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Occurrence of Obstructive Sleep Apnea in Interstitial Lung Disease Patients

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ABSTRACT

Background: To assess Obstructive sleep apnea in interstitial lung disease patients. **Methods:** One hundred twelve patients of age groups >18 years of ILD of both genders were enrolled. Arterial blood gas (ABG) analyses, ECG, 6-min walk test; and spirometry to measure forced vital capacity (FVC), forced expiratory volume in first second (FEV1), and FEV1/FVC ratio was recorded. **Results:** ILD had cases of hypersensitivity pneumonitis seen in 21 males and 18 females, idiopathic pulmonary fibrosis in 14 males and 15 females, nonspecific interstitial pneumonia in 10 males and 8 females, connective tissue disease in 5 males and 4 females, sarcoidosis in 5 male and 2 females and respiratory bronchiolitis interstitial lung disease in 7 male and 3 female. A non- significant difference was seen (P> 0.05). Grading of OSA was no in 52, mild in 40, moderate in 13 and severe in 7 cases. FEV1 was 76.2% and 80.4%, FVC was 68.2% and 73.2%, FEV1/FVC was 89.3% and 85.4, PaO2 was 70.2 mm Hg and 60.1 mm Hg and 6 min walk distance was 288.5 meters in ILD with OSA patients and 340.2 in ILD without OSA patients. A non- significant difference was seen (P> 0.05). **Conclusion:** Obstructive sleep apnoea is a highly prevalent comorbidity in interstitial lung disease patients, hence a thorough assessment of respiratory system is required.

Keywords: Interstitial lung disease, Obstructive sleep apnoea, Sarcoidosis, connective tissue disease.

INTRODUCTION

Interstitial lung disease (ILD) constitutes a heterogeneous group of disorders that affect the alveolar capillary membrane and lung interstitium, thereby causing a diffusion impairment.[1] This leads to a chronic hypoxia and restrictive lung disease with ventilatory impairment.[2] They eventually culminate in pulmonary hypertension (PH), cor pulmonale, and respiratory failure.[3] Sufferers exhibit lung restriction and exercise intolerance, often developing progressive hypoxia over time.[4] Independent of the presence of daytime hypoxia, many individuals with ILD are observed to desaturate during sleep, with or without associated apnoea. Interstitial lung disease (ILD) is a chronic and restrictive lung disease with high morbidity and mortality.[5] It is associated with hypoxemia that progresses to respiratory failure, pulmonary hypertension, and death.[6]

Obstructive sleep apnea (OSA) is a subtype of SRBDs, which is characterized by a repetitive pattern of upper airway collapsibility, airflow obstruction, and resultant arousals. It is associated with repeated episodes of partial or full cessation of breathing during sleep, usually accompanied by oxyhemoglobin desaturation.[7] Obstructive sleep apnea (OSA) is estimated to occur in approximately 2–4 % of healthy adults. The morbidity and the mortality of OSA are high especially when it occurs concomitantly with other respiratory diseases.[8]

Earlier studies that were performed with small groups showed that the desaturation during sleep was mild and less severe in patients with ILD than in patients with chronic obstructive lung disease. Oxygen desaturations are unlikely to be of clinical importance in patients with ILD. Therefore, the frequency and significance of OSA in ILD are still unclear.[9] Considering this, the present study was started with the objective of assessing OSA in ILD patients.

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MATERIALS AND METHODS

One hundred twelve patients of age groups >18 years of ILD of both genders were enrolled. Ethical approval was obtained from ethical clearance committee. Enrolled patients gave their written consent for the participation of study.

