

Prevalence of other comorbidities like Diabetes Mellitus, Cardiovascular and Renal in COPD patients in Intensive Care Unit

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ABSTRACT

Background and objectives- Chronic Obstructive Pulmonary Disease (COPD) is a major health problem worldwide. The major risk factors for COPD are smoking, exposure to biomass fuel and elder age. Many of them need intensive care unit (ICU) admission due to infective exacerbation. Association with extrapulmonary comorbidities potentiate the morbidity and mortality with increased ICU admission, prolonged ICU stay. Some of the important comorbidities are cardiovascular disease, renal disease and diabetes mellitus. Aim and objective of the study was to determine prevalence of these comorbidities in ICU admitted COPD patients.

Methods- This study included 72 numbers of ICU admitted COPD patients in a tertiary care teaching hospital with inclusion and exclusion criteria. Presence of each comorbidity was diagnosed with appropriate clinical examination and investigations and prevalence of each was determined by proper statistical analysis of all data obtained.

Results- Prevalence of cardiovascular diseases including hypertension and coronary artery disease was found in 84.72%, which was the most predominant comorbidity. Next prevalent was diabetes mellitus-79.16% and renal disease-44.44% successively. Pulmonary arterial hypertension that results as a direct effect of COPD had a prevalence of 66.66%. Males had higher prevalence of comorbidity (mean 77.2%) than females (mean 55.45%). Patients with age 60 years and above had maximum prevalence of comorbidities (100%). Almost 90% of patients had single or multiple comorbidities.

Conclusion- Prevalence of comorbidities are high in three important diseases. Early recognition and management of comorbidities will help in early discharge from ICU with less morbidity and mortality in COPD patients

Keywords:

Comorbidities, Chronic obstructive pulmonary disease (COPD), GOLD guidelines, Intensive care unit (ICU)

1.Background

Chronic Obstructive Pulmonary Disease (COPD) is a growing public health disease and accounts as third leading cause of death in the world. The main risk factors for COPD are smoking, exposure to biomass fuel and elder age [1, 2, 3]. The brunt of the disease appears mostly in elderly population, after 40 years of age due to gradual and sustaining effect of risk factors [4]. Many other comorbidities are present in COPD patients as a result of sharing effect of these risk factors [5, 6]. Though there are so many other comorbidities found in COPD patients our concern was with three important comorbidities e.g. cardiovascular disease, renal disease and diabetes mellitus for this study. COPD patients need frequent hospital admission due to acute infective exacerbation of lungs and further presence of these co-morbidities make the patient more serious and vulnerable for admission in the intensive care unit of the hospitals. More than 25% of COPD patients require ICU admission at some point of time during the course of the disease [7]. The presence of these common comorbidities usually influence the duration of ICU stay, duration of

hospital admission, prognosis of the disease, patient's quality of life and survival. They are also associated with increased morbidity and mortality with increased cost towards ICU treatment than COPD alone. So early diagnosis and treatment of these comorbidities are important. Some studies showed that inflammation increases during COPD exacerbations with an elevation of oxidative stress, plasma fibrinogen and serum IL-6 levels [8, 9] suggesting that COPD exacerbations can increase comorbidities like Diabetes mellitus with insulin resistance [10]. Ischemic cardiovascular disease is a leading cause of death in COPD with increased risk of hospitalization [11]. Chronic renal failure must not be overlooked as an accompanying comorbidity in COPD patients [12].

The aim and objective of this study was to determine the prevalence of comorbidities like diabetes mellitus, cardiovascular and renal disease in association with COPD patients admitted in ICU of a tertiary care teaching hospital.

2. Materials and methods:

The present study was a non-interventional prospective observational study in which 72 numbers COPD patients admitted in the intensive care unit of the department of Respiratory Medicine, Trichy SRM Medical College Hospital, Trichy, for a period of one year (February 2020 to January 2021) were taken.

Inclusion criteria-

1. Patients of both sexes aged ≥ 40 years with diagnosis of COPD.
2. Admitted in respiratory intensive care unit.

Exclusion criteria- COPD patients on invasive mechanical ventilation.

The diagnosis of COPD was made according to Global initiative for chronic Obstructive Lung Disease (GOLD) guidelines 2014 [13]. In 30 patients diagnosis of COPD was made at the time of admission whereas 42 patients were diagnosed previously. All the patients were subjected to thorough clinical examination with proper history taking. Relevant investigations like routine complete blood count(CBC), arterial blood gas analysis (ABG), blood sugar-fasting and post prandial, glycosylated haemoglobin, pulmonary function test, kidney function test, liver function test, chest x-Ray, HRCT thorax, ultra-sonogram of abdomen, 12 lead ECG, and echocardiogram were done in each patient. Analysing all the data the patients were grouped as per the evidence of associated comorbidities for each disease e.g. diabetes mellitus, cardiovascular diseases and renal diseases. All the patients were receiving appropriate treatment for COPD and for associated comorbidities during the ICU stay.

