Prevalence of Cardiac Complication in Patients with COPD Exacerbation: A Retrospective Study

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ABSTRACT

Objective: To assess the prevalence and various risk factors for COPD, to categorize the COPD patients using dyspnea scale and to identify the various cardiac complications among COPD exacerbative patients. Method: Subjects aged between 30 to 65 yrs (n=200) were included in the analysis. The clinical examination data's and patient history was collected in a predesigned data entry form. The percentage was calculated by using MS excel. Result: Out of 200 COPD patients, about 49.5% (n=99) were without CVDs and about 50.5% (n=101) were with CVDs. Male gender (66%) is more susceptible to COPD than female gender (34%). Age group between 61-65 (62%) and 56-60 (29%) are more prone to COPD. Results shows that cigarette smoking is one of the major risk factor in both subject categories, it is of about 69.7% and 52.5% respectively. Other major risk factors are smoke exposure (16.2% & 31.6% respectively). Patients with COPD had significantly higher incidence of grade-2 (29.3%) and grade-3(40.4%). Also, COPD patients with CVD had significantly higher incidence of Mmrc dyspnea scale 4 (49.5%) and 5 (50.4%). In COPD patients with CVD, most commonly symptom associated CVD is systemic hypertension (HTN), 41.50%. Followed by coronary artery disease(CAD) 25.70% patients. Other associated CVDs were pulmonary arterial hypertension (PAH) (20.70%), corpulmonale (6.93%), cardiac arrhythmias (2.97%) and atherosclerosis (1.98%). **Conclusion**: These findings support the conclusion that COPD is an independent risk factor for CVD.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common obstructive inflammatory lung condition characterized by progressive airflow limitation which is irreversible with concomitant respiratory symptoms.[1] It is a major cause for morbidity and mortality among COPD patients. The worldwide prevalence of COPD has been reported to vary between 6-26.1%. COPD is associated with other comorbid conditions which have a major impact on health status and mortality. As comorbidities increases the risk for exacerbations, mortality, and reduced health status also increases.[5] Major comorbidites associated with COPD are cardiovascular and cerebrovascular diseases, lung cancer and diabetes.[7]Cardiovascular diseases (CVDs) are major comorbidity associated with COPD patients.[1]Major cardiovascular disorders associated with COPD are the following i.e; Coronary artery disease (CAD), Congestive cardiac failure (CCF), pulmonary artery hypertension(PAH), systemic hypertension(HTN) and peripheral vascular disease (PVD).[4]

Its evident that chronic obstructive pulmonary disease and other disorders associated with reduced lung function will act as a strong risk factors for cardiovascular events, independent of smoking.[2] Diagnosis of COPD can be done by using pulmonary function tests which will help in identifying causes of unexplained respiratory symptoms and monitoring patients with known respiratory disease.[8]From studies it was found that for every 10% decrease in FEV_1, all-cause mortality increases by 14% and cardiovascular mortality increases by 28 %. All these data's shows that chronic obstructive pulmonary disease is a powerful independent risk factor for occurrence of cardiovascular disease.[2]There are different methods available for assessing severity. The most effective and commonly used method is dyspnea scale (1–5) is a simple measure of breathlessness associated with exercise.[9]By studying the association between COPD and CVD, it will very useful in the management as well as in setting newer guidelines for COPD patients. It will also help in CVD risk prediction in patients with COPD by identifying those individuals at higher risk of CVD morbidity and mortality.[6]

The main objective of the study is to assess prevalence and various risk factors for COPD, to categorize the COPD patients using dyspnea scale and to identify the various cardiac complications among COPD exacerbative patients.

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MATERIALS AND METHODS

STUDY SITE

Paalana Institute of Medical Sciences, Palakkad, Kerala, which is a 175 bedded speciality hospital having well set up Pulmonology Department with spirometry facilities.

STUDY DURATION

The study was conducted for a period of 5 month (November 2018- March 2019).

STUDY POPULATION

A total of 200 COPD patients are included in the study.

STUDY CRITERIA

Inclusion criteria: All COPD patients of both genders aged between 30 to 65 yrs is included in the study.

