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Study the Incidence and Clinical Profile of Coronary Artery Disease among Chronic Obstructive Pulmonary Disease Cases

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Abstract: ***Background: Chronic obstructive pulmonary disease (COPD) and coronary artery disease. Share several etiopathogenic factors and increases risk of mortality and morbidity. Coexistence of both diseases is very common and has diagnostic, therapeutic, and prognostic implications. Study was carried to find incidence and clinical profile of coronary artery disease among COPD Cases. Material and method: Cross sectional study was carried out for duration of two years in medicine department of tertiary care hospital using semi structured pre validated questionnaire and with help of laboratory investigation to confirm diagnosis. Results: Incidence of CAD was 22.3%. Incidence of CAD was more among elderly with male predominance. Out of 63 cases 53(84.1%) cases had positive history of smoking. Mean duration of years of smoking was19.28 ± 4.91 (10 - 27) and incidence increased with years of smoking CAD cases were more among severe (5/17=29.4%) and Very severe COPD cases (6/11=54.5%) than mild and moderate one. Conclusion: Incidence of CAD in COPD was more with increasing years of smoking and grades of COPD.***

Keywords: CAD, Clinical profile, COPD, Incidence

1. Introduction

Chronic Obstructive Pulmonary Disease (COPD), a common preventable and treatable disease is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patients. [1]

COPD is now recognized to be a condition that has an impact on other organs, the so-called systemic effects and comorbidities of COPD. [2]

Ischemic heart disease is one of the main causes of mortality in COPD. [3] Coexistence of both diseases is very common and has diagnostic, therapeutic, and prognostic implications.[4]Chronic bronchitis alone increases the risk of coronary deaths by 50%. In more advanced COPD, cardiovascular diseases account for 20-25% of all deaths.[5]

Left ventricular diastolic dysfunction (LVDD) is a common co-phenomenon in COPD.[6]Abnormal left ventricular function is seen in COPD due to many factors such as hypoxia, acidosis, ventricular interdependence, lung hyperinflation, and distension. COR-P usually has a slow and chronic progression, but acute onset and life-threatening complications can occur.[7]It has been studied that echocardiography measured pulmonary arterial pressure closely correlates with pressure measured by right heart catheterization. [8]

With this background, the present research was conducted to study the incidence and severity of CAD (Coronary Artery Disease) in COPD (Chronic Obstructive Pulmonary Disease) patients.

2. Material and Methods

Present study was a descriptive cross sectional study for duration of two years (Oct 2016-Sept 2018) on randomly selected cases of chronic obstructive pulmonary disease coming to the Medicine department of Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune. A total of 63 cases of chronic obstructive pulmonary disease who attend the Medicine department were included in the study above the age of 12years. Cases age more than 80 years ,Chronic kidney disease, Thyroid disease , Severe anemia , Severely immunocompromised patients , Previous history of CAD who has undergone CABG or PTCA and Those who did not give consent for the study were excluded from study.

A predesigned semi-structured questionnaire was prepared based on the review of literature on Coronary artery disease in COPD. A piloting of 5 participants was done to understand the feasibility, reliability and validity of the questionnaire. After piloting, the correction was made in the questionnaire based on the further review of literature and advice/suggestions of the guide of the study. Then the final questionnaire was presented in front of the guide and after minor corrections it was used for the data collection among the study participants.

Questionnaire included the information regarding age, gender, height and weight. It also included information regarding clinical symptoms, blood pressure measurement, past history and family history.

All patients diagnosed clinically for COPD with Chest X-Ray, spirometry had undergone Laboratory investigations (TROP-T,CPKMB,Hs CRP), ECG and 2D echocardiography. Coronary artery disease [CAD] diagnosis was based on accumulated findings for patient medical record, clinical manifestations, electrocardiography findings, and correlating them with echocardiography findings. The machine was calibrated before recording ECG with paper

speed at 25mm/sec and amplitude of stylus deflection at 1mV/cm.

Using 2-D echocardiogram as a guideline M-mode recording was obtained. Left ventricular posterior wall thickness (LVPWT), left ventricular internal diameter (LVID) and interventricular septal thickness (IVS), in both systole and diastole, was measured.