3. Results:

Out of total 72 COPD patients, 50 (69.44%) were males and 22 (30.55%) were females with mean age of 65.4 years. Age distribution of the patients was like this, 9 (12.5%) between 40-49 years, 18 (25%) between 50-59 years, 26 (36.11%) between 60-69 years and 19 (26.38%) with age 70 years and above. Hypertension was found in 61 patients with a prevalence of 84.72%, more in male 45 (90%) than female 16 (72.72%). Coronary Artery Disease (CAD) was present in 56 patients with a prevalence of 77.77%, more in male 41 (82%) than female 15 (68.18%) and all of them had hypertension. Diabetes mellitus was detected in 57 patients with a prevalence of 79.16%, more in male 44 (88%) than female 13 (59.09%). Pulmonary arterial hyper tension was present in 48 patients with a prevalence of 66.66%, more in male 37 (74%) than female 11 (50%). Renal disease in the form of chronic renal failure was present in 32 patients with a

prevalence of 44.44%, more in male 26 (52%) than female 6 (27.27%). Total prevalence for all the three diseases (patients having single or multiple diseases) was 90.27% (65 patients). All patients with age 60 years and above had either single or multiple comorbidities. Comorbidity was absent in 7 (9.2%) patients belonging to age group of 40-59 years.

4. Discussion:

Three important diseases were considered for this study because they are commonly found in elderly people and clinical manifestation of COPD usually occurs in elders. The prevalence of comorbidities for each disease was found as 84.72% for cardiovascular diseases in the form of hypertension and coronary artery disease and it was the most predominant comorbidity, 79.16% for diabetes mellitus and 44.44% for renal diseases in the form of chronic renal failure. Presence of pulmonary arterial hypertension was not considered as a comorbidity that results often as a direct effect of COPD which had a prevalence of 66.66%. But pulmonary hypertension itself is responsible for several clinical manifestations with some cardiac symptoms and signs. All most 90% of total COPD patients had any one of these comorbidities and commonly found at the age of 60 years and above. Male predilection for these comorbidities was noted that was found in 77.2% (mean 38.6patients) in males than 55.45% (mean 12.2 patient) in females. Only 7 (9.2%) patients had no comorbidity and all were under 60 years of age. As per number of comorbidities present, 10 (13.88%) cases had single comorbidity, 32 (44.44%) cases had two comorbidities, and 23 (31.94%) cases had three comorbidities.

Many of studies were done in the past to determine the prevalence of associated comorbidities in COPD patients, but most of them were conducted among the patients those were admitted in hospital as a normal and routine process and majority of studies revealed overall prevalence with variable range for each comorbidity [14]. In the review by Holguin and colleagues, comorbidities were frequently reported in hospitalized patients with primary or secondary COPD diagnoses: hypertension 17%, cardiac disease 25%, and diabetes 11%, all higher than in the control group [15]. In a study of over 45,000 patients with COPD, heart failure was the leading cause of hospitalization, followed by myocardial infarction and stroke [16]. But ours is a rare study which was conducted among the COPD patients admitted in the intensive care unit (ICU) of a hospital for three important comorbidities those may influence the outcome of ICU treatment in terms of duration of ICU stay, ICU morbidity and mortality. This study revealed a high prevalence of each and total comorbidities.

5. Conclusion:

COPD is frequently associated with other diseases. The most common comorbidities are cardiovascular, Diabetes Mellitus and Renal diseases. Prevalence of these comorbidities are very high in ICU admitted COPD patients. There is consistent evidence that these comorbidities have greater influence in COPD patients by prolonging ICU stay, increasing overall morbidity and mortality. Hence early diagnosis and management of these important comorbidities are very much important to reduce their negative impacts.

Table 1: Age and sex distribution of patients:

Age group in years	Male	female	Total	%
40-49	7	2	9	12.5%

50-59	11	7	18	25%
60-69	18	8	26	36.11%
70 and above	14	5	19	26.38%

Table 2: prevalence of different comorbidities:

Comorbidities	Male n=50		Female n=22		Overall N=72
	No	%	No	%	
Hypertension	45	90%	16	72.72%	61 (84.72%)
CAD	41	82%	15	68.18%	56 (77.77%)
Diabetes	44	88%	13	59.09%	57 (79.16%)
Renal	26	52%	6	27.27%	32 (44.44%)
PAH	37	74%	11	50%	48 (66.66%)

Table 3: Prevalence of comorbidities in different age group:

Age group in years	Total No. of patients	No. of patients with comorbidities	%
40-49	9	5	55.55%
50-59	18	15	83.33%
60-69	26	26	100%
70 and above	19	19	100%
Total	72	65	90.27%

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