Original Article

Risk factors for development of obstructive sleep apnea in patients with obstructive airway disease

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Abstract

Background: The association of obstructive airway disease (OAD) and OSA, which are both frequent diseases, is likely to occur in a number of patients. A high prevalence of OSA has been reported in asthma and COPD cases. Many factors can increase the vulnerability of sleep apnea include age, male sex, obesity and smoking. This study was undertaken to emphasize risk factors that can increase the index of suspicion and encourage physicians to investigate possible OSA to avoid its consequences. **Material and Methods:** The present study was included 114 patients of COPD, bronchial asthma and obstructive sleep apnea. Patients after history, clinical examination and spirometry with post bronchodilator reversibility were categorized into bronchial asthma and COPD. Subsequently, polysomnography was done of these patients to find out presence of OSA. **Results:** Majority of patients having COPD were in the age group of 45-54 years and 55-64 years. Most of the patients were males, obese and smokers. **Discussion:** Population risk factors that were observed for the development of OSA were middle to elderly age (>45 years), male sex, obesity, smoking, anatomical (retrognathia) and ear nose throat (ENT) pathologies (nasal polyps, supraglottic mass).
Key Words: Obstructive airway disease, Obstructive sleep apnea, risk factors.

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INTRODUCTION

Obstructive sleep apnea (OSA) is a potentially disabling condition characterized by disruptive snoring, repeated episodes of complete or partial pharyngeal obstruction during sleep resulting in nocturnal hypoxemia, frequent arousals and excessive day time sleepiness[1]. Recognized as a separate clinical entity nearly 35 years ago, OSA still remains a substantial but frequently ignored public health threat. Prevalence of obstructive sleep apnea (OSA) varies in different population. In most of the studies it varies from 3-7% [2]. In India prevalence of obstructive sleep apnea is 7.5% in males and that of 4.5% in females[3]. The association of obstructive airway disease (OAD) and OSA, which are both frequent diseases, is likely to occur in a number of patients. Individuals with OAD also tend to have a short and disturbed sleep. A high prevalence of OSA has been reported in asthma cases[3], and asthma may also be common in OSA[4]. Several reports concluded that OSA may contribute to asthma symptoms and severity and OSA prevalence increases with asthma severity[5]. Factors that increase vulnerability of sleep apnea include age, male sex, obesity, family history, craniofacial abnormalities and certain health behaviors such as alcohol abuse and smoking[2]. OSA is a leading public health problem in developed and developing nations. However, awareness regarding diagnostic options, management and consequences of untreated OSA remains inadequate in developing nation. Untreated OSA leads to excessive daytime sleepiness, diminished performance and overall poor quality of life. This study was undertaken to emphasize risk factors that can increase the index of suspicion and encourage physicians to investigate possible OSA to avoid its consequences.

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MATERIAL AND METHODS

The present study was included 114 patients of COPD, bronchial asthma and obstructive sleep apnea who satisfied all the inclusion criteria attending Department of Medicine of a tertiary care hospital. All patients of COPD and bronchial asthma diagnosed as per guidelines and those fulfilling the criteria for diagnosis of obstructive sleep apnea were included in the study. Patients after clinical examination and spirometry with post bronchodilator reversibility were categorized into bronchial asthma and COPD. Subsequently, polysomnography was done of these patients to find out presence of OSA. Patients under 13 years of age having chronic lung diseases not satisfying guidelines for diagnosis of COPD, bronchial asthma and OSA, patients admitted with life threatening conditions like acute respiratory failure, critical metabolic acidosis, altered sensorium, hypotension, left ventricular failure and with Acute exacerbation of COPD/bronchial asthma, acute myocardial infarction and acute stroke were excluded from the study. All the patients were interviewed for demographic data and detail history of their illness. All selected patients were subjected to detail physical examination. In all patients, baseline spirometry was done with computerized Medgraphics Spirometer[6]. Asthma was diagnosed on the basis of Global Initiative for Asthma guidelines (GINA)[7]. Diagnosis of COPD was based on Global Initiative for obstructive lung Disease guidelines[8].

