



OBSTRUCTIVE SLEEP APNEA; FREQUENCY OF OBSTRUCTIVE SLEEP APNEA IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN A TEACHING HOSPITAL IN MULTAN.

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ABSTRACT... Obstructive sleep apnea (OSA) and chronic obstructive pulmonary disease (COPD) are two different diseases that may coexist within an individual and is known as overlap syndrome. Treatment of choice for overlap patients is CPAP along with supplemental oxygen for correction of upper airway obstructive episodes and hypoxemia during sleep, which is different from the treatment of COPD or OSA alone so detection of these cases is important for proper management of these patients. **Objectives:** To find out the frequency of obstructive sleep apnea in patients with COPD. **Study Design:** Cross section study. **Setting:** Department of Pulmonology Multan Medical and Dental College; Tertiary care hospital. **Period:** Six months from July to Dec 2017. **Materials & Methods:** 151 consecutive patients with diagnosed COPD attending our Pulmonology Outpatient Department and fulfilling the inclusion and exclusion criteria were included in the study. All the patients were asked questions from Berlin Sleep Questionnaire and categorized into high or low likelihood for having OSA. Overnight polysomnography was done in those with high likelihood to confirm the diagnosis of obstructive sleep apnea. **Results:** There were 151 patients. Males were 125 (82.8%) whereas females were 26 (17.2%). Mean age of all patients was 54.49 ± 10.33 years. Mean values for height and weight were 160.9 ± 1.05 cm and 62.33 ± 1.39 kg respectively. Mean BMI was 24.13 ± 5 . Mean for number of smoking pack years was 16.45 ± 7.22 . We found 16 patients (10.5%) to have OSA. **Conclusion:** Frequency of OSA in COPD patients is high and needs special attention while managing these patients. This can be achieved by routine use of screening questionnaires and by conducting polysomnography where indicated.

Key words: COPD, Obstructive Sleep Apnea, Overlap Syndrome, Polysomnography.

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of mortality in many countries.¹ Sleep related various respiratory disturbances including obstructive sleep apnea (OSA) are reported to be more prevalent in COPD patients.² Obstructive sleep apnea is clinically defined by frequent episodes of apneas and hypopneas with symptoms of daytime functional impairment like fatigue and hypersomnolence.³ Confident diagnosis of obstructive sleep apnea can be established by calculating Apnea Hypopnea Index (AHI) based on overnight polysomnography findings.⁴ However, high cost of the test, unavailability of the polysomnography equipment and lack of public awareness limit its widespread use.⁵ To overcome this problem,

various symptom based screening questionnaires have been developed to predict the likelihood of obstructive sleep apnea. The Berlin questionnaire has been validated to be used in the Western as well as Asian populations to identify patients at risk of having obstructive sleep apnea with a sensitivity of 86 percent and specificity of up to 95 percent.⁶ A possible association between COPD and OSA could be due to sleep related physiological changes in ventilatory control in both diseases and co-existence of common risk factors such as tobacco smoking.⁷ Furthermore, it has been found that co-existence of COPD and OSA leads to greater blood gas and pulmonary hemodynamic derangements than those in patients with COPD or OSA alone, so detection of OSA in COPD is of utmost importance for proper

management of these patients and to prevent morbidity and mortality. The reported prevalence of OSA in the general middle aged adults is 2-4%.² However, data regarding the prevalence of obstructive sleep apnea in patients with COPD reaches above 11%.⁸

OBJECTIVES

Objective of this study was to find out the frequency of obstructive sleep apnea in patients with COPD.

OPERATIONAL DEFINITIONS

Obstructive Sleep Apnea

Was defined according to the American Academy of Sleep Medicine recommendations as Apnea Hypopnea Index ≥ 5 on overnight polysomnography.

COPD

Was defined as chronic airflow limitation in a patient with history of exposure to smoke or other noxious particles or gases with FEV1/FVC < 70 on spirometry.

The Berlin Sleep Questionnaire

Was used to determine the occurrence of risk factors for OSA in three main categories namely snoring behavior, wake-time sleepiness or fatigue and the presence of obesity or hypertension.