Data such as a detailed sleep history and symptoms of OSA were taken. Snoring, its intensity, presence

of choking or witnessed breathing pauses, recurrent awakenings from sleep, excessive daytime sleepiness (Epworth Sleepiness Scale score), increased irritability, and lapses in concentration was recorded. Height; weight, BMI, neck, waist, and hip circumferences; and waist/hip ratio was recorded. Complete blood count; fasting sugar glucose, arterial blood gas (ABG) analyses, ECG, 6-min walk test; and spirometry to measure forced vital capacity (FVC), forced expiratory volume in first second (FEV1), and FEV1/FVC ratio was recorded. ESS score, SACS score, APNEIC score, STOP-Bang Scoring Model, and Berlin questionnaire was recorded. The polysomnography (PSG) was also measured. Results of the present study after recording all relevant data were subjected for statistical inferences using chi- square test. The level of significance was significant if p value is below 0.05 and highly significant if it is less than 0.01.

RESULTS

Table 1: Distribution of interstitial lung disease

ILD	Male	Female	P value
Hypersensitivity pneumonitis	21	18	>0.05
Idiopathic pulmonary fibrosis	14	15	>0.05
Nonspecific interstitial pneumonia	10	8	>0.05
Connective tissue disease	5	4	>0.05
Sarcoidosis	5	2	>0.05
Respiratory bronchiolitis interstitial lung disease	7	3	<0.05
Total	62	50	

Table 2: Grading of obstructive sleep apnea

Grading	Number	P value
No (0-5)	52	<0.05
Mild (6-15)	40	
Moderate (16-30)	13	
Severe (>30)	7	

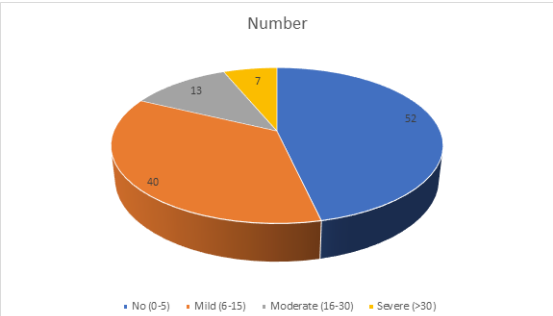

Figure 1: Grading of obstructive sleep apnea

ILD had cases of hypersensitivity pneumonitis seen in 21 males and 18 females, idiopathic pulmonary fibrosis in 14 males and 15 females, nonspecific interstitial pneumonia in 10 males and 8 females, connective tissue disease in 5 males and 4 females, sarcoidosis in 5 male and 2 females and respiratory bronchiolitis interstitial lung disease in 7 male and 3 female. A non- significant difference was seen (P> 0.05) [Table 1].

Grading of OSA was no in 52, mild in 40, moderate in 13 and severe in 7 cases. A significant difference was seen (P< 0.05) [Table 2, Figure 1].

Table 3: Comparison of various parameters in ILD patients with and without OSA

SDB	ILD with OSA	ILD without OSA	P value
FEV1	76.2	80.4	>0.05
FVC	68.2	73.2	>0.05
FEV1/FVC	89.3	85.4	>0.05
PaO2 (mm Hg)	70.2	60.1	>0.05
6 min walk distance (meters)	288.5	340.2	>0.05

FEV1 was 76.2% and 80.4%, FVC was 68.2% and 73.2%, FEV1/FVC was 89.3% and 85.4, PaO2 was 70.2 mm Hg and 60.1 mm Hg and 6 min walk distance was 288.5 meters in ILD with OSA patients and 340.2 in ILD without OSA patients. A non- significant difference was seen (P> 0.05) [Table 3].

DISCUSSION

Interstitial lung diseases (ILDs) are a group of heterogeneous disorders characterised by varying degrees of fibrosis and inflammation of lung parenchyma. Overall incidence and prevalence (per 100,000 population/year) of ILD has been observed to be 31.5, 80.9 in males and 26.1 and 67.2 in females, respectively. ILDs are also common in India with regional variation.[10] Due to chronic nature of ILD, these patients often have associated co-morbidities that add to the symptom burden and affect the quality of-life (QoL) of these patients. These include gastro-oesophageal reflux, pulmonary hypertension, cor pulmonale and depression.[11] Recent evidence has shown that obstructive sleep apnoea (OSA) has also been associated with ILD. Obstructive sleep apnoea is a type of sleep disordered breathing characterised by repeated episodes of apnoea and hypopnoea during sleep due to narrowing or occlusion of the upper airway.[12] The present study was started with the objective of assessing OSA in ILD patients.

