The prevalence of OSA in patients with grade 1 and 2 obesity or morbid obesity is almost two times higher than adults of normal weight. Furthermore, patients with mild form OSA showing an increase of 10% compared to their initial weight posed a risk six times higher for progression, and the same percentage of weight loss can lead to an improvement of more than 20% OSA severe form (13,16).

Multiple mechanisms are responsible and interconnected in the increased risk of developing OSA and obesity. These include narrowing the pharyngeal lumen due to deposited fat at this level, muscle weakness in the upper airways due to deposition of fat in the muscles, mainly due to the compression of abdominal mass reared on the airways. These mechanisms show the importance of markedly increased circumference of the abdomen and neck.

On the other hand, OSA may predispose to worsening obesity because of sleep deprivation, disturbance in regulating appetite, daytime sleepiness, lack of physical activity, fragmentation of sleep leading to inefficient sleep, and because of changing insulin resistance, which can predispose to diabetes and obesity worsening. Thus, it appears that obesity and OSA form a vicious circle in which each leads to worsening the other (17,18).

Another factor that influenced OSA is sex. It has been estimated, in the case of OSA, that the ratio of male and the female is between 3:1 and 5:1 in the general population, with a ratio much higher between 8:1 and 10:1 in some clinical groups (13,14). These percentages are not surprising, because OSA over time was seen as a disease of male sex characteristics. Making a differential diagnosis of OSA in women may be more difficult, since women tend to have more generalized daytime symptoms than men. OSA women complain of symptoms such as insomnia, restless legs syndrome, depression, nightmares, palpitations and hallucinations, while men are more likely to report snoring and apnea episodes. OSA is often associated with strong snoring and is not considered a female gender trait. Women may consider their own snoring "unladylike" and therefore are less likely to mention this to their doctor. Furthermore, women are more likely to attend a medical visit alone, while men often attend with their partner. Thus, information on the connection of snoring and apnea may not be as readily available for women compared to men (19-22).

As we previously have shown, obesity is a well acknowledged risk factor for OSA, the value of body mass index (BMI) is directly proportional to the severity of OSA for both genders, but for the same AHI, women tend to be more obese than men (23). A possible explication is the difference in body fat distribution between men and women. For the same BMI, men have a greater muscle mass than women. RMN studies have confirmed that obese women have less peripharyngeal fat than obese men (24).

Other risk factors of developing OSA in women is menopause and pregnancy. Progesterone is a respiratory stimulant, increasing response to hyperpnia and hypoxia chemoreceptors, and its role was established in increasing muscle tone in the upper airways. During menopause, progesterone levels decrease, leading to an increased risk and severity of OSA. Also, hormones have a major role in the fat distribution. Postmenopausal women have a higher fat mass than before menopause and the fat is distributed on the upper body versus the lower body (25,22).

Women also have an increased risk of OSA during pregnancy, due to several factors including: the expansion of the uterus which compresses the diaphragm, thus changing mechanical pulmonary function, increasing the amount of fat and an increase in the circumference of the neck and developing edema throat and reduced nasal absorption (26).

OBJECTS

The purpose of this article was to show the correlation between OSA and obesity, adipose tissue in the abdomen and neck, sex and background of the patients in the study group.

MATERIALS AND METHODS

Between the years 2014-2016, within the Marius Nasta Institute – Bucharest/Romania we conducted a study on a group of 101 patients diagnosed with OSAS. The patients were selected randomly. Most patients enrolled in the study had residence in Bucharest and the patients from the rural areas came from the suburbs of Bucharest. The patients who required medical attention were complaining of snoring, cessation of breathing during sleep, sleepiness, decreased ability to concentrate. The study's Ground Zero was considered the date of the polysomnography, patients subsequently being evaluated periodically at 2, 6 and 12 months, both by phone and at The Marius Nasta Institute. 83 patients were male (82.17%) and 18 women (17.83%). The age of the patients was between 23 and 84 years old.

COMPARATIVE RESULTS AND DISCUSSION

Fig. 1 shows that the majority of patients with OSA are male. OSA diagnosis is significantly more common among people who have a life partner, who are alerted to their condition by their sleep partner, because people with OSA are often not aware of this illness. OSA is associated with snoring, which is not considered a female gender trait. Therefore, women are less likely to be warned by their partners of snoring or recognize that they need a doctor.

Fig. 2 shows the distribution of patients depending on their environment. Thus, we see large numbers of patients coming from urban areas. This can be explained by the fact that people from the urban areas will more likely seek a doctor than people from the rural area.

