RESEARCH

OBSTRUCTIVE SLEEP APNEA IN ELDERLY

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Abstract

Introduction: This study's purpose is to compare obstructive sleep apnea (OSA) patients over 65 with those under 65 using polysomnography tests.

Materials and Method: The polysomnography tests performed on 108 patients (54 study and 54 control group) from January 1, 2018 to January 1, 2022 were examined retrospectively at the ear, nose and throat clinic in the Adana City Training and Research Hospital.

Results: The study group and the control group shared the same body mass index (BMI) median, apnea-hypopnea index (AHI) median value, the mean oxygen saturation median value, the minimum oxygen saturation median value, the oxygen saturation < 90% (SAT90) median value, the oxygen desaturation index (ODI) median value, the average apnea duration value and the arousal index value. (p>0.01)

Conclusion: In conclusion, being a male above 65 years of age may be a risk factor for obstructive sleep apnea. However, getting older does not increase obstructive sleep apnea.

Keywords: Sleep Apnea Syndrome; Polysomnography; Aged; Oxygen.

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INTRODUCTION

Obstructive sleep apnea(OSA) syndrome is characterized by recurrent complete or partial obstructions of the upper airway during sleep, often accompanied by a decrease in blood oxygen saturation as is arousal. OSA syndrome is common in older adults (1). If left untreated, it can reduce one's quality of life and lead to adverse health outcomes. Effective treatment is possible, so all physicians treating the elderly should be familiar with the clinical manifestations, diagnostic methods, and treatment options for OSA (2).

Most sleep apnea patients are middle-aged men. At least 1% of the global population experiences sleep apnea. Some studies have shown that 18-73% of elderly people suffer from sleep apnea. However, for various reasons, such as a lack of standard criteria, differences in recording techniques, and sleep patterns that may vary from night to night, it is better to avoid making generalizations about the impacts of sleep apnea on the elderly (3).

Experimental and clinical data show that OSA can cause both cellular and molecular changes that accelerate health problems related to aging. Nonetheless, the pathways in which OSA may evoke or speed up aging have not yet been widely researched. (4)

Few studies in the medical literature contain the polysomnography parameters of OSA patients aged 65 and over. This study's purpose is to compare OSA patients over 65 with those under 65 using polysomnography tests.

MATERIALS AND METHODS

Ethics

The University of Medical Sciences, Adana City Training and Research Hospital Ethics Committee approved the study (decision date: 08.08.2022, number: 2059) and it was conducted in compliance with the Helsinki Declaration. Before being included in the study, all the participants including the control group provided written consent. The "good medical practice guidelines and "good laboratories practice guidelines" were followed throughout the study.

Data Collection

The patients' polysomnography test records from January 1, 2018, to January 1, 2022, were examined retrospectively at the ear, nose and throat clinic in the Adana City Training and Research Hospital. The polysomnography tests were performed on 108 patients, with 54 belonging to the study group and 54 belonging to the control group. Patients were divided into groups based on the severity of their OSA according to WHO classification standards: there were individual groups for those with mild, moderate, and severe obstructive sleep apnea; as well as a control group. The polysomnography tests of OSA patients over 65 and the control group under the age of 65 were compared. Exclusion criteria included CPAP use, substance abuse (smoking, alcohol, etc.), chronic illnesses, allergies, and pregnancy.

Polysomnography is the gold standard for diagnosing sleep apnea. While patients were asleep their apnea-hypopnea index (AHI) resulting from respiratory arrest increased. The WHO classifies AHI values of 0-5 as normal, 5-15 as mild OSA, 15-30 as moderate OSA, and >30 as severe OSA.

Statistical analysis

IBM SPSS V23 was used for the statistical analysis. The Kolmogorov-Smirnov test was used to determine whether the variables were distributed normally. A chi-square test was used to compare the gender and OSA severity of the groups. A Mann-Whitney U test was used to compare the study group and the control group. An independent sample t-test was used to compare two independent groups whether there was a statistically significant difference. The results of the analysis for a single categorical variable were described in the

form of frequency (percentage). A standard deviation and a median (minimum–maximum) were used to summarize and describe continuous variables. The significance level was set as $p < 0.01$.

