

Prevalence of Obstructive Sleep Apnea among Chronic Obstructive Pulmonary Disease Patients

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ABSTRACT

Background and Aim: Chronic obstructive pulmonary disease (COPD) is related to a number of comorbidities that contribute to various phenotypes, including increased mortality rates and decreased physical activity. The present study aim was to determine the incidence of obstructive sleep apnea among chronic obstructive pulmonary disease patients.

Methodology: This prospective study was carried out on 250 obstructive pulmonary disease patients at the department of Medicine/ Pulmonology, Fauji Foundation Hospital, Rawalpindi and Avicenna hospital, Lahore from February 2021 to July 2021. Out of 250 patients, 128 patients were enrolled based on clinical examination, medical history and pulmonary tests. Ethical approval was taken from the respective institutional ethical committees. Written informed consent was taken from all the patients. All the patients with sputum production, history of disease exposure and risk factors, chronic cough and forced vital capacity with volume of post-bronchodilator forced expiratory presence in first capacity <70% were enrolled. Patients with thyroid dysfunction, decompensated heart failure, hepatic and renal impaired, Obstructive sleep apnea (OSA) caused by ENT, and acute COPD patients (forced vital capacity <30% or <50% anticipated were excluded. Based on BMI, COPD patients were categorized into two groups: Group-I had 64 obese patients of chronic obstructive pulmonary disease (BMI \geq 29 kg/m²) and non-obese COPD patients (BMI \leq 29 kg/m²) in Group-II. SPSS version 21 was used for data analysis.

Results: Of the total 128 COPD patients, male and female patients were 84 (65.6%) and 44 (34.4%) respectively. Out of 128 COPD patients, the incidence of mild, moderate, and severe COPD was 28 (21.9%), 68 (53.1%), and 32 (25%) respectively. The severity of obstructive sleep apnea was 9 (32.1%) in mild, 28 (41.2%) in moderate, and 27 (84.4%) in severe respectively. Based on body mass index (kg/m²), incidence of mild, moderate and severe cases in Group-I (Obese) and Group-II (non-obese) were 3 (2.3%), 20 (15.6%), and 41 (64.1%) and 26 (20.3%), 33 (25.8%), and 5 (3.9%) respectively.

Conclusion: Our study found that sleep-disordered breathing diagnosed in moderate and severe in COPD patients. Obstructive sleep apnea are more likely to develop in Obese COPD patients.

Keywords: Obstructive sleep apnea, COPD, Obesity

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is related to a number of comorbidities that contribute to various phenotypes, including increased mortality rates and decreased physical activity. Upon exposure to toxic gases, limitation of airflow by alveolar abnormalities and symptoms of persistent respiratory is characterized by preventable and treatable chronic obstructive pulmonary disease (COPD) [1]. Sleep arousals and hypoxemia at nighttime result from respiratory effort in airflow characterized by sleep disorder in Obstructive sleep apnea (OSA) [2]. Obstructive sleep apnea and chronic obstructive pulmonary disease co-existence as overlap syndrome was described by David Flenley 30 years ago exist in COPD obese patients with post-nocturnal oxygen therapy headache complain to detect the presence of OSA [3]. Patients with overlap syndrome have higher nocturnal oxygen desaturation (NOD), SpO₂ 90% (T90) sleep time, and obstructive sleep apnea poorer sleep quality. Cardiovascular morbidity increased with overlap syndrome, life-quality lower health, and higher medical cost [4-6].

Chronic obstructive pulmonary disease patients plays a significant role in pulmonary rehabilitation programs (PRPs). Chronic obstructive pulmonary disease and obstructive sleep apnea patients have a higher risk of morbidity and mortality [7]. The prevalence of mild chronic obstructive pulmonary disease and obstructive sleep apnea are 14% and 11% respectively [8]. Breathing, lungs function, and respiratory drive are affected adversely by sleep disorder. Hypercapnia and hypoxemia might be experience severely and lower the life quality and increased mortality [9]. The incidence of obstructive sleep apnea varies greatly due to various factors such as obstructive airway severity, diagnostic criteria, and concomitant comorbidities. A previous study conducted by Du W et al. found an 11% incidence of obstructive sleep apnea with an AHI threshold of 20 events/hours in airway obstruction severe patients [10]. The present study aim was to study was to evaluate the prevalence and predictors of OSA in patients with COPD who underwent an inpatient PRP.