RESULTS

Majority of patients having COPD were in the age group of 45-54 years and 55-64 years, 44.87% and 25.64% respectively. Majority of patients having bronchial asthma were in the age group of 35-44 years 44.40%.Amongst COPD patients 59 (75.64%) were males and 19 (24.35%) were females, male to female ratio in COPD was 3.10:1.Amongst patients with asthma 21(58.33%) were males and 15(41.66%) were females, with male to female ratio of 1.4:1.In the total study population of 114 patients 80 (70.17%) were males and 34(29.82%) were females. 63 (80.76%) amongst 78 patients with COPD were smokers and 15(19.23%) were non-smokers, smokers to non-smokers ratio was 4.2:1.In asthma 13 (36.11%) patients were smokers and 23 (63.89%)patients were non-smokers. In the COPD patients bidi smoking was more common 60 (95.23%) than cigarette smoking 3 (5.26%). Body mass index was normal [18.5-24.99] in 58 (50.88%) patients, 24 (21.05) patients were overweight [25-29.99] amongst this group, obesity (BMI >30) was found in 32 (28.05%) patients having COPD and bronchial asthma. Amongst patients with COPD, 12 (15.38%) had mild COPD, 30(38.46%) had moderate COPD, 26 (33.33%) had severe COPD and 10(12.82%) patients had very severe COPD.36.11% and 33.33% that is 13 and 12 out of 36 patients had moderate and severe asthma respectively. Again 16.67% and 13.89% that is 6 and 5patients had mild persistent and intermittent asthma respectively.22 (28.21%) patients of COPD were found to have obstructive sleep apnea and 12 (33.33%) patients had obstructive sleep apnea. Among 34 patients of OSA 27 patients (79.41%) were in the age group of more than 45 years suggesting that OSA is more prevalent in middle and elderly patients of the study population. Among patients with obstructive sleep apnea 26 patients (76.47%) were male and 08 patients (23.53%) were female. Male to female ratio 3.25: 1. Out of 34 patients of OSA 22(64.71%) were smokers of which 19patients had COPD and 3 had bronchial asthma. 12 (35.29%) patients were nonsmokers. Out of 34 patients of obstructive sleep apnea 27 patients (79.41%)had mild to severe obesity, 05 patients (14.70%) were overweight and only02 patients (5.88%) were having normal body mass index. It was observed that obesity is major risk factor for the development of obstructive sleepapnea in the study population. Correlation coefficient was 0.469 showing linear correlation of severity of OSA and obesity. Out of 22 patients of obstructive sleep apnea 13 (59.09%) patients had severe COPD, 06 (27.27%) patients had moderate COPD and 03(13.64%) patients had very severe COPD. Out of 12 patients of obstructive sleep apnea 07 (58.33%) had severe asthma, 03 patients (25%) had moderate asthma and 02 patients (16.67%) had mild asthma. This suggest that severity of asthma is one of the predictor of severity of OSA in patients of bronchial asthma. It was also observed that in patients having severe OSA, 10 out 12patients had more severe grade of bronchial asthma. FEV1 <80%.Correlation coefficient was 0.676 as calculated with scatter diagram showed linear correlation with the severity of OSA and that of bronchialasthma.

Table 1: Risk factors for development of OSA

Risk factor	COPD with OSA (n=22)	Asthma with OSA (n=12)	Total (n=34)
Age >45 yrs	21	06	27 (79.41%)
Male sex	17	09	26 (76.47%)
Obesity	17	10	27 (79.41%)
Smoking	19	03	22(64.71%)
Nasal polyp	00	01	01 (2.94%)
Retrognathia	00	01	01(2.94%)
Supraglottic mass	01	00	01(2.94%)

In the present study, population risk factors that were observed for the development of OSA were middle to elderly age (>45 years), male sex, obesity, smoking,

anatomical (retrognathia) and ear nose throat (ENT) pathologies(nasal polyps, supraglottic mass).