Exclusion criteria: Patient with malignancy, pregnancy and lactating females are excluded.

DATA COLLECTION

The data's were obtained from the prescriptions, patient register book and case history forms. All necessary and relevant data was collected on a specially designed patient data collection proforma, which contain demographic details, social history, laboratory investigations, treatment chart. Severity was assessed by using Dyspnea scale. Data was sorted and percentage was calculated by using Microsoft excel.

RESULTS

During the study period a total of 200 patients were considered in the study.

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Table 1: Distribution according to patient with COPD and COPD patients with CVD

COPD Patients without CVD		COPD Patients with CVD	
No: of Patients (n=200)	Percentage (%)	No: of Patients (n=200)	Percentage (%)
99	49.5%	101	50.5%

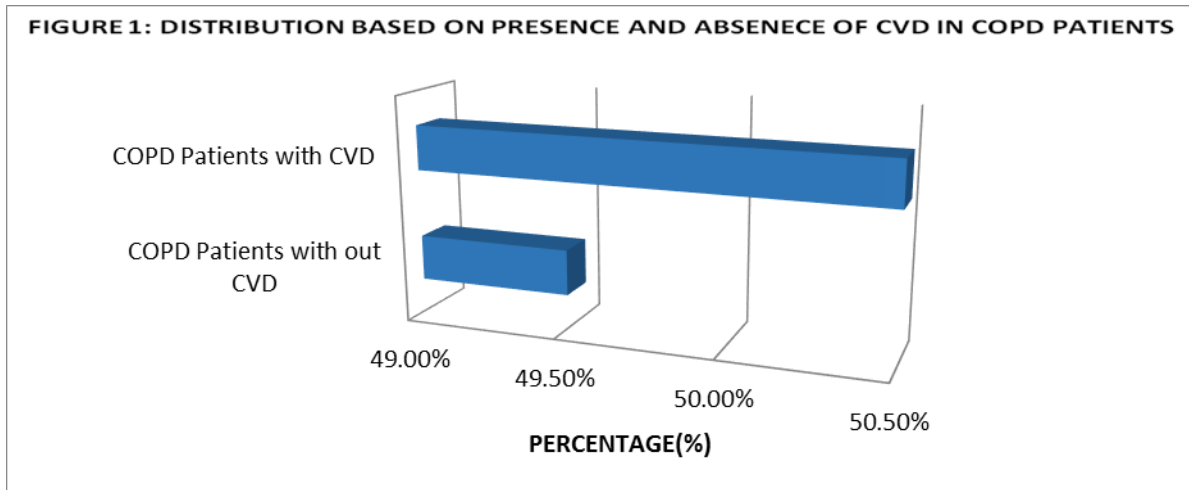FIGURE 1: DISTRIBUTION BASED ON PRESENCE AND ABSENECE OF CVD IN COPD PATIENTS

Table 2: Gender wise distribution:

SI NO	Gender	No: of patients (n=200)	Percentage (%)
1	Male	132	66%
2	Female	68	34%

