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Coincidence of obstructive sleep apnea syndrome and systemic diseases in geriatric patients

Geriatrik Hastalarda Obstruktif Uyku Apne Sendromu Ve Sistemik Hastalık Birlikteliği

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ABSTRACT

Aim: To evaluate the coincidence of obstructive sleep apnea syndrome (OSAS) and systemic diseases in elderly patients presenting to our sleep disorders center.
Materials and Methods: Ninety-seven patients with ages older than 65 years, who had at least one of snoring, witnessed apnea, and excessive daytime sleepiness symptoms, and whose systemic diseases were under evaluation, were included in the study. The patients were divided into 4 groups according to their apnea-hypopnea indexes (AHI) and body mass index (BMI) values. The association of BMI and the polysomnography parameters such as AHI, arousal index, lowest oxygen saturation and mean oxygen desaturation in patients with and without systemic illnesses ,were evaluated.
Results: Seventy-one (73.2%) of the patients comprised the group with systemic illnesses, and 26 (26.80%) patients comprised the group without systemic illnesses. AHI value was found to be higher in patients with systemic diseases compared to patients without systemic illnesses, and this was statistically significant ($p<0.05$). A statistically significant association was found between the presence of systemic diseases and OSAS and increased BMI (BMI>25) ($p<0.05$). A statistically significant association was not detected between the arousal index, lowest oxygen saturation, mean oxygen saturation, and presence of systemic illness. No difference in the rates of presence of systemic illnesses was found among male and female patients.
Conclusion: Patients in the geriatric age group with increased BMI and OSAS should be evaluated for the presence of systemic illnesses.

Keywords: Obstructive sleep apnea syndrome, systemic diseases, geriatrics

ÖZ

Amaç: Uyku bozuklukları merkezimize başvuran yaşlı hastalardaki obstruktif uyku apne sendromu (OSAS) ile sistemik hastalık birlikteliğini ve bunlarla ilişkili parametreleri araştırmaktır.
Gereç ve Yöntem: Horlama, tanıklı apne, gündüz aşırı uyku hali semptomlarından en az birinden şikayeti olan ve sistemik hastalıkları araştırılan 65 yaş üstü 97 hasta çalışmaya alındı. Hastalar apne hipopne indeksi (AHİ) ve vücut kitle indeksi (VKİ) değerlerine göre 4'er gruba ayrıldı. Sistemik hastalığı olan ve olmayan hastalarda VKİ ile polisomnografi parametrelerinden AHİ, arousal indeksi, en düşük oksijen saturasyonu ve ortalama oksijen desaturasyonu arasındaki ilişki incelenmiştir.
Bulgular: Hastaların 71'i (%73.2) sistemik hastalığı olanlar, 26'sı (%26.80) sistemik hastalığı olmayanlar grubunu oluşturmuştur. Sistemik hastalığı olanlarda, sistemik hastalığı olmayanlara göre AHİ değeri daha yüksek saptanmış olup istatiksel olarak anlamlı saptanmıştır($p<0.05$). Sistemik hastalık varlığı ile OSAS ve artmış VKİ (VKİ>25) arasında istatiksel olarak anlamlı birliktelik saptanmıştır($p<0.05$).Arousal indeksi, en düşük oksijen saturasyonu ,ortalama oksijen desaturasyonu ile sistemik hastalık varlığı arasında istatiksel anlamlı bir birliktelik saptanmamıştır. Kadın ve erkek hastalar arasında sistemik hastalık görülmesi açısından fark saptanmamıştır.
Sonuç: Artmış VKİ ve OSAS'ı olan geriatrik yaş gurubundaki hastalar sistemik hastalık varlığı açısından değerlendirilmelidir.