Overnight Polysomnography

It was performed to detect Apnea / Hypopnea index which was defined as number of obstructive apneas and hypopneas occurring per hour during sleep. Apnea was defined as cessation of oro-nasal airflow for more than 10 seconds with continued respiratory efforts.

MATERIAL AND METHODS

Setting

Department of Pulmonology Multan Medical and Dental College; Tertiary care hospital of 600 beds.

Study Design

Cross sectional

Sample Size

151 patients with COPD attending outpatient pulmonology department Multan Medical and Dental College.

Inclusion Criteria

Both male and female patients of age ≥ 35 years with diagnosed COPD on the basis of spirometry were included in the study.

Exclusion Criteria

Patient with active tuberculosis, decompensated heart failure, chronic liver disease or chronic renal failure, Pregnancy or Unwillingness to participate in the study were excluded.

Data Collection Procedure

151 consecutive patients with diagnosed COPD (on history, physical examination, chest x-ray and spirometric measurements with FEV1/FVC < 70) attending the pulmonology outpatient department and fulfilling the inclusion and exclusion criteria were included in the study. Written informed consent was taken from the patients and permission from ethical committee of hospital was taken. Complete physical examination was done in all patients including blood pressure, weight and height. BMI was calculated for every patient. All the patients were asked questions from Berlin Sleep Questionnaire and the questionnaires were assessed by the researcher. On the basis of positive responses in the questionnaire patients were divided into low probability or high probability of having OSA. Those patients who had low probability were labeled to have no OSA whereas these patients with high probability if of OSA underwent overnight polysomnography by the researcher to confirm or refute the diagnosis of obstructive sleep apnea. Apnea hypopnea index > 5 on polysomnography was considered diagnostic for presence of OSA.

RESULTS

There were 151 patients with established diagnosis of COPD on clinical grounds and spirometry. Mean age of the patients was 54.49 ± 10.33 years ranging from a minimum of 35 years to a maximum of 81 years. Mean height of the patients was 160.9 ± 1.05 cm ranging from a minimum of

123cm to a maximum of 180cm. Mean weight was 62.33 ± 1.39 kg ranging from 37kg to 103kg. Mean BMI was 24.13 ± 5 ranging from 15.06 to 38.67. Mean for smoking pack years was 16.45 ± 7.22 ranging from a minimum of 7 to a maximum of 55 (Table-I). Males were 125 (82.8%) whereas females were 26 (17.2%) (Figure-1).

There were 16 patients (10.5%) found to have high likelihood of obstructive sleep apnea on Berlin sleep questionnaire and confirmed with polysomnography (Figure-2). There were 12 (75%) males and 4 (25%) females among them. The percentage of OSA in male patients with COPD was 9.6% (12/125), whereas that for females is 15.3% (4/26). Chi-square test was applied to see the statistically significant difference and P-value was found out to be 0.38 which is statistically non-significant.

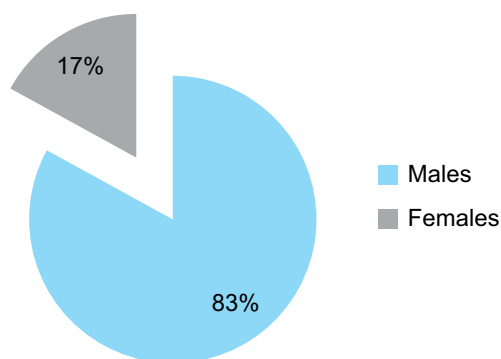


Figure-1. Percentage of male and female patients in the study population

There were 70 (46.3%) patients with BMI ≥ 24 and 15 (21.4%) had obstructive sleep apnea. On the other hand, out of 81 (53.6%) patients with BMI < 24 only 1 (1.23%) was having obstructive sleep apnea (Figure-3). The chi-square statistic was 16.1641 with a p-value of 0.000058. This result is statistically significant.