Our study comprised of 112 patients with ILD in which 62 were males and 50 were females. Pihtili et al,[13] analyzed the relationship between polysomnography (PSG) findings and pulmonary function, disease severity, parenchymal involvement, and Epworth Sleepiness Scale (ESS) scores in ILD patients. The disease severity was assessed using an index consisting of body mass index (BMI), carbon monoxide diffusion capacity, the Modified Medical Research Council dyspnea scale, and the 6-min walking distance. All of the patients had lung function, chest X-ray, PSG, ESS

scoring, and an upper airway examination. Of 62 patients, 50 patients comprised the study group (14 male, 36 female; mean age 54 ± 12.35 years, mean BMI 25.9 ± 3.44 kg/m(2) with diagnoses of idiopathic pulmonary fibrosis (IPF; n = 17), stage II-III sarcoidosis (n = 15), or scleroderma (n = 18). The frequency of OSA was 68 %. The mean apnea-hypopnea index (AHI) was 11.4 ± 12.5. OSA was more common in IPF patients (p = 0.009). The frequency of rapid eye movement-related sleep apnea was 52.9 %. The frequency of OSA was higher in patients with a disease severity index ≥3 (p = 0.04). The oxygen desaturation index and the AHI were higher in patients with diffuse radiological involvement (p = 0.007 and p = 0.043, respectively).

Hypothesis for the development of OSA in ILD is the ventilatory control system instability that results in over-sensitive/over-responsiveness of the chemoreceptor circuits involving medulla leading to hypocapnia.[14] The low partial pressure of carbon dioxide (PaCO2) level results in apnoea and this cycle repeats as the centre attempts for homeostasis. Intermittent hypoxaemia in ILD may be an explanation for over-stimulation of chemo responsiveness and ventilatory control instability. Apart from the development of OSA in ILD patients, a recent study20 has also proposed OSA to be a risk factor for ILD. Cyclic hypoxia reoxygenation with intermittent breathing and cyclic alveolar deformation in OSA are the proposed mechanisms for the development of ILD.[15]

We observed that ILD consisted of pneumonitis seen in 21 males and 18 females, idiopathic pulmonary fibrosis in 14 males and 15 females, nonspecific interstitial pneumonia in 10 males and 8 females, connective tissue disease in 5 males and 4 females, sarcoidosis in 5 male and 2 females and respiratory bronchiolitis interstitial lung disease in 7 male and 3 female. Aydogdu et al,[16] included different diagnoses of ILD such as IPF (n=18), sarcoidosis (n=7), and other interstitial lung diseases (n=12) in small numbers, and they reported an OSA diagnosis rate of 64.8 % in ILD patients and also compared the PSG findings from patients with IPF and a mixed group of different ILDs. There were only seven patients with sarcoidosis in their population, but there were no patients with scleroderma. They did not find any differences in the PSG data between IPF and the other diagnoses.

We observed that Grading of OSA was no in 52, mild in 40, moderate in 13 and severe in 7 cases. FEV1 was 76.2% and 80.4%, FVC was 68.2% and 73.2%, FEV1/FVC was 89.3% and 85.4, PaO2 was 70.2 mm Hg and 60.1 mm Hg and 6 min walk distance was 288.5 meters in ILD with OSA patients and 340.2 in ILD without OSA patients. Krishnan et al,[17] reported excessive daytime sleepiness and worse sleep efficiency in IPF patients. However, they did not confirm this finding by PSG.

CONCLUSION

It was seen that Obstructive sleep apnoea is a highly prevalent comorbidity in interstitial lung disease patients, hence a thorough assessment of respiratory system is required.

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