Pak. J. Chest Med. 2022;28(01)

Original Article

journal homepage: https:/www.pjcm.net/

Pakistan Journal of Chest Medicine

Official journal of Pakistan Chest Society

Frequency of Obstructive Sleep Apnea in patients of Chronic Obstructive Pulmonary Disease

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Article History:

Received:	Oct 12, 2021
Revised:	Jan 20, 2022
Accepted:	Feb 28, 2022
Available Online:	Mar 02, 2022

Author Contributions:
WA conceived idea, SA RF drafted the study, AK WH collected data, SA WA did statistical analysis and interpretation of data, SA WA critical reviewed manuscript. All approved final version to be published.

Declaration of conflicting interests:
The authors declare that there is no conflict of interest.

How to cite this article:
Ahmad A, Ashraf S, Ahmad W, Farooqi R, Ahmad H. Frequency of Obstructive Sleep Apnea in patients of Chronic Obstructive Pulmonary Disease. Pak J Chest Med. 2022; 28(1):54-59.

A B S T R A C T

Background: Obstructive sleep apnea (OSA), is a sleep related disorder that is characterized by repeated upper airways collapse during sleep which leads to hindered airflow. It has been recognized as a common comorbidity in patients with COPD contributing to severity of symptoms and COPD progression. Early identification and timely intervention will prevent complications and decrease morbidity and rate of hospital admissions.

Objective: The present study was conducted to determine the frequency of obstructive sleep apnea in patients with chronic obstructive pulmonary disease.

Methodology: It was a descriptive cross-sectional study conducted at Pulmonology Unit, Khyber Teaching Hospital Peshawar between September 18, 2018 to March 18, 2019. Overall, 88 COPD patients fulfilling the criteria were studied. Patients' demographic data was entered on structured questionnaire. Each patient was assessed for BMI (Body MassIndex) and neck circumference. Later on, in order to eliminate bias all patients were subjected to the same level-3 polysomnography (a portable monitor which monitors at minimum the respiratory movements, oxygen saturation, airflow i.e. AHI and pulse rate. Each polysomnographic study was attended by the same sleep laboratory technician having adequate relevant experience. Those having AHI more than 5 were taken as OSA.

Results: Mean age in years for this study was 55.7 with SD (standard deviation) ± 7.82. A total of 88 patients were subjected to the study among which males were 36.4% and 63.6% were female. Mean BMI was 35.89 kg/m2 with standard deviation ± 7.52. Moreover, 63.6% had obstructive sleep apnea while 36.4% didn't had obstructive sleep apnea.

Conclusion: In conclusion, this study underscores the high prevalence of obstructive sleep apnea (OSA) among patients diagnosed with Chronic Obstructive Pulmonary Disease(COPD), with 63.6% of participants exhibiting OSA.

Keywords: Obstructive Sleep Apnea; Chronic Obstructive Pulmonary Disease; Peshawar.

Introduction

Obstructive sleep apnea (OSA), a disorder related to sleep usually described by recurrent upper airways collapse causing hindered airflow. It is now becoming a common problem with a prevalence of moderate disease as high as17% (males) and 9% (females) of middle age. There is increasing list of detrimental consequences associated with OSA i.e. daytime symptoms of somnolence, compromised cognition and risk of motor vehicle accidents as well as links with hypertension, cardiovascular morbidity, malignancy and all cause mortality.[1]