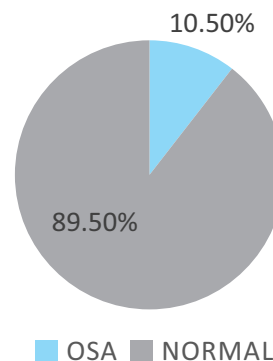


Figure-2. Percentage of OSA in COPD patients

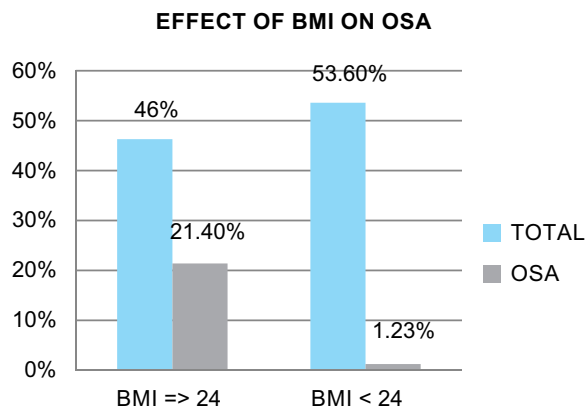


Figure-3. Effect of BMI on frequency of OSA

There were 95 (62.9%) patients with age ≥ 50 years and 10 (10.5%) were found to have OSA. Whereas there were 56 (37%) patients with age < 50 years and 6 (10.7%) patients were found to have obstructive sleep apnea (Figure-4). The chi-square statistic is 0.0013. The p-value is 0.97 which is not significant.

There were 73 (48.3%) patients with smoking ≥ 15 pack years and 12 (16.4%) of these were found to have OSA. While there were 78 (51.6%) patients with smoking < 15 pack years and only 4 (5.1%) were found to have obstructive sleep apnea (Figure-5). The chi-square test was applied

	Mean	Median	Mode	Range (Min. - Max.)
Age (Years)	54.49 ± 10.33	54	45	35 - 81
Height (cm)	160.99 ± 1.05	163.0	165	123 - 180
Weight (Kg)	62.33 ± 1.39	60	53	37-103
BMI (Kg/m ²)	24.13 ± 5	23.46	31.22	15.06- 38.67
Smoking Pack years	16.45 ± 7.22	14	12	7 -55

Table-I. Statistics of age, height, weight, BMI and smoking pack years

which was 5.0919. The p-value was 0.024 which is statistically significant.