RESULTS

A difference in the gender distribution existed between the two groups ($p = 0.015$). Only 70.4% of the study group was male. On the other hand, 90.7% of the control group was male. There was no statistically significant difference between the median distributions of groups ($p = 0.345$). While 59.3% of the study group was severe, 44.4% of the control group was severe. (Table 1)

A difference in the median ages also existed between the two groups ($p < 0.001$). The study group's median age was 66, while the control group's median age was 45. However, the two groups shared the same BMI median ($p = 0.601$), AHI median value ($p=0.511$), mean oxygen saturation median value ($p=0.219$), minimum oxygen saturation median value ($p=0.453$), SAT90 median value ($p=0.773$), the ODI median value ($p=0.499$) and the average apnea duration value. (Table 2)

DISCUSSION

Obstructive sleep apnea is a common disease in the general population however studies on the elderly are few and the results are discordant. When we look at the literature studies show an increased prevalence of OSA with age but despite high prevalence, it remains underdiagnosed due to a lack of knowledge of the geriatric feature of the disease and the frequency of comorbidities that may worsen it.

The results of this study revealed that although males of all ages may be more at risk of developing OSA but fortunately being over 65 does not inherently result in OSA worsening. The polysomnography variables and oxygen parameters of OSA patients over 65 did not differ from those of OSA patients under 65.

The prevalence of OSA in people over 65 is estimated to be 30% or higher. (5) This increased prevalence is about factors pertaining to age-related physiological changes in older patients such as sleep onset, respiratory chemosensitivity, increase pharyngeal resistance due to airway lengthening and descent of hyoid bone, and the presence of comorbid diseases (5).

The knowledge gaps in research on sleep apnea include etiopathogenesis and its implications. Chowduri et al. (6) revealed that SDB is common in older adults and is associated with significant negative effects. Predominantly central apneas are common in the elderly due to increased breathing instability during non-REM sleep, as suggested by a lower carbon dioxide reserve and a higher controller gain (6). Despite the pharyngeal muscle function and the size of the airway lumen being reduced in elderly people, an increase in arousal frequency due to aging causes hyperventilation and hypocapnia, which promote respiratory instability (7). These two studies of Chowduri et al. were both contrary to our study while in our study oxygen saturation values of the elderly were not significantly different from the younger OSA patients.

According to Hongyo et al., gender (being male), body mass index, and age are risk factors for severe OSA in the elderly (8). Age and body mass index were significantly greater in severe OSA patients in the age cohort than in mild-to-moderate OSA patients. Their research indicates that even in older people who are physically active and neuropsychiatrically healthy, aging worsens OSA symptoms (8). In our study gender, body mass index and, age were not expected to be risk factors for OSA. This may be due to our small sample size.

In Russel et al.'s study, being overweight, male, and elderly and having a genetic predisposition toward sleep apnea and craniofacial aberrations are all possible causes of OSA. However, being over-

Table 1. The comparison of categorical variables by groups.

	Study group	Control	Total	Test ist.	p
Gender					
Male	38 (70.4)	49 (90.7)	87 (80.6)	5.911	**0.015**
Female	16 (29.6)	5 (9.3)	21 (19.4)		
AHI groups					
Normal	7 (13)	6 (11.1)	13 (12)	3.32	0.345
Mild	9 (16.7)	15 (27.8)	24 (22.2)		
Moderate	6 (11.1)	9 (16.7)	15 (13.9)		
Severe	32 (59.3)	24 (44.4)	56 (51.9)		

*Chi-square test, frequency (percent)

Table 2. The comparison of quantitative data by groups.