OSA has been described as a co-existing condition in patients having chronic obstructive pulmonary disease (COPD) which is usually an advancing disease and exhibits chronic inflammation to noxious gases and particles of the airways.[2] The coexistence of COPD and OSA was described by Flenley first as an overlap syndrome. Patients having overlap syndrome shows more intense oxygen desaturation and consequently high occurrence of pulmonary hypertension.[3,4] OSA and COPD are both common conditions, and their coexistence called the overlap syndrome, may occur and its coexistence is by chance. COPD has a prevalence of10% in adult population while OSA affects the same proportion of population.[5] According to a large epidemiological survey (BREATHE), in Pakistan COPD is prevalent amongst adults who are older than 40 years is 2.1%.[6] According to already established figures, the prevalence of both the conditions in general populations is about 1% or even higher.[7] In A study conducted by Soler et al, OSA was observed in 65.9% of moderate to severe COPD patients in USA.[8] The mortality and morbidity of overlap syndrome (COPD+OSA) is higher as compared to either condition alone.[9] The rationale of our study is that there is a higher risk of nocturnal hypoxemia, development of pulmonary hypertension, severe COPD exacerbations as well as mortality related to all causes in this subgroup (overlap syndrome) than in patients who have only one disorder. Furthermore, treatment of OSA via CPAP (continuous positive airway pressure) in overlap syndrome will decrease COPD exacerbations and improvement in survival. Therefore, it is vital to assess the potential association of both the diseases. Moreover, as no local data is available on this important issue, our study may provide an objective evidence for OSA prevalence in COPD patients, which will be the stepping stone towards the goal of better management of these patients. Also, early intervention will prevent complications and decrease morbidity and rate of hospital admissions.

Objective

The present study was conducted to determine the frequency of obstructive sleep apnea in patients with chronic obstructive pulmonary disease.

Methodology

This was a descriptive study conducted at pulmonology unit Khyber Teaching Hospital Peshawar from September 2018 to March 2019. Sample size was 88with 95% confidence interval, 10% margin of error and prevalence of 65.9%8 calculated via WHO sample size calculator. Consecutive, Non probability sampling technique was applied. All the patients of both gender having age 40-70 years presenting to pulmonology unit Khyber Teaching Hospital having COPD (confirmed via spirometry i.e. post bronchodilator FEV1/FVC< 0.70) were enrolled in the study. Patients having acute exacerbation of COPD who had respiratory failure, pneumothorax, hemoptysis, pneumonia or active tuberculosis, acute coronary syndrome or hemodynamically instability were excluded. After taking consent and appropriate management of these patients, demographic data like age, gender, BMI and spirometric findings were noted.

Later on, in order to eliminate bias all patients were subjected to the same polysomnography type 3(a portable monitor which monitors at least the respiratory movement, airflow i.e. AHI, ECG or pulse rate and oxygenate Pulmonology Unit KTH over a whole night for confirmation of OSA. Those having AHI more than 5 were taken as OSA. The patient's bio data along with frequency of OSA was recorded in a structured proforma. Confounders were eliminated by excluding the conditions as mentioned in exclusion criteria. Data Analysis All the data collected was entered and analyzed via SPSS-19. Frequencies and percentages were calculated for categorical variables like gender and OSA. Mean ± standard deviation was calculated for numerical variables i.e. age, height, weight, BMI, neck circumference and AHI. Frequency of OSA was stratified among age, gender, neck circumference and BMI to see the effect modification. Post stratification chi square was applied. P valve <0.05 5 was taken significant. The data were presented as tables.

Results

In this study, a total of 88 patients diagnosed with COPD and fulfilling the inclusion criteria were assessed for the presence of OSA. Out of 88 patients, 32 (36.4%) patients were male and 56 (63.6%) patients were female. Mean

age was 55.7 years with standard deviation ± 7.82 Most of the patients were in age range 51-60 years (43.2%) (Table 1). Mean BMI was 35.89 kg/m² with standard deviation ± 7.52. Mean neck circumference was 38.98 cm with standard deviation ± 4.26. 46 (52.3%) patients had neck circumference > 38cm. Out of 88 patients, 56 (63.6%) were found to have OSA (Figure 1). Stratification of obstructive sleep apnea in COPD with respect to age, gender, BMI and neck circumference is given in Table 3 & 4.

