ORIGINAL ARTICLE

FREQUENCY OF UNDIAGNOSED CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN PATIENTS WITH CORONARY ARTERY DISEASE

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Background: Chronic obstructive airway disease (COPD) is considered as risk factor for coronary artery disease (CAD) along with other risk factors. This study was conducted to determine the frequency of undiagnosed chronic obstructive pulmonary disease in patients with coronary artery disease. **Methods:** This cross-sectional study was conducted in the Pulmonology and Cardiology wards/OPD's of Khyber Teaching Hospital Peshawar. Patients more than 35 years of age, diagnosed with CAD of either gender were included. Patients already diagnosed with COPD, recent myocardial infarction (within 7 days), left ventricular impairment, pneumothorax, bronchiectasis, comatose patient, asthmatic and those with chest trauma were excluded. All the patients underwent spirometry examination before and after administration of salbutamol (5 mg for 5 minutes) via nebulizer. FEV1/FVC less than 70% confirmed the presence of COPD. **Results:** Out of 151 patients, 57 (37.7%) were found to have COPD. Among them, 39 (68.42%) were male and 18 (31.57%) were female. Among male patients with COPD, 82.05% (n=32) were smokers and 17.94% (n=7) were nonsmokers while in females with COPD no one was smoker. **Conclusion:** COPD is an under-diagnosed progressive disease in patients with high risk patients with coronary artery disease.

Keywords: Chronic Obstructive Airway Disease; Coronary Artery Disease
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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a respiratory disease that is characterized by airflow obstruction that is persistent, progressive in nature and not fully reversible.[1] It is associated with an increased chronic inflammatory response in the airways and the lungs that occurs in response to noxious particles/gases.[2]

Coronary artery disease (CAD) is a chronic disease which is characterized pathologically by the presence of atherosclerotic plaques in the coronary arteries and clinically manifested by stable angina, acute coronary artery syndromes or sudden cardiac death. It is a major cause of mortality and morbidity throughout the world. According to WHO 3.8 million men and 3.4 million women die each year from ischemic heart disease worldwide. It is also regarded as leading cause of mortality in indopak subcontinent. Shahid Abbas et al have shown that the prevalence of CAD in Pakistan is 6.25%.[3]

According to WHO, in 2002, COPD was the 5th leading cause of death throughout the world and predicted that it would be the third most common by 2030.[4] In Pakistan, COPD mortality rate is estimated to be 71 deaths per 100,000, which is the fourth highest rate among the 25 most populous nations in the world.[5] Global prevalence of COPD ranges from 4 to 10% in general population over age 40 years.[6]

The major risk factors for CAD are smoking, diabetes, hypertension, hyperlipidemia, biomass burn exposure. Also, smoking is the most common risk factor for COPD.[7] Other factors include air pollution, occupational dusts and chemicals when sufficiently exposed.[8] In addition, it has been suggested that the risk of CAD is further augmented in those smokers who have developed COPD.[9] Thus, there may be a high prevalence of COPD and CAD together in the same patient. However, the exact prevalence of COPD in patients with CAD is not known. Further, whether COPD is adequately diagnosed and treated in patients with CAD has not been investigated before in our setup. Few international studies have assessed such a relationship. Joan et al. has demonstrated a prevalence of 33.6% of COPD in CAD patients.[10] Roversi in another study demonstrated prevalence of 26–35% COPD in CAD patients.[11]

The purpose of this study is to determine the frequency of undiagnosed COPD in CAD patients. Diagnosis of COPD in CAD patients will result in timely treatment of this important comorbidity.

MATERIAL AND METHODS

This cross-sectional study was conducted in the Pulmonology and Cardiology wards/OPD, Khyber Teaching Hospital Peshawar, Pakistan from 01-10-2014 to 30-03-2015. A total of 151 patients were include through consecutive, non-probability

sampling technique. The sample size was calculated using the WHO software for sample size determination in health studies with the assumptions of 25%[11] proportion of COPD in patients with coronary artery disease, 95% confidence interval and 7% margin of error. Patients more than 35 years of age, diagnosed with CAD of either gender were included. Patients already diagnosed with COPD, recent myocardial infarction (within 7 days), left ventricular impairment, pneumothorax, bronchiectasis, comatose patient, asthmatic and those with chest trauma were excluded.

Patients who were diagnosed with CAD (on the basis of ECG and echocardiography findings) presenting to pulmonology/cardiology wards/OPD were enrolled as per criteria after taking a written informed consent. Spirometry was done with MIR Spiro lab machine in the laboratory of Khyber Teaching Hospital Peshawar by a trained technician. All spirometries were performed in standing position. Patients were encouraged for forceful and prolonged expiration after forceful inhalation. Spirometry was done before and after administration of salbutamol (5mg for 5 minutes) via nebulizer. FEV1/FVC less than 70% confirmed the presence of COPD.

Statistical analyses were carried out with SPSS-15. Frequencies and percentages were calculated for categorical variables like gender, COPD. Mean±standard deviation (SD) were calculated for continuous variables like age.