FIGURE 2: DISTRIBUTION BASED ON GENDER

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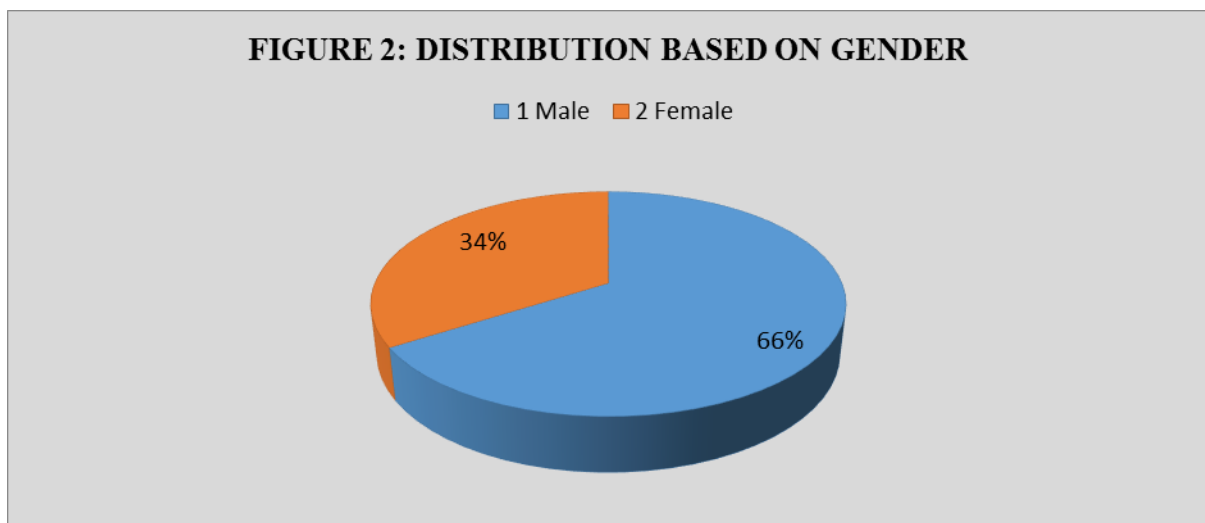
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Table 3: Distribution according to Age

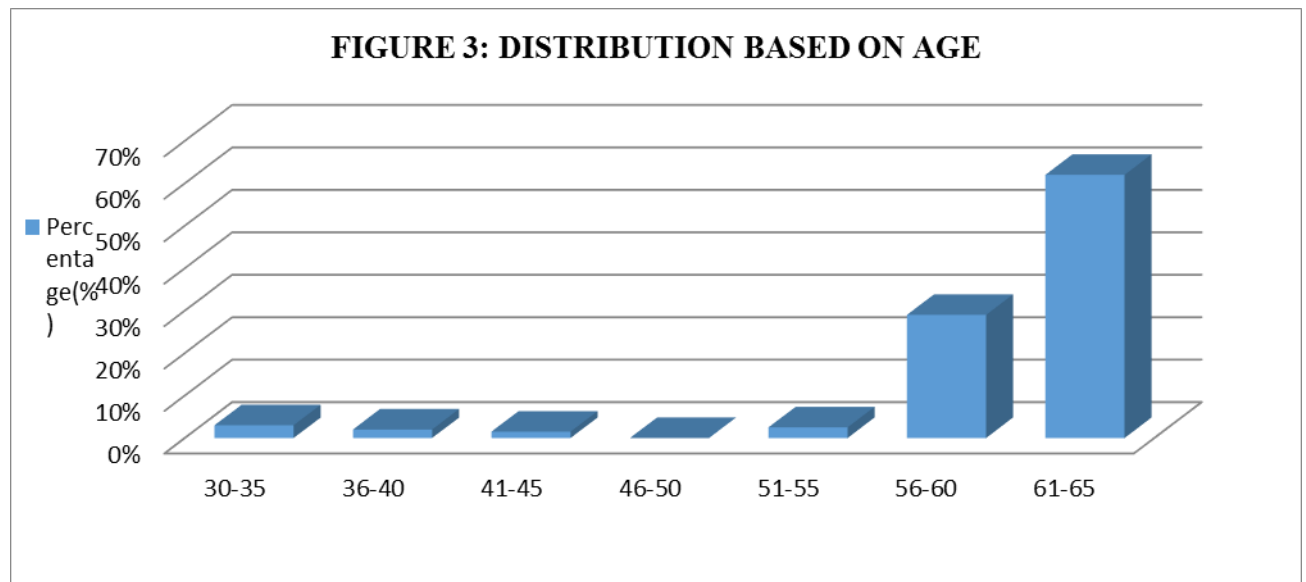| SI NO	Age in years	No: of patients (n=200)	Percentage (%)
1	30-35	6	3%
2	36-40	4	2%
3	41-45	3	1.5%
4	46-50	0	0%
5	51-55	5	2.5%
6	56-60	58	29%
7	61-65	124	62%