Effect of age on frequency of OSA

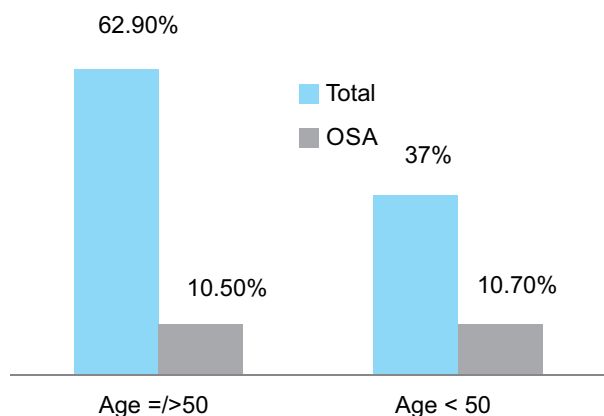


Figure-4. Effect of age on frequency of OSA

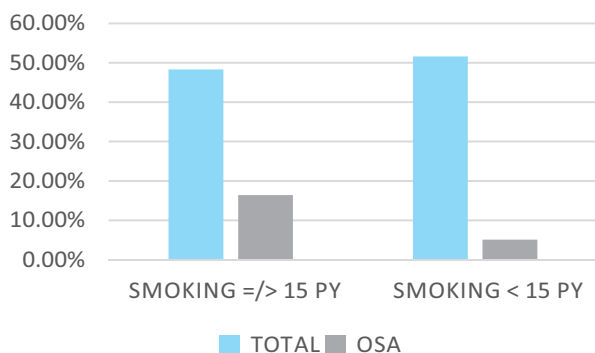


Figure-5. Effect of smoking on frequency of OSA

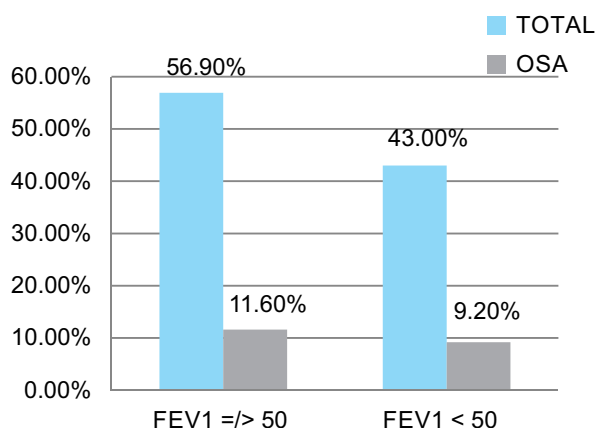


Figure-6. Effect of FEV1 on frequency of OSA

There were 86 (56.9%) patients with FEV1 > 50% and 10 (11.6%) were having OSA while there were 65 (43%) patients with FEV1 <50% and 6 (9.2%)

were found to be having obstructive sleep apnea (Graph 6). The chi-square statistic is 0.2246. The p-value is 0.635592 which is not significant.

DISCUSSION

Chronic obstructive pulmonary disease (COPD) and obstructive sleep apnea (OSA) represent two of the most prevalent chronic respiratory disorders in pulmonology practice and chances of cardiovascular diseases are increased by both of these independently. While COPD patients already tend to have a poor sleep quality due to alterations in ventilation and gas exchange during sleep,⁹ the coexistence of OSA which is referred to as the overlap syndrome leads to a more pronounced night time oxygen desaturation and hemodynamic disturbances which many occur with COPD or obstructive sleep apnea alone. This, in turn, leads to rapid development of pulmonary hypertension and earlier and severe cardiovascular morbidity.¹⁰ López-Acevedo reported that 10–20% of patients with OSA have co-existent COPD.¹¹ A more subtle form of overlap syndrome has been estimated to be present in 16.8% for GOLD 1 stage COPD patients with a borderline apnea hypopnea index of 5 episodes per hour.¹²

To understand the significance of detection of OSA in COPD patients, A Spanish study assessed the relationship of overlap syndrome to mortality and first time hospitalization due to COPD exacerbation and also examined the impact of continuous positive airway pressure (CPAP) therapy on major outcomes. It was identified that undetected OSA in COPD results in higher mortality and can result in more severe COPD exacerbation leading to hospitalization compared to patients with COPD alone.¹³ Another important recent Brazilian prospective cohort study evaluated the effect of CPAP treatment in overlap patients on the survival of hypoxemic COPD patients. It was detected that CPAP treatment was associated with a better survival in patients with moderate-to-severe OSAS and hypoxemic COPD.¹⁴

We studied 151 patients and found 16 patients (10.5%) to have obstructive sleep apnea

suspected on Berlin sleep questionnaire and confirmed with polysomnography. The worldwide prevalence of COPD is estimated to be about 12% (ranging from 2% to 22%). The reported prevalence of OSA in the western population is 2-4%.² In general population of Asia, OSA is estimated to be in the range of 2.1 to 7.5%.¹⁵ This suggests that frequency of OSA was higher in our study population of COPD patients than that seen in the general population. O'Brien and Whitman found the prevalence of OSA in COPD patients to be 11.9% while in another study it was found to be 9.3%.¹⁶ These figures are compatible with our study results. The frequency of OSA in male patients with COPD is 9.6% (12/125), whereas that for females is 15.3% (4/26). This suggests that female patients with COPD are more likely to have OSA than males. All these female patients with OSA were above 45 years of age and were likely to be post-menopausal. Female gender and hormonal changes associated with post-menopausal state are established etiologic and predisposing factors for the development of OSA¹⁷, which explains the relatively higher frequency of OSA among females in our study population.