Anahtar Kelimeler: Obstrüktif uyku apne sendromu, sistemik hastalıklar, geriatri

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INTRODUCTION

Along with aging, many changes occur in sleep structure. It is known that there is a deterioration in sleep quality and an increase in the prevalence of sleep disorders in the elderly [1,2]. The incidence of sleep disorders also increases in old age: it is reported that approximately 35% of people over 60 years old and about 50% of people over 65 years old, experience sleep disorders [3]. In old age, night sleep time decreases, sleep efficiency decreases to around 70-80%, and the frequency and duration of nighttime awakenings increase. Among the causes of sleep disorders seen in old age are changes in sleep duration and rhythm, changes in the metabolism, cardiovascular diseases, neurological diseases, psychiatric problems and multiple drug use. It is a problem to be able to distinguish normal or physiological sleep changes associated with age, from abnormal or pathological sleep, because there is a close relationship between comorbid conditions with high prevalence in elderly and sleep disorders. In addition to the changes occurring in sleep due to age in the elderly, the rate of sleep respiratory disorders increases [4]. It is difficult to obtain useful data with sleep-breathing disorders in the elderly, as it is more difficult to persuade the elderly to perform polysomnography (PSG) and to bring them to the sleep laboratory with the restrictive effect of the accompanying diseases [5].

Obstructive sleep apnea syndrome (OSAS) constitutes more than 90% of the most common sleep-related respiratory disorders. OSAS is a disease coursing with recurrent apnea and hypopnea episodes, that develop due to obstructions in one or more areas of the upper respiratory tract during sleep [6]. It has been reported that disruption between the neural and muscular factors responsible for keeping the airway open during sleep causes obstructions [7]. This can range from partial obstruction of the airway that causes simple snoring, to full obstruction of the airway that causes apnea formation. The reason for the closure of the upper airway during sleep is the disruption of the balance of the forces that keep the airway open, which causes it to collapse [8]. Although its prevalence varies with age, gender and genetics, it is 2-4% on average. The most common symptoms are respiratory standstill in sleep, snoring, and excessive daytime sleepiness. The gold standard in diagnosis is PSG [9] and continuous positive air pressure (CPAP) is the most effective method of treating the disease and preventing complications [10]. With increasing age, upper respiratory tract muscle tone decreases, snoring prevalence increases and increased comorbidities are thought to increase the tendency to upper respiratory obstructions.

In OSAS, besides respiratory disorders in sleep, serious complications occur in other systems, especially in the cardiovascular system, and these complications constitute the most important cause of mortality and morbidity in OSAS. With the prolongation of lifetime, the frequency of chronic diseases increases: 90% of people aged 65 and over have at least one chronic disease, while 35% of them have 2, 23% of them have 3, 15% of them have 4 or more diseases simultaneously [7].

The aim of this study is to investigate the coincidence of OSAS and systemic diseases and the related parameters, in elderly patients admitted to Akdeniz University Faculty of Medicine Otorhinolaryngology Sleep Disorders Center.

MATERIALS AND METHODS

A total of 118 patients over the age of 65 who complained of at least one of the symptoms of snoring, witnessed apnea and excessive sleep during the day admitting to Akdeniz University Faculty of Medicine Otorhinolaryngology clinic, were included in the study. The patient data related to the study were retrospectively taken from their files. Since 21 patients did not have a record of systemic disease in the file, they were not included in the study, so that 97 patients were included in the study. As the inclusion criteria, in addition to the complaints of respiratory disorders in the sleep of the patients, questioning about systemic disease and having related records, patients who were tested for PSG (Compumedics E-Series, Profusion) in the sleep laboratory, were included in the study. Those who were under the age of 65, who did not have records about their systemic diseases, those who had previously been diagnosed with OSAS, and those who were treated, were excluded from the study. The PSG records were scored manually by an

experienced otolaryngologist for sleep disorders according to the American Academy of Sleep Medicine (AASM) 2007 criteria [11]. In the scoring of respiratory events, the duration of respiratory effort (obstructive), lack of respiratory effort (central), or lack of initial respiratory effort, and then the initiation of respiratory effort (mixed) and the cessation of air flow for at least 10 seconds, were defined as apnea. Hypopnea was defined as the decrease of at least 3% in the oxygen saturation, or accompanied by arousal, and at least 10 minutes of the event with a decrease of minimum 50% compared to the initial value of the airflow. The patients were divided into four groups according to the severity of their disease, apnea-hypopnea index (AHI), and the results of the PSG [11]:

- AHI<5: Simple snoring

- AHI 5-15: Mild OSAS

- AHI 16-30: Moderate OSAS

- AHI> 30: Severe OSAS

BMI values of the patients were calculated. They were grouped as underweight (<18.5), normal (18.5-24.9), overweight (25-29.9), and obese (> 30) according to BMI values [12].