FIGURE 3: DISTRIBUTION BASED ON AGE

Table 4: Distribution according to Risk factors

Patients with COPD			COPD patients with CVD		
Risk factors	No: of patients (n=99)	Percentage (%)	Risk factors	No: of patients (n=101)	Percentage (%)
Cigarette smoking	69	69.7%	Cigarette smoking	53	52.5%
Alcohol	1	1.01%	Alcohol	1	0.99%
Occupation	13	8.08%	Occupation	8	7.9%
Infection	9	9.09%	Infection	7	6.9%
Smoke exposure	16	16.2%	Smoke exposure	32	31.6%

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n=99 & 101; Total will not correspond to 100% because of multiple diagnosis.
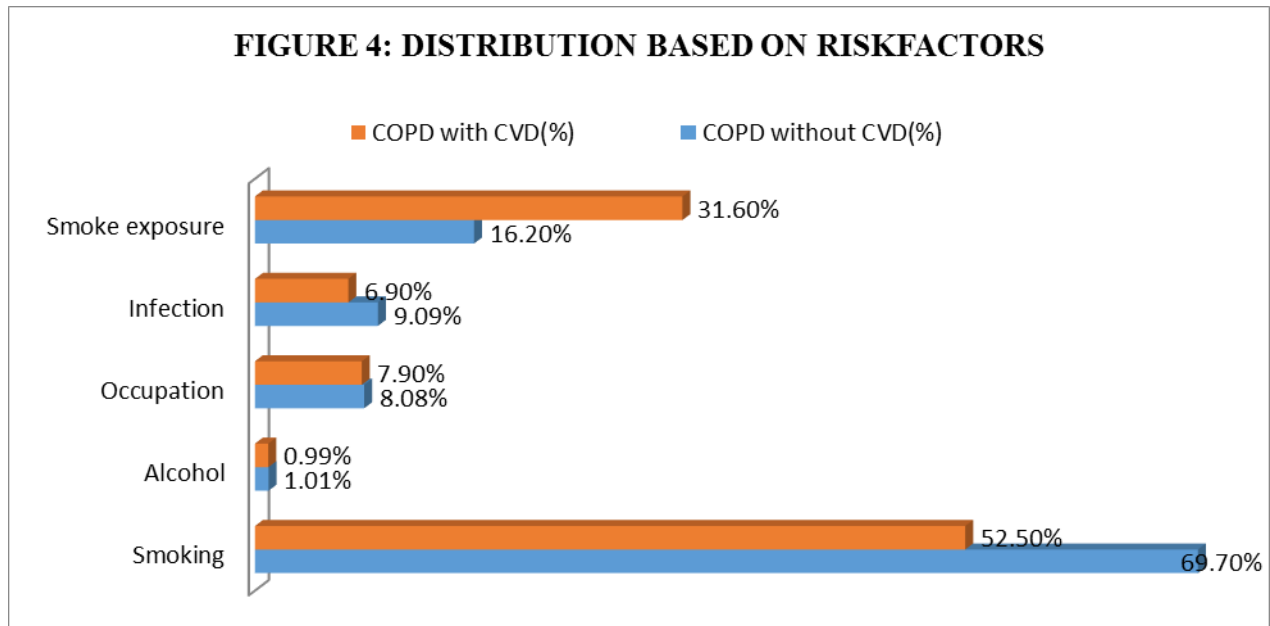

FIGURE 4: DISTRIBUTION BASED ON RISKFACTORS

Table 5: Distribution based on Dyspnea Scale

Patients with COPD (n=99)			COPD patients with CVD (n=101)		
Grade	**No: of patients (n=99)**	**Percentage (%)**	**Grade**	**No: of patients (n=101)**	**Percentage (%)**
G-1	5	5.05%	**G-1**	0	0
G-2	29	29.3%	**G-2**	0	0
G-3	40	40.4%	**G-3**	0	0
G-4	12	12.1%	**G-4**	50	49.5%
G-5	13	13.1%	**G-5**	51	50.4%