In our study the frequency of OSAS in patients with BMI \geq 24 was 21.4% whereas it was only 1.23% in those with BMI $<$ 24. This finding was in concordance with the established fact that a higher BMI is strongly associated with development of OSAS which is documented in various studies.¹⁸ While assessing the effect of age the prevalence was 10.5% in those with age $>$ 50 years as compared to 10.7% in those with age $<$ 50 years but the difference was statistically non-significant. This relatively higher frequency in $<$ 50 years age group is partly explainable because majority of patients having OSA in this sub-group had a BMI $>$ 30 and were heavy smokers with $>$ 15 pack years of smoking. In patients with smoking \geq 15 pack years the prevalence of OSAS was 16.4% in comparison with 5.1% patients with OSAS in whom smoking was $<$ 15 pack years. This indicates the fact that a higher burden of smoking is also strongly linked to the development of OSA.¹⁹

CONCLUSION

Frequency of OSA is high in patients with COPD than in the general population. This signifies the need to use screening questionnaires in populations of COPD patients to detect those having OSA and provide them with appropriate diagnostic and therapeutic options to prevent catastrophic complications. Moreover a higher BMI and a higher burden of smoking are associated with increased risk of having OSA.

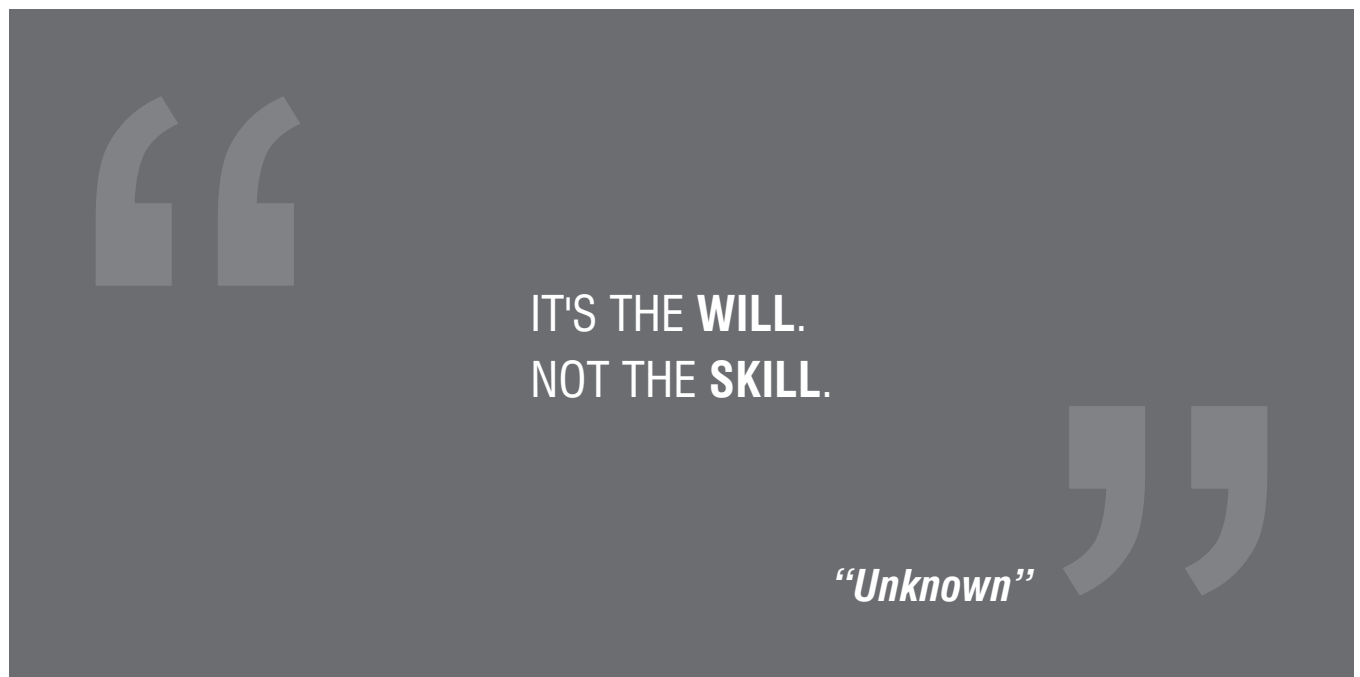
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