DISCUSSION

A total of 114 patients attending outpatient department and indoor patients of a tertiary care hospital were studied. All the patients included in the study were subjected to detail history, physical examination, routine and specific investigations. In the present study, patients having COPD were more 78 (68.42%) than that of bronchial asthma (31.58%). In similar studies done by Seemungal *et al* observed that patients having COPD were more in number (62.97%) than bronchial asthma (37.08%) [9].In another study done by Gothi *et al*, 169 (63%) had asthma, 46 (17%) had COPD, 15 (6%) had bronchiectasis, 36 (13%) obliterative bronchiolitis and 2 (1%) suffered from occupational airway disease[10]. The prevalence of OSA increases with age, with a 2- to 3-fold higher prevalence in older persons compared with those in middle age. The associations of OSA with hypertension, sleepiness, and cognitive dysfunction are weaker in older versus middle-aged persons. The mean age of the patients with COPD was 53.98 years and that of asthma patients was 37.33 years in present study. Gothi *et al*found that mean age of COPD patients was 54 years and that of asthma was 38 years[10]. In the study done by Seemungal *et al*, mean age of COPD patients was 60.3 years and that of asthma was 47.8 years[9]. Mean age of the patients with COPD and asthma in present study correlates with Gothi *et al* study[10]. In the present study, majority of the COPD and asthma patients were males. Comparison of the male to female ratio in OSA patient indicates that women with OSA are less likely to be evaluated and diagnosed[4]. Few studies suggest that OSA in women may be diagnosed late in the course of the disease or may not be aggressively treated[11]. Awareness of OSA prevalence in women has increased, but a greater understanding of sex differences in etiology, presentation and clinical management of OSA is needed. In the study done by Jindal *et al* in COPD patients, male to female ratio was 1.56:1[12]. In another study done by Mathur *et al*, male to female ratio was 1.6:1[13]. Findings in the present study correlate with above mentioned studies in which male were more than female both in COPD as well as in bronchial asthma. Obesity, a risk factor for OSA has reached epidemic proportions in India and rest of the world in 21st century. COPD and bronchial asthma are common clinical problems. Prevalence of overlap syndrome that is association of COPD and OSA and bronchial asthma patients having OSA is also on rise and we intended to study it along with the risk factors responsible in the present study population. In the present study, patients having COPD were more 78 (68.42%) than that of bronchial asthma (31.58%).Morbid obesity is common in OSA patient populations. There is a graded increase in OSA prevalence with increasing body mass index. There is strong evidence that excess weight is a causal factor in OSA. In a Wisconsin cohort with a 4-year follow-up, a 10% increase in weight was associated with a 6-fold greater risk of developing OSA among persons initially free of OSA[14]. Smoking is a possible risk factor for OSA the hypothesized mechanisms for a role of smoking in OSA include airway inflammation and smoking-related disease, as well as effects of declining blood nicotine levels on sleep stability. In the Wisconsin cohort[15], current smokers were 3 times more likely to have OSA than were former or never smokers. Because there was no increase in OSA for former smokers, it is likely that if smoking does contribute to increased OSA, the effect is reversible with smoking cessation. In the present study, 63 (80.77%) amongst78 patients of COPD were smokers and 15 (19.23%) were nonsmokers, with smokers: non-smokers ratio of 4.2:1. Amongst non-smokers in patients with COPD, chullah smoke exposure seen in 10 (12.82%) patients and oldpulmonary tuberculosis seen in 5 (6.41%) patients, were the causes. These results are comparable with the study done by Gothi *et al*[10], Shah *et al*[16], 37 in which 98% of COPD patients were smokers. Nasal congestion at night, whether due to nasal polyp, allergic rhinitis or anatomy has been linked to snoring and OSA in both experimental and epidemiological studies[17]. In the patients who were non obese one patient was having supraglottic mass and the another one was having retrognathia. One patient among overweight group was having nasal polyps. In the present study it was observed that age >45 years, male sex, obesity, smoking, nasal polyps, supraglottic mass and retrognathia were the risk factors associated with development of OSA in patients with COPD and bronchial asthma. Similar risk factors were observed for the development of obstructive sleep apnea in general population[1]. This study emphasizes the risk factors that will increase the index of suspicion and encourage physicians to investigate possible OSA.

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