Study protocol was approved by the Scientific and Ethical Committee of the Institution. All the participants were also informed about the study procedure and the information required from them for the study.

Statistical Analysis
Data management and analysis was done using Microsoft excel and Epi-info software. The frequency distribution and graph were prepared for the variables. The categorical variables were assessed using Pearson chi-square. The test was considered significant only if the p value comes out to be less than 0.05

3. Results

Mean age of the participants was 58.17 ± 8.69 years and range was 42-76 years. M: F was3.8:1. Out of 63 cases 84.1% cases had positive history of smoking with mean years of smoking 19.28 ± 4.91 (10 - 27). Mean duration of COPD was 5.25 ± 2.04 (2 - 9). It was observed that 59 (93.7%) cases had tachypnea, 40 (63.5%) cases had wheezing, 24 (38.1%) cases had raised JVP, 21 (33.3) cases had parasternal heave, 24 (38.1%) cases had crepitations and 24 (38.1%) cases had pedal edema indicating right ventricular hypertrophy with COPD.

According to FEV1% Predicted 19 (30.2%) cases had mild (>80) COPD, 16 (25.4%) cases had moderate (50-79) COPD, 17 (27.0%) cases had severe (30-49) COPD and 11 (17.5%) cases had very Severe (<30) COPD.

On chest X Ray It was observed that 42 (66.7) cases had emphysema, 36 (57.1) cases had increased bronchovascular markings, 30 (47.6) cases had cardiomegaly and 19 (30.2) cases had Prominent RDPA>16mm.incidence of Coronary Artery Disease was 22.3%. CAD was found in 6 (54.5%) out of 11cases of very severe COPD. Among female cases 38.36% cases had CAD.

4. Discussion

Perceptions of COPD as a disease have changed nowadays. It's no longer 'just a disease of the lungs', COPD has recently been described as the pulmonary component of systematic endothelial disease whereby a range of 'inflammation' processes simultaneously affect multiple organs giving rise to a state multi-morbidity, withoutany clear indication as to which disease came first.[9,10]

Among the long list of comorbid conditions seen in people with chronic obstructive pulmonary disease (COPD), cardiovascular diseases (CVDs) are generally perceived to be the most important. CVDs not only rank among the most common comorbidities in COPD, but are also associated with an increased risk of death.[11]Despite the growing appreciation of the importance of CVDs in COPD, [12] there is still considerable ambiguity about their prevalence and impact, especially in the general COPD population. There remains an unmet need to identify CVDs in the COPD population in order to improve symptom burden and quality of life, as well as to reduce the number of premature deaths in this patient group. Present study tried to find incidence and clinical profile of CAD among COPD cases in a tertiary care centre in medicine department.

Present study found that incidence of CAD was more among elderly with male predominance similarly Various studies [13-20] found prevalence of CAD in COPD was more among elderly and M:F in range of 1-15.

Smoking remains an important shared risk factor for both diseases, it is becoming more widely accepted that responses to smoking are not the sole reason for the observed association between COPD and CVD. Increased awareness of the role of other risk factors for COPD, in particular those that influence its natural history, has led to the realization that COPD and CVD are more closely intertwined mechanistically than was previously thought. [21]

In present study also 53 (84.1%) cases had positive history of smoking. mean duration of years of smoking was19.28 ± 4.91 (10 - 27) and incidence increased with years of smoking. Various studies had smoking prevalence among CAD in COPD in range of 74-86%.[13,15,16,17]

Several studies have investigated whether CVDs are more prevalent in certain subtypes of COPD patients. To date, studies of this type, including cluster analyses, have yet to provide definitive answers to this question.[22,23]
What has emerged is that CVD co morbidity is not confined to those with more advanced airflow obstruction, but occurs across the spectrum of COPD disease severity. [21]In present study we found that CAD cases were more among severe (5/17=29.4%) and Very severe COPD cases (6/11=54.5%) than mild and moderate one.