Statistical Analysis: The data of the study were analyzed by using the SPSS Software (version 16.0-SPSS Inc., Chicago, USA). The descriptive data were given as Mean ± Standard Deviation (SD). The results of the categorized data were given as percentages (%). The independent groups were compared with the Chi-Square Test, and the group ratios were compared with Student's t-test. The P<0.05 level was considered to be significant.

RESULTS

A total of 97 patients, 66 males (68%) and 31 females (32%), were included in our study. The ages of the patients were between 65-78 and the mean age was 70.56 (±4.52). The BMI values of the patients were between 21.4 and 46.2 and the mean was 29.83 (±4.94). After the PSG test, AHI values were found to be between 0 and 80.6, with an average of 28.96 (±22.46).

According to AHI values, 15 (15.46%) patients with simple snoring, 19 (19.59%) with mild OSAS, 19 (19.59%) with moderate OSAS, and 44 (45.36%) with severe OSAS were identified. (Figure 1).

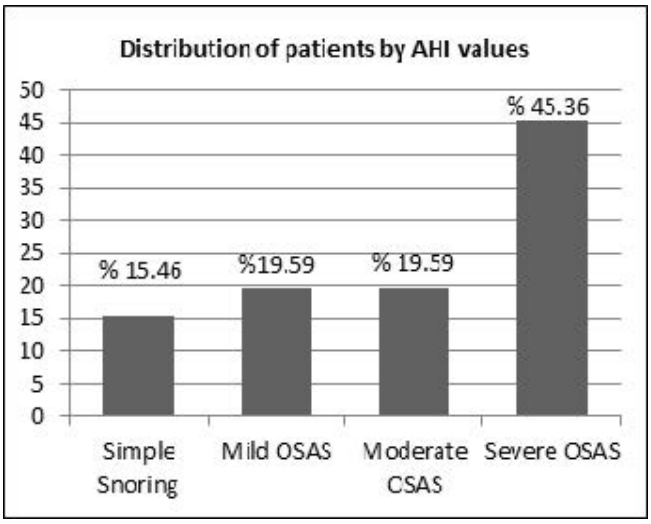

Figure 1. Distribution percentages of patients by AHI values

According to BMI values, 0 (0%) underweight, 20 (20.62%) normal, 33 (34.02%) overweight and 44 (45.36%) obese patients were found (Figure 2).

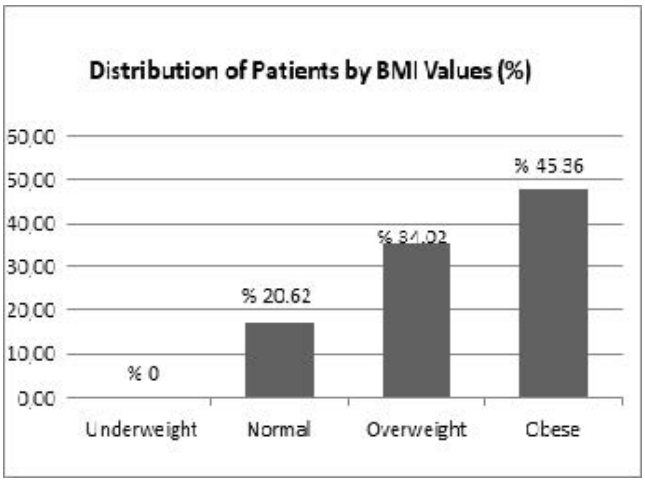

Figure 2. Distribution of Patients by BMI Values

The patients were divided into two groups as those with and without systemic disease: 71 (73.2%) of the patients made up the group with systemic diseases, which were detected in 49 (69.0%) of male patients and 22 (31.0%) of female patients. 26 of the patients (26.80%) made up the group without systemic diseases. No systemic disease was detected in 17 (65.4%) of male patients and 9 (34.6%) of female patients. When those with systemic diseases were evaluated, hypertension