RESULTS

Out of 151 patients 84 (55.6 %) were male and 67 (44.4%) were females. Mean age of the study population was 56.97±12.08 years. There are 54 (35.8%) patients in age group 35–50, 61 (40.4%) patients in age group 51–65, 33 (21.9%) patients in age group 66–80 and 3 (2%) patients in age group >80 years.

Out of 151 patients, 57 (37.7%) were found to have COPD while 94(62.3%) were not having COPD. Among the 57 patients found to have COPD, 39 (68.42%) were male and 18 (31.57%) were female. Maximum number of COPD patients were in age group between 66–80 years. Mean pre and post bronchodilator values of FEV1 in COPD patients were 57.65 and 59.82 respectively. COPD severity was classified on the basis of GOLD criteria distributed as: 7 patients (12.28%) were in grade 1 (FEV1 >80%), 27 patients (47.36%) were in grade 2 (FEV1 <80 and >50), 18 patients (31.57%) were in grade 3 (FEV1 <50 and >30) and 5 patients (8.77%) were in grade 4 (FEV1<30%) of COPD. Among male patients with COPD, 32 (82.05%) were smokers. All female patients with COPD (n=18) were non-smokers.

DISCUSSION

Chronic obstructive airway disease is a disease that is characterized by chronic airflow limitation. Coronary artery disease is characterized by atherosclerotic plaque resulting in angina and myocardial infarction. Studies have shown that there is an association between these two diseases. Smoking is the most common risk factor between these two.[12,13] The coexistence of smoking has been shown to be as high as 30% or even higher.[14]

It has been suggested that risk of cardiovascular disease is augmented in those smokers who had COPD[15] and also that COPD may be an independent risk factor in the development of cardiovascular disease[16]. The pathogenetic mechanism is not fully understood but it is suggested that there is low grade chronic inflammation[9,18] that affects both lungs and cardiovascular endothelial cells and is associated with development of atherosclerosis[19]. This association is most likely a multi factorial process that interacts in an intricate manner with a complex background of age related tissue modifications, genetic determinants and environmental stimuli.[11]

C-reactive protein is thought to be the key mediator of this sustained inflammation that not only maintain bronchial constriction in COPD but also increases the risk of coronary artery disease.[21,22] Non-smokers can also have both of these conditions together. This can be explained by exposure to biomass burn[23] that is the leading cause of COPD development especially in women[24].

Although active smoking is the most common factor involved in the pathogenesis of chronic inflammation in the airways responsible for development of COPD, exposure to passive smoke, chemical agents, occupational exposure can also result in the development of COPD through the same mechanism.[25,26] Alpha-1 antitrypsin deficiency that is encoded by SERPINA1 gene[27] is also associated with a small number of patients with COPD.

In our study the frequency of COPD in patients with coronary artery disease is found to be 37.7%. Our study results are closer to those of Joan *et al*[10] (33.6%). and Roversi[11] (25–35%). COPD was found to be more prevalent in male (68.42%) than in female (31.57%) patients with coronary artery disease. This may be because smoking is most important factor for the development of COPD[30] and is more common in males than in females.

Our study shows that a greater percentage of patients with coronary artery disease were having airflow limitation compatible with COPD. This unfortunate finding of undiagnosed COPD may be explained by the similarity in symptoms (cough and

dyspnea) of ischemic heart disease and COPD and smoking, commonly shared risk factor.[31] It becomes clinically relevant as COPD is now considered as preventable and treatable disease.[32,33]

A study done in rural Sindh showed the prevalence of COPD in patients with respiratory symptoms to be 28.57% that is less than the prevalence of COPD in coronary artery disease patients.[34]

According to The BREATHE Study conducted in 11 countries (Pakistan, UAE, Algeria, Lebanon, Jordan, Egypt, Saudi Arabia, Morocco, Syria, Tunisia, Turkey) the overall prevalence of COPD was 3.6%. In Pakistan, specifically it was 2.1% in people above age 40. This number increases with age. According to NHSP (National Health Survey of Pakistan) 1990–1994 the prevalence of chronic bronchitis in rural areas is 6% and 14% in male and female respectively[5] and in urban population this number is 9% among both genders. This shows that prevalence of COPD is more in patients with coronary artery disease as compared to general population in Pakistan.

Our study has few limitations for its cross-sectional design failing to assess causal relationship between COPD and CAD. Moreover, the data is from one hospital only.

CONCLUSION

Chronic obstructive airway disease is an under-diagnosed progressive disease. There is an urgent need for national awareness and screening for early diagnosis of COPD in people at risk like CAD patients. Further multi-centric prospective studies should be done in order to determine the exact prevalence of COPD in coronary artery disease patients, to know the causal relationship and explain the pathogenesis of the co-existence of the two conditions in depth. If a significant relationship is established, the guidelines should be re-evaluated to treat and manage this important co-morbidity.

AUTHORS' CONTRIBUTION

RU: Abstract writing, concept of study, study design, data collection, writing results, discussion, data analysis. SS: Writing introduction, discussion, references writing. TG: Abstract writing, data analysis, writing conclusion. RM: Wring conclusion, data collection. IK: Discussion, data analysis, writing conclusion, final review.

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