Table No 1. Basic characteristics of study cases (n=88)

Characteristics	Frequency	Percentage
Gender		
Male Female	38 56	36.4% 63.6%
Age Group		
40 - 50 yrs 51 - 60 yrs 61 - 70 yrs	26 38 24	29.5% 43.2% 27.3%
BMI		
≤35kg/m² >35kg/m²	46 42	52.3% 47.7%
Neck Circumference		
≤38cm >38cm	42 46	47.7% 52.3%

Discussion

Obstructive sleep apnea (OSA), a sleep disorder usually characterized by recurrent upper airways collapse causing hindered airflow. It is now becoming a common problem with a prevalence of moderate disease as high as 17% and 9% in men and women of middle age respectively. There is increasing list of unfavorable consequences associated with OSA i.e. daytime symptoms of sleepiness, impaired cognition and risk of motor vehicle accidents as well as associations with hypertension, cardiovascular morbidity, malignancy and all-cause mortality.[1] Prevalance of OSA in COPD patients has been reported by different studies from 50 to 70 percent. In our study mean age was 55.7 years with standard deviation ± 7.82. 36.4% patients were male and 63.6% patients were female. It was concluded that 63.6% patients had obstructive sleep apnea while 36.4% patients didn't have obstructive sleep apnea.

Our study results were closer to those of Soler et al. According to the study conducted by Soler et al in USA, the prevalence of OSA in moderate to severe COPD was 65.9%. The mortality and morbidity of overlap syndrome (COPD+OSA) is higher as compared to either condition alone.[15]

Table 2. Frequency of OSA in COPD patients

Obstructive Sleep Apnea	Frequency	Percentage
Yes No	56 32	63.6% 34.4%
Total	**88**	**100.0%**

In another study conducted by Schreiber A et al12 in which 422 patients were evaluated, it was observed that 190 (45%) of the study population had an Apnea Hypopnea Index (AHI) ≥ 15 events/hour and went through OSA treatment. Patients having OSA were considerably of younger age and had a less severe airway limitation compared to those without OSA. Neither cardiac comorbidities nor arterial blood gases were significantly different. As anticipated, patients having OSA exhibited considerably more severity in diurnal symptoms evaluated by Epworth Sleepiness Scale (ESS) and greater Body Mass Index (BMI). Nevertheless, only 69 out of 190 patients having OSA (36.3%) displayed an ESS more than10, while 25% of them were having BMI ≤ 25 and

Table 3. Stratification Of Obstructive Sleep Apnea W.r.t Gender (n=88)

Obstructive Sleep Apnea	Gender		Total
	Male	Female	
Yes No	20 12	36 20	56 32
Total	**32**	**56**	**88**

41% of them had a BMI <30 Entirely, 68% of patients having OSAwere discharged with continuous positive airway pressure (CPAP), 15% with Bi-level ventilation, and 17% without any ventilatory therapy. To conclude, in population under study, the coexistence of OSA and COPD was common. BMI and ESS values usually deliberated as cutoff for the estimation of OSA in the general population may not be precise in a COPD patient's subgroup.

The recognition of coexisting OSA in patients with COPD has important clinical relevance, as the management of patients with overlap syndrome is different from the management of COPD alone. Moreover the mortality and morbidity of the patients with overlap syndrome is quite higher unless properly treated with nocturnal positive airway pressure. 13 In another study conducted by Donovan LM and colleagues, it was concluded that, of the 222 participants studied, 164 (74%) were at intermediate to high risk for OSA based on the modified STOP-BANG score. Moreover, more severe respiratory symptoms, increased frequency of exacerbations and lower quality of life was observed in this group of patient.[14]

Table 4. Stratification of OSA W.R.T Age groups, BMI & Neck circumference

Characteristics	OSA			P-Value
	Yes	No	Total	
Age Group (Years)				
40 – 50 51 – 60 61 – 70	13 30 12	16 13 14	19 43 26	0.515
Neck Circumference				
≤38 cm >38 cm	20 36	22 10	42 46	0.035
Body Mass Index (BMI)				
≤35 kg/m² >35 kg/m²	28 28	18 14	46 42	0.690

Hence it can be concluded that among patients with COPD, undiagnosed OSA is associated with poor outcomes. Early recognition and management of OSA in COPD patients can improve clinical outcomes.