(HT), diabetes mellitus (DM), hyperlipidemia (HPL), chronic obstructive pulmonary disease (COPD), heart failure, cardiac pathology such as coronary artery disease (CAD) and history of myocardial infarct, and depression were encountered alone or with other systemic diseases in 64 (90,1%), 27 (38%), 18 (25,4%), 12 (16,9%), 12 (16,9%), 8 (11,3%), and 4 (5,6%) patients, respectively.

While 21 (29.58%) of patients with systemic diseases had a single isolated systemic disease, 50 (70.42%) of them had two or more systemic disease comorbidities. The ages of the patients with systemic diseases were between 65-77 and the mean age was 70.31 (±4.52). AHI values range between 0-80.6 and the mean AHI was determined as 31.92 (±22.43). The BMI values range between 21.4-42.6 and the mean BMI was determined as 30.07 (±4.75). The ages of the patients without systemic diseases were between 65-78 and the mean age was 71.19 (±5.46). The AHI values range between 0-75.3 and the mean AHI was determined as 20.88 (±20.86). The BMI values range between 21.5-46.2 and the mean BMI was determined as 29.17 (±5.45) (Table 1).

Table 1. Distribution of patients with and without systemic diseases by age, AHI and BMI values

		Min.	Max.	Mean	SD
Those with Systemic Diseases (n:71)	Age	65.00	77.00	70.31	4.52
	AHI	0.00	80.60	31.92	22.43
	BMI	21.40	42.60	30.07	4.75
Those without Systemic Diseases (n:26)	Age	65.00	78.00	71.19	5.46
	AHI	0.00	75.30	20.88	20.86
	BMI	21.50	46.20	29.17	5.45

AHI=Apnea Hypopnea Index, BMI=Body Mass Index, Age (years)

Sixty-two (% 87.3) of the patients with a systemic disease had OSAS (AHI>5), and 34 (47.9%) had obesity (BMI>30). 20 (%77) of the patients without a systemic disease had OSAS (AHI>5), and 10 (38.5%) had obesity (BMI>30). The number and distribution (%) of the classified AHI and BMI values of the patients with and without systemic diseases are shown in Table 2.

AHI and BMI values were found to be higher in patients with systemic disease. A statistically significant relationship was found between the presence of systemic disease and OSAS (AHI>5) and increased BMI (BMI>30) ($p<0.05$).

Table 2. Number and distribution (%) of patients with and without systemic diseases by classified AHI and BMI values

		Those with Sys-temic Diseases (n:71)	Those without Systemic Diseas-es (n:26)	Total (n:97)
AHI	Simple snoring	9 (%12.7)	6 (%23.0)	15 (%15.5)
	Mild OSAS	11 (%15.5)	8 (%30.8)	19 (%19.6)
	Moderate OSAS	15 (%21.1)	4 (%15.4)	19 (%19.6)
	Severe OSAS	36 (%50.7)	8 (%30.8)	44 (%45.3)
BMI	Thin	0 (%0.0)	0 (%0.0)	0 (%0.0)
	Normal	12 (%16.9)	8 (%30.8)	20 (%20.6)
	Overweight	25 (%35.2)	8 (%30.8)	33 (% 34)
	Obese	34 (%47.9)	10 (%38.5)	44 (%45.4)

AHI=Apnea Hypopnea Index, BMI=Body Mass Index

The AHI values of 71 patients with systemic disease in the PSG test were detected as a minimum of 0.00, a maximum of 80.60, and an average of 31.92 (±22.43). Arousal Index values were detected as a minimum of 3.30, a maximum of 73.80, and an average of 30.09 (±19.39). The lowest oxygen saturation was determined as a minimum of 43.00, a maximum of 96.00, and an average of 81.35 (±9.74). The mean oxygen desaturation value was determined as a minimum of 0.00, a maximum of 20.00 and an average of 6.24 (±3.91).