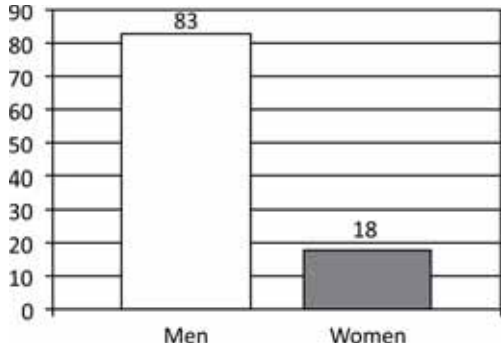

FIGURE 1. *OSA distribution by gender*

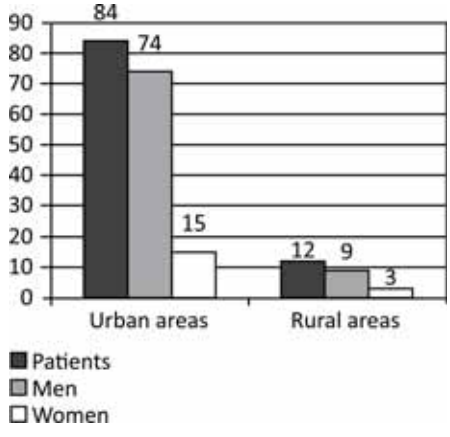

FIGURE 2. *Distribution of patients according to their environment and within this on sex*

Fig. 3 presents the distribution of patients according to the severity of OSA. Thus, we see that the majority of patients have severe OSA. One possible explanation is that the person with OSA is rarely conscious that he/she has difficulty breathing, even upon awakening. OSA is recognized as a problem by individual witnesses during episodes or it is suspected because of its effects on the body. OSA is usually accompanied by snoring. People who generally do not have a spouse or who sleep alone are, in most cases, unaware of their condition. As a result, when they visit a doctor and usually are diagnosed with OSA of the severe form).

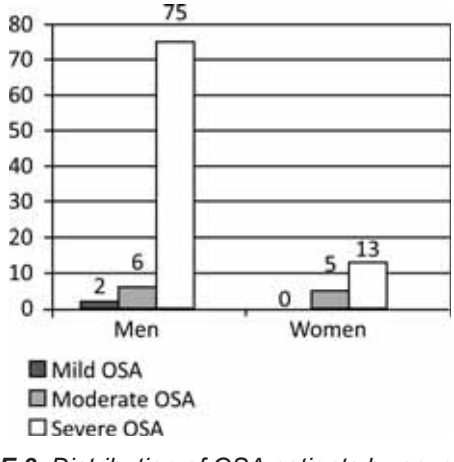

FIGURE 3. *Distribution of OSA patients by severity*

Obesity and OSA often coexist and, in fact, can cause each other. In Table 1 we can see the BMI mean for patients with OSA (classified by degrees of severity), showing that the value increased BMI correlates with the severity of OSA.

TABLE 1. *Mean BMI for the group of patients*

OSA Distribution	BMI Mean
OSA	33.66
Mild OSA (1.98%)	30.28
Moderate OSA (10.9%)	31.88
Severe OSA (87.12%)	33.94

The worst part of this is that not only obesity is associated with OSA, but with poor sleep due to fragmentation tends to cause patients to eat more. There seems to be a relationship between hormones of hunger, satiety and sleep deprivation, although the exact nature of this relationship is unclear. Basically, it is a vicious circle.

Table 2 shows the distribution of BMI/number of patients, where we can see the large number of overweight and obese patients in the study (100 out of 101 patients).

TABLE 2. *Distribution of BMI/number of patients*

BMI distribution		Number of patients	
		Men	Women
	Underweight	0	0
	Normal Weight	1	0
	Overweight	21	4
	Obesity Level I	32	2
	Obesity Level II	20	8
	Morbid Obesity	9	4

Table 3 presents the number of patients in the study group who experienced insomnia.

TABLE 3. *Number of patients (men-women) who have insomnia*

Sleep disorders	Men	Women
Insomnia	24	11
No	59	7

Table 4 presents the average diameter of the neck and abdomen of patients with OSA based on gender. You can see high value thereof specific to obese people.

TABLE 4. *Average diameter of the neck and abdomen by gender*

	Men	Women
Neck diameter (cm)	45.24	42.33
Abdominal diameter (cm)	123.71	126.28

CONCLUSIONS

Obesity, especially visceral fat and neck fat is a strong risk factor for the development and progression of OSA, but may be an inverse association (Obesity due to Sleep Apnea).

OSA is more common in men than women. The symptoms that occur in women compared to men may be different, the women may complain of insomnia and symptoms of depression related to lifestyle, family environment and socio-cultural factors. Thus, it is possible for women to be underdiagnosed. This is an important public health issue that leads to the exposure of many women to the risk of cardiovascular and neuro-cognitive sequelae and decreased quality of life.

Differences in upper airway anatomy, neuro-chemical mechanisms, the response to the stimulation, fat distribution and sex hormones contribute to disease pathogenesis. So, we remark the significant differences in symptoms, diagnosis and consequences of OSA between men and women. Most of the existing data mainly refers to the male gender population, especially when it comes to treatment. A better understanding of gender differences in OSA will contribute to increased and improved awareness and diagnosis of OSA in women, and the development and availability of therapeutic options that take into account differences in a person's physiology.

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