	Study Group		Control		Total		Test ist.	p
	Mean ± SD	Median (min.-max.)	Mean ± SD	Median (min.-max.)	Mean ± SD	Median (min.-max.)		
Age	67.72 ± 3.83	66.00 (65.00 - 80.00)	45.74 ± 8.46	45.00 (20.00 - 62.00)	56.73 ± 12.83	63.50 (20.00 - 80.00)	0.000	**<0.001***
BMI	30.44 ± 5.58	29.00 (22.00 - 50.00)	30.41 ± 4.02	30.00 (21.00 - 40.00)	30.43 ± 4.84	30.00 (21.00 - 50.00)	1373.000	0.601*
AHI	34.41 ± 22.95	34.95 (1.30 - 90.80)	32.54 ± 26.01	25.05 (0.20 - 95.50)	33.47 ± 24.43	32.30 (0.20 - 95.50)	1351.000	0.511*
SaO2	92.48 ± 1.85	92.80 (86.90 - 95.70)	92.61 ± 2.59	93.45 (83.40 - 96.30)	92.54 ± 2.24	93.00 (83.40 - 96.30)	1258.000	0.219*
minimum SaO2	76.69 ± 8.55	78.00 (52.00 - 90.00)	77.31 ± 10.35	79.00 (51.00 - 93.00)	77.00 ± 9.45	78.00 (51.00 - 93.00)	1336.000	0.453*
ODI	18.40 ± 21.97	9.65 (0.10 - 85.90)	14.18 ± 14.45	9.95 (0.00 - 60.90)	16.29 ± 18.63	9.70 (0.00 - 85.90)	1411.000	0.773*
SAT90	19.33 ± 21.50	13.40 (0.00 - 98.20)	19.17 ± 24.43	7.05 (0.00 - 92.40)	19.25 ± 22.90	8.85 (0.00 - 98.20)	1348.000	0.499*
Apnea duration	23.52 ± 6.12	23.35 (13.50 - 36.10)	24.46 ± 9.56	23.20 (0.00 - 60.00)	23.99 ± 8.00	23.30 (0.00 - 60.00)	-0.611	0.542**
Arousal index	4.35 ± 14.38	0.00 (0.00 - 78.20)	1.01 ± 2.93	0.00 (0.00 - 20.30)	2.68 ± 10.46	0.00 (0.00 - 78.20)	1344.000	0.434*

*Mann-Whitney U test, **Independant Samples T-test, median (minimum – maximum)

weight is not as significant a contributing factor in the geriatric population. (2) Our study did not include craniofacial aberrations.

The relationship between obesity and being an elderly person is less transparent. They have a lower BMI and lesser neck circumference than younger OSA patients. (9) Furthermore, risk stratification models are employed if the patient is male and depending on their BMI. However, these models have been demonstrated to provide incorrect analyses for those who are not obese and the elderly. (10)

According to Morley et al.'s investigation, younger people may exhibit a distinct phenotype of OSA from older people. (11) Although the architecture of younger people with OSA is generally healthy, their stronger respiratory capacity and increased loop gain make them likelier to develop the condition. Worsening anatomy with aging should counteract any reduction in the susceptibility toward OSA, even though the decrease in ventilatory effort and loop gain with age should act as protection against OSA. We think that the study that was mentioned may help to explain why OSA was not worsening in the elderly.

Pinilla et al. (4) examined the link between OSA and aging and found that OSA is connected to an increase in specific aging markers in a dosimetric manner. When the core group was subdivided by age group, they found that OSA was linked to a rise in specific age markers in patients younger than 50, independent of many defined potential confounders. Our study did not include specific age markers.

The sleep patterns of different age groups can vary greatly. Older people complain that they have trouble falling asleep and staying asleep and frequently wake up during the night and in the morning. With age, sleep becomes more fragmented, independent of sleep apnea. (12) In our study the sleep patterns of the patients were not included.

In older adults, some unidentified factors affect these interrelations. Also, due to the sheer anatomical and physiological proclivity for the progression of sleep apnea with advancing age, aged patients could be diverse. It is acknowledged that older people have a range of health issues and functionalities that are not always associated with their biological age. Some people age without developing chronic diseases. As a result, more cohort studies are needed to better understand these interactions.

One of the limitations of our study was the small sample size; not all age groups were included. Another limitation could be that we did not follow the OSA patients from the onset of OSA. Therefore, we could not contribute to the causal relation.

In conclusion, being a male above 65 years of age may be a risk factor for OSA. Hence, early evaluation can reduce risk. However, getting older does not increase OSA. The condition becomes aggravated due to individual differences and well-being. Further studies with large sample sizes are needed.

Conflict of interest: There is no conflict of interest.

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