METHODOLOGY

This prospective study was conducted on 250 obstructive pulmonary disease patients at the department of Medicine/ Pulmonology, Fauji Foundation Hospital, Rawalpindi and Avicenna hospital, Lahore from February 2021 to July 2021. Out of 250 patients, 128 patients were enrolled based on clinical examination, medical history, and pulmonary tests. Ethical approval was taken from the respective institutional ethical committees. Written informed consent was taken from all the patients. All the patients with sputum production, history of disease exposure and risk factors, chronic cough, and forced vital capacity with volume of post-bronchodilator forced expiratory presence in first capacity <70% were enrolled. Patients with thyroid dysfunction, decompensated heart failure, hepatic and renal impaired, Obstructive sleep apnea (OSA) caused by ENT, and acute COPD patients (forced vital capacity <30% or <50% anticipated were excluded. Based on BMI, COPD patients were categorized into two groups: Group-I had 64 obese patients of chronic obstructive pulmonary disease (BMI ≥ 29 kg/m²) and non-obese COPD patients (BMI ≤ 29 kg/m²) in Group-II. Physical examination, history, general investigation such as body mass index, oral examination, and ENT and chest examination was taken from all the patients.

Apnea patients had respiratory cessation at least 10 second, and breathing is considered by amplitude reduction from baseline during sleep and 4% oxygen desaturation reaches > 30%. The apnea-hypopnea index (AHI) is calculated by dividing the total sleep time by the absolute number of apneas and hypopneas. AHI cutoff levels include 5–15 episodes per hour for mild OSA, 15–30 episodes per hour for moderate OSA, and more than 30 episodes per hour for severe OSA. SPSS version 21 was used for data analysis. Frequencies and relative percentages were used to address qualitative data. The chi-square test was used to differentiate between qualitative variables. For non-parametric data, quantitative data were described in terms of median.

RESULTS

Of the total 128 COPD patients, male and female patients were 84 (65.6%) and 44 (34.4%) respectively. Out of 128 COPD patients, the incidence of mild, moderate, and severe COPD was 28 (21.9%), 68 (53.1%), and 32 (25%) respectively. The severity of obstructive sleep apnea was 9 (32.1%) in mild, 28 (41.2%) in moderate, and 27 (84.4%) in severe respectively. Based on body mass index (kg/m²), incidence of mild, moderate and severe cases in Group-I (Obese) and Group-II (non-obese) were 3 (2.3%), 20 (15.6%), and 41 (64.1%) and 26 (20.3%), 33 (25.8%), and 5 (3.9%) respectively. Gender distribution is shown in Figure-1. Figure-2 demonstrate the prevalence of mild, moderate, and severe COPD. Incidence of obstructive sleep apnea in COPD patients is shown in Figure-3. Incidence of obstructive sleep disorder in chronic obstructive pulmonary disease patients is shown in Table-I. Table-II shows the prevalence of mild, moderate, and severe COPD patients based on body mass index.

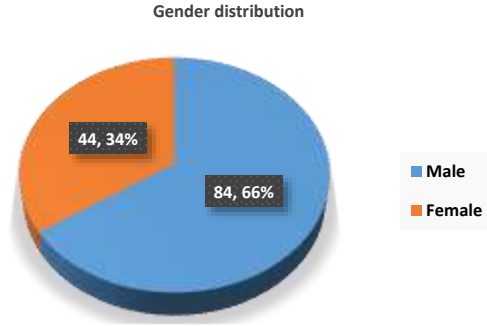


Figure 1: Gender distribution (n=128)