The AHI values of 26 patients without a systemic disease in the PSG test were determined as a minimum of 0.00, a maximum of 75.30, and an average of 20.88 (±20.86). The arousal index values were determined as a minimum of 3.10, a maximum of 62.00, and an average of 22.71 (±17.16). The lowest oxygen saturation was determined as a minimum of 68.00, a maximum of 93.00 and an average of 82.81 (±6.81). The mean oxygen desaturation value was determined as a minimum of 0.00, a maximum of 11.00 and an average of 5.19 (±2.50). The AHI, arousal index, lowest oxygen saturation, mean oxygen desaturation values of the patients with and without systemic diseases are presented in Table 3.

The AHI value was found to be higher in patients with systemic diseases compared to patients

Table 3. AHI, Arousal Index, Lowest O2 Saturation, Average O2 Desaturation values of patients with and without systemic diseases

		Minimum	Maximum	Mean	SD
Those with Systemic Diseases (n:71)	AHI	0.00	80.60	31.92	22.43
	Arousal Index	3.30	73.80	30.09	19.39
	Lowest O2 Saturation (%)	43.00	96.00	81.35	9.74
	Average O2 Desaturation (%)	0.00	20.00	6.24	3.91
Those without Systemic Diseases (n:26)	AHI	0.00	75.30	20.88	20.86
	Arousal Index	3.10	62.00	22.71	17.16
	Lowest O2 Saturation (%)	68.00	93.00	82.81	6.81
	Average O2 Desaturation (%)	0.00	11.00	5.19	2.50

AHI=Apnea Hypopnea Index, O2=Oxygen

without systemic illnesses, which was statistically significant ($p<0.05$). In terms of the relationship between the presence of systemic disease and the arousal index, the arousal index was found to be higher in those with systemic disease, but no statistical relationship was found ($p>0.05$). The lowest oxygen saturation was found to be lower in those with systemic disease, but this was not statistically significant ($p>0.05$).

When we look at the association between systemic diseases and gender, the number of systemic diseases was found to be more in male patients, but no statistically significant difference was found between men and women in terms of the presence of systemic diseases ($p> 0.05$). While 21 (29.58%) of the patients with systemic disease had a single isolated systemic disease, 50 (70.42%) of them had two or more systemic diseases. Although no statistical significance was found, the frequency of systemic diseases increases with increasing AHI values ($p>0.05$). A statistically significant relationship was found between the presence of systemic diseases and OSAS (AHI> 5) and increased BMI (BMI>30) ($p<0.05$).

DISCUSSION

Studies show that the OSAS prevalence varies between 1% and 5%. According to the study of Kokturk et al., the OSAS prevalence in our society is estimated to be 0.9-1.9% [13]. In terms of the frequency of OSAS in the elderly, different results have been revealed in studies. Martin J. et al. found that 62% of the randomly selected population aged between 65-95 years had AHI>10 and 24% had AHI>5. Compiled epidemiological studies and reported that the incidence of SBD ranged between 28-62% in males and 19.5-60% in females. This figure was between 5.6-45% when gender differences were disregarded [14]. In the study of Ancoli-Israel et al., 427 cases over 65 years of age were followed for 5 years and it was shown that AHI increased with age. In the same study, the rate of those with AHI>20 between the ages of 40 and 60 was 10.9% in men and 5.3% in women [15].

Patients aged 65 and over were included in our study and among those, 82 (84.5%) were found to have AHI>5. The OSAS rate was found to be quite high among our elderly patients, since all of the patients admitted had at least one of the three major symptoms of OSAS and the patients were not randomly selected from the population.