The symptoms and physical signs of COPD and heart failure may coexist. Fatigue and exertional dyspnea are frequent symptoms that are common in both conditions, and they can result in marked activity intolerance.[24] However, acute onset dyspnea or orthopnea, nocturnal cough, paroxysmal nocturnal dyspnea, ease of fatigue, and reduced exercise tolerance in the absence of infectious exacerbation of COPD gives rise to a diagnosis of Heart Failure. The presence of jugular venous distension, ankle edema, and hepatomegaly in COPD should be oriented toward the existence of right ventricular failure.[25]

Heart failure and COPD are diseases with very similar risk factors, particularly through the role of smoking, that share pathophysiological mechanisms, such as inflammation and skeletal muscle alterations. This explains the frequent coexistence of the two conditions, the underestimation of which can lead to delayed diagnosis, given the similarity of the symptoms and to treatment inefficacy.[26] In present study It was observed that 59 (93.7%) cases had tachypnea, 40 (63.5%) cases had wheezing, 24 (38.1%) cases had cough

with raised JVP and crepitation and pedal edema respectively. Parasternal heave was found in 33.3% cases.

COPD is associated with a systemic inflammatory response and, in particular, with CRP elevation, the concentration of which increases with the severity of the bronchial obstruction. This systemic inflammatory reaction might play a role in the increased coronary risk in patients with COPD.[27] In present studythe mean hsCRP in COPD with CAD cases was 3.6 ± 1.4 mg/ml while COPD without CAD was 0.26 ± 0.3 mg/ml.

5. Limitation

Study was carried out on few number of cases and Study couldn't found impact of confounding factor like smoking, sedentary lifestyle,occupation, increased BMI, History of diabetes on incidence of CAD among COPD Cases. Further large study required to generalise the findings.

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Tables

Table 1: Baseline characteristic of study participants

Variables (n=63)	Freq	Percentage
Age wise distribution(In Years)		
41-50	12	19
51-60	28	44.4
61-70	17	27
71-80	6	9.5
Gender		
Male	50	79.4
Female	13	20.6
H/o Smoking		
yes	53	84.1
No	10	15.9
Duration of COPD(In Years)		
2-4	25	397
5-7	27	42.9
8-10	11	17.5
CAD		
Present	14	22.3
Absent	49	77.3

***COPD- Chronic Obstructive Pulmonary Disease, CAD- Coronary Artery Disease**

Table 2: Clinical findings among study Participants

Variables (n=63)	Freq	Percentage
Clinical Presentation		
Breathlessness	61	96.8
cough with sputum	55	87.3
Weight loss	26	41.3
chest pain	14	22.2
Decreased urine output	4	6.3
Signs		
Tachypnea	59	93.7
Raised JVP	24	38.1
Parasternal heave	21	33.3
Wheezing	40	63.5
Pedal edema	24	38.1
Crepitations	24	38.1
ECG Findings		
ST wave changes	14	22.3
WNL	49	77.3

Table 3: Coronary artery disease distribution in relation to different study variables

Variables	CAD		Total
Age in yrs	Present (n=14)	Absent (n=49)	
41-50	0	12 (24.5)	12 (19.0)
51-60	1 (7.1)	27 (55.1)	28 (44.4)
61-70	10 (71.4)	7 (14.3)	17 (27.0)
71-80	3 (21.4)	3 (6.1)	6 (9.5)
Gender			
Male	9 (64.3)	41 (83.7)	50 (79.4)
Female	5 (35.7)	8 (16.3)	13 (20.6)
Severity of COPD			
Mild	0	19 (38.8)	19 (30.2)
Moderate	3 (21.4)	13 (26.5)	16 (25.4)
Severe	5 (35.7)	12 (24.5)	17 (27.0)
Very Severe	6 (42.9)	5 (10.2)	11 (17.5)
Duration of smoking (in Yrs)			
06-10	0	2 (5.1)	2 (3.8)
11-15	1 (7.1)	12 (30.8)	13 (24.5)
16-20	2 (14.3)	14 (35.9)	16 (30.2)
21-25	7 (50.0)	8 (20.5)	15 (28.3)
26-30	4 (28.6)	3 (7.7)	7 (13.2)
Enzymes			
CPK MB(mean+sd)	42.4 ±3.36	13.6 ± 3.4	
hsCRP(mean+sd)	3.6 ± 1.4	0.26 ± 0.3	

***Figure in bracket indicate column percentage**