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FIGURE 5: DISTRIBUTION BASED ON DYSPNEA SCALE

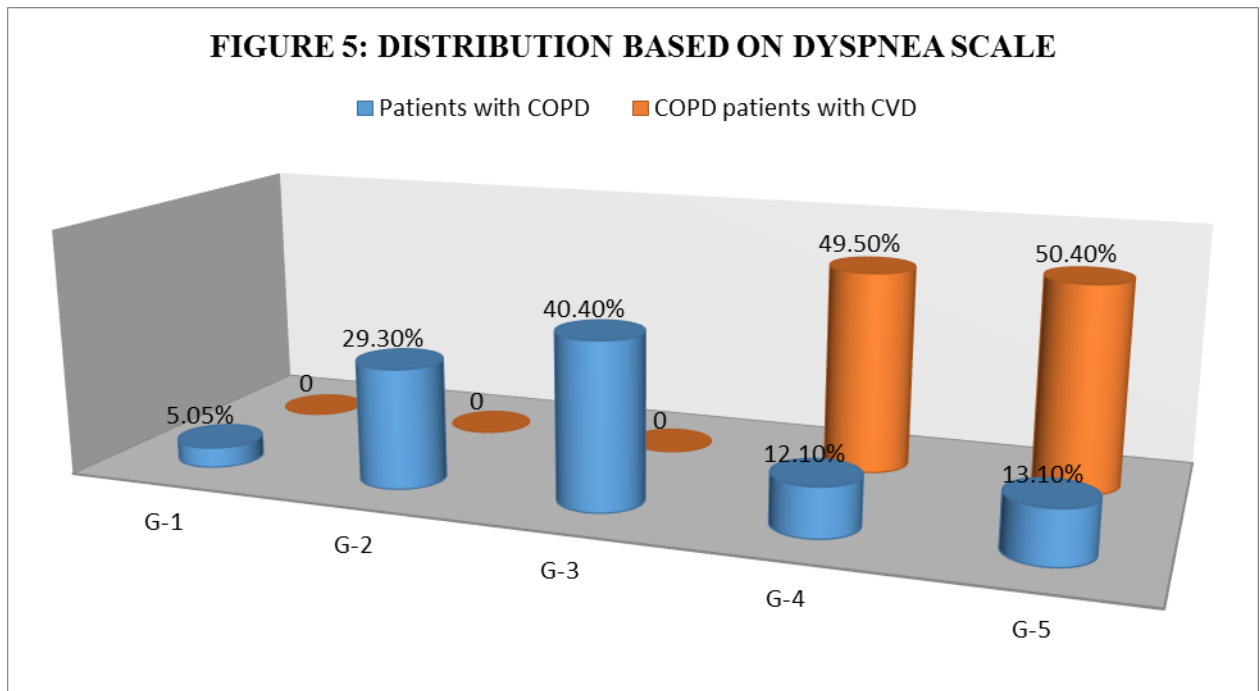**Table 6: Distribution based on cardiovascular disease in COPD patients**

Disease	No: of patients (n=101)	Percentage (%)
Systemic HTN	42	41.5%
PAH	21	20.7%
CAD	26	25.7%
Corpulmonale	7	6.93%
Cardiac arrhythmias	3	2.97%
Atherosclerosis	2	1.98%

n=101; Total will not correspond to 100% because of multiple diagnosis.

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FIGURE 6: DISTRIBUTION BASED ON CARDIOVASCULAR DISEASE IN COPD PATIENTS

DISCUSSION

Table:1 and Figure:1 shows the distribution according to COPD patients with CVD and without CVD. Out of 200 COPD patients, about 49.5% (n=99) were without CVDs and about 50.5%(n=101) were with CVDs. Engstorm *et al.* conducted a population based study and showed that reduced lung function predicted fatality in future cardiac events. In COPD exacerbative patients the chance for triggering cardiovascular disease is high. It may be due to hypoxemia and stress associated with an increased work of breathing during exacerbation which will promote sympathetic over-activity that increases myocardial oxygen demand. Further, myocardial ischemia and left ventricular dysfunction which will promote wheezing, may complicate or be mistaken for an exacerbation of COPD.[4]