OSAS has consequences regarding many systems, especially on the cardiovascular system. The main consequences regarding the cardiovascular system are hypertension, cardiac arrhythmias, ischemic heart diseases and myocardial infarction. Although the mechanisms of the consequences of OSAS regarding the cardiovascular system are still under investigation, blood gas changes and sympathetic nervous system activation due to respiratory events, are primarily held responsible [14,16]. Hypoxemia, which develops following apnea and hypopneas during sleep, stimulates the sympathetic nervous system and as a result, sudden increases in heart rate and blood pressure occur [17]. 30-50% of the patients with OSAS have systemic HT. In the prevalence studies of HT in the elderly, the rate of HT was found to be 41% in those between the ages of 60-69 and 53% in those between the ages of 70-79 [18]. The rate of HT in geriatric patients in our study was determined to be

90.1%. Many clinical and epidemiological studies have shown that dyslipidemia is an important cardiovascular risk factor in the elderly and this risk can be reduced with appropriate treatment. In our study, the rate of HPL in elderly patients was found to be 25.4%. As with the OSAS rate, the HT rate was found to be quite high among our elderly patients since all of the patients admitted had at least one of the three major symptoms of OSAS and patients were not randomly selected from the population.

Diabetes mellitus (DM) is a metabolic disease that negatively affects the quality and life of the elderly. In addition to the deterioration in carbohydrate metabolism that causes hyperglycemia, protein and lipid metabolism are also affected. With age, the incidence and prevalence increase gradually. Diabetic patients over the age of 65 make up almost 40% of all diabetics. Again, 20% of the geriatric age group have impaired glucose tolerance. In addition, 10% of the elderly population has undiagnosed diabetes [19]. In our study, the DM rate was found to be 38% in elderly patients.

Chronic obstructive pulmonary disease (COPD) is a disease that is not fully reversible and is characterized by airflow restriction, which is progressive in these patients, and an abnormal inflammatory response develops against harmful particles and gases (cigarettes). The prevalence of COPD in people over 65 years old is about 10% [20], in our study, COPD was found to be 16.9% in elderly patients.

A psychiatric disorder was found in 66% of those with sleep disorders. The frequency of sleep disorders in the elderly was found as 37%, and the frequency of depression as 31%. It is reported that sleep disorders in the elderly are a predictor of depression that may develop in the future [21] but that effective treatment of sleep disorders also delays or prevents the onset of major depression [22]. The rate of depression in the elderly varies according to where they live: the rates determined in the community are between 1-5%, and in our study, depression was found to be 5.6% in elderly patients.

Obesity has an important place in OSAS physiopathology. There is a poorly understood complex relationship between OSAS and obesity, insulin resistance, and daytime sleepiness. In addition to obesity, interruptions in sleep increased sympathetic activity and hypoxia have negative effects on insulin resistance and metabolic disorders[23]. Central obesity increases the OSAS tendency by affecting the upper respiratory tract patency and respiratory pattern, through fat accumulation around the upper respiratory tract and in the abdominal region [24]. In our study, 20.6% of all cases were normal, 34% were overweight and 45.4% were obese. When we look at the groups of BMI according to the AHI values, we determined that 46.7% of the patients with simple snoring were normal, 20% were overweight and 33.3% were obese, 31.6% of patients with mild OSAS were normal, 42.1% were overweight and 26.3% were obese, and 26.3% of the patients with moderate OSAS were normal, 26.3% were overweight and 47.4% were obese. It was found that 4.6% of the patients with severe OSAS were normal, 38.6% were overweight and 56.8% were obese. Our study showed that BMI values also increased in patients with increased AHI, and obesity was observed mostly in patients with severe OSAS. In the past, OSAS was known as a disease of obese people, however studies have reported that around 40% of the people with OSAS are in fact, not obese. The data obtained from our study shows that OSAS can also be seen in people over 65 years old who are not obese (BMI<30)

CONCLUSION

Patients in the geriatric age group with increased BMI and OSAS should be evaluated for the presence of systemic illnesses. We think that OSAS can cause cardiovascular, neurological, pulmonary, endocrine and psychiatric complications, and the complications that may occur due as a result may increase the morbidity and mortality of OSAS. This relationship will be understood more accurately with prospective studies.

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