Similar results were also observed by Soler X et al who reported that 65.9% of the COPD patients were having co existing OSA. Moreover these patients were more symptomatic, having decreased exercise tolerance, efficiency of sleep and poor qualityoflife.[10]

In another study conducted by Turcani P et al12, 51.4%of the scrutinized COPD patients had AHI ≥ 5, therefore, conforming to the criteria for the existence of sleep apnea. A statistically substantial relationship was recognized between categorized AHI and weight (P=0.004), BMI (P=0.001), neck circumference (P=0.003), waist circumference (P=0.001), hip circumference (P=0.001) and Epworth Sleepiness scale (P=0.005). It is obvious in itself that with increasing height, BMI, neck, waist, and hip circumferences in addition to a greater value of the Epworth scale, AHI increases and so does the severity of OSA.[12]

Management of a disease need a holistic approach including timely identification and treatment of its comorbidities. OSA has been recognized as a significant comorbidity in COPD patients contributing to overall mortality and morbidity. Early identification and timely interventions will result in better clinical outcomes. As no local data is available on this important issue, our study may provide an objective evidence for prevalence of OSA in COPD patients which will prove to be the stepping stone towards the goal of better management of these patients.

Conclusion

In conclusion, this study underscores the high prevalence of obstructive sleep apnea (OSA) among patients diagnosed with Chronic Obstructive Pulmonary Disease (COPD), with 63.6% of participants exhibiting OSA. Demographically, a predominance of females and individuals aged 51-60 years was observed, alongside notable anthropometric indicators such as elevated mean BMI and neck circumference, highlighting potential risk factors for OSA in this population. These findings emphasize the importance of vigilant screening and management of OSA in COPD patients, particularly among those who are obese or exhibit larger neck circumferences, to optimize respiratory health outcomes and enhance overall quality of life. Further research is warranted to elucidate the complex interplay between COPD and OSA and to inform targeted interventions aimed at improving patient care strategies.

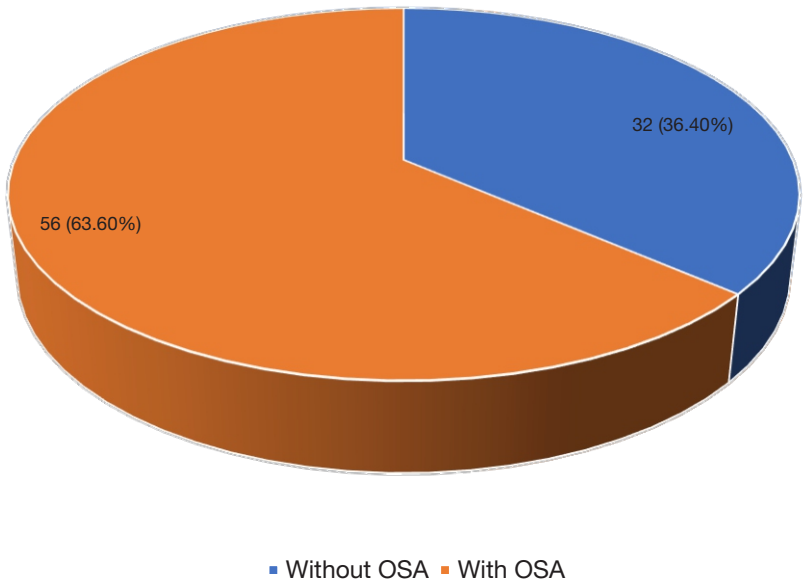

Figure 1. Frequency of OSA among study cases

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