Table:2 and Figure:2 shows the distribution of COPD patients according to gender. Male gender (66%) is more susceptible to COPD than female gender(34%). Similar to present study, Almargo *et al.* De Torres *et al.* and Shabrawy *et al.* also found higher occurrence of COPD in male patient compared to female COPD patients. This may be due to the difference in prevalence of smoking in males and females and protective effect of estrogen in females.[4]

Table:3 and Figure:3 shows the distribution of patients according to age. Age group between 61-65(62%) and 56-60 (29%) are more prone to COPD. Gupta *et al* concluded that subject about age 50 years is at higher risk of having COPD. Similarly, Donaldson *et al* found increased prevalence of various types of CVD in COPD patients with increasing age. Ann D

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Morgan *et al* indicates that the increased risk for CVD in COPD patients is in mid-to-late-middle-age. It may be harder for cells to repair themselves as the body ages and this may play a role in the development of COPD. Younger people are still at risks but increasing age may mean more lung damage and exposure to risk factors and so a higher risk.

Table:4 and Figure:4 represents the distribution according to risk factors in both patients with and without COPD. In present study, cigarette smoking is one of the major risk factor in both subject categories, it is of about 69.7% and 52.5% respectively. Other major risk factors are smoke exposure (16.2% & 31.6% respectively). A study done by Finkelestein et al. reported that smoking is more prevalent in COPD patients and it is also a major risk factor for a CVD. Huiart et al concluded that tobacco alone act as a major risk factor for COPD and COPD with CVD. Also, suggest the presence of risk factor for CVD other than tobacco in COPD patients. Cigarette smoking and other environmental irritants may activate alveolar macrophages, bronchial epithelial cells and other inflammatory cells. This cells will synthesize elastase and metalloproteinases, which promote emphysematous changes and airway remodelling.[16]

Table:5 and Figure|:5shows distribution on severity assessment using dyspnea scale. Patients with COPD had significantly higher incidence of grade-2(29.3%) and grade-3(40.4%). Also, COPD patients with CVD had significantly higher incidence of Mmrc dyspnea scale 4 (49.5%) and 5 (50.4%). Gupta et al reported that most COPD patients belongs to grade-2 and grade-3 i.e; mild to moderate, Whereas COPD patient with CVD normally belong to grade-4 and 5 of dyspnea scale i.e; severe condition.

Table:6 and Figure:6 indicates the distribution pattern based on various cardiovascular disease in COPD patients. In COPD patients with CVD, most commonly symptom associated CVD is systemic hypertension(HTN), 41.50%. Followed by coronary artery disease(CAD) 25.70% patients. Other associated CVDs were pulmonary arterial hypertension(PAH) (20.70%), cor pulmonale (6.93%), cardiac arrhythmias(2.97%) and atherosclerosis(1.98%). Gupta et al reported that the prevalence of CVDs in patients hospitalized for COPD was high. Increased cases of systemic hypertension may be due to the affect of COPD in the working of the heart. The nature of the disease may force the heart to work overtime. This will produce high blood pressure in the blood vessels from the heart to the lungs and make it even more difficult for the heart to pump much needed blood to the rest of the body and gradually will act as a risk factor for development of other CVDs like atherosclerosis, coronary artery disease etc.

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CONCLUSION

The study was aimed to assess the prevalence and various risk factors for COPD, to categorize the COPD patients using dyspnea scale and to identify the various cardiac complications among COPD exacerbative patients. According to the result, risk of COPD and associated cardiac comorbidities was more in elder patients above age 50 and it was prominent in males comparing to females. COPD and cardiac comorbidities was more prevalent smokers. Most of the COPD patients without CVD belongs to Mmrc dyspnea scale 2 and 3 i.e; mild to moderate whereas COPD patients with CVD belongs to grade 4 and 5. In this particular study, the commonly symptom associated CVD is systemic hypertension (HTN). Followed by coronary artery disease and the other associated CVDs were pulmonary arterial hypertension (PAH), corpulmonale, cardiac arrhythmias and atherosclerosis.

ACKNOWLEDGEMENT

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