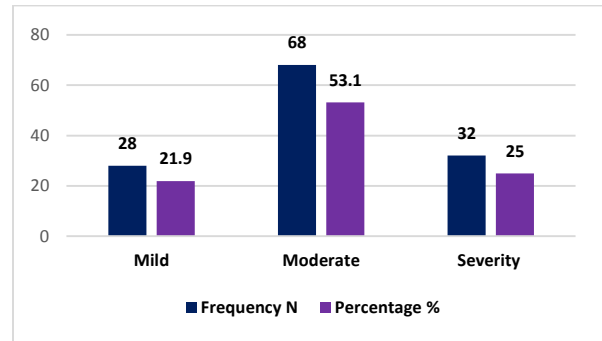


Figure 2: Prevalence of severity of COPD patients \

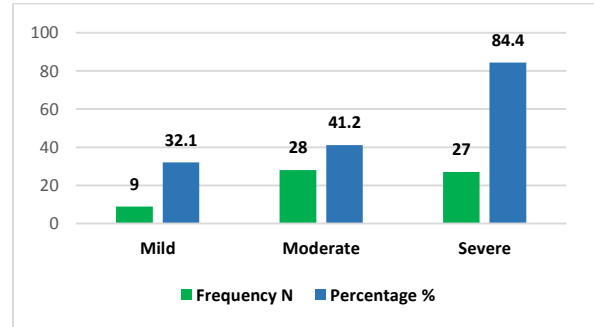


Figure 3: Incidence of obstructive sleep apnea among COPD patients

Table 1: Incidence of obstructive sleep disorders

Parameters	Frequency N	Percentage %	p-value
Mild (9)	4	44.4	<0.001
Moderate (28)	17	60.7	<0.001
Severe (27)	23	85.2	<0.001
Total (64)	44	68.8%	

Table 2: prevalence of mild, moderate, and severe COPD patients based on body mass index.

Parameters	Obese N (%)	Non-Obese N (%)	p-value
Mild	3 (2.3%)	26 (20.3%)	0.007
Moderate	20 (15.6%)	33 (25.8%),	0.007
Severe	41 (64.1%)	5 (3.9%)	0.007

DISCUSSION

The present study found that moderate and severe COPD patients had a higher diagnosis of sleep-disordered breathing. Obese COPD patients are also more likely to

develop OSA. Symptoms of nocturnal respiratory and sleep disorders caused in 75% chronic obstructive pulmonary disease patient's especially breathing, primary obstructive sleep apnea, sleep disorders, and their combination. The overlap syndrome refers to the coexistence of COPD and OSA, and while its occurrence is not higher than expected based on the occurrence of either disorder alone, or poor quality of sleep, and significant nocturnal hypoxemia. Sleep disturbance is estimated to affect 34 to 78% of COPD patients [11, 12].

General population are more susceptible to obstructive sleep apnea and chronic obstructive pulmonary disease. It pose a higher risk of morbidity and mortality. Clinicians should assess the results and the cardiovascular issues high risk associated with the overlap with caution [13]. In the current study, the study groups were matched in terms of age and gender distribution. Men are more likely than women to be obese or overweight. Obesity-related hormonal changes (increased leptin and insulin) and fat deposits in the upper respiratory tract also predispose to OSA [14].

A previous study conducted by Ustun B found that the majority of the elderly males' patients, and subjects with OS had significant increases in BMI, NC, and a greater smoking history, with more prevalent OSA among overweight subjects (75%) [15]. Similarly, Sun WL et al. concluded that overweight COPD patients with a BMI greater than 27 kg/m² were more likely to develop OSA [16].

BMI, as a marker, cannot distinguish between muscle tissue and body fat, which may have an impact on lung function [17]. Furthermore, compared to obese patients, non-obese patients of COPD had a higher FEV₁ without obstructive sleep apnea [18]. Similarly, Hu W et al. found that obese patients had substantially lower obstructive sleep compared to non-obese patients [19]. Patients with moderate to severe COPD had lower quality of sleep and life [20, 21].

Edwards et al. reported that patients with an ODI of more than 15/h had an increased weight and BMI [22]. Xie J et al., found that COPD patients had higher AHI with overlap syndrome than in patients without OSA [23]. Furthermore, Papachatzakis et al. discovered that patients with severe COPD were 4.39 times more susceptible to OSA than COPD patients of mild to moderate severity [24].

A previous study discovered that obstructive sleep apnea was present in almost 23 out of 30 patients. The incidence of normal and overweight patients was 17.33% and 82.6% respectively [25]. While other discovered a 52.8% pervasiveness of COPD patients with obstructive sleep apnea [26], others found an incidence of 64% and 66% in sensible to Spartan COPD. McMahon et al. discovered that about 58% COPD hypoxemia patients reached mild level without obstructive sleep apnea [27]. Obstructive sleep apnea was founded in 68% COPD patients ranging from 3% to 66% in different degrees of COPD [28]. The pulmonary artery pressure (PAP) in COPD patients was reported to resemble regardless of OSA presence. In addition, in a similar study [29], AHI did not correlate with PAP. A previous study found that obstructive sleep apnea independent factors were BMI, smoking index, and HC [30].

CONCLUSION

Our study found that sleep-disordered breathing diagnosed in moderate and severe in COPD patients. Obstructive sleep apnea are more likely to develop in Obese COPD patients.

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