

Prevalence of Comorbid Conditions in Patients of Chronic Obstructive Pulmonary Disease [COPD] with Acute Exacerbation

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Abstract: **Background:** Acute exacerbation of chronic obstructive pulmonary disease [AECOPD] often requires hospital admission in ICU with high mortality. Comorbidities appear to increase the mortality. Recent studies have focused on the comorbid conditions aggravating this problem. **Aim:** To study the prevalence of comorbid conditions in hospitalized patients with AECOPD in a tertiary care hospital in Tamilnadu. **Methods:** One hundred patients admitted to the hospital with the diagnosis of AECOPD during the period of June 2013 to March 2014 were taken up for study. Ethical clearance and patient consent were obtained. They were investigated for comorbid conditions. **Results:** Majority of patients were above 65 years of age. Mean age was 67.1%. Males constituted 75% and 74.6% of them were smokers, 68% were hypertensive, 53.5% had diabetes and 28% had cardiac diseases. 17% were anemic, 15% had renal diseases, 12% had obstructive sleep apnea [OSA], 12% had eye problems, 11% had liver diseases and 10% had arthritis. **Conclusion:** It is important to identify these comorbidities and treat them effectively so as to reduce the morbidity and mortality of AECOPD.

Keywords: AECOPD, comorbidities

1. Introduction

According to WHO estimates, 65 million people have moderate to severe chronic obstructive pulmonary disease (COPD). More than 3 million people died of COPD in 2005, which corresponds to 5% of all deaths globally.[1,2] COPD is now the third leading cause of death in the United States of America. It is predicted to become the third leading cause of death worldwide by 2030.[1] It leads to significant morbidity and mortality and poses to be a major burden on the health care delivery systems worldwide.

Most AECOPD patients have other chronic coexisting medical diseases which may include high blood pressure, elevated cholesterol, heart disease, diabetes, osteoporosis, depression and cancer. These other conditions are called "comorbidities." Recently the link between COPD and these comorbid conditions has caused a great deal of interest. Comorbid conditions seem to be more than a mere coincidence in people with COPD than in patients with other medical diseases.[3]

2. Aim and Objectives

Despite the high incidence of COPD related hospital admissions little is known about the comorbid conditions which are likely to aggravate the condition and lead to acute exacerbation of COPD [AECOPD], ultimately leading to increase in morbidity and mortality, hence an attempt was made to identify these comorbid conditions in patients admitted with AECOPD.

3. Material and Methods

It is a prospective observational study. Patients with a diagnosis of AECOPD who were admitted to a tertiary care hospital in Chennai [Tamil Nadu] over a period of 10 months [June 2013- May 2014] were taken up for the study. Study was approved by institutional ethical board and patient consent was obtained.

Data regarding age, sex, history of smoking and alcohol consumption were collected for 100 patients. Comorbid conditions like hypertension, diabetes, cardiac diseases, renal diseases, anemia status, diseases related to liver, central nervous system and bone were also noted.

4. Results

One hundred patients admitted with AECOPD were analyzed for comorbid conditions. 75% of them were males and 25% of them were females. Of the 75 males 74.6% were smokers and 32% consumed alcohol. Majority of them were above 65 years of age. The demographic characteristics are shown in [Table 1].

Number of Comorbid conditions: 46% had more than five comorbid conditions, 43% had three to five, and 11% had less than three comorbidities [Table 2].

Comorbid Conditions: 68% had hypertension, 53% were diabetic, 28% had cardiac diseases and 16% were anemic [table3].

Table 1: Demographic Characteristics

	Characteristics	Total	Male	Female
Age (years)	< 50	6	5	1
	50 - 65	27	23	4
	> 65	67	47	20
Sex	Male	No. 75	Smoking 56 [74.6%]	Alcohol 24[32%]
	Female	25		

Table 2: Number of associated comorbid conditions

Number of comorbidities	Number of patients
< 3	11
3 - 5	43
> 5	46

Table 3: Prevalence of comorbid conditions in hospitalized COPD patients with acute exacerbation

Comorbid condition	Prevalence (%)
Hypertension	68
Diabetes mellitus	53
Coronary artery disease Congestive cardiac failure	28
Anemia	16
Kidney disease	15
Obstructive sleep apnea	12
Arthritis	10
Eye problems	11
Liver diseases	11

5. Discussion

In this study of patients admitted with AECOPD, the mean age was 67.1 years and majority of them were above 65 years. Males constituted 75%. Amongst the males 74.6% gave history of regular smoking and 32% were in the habit of taking alcohol. 89% of patients had more than three comorbid conditions of which 46% had more than five

comorbid conditions. To better understand the impact of comorbid conditions, the COPD Foundation surveyed 1,000 COPD patients. The results of this survey were published in the American Journal of Medicine in early 2009, which showed 50% had six to ten comorbid conditions.[4]

In one study of over 1,500 COPD patients, those with COPD averaged having four other conditions. Yet the control group, or those without COPD, averaged less than two.[4] Van Manen and colleagues reported that over 50% of 1,145 patients with COPD had one to two comorbidities, 15.8% had three to four comorbidities, and 6.8% had five or more comorbid conditions.[5] In another study that selected 200 patients with COPD from 1,522 patients in a managed care organization, Mapel and coworkers reported that the COPD cohort had an average of 3.7 comorbidities versus 1.8 for the control subjects, and only 6% of patients with COPD did not have another chronic medical condition.[6] Unfortunately, the presence of both COPD and other comorbidities is often ominous and contributes significantly to poor health outcomes.

In our study major comorbidities were hypertension 68%, diabetes 53% and cardiovascular diseases 29%. [Table 4]

Source	n	By various authors		
		Hypertention %	Diabetes %	Cardiovascular %
Present study	100	68	53	29
Chok limsuwat etal [7]	1000	59.4	28.6	24.4
Andrew.etal[8]	34478	57.5	26.3	30
van Manen and colleagues	1145	23	5	13
Mapel and colleagues	200	45	12	65
Sidney and colleagues	45966	18	2	18
Walsh and Thomshow (9,10)	3000	50	16	50

Table 4

Cohort studies have shown that moderate to severe COPD increases the risk of diabetes with an Odds ratio of 1.4 and 1.5, respectively. In a large cohort of females, Song *et al* showed that the presence of asthma or COPD was associated with a risk of developing type-2 diabetes, suggesting that airway inflammation contributes to the pathophysiology of diabetes. Conversely, in a US cohort, the relative risk of developing COPD was higher (Hazard Ratio 1.22) in patients with diabetes than in non-diabetics [11, 12]

In this study we found that the most common comorbid condition was hypertension (28%) followed by diabetes mellitus (14%) and ischemic heart disease (10%).

One of the more interesting new concepts in COPD relates to the issue of lung inflammation. Inflammation is common in COPD both in early and later stages of the disease. However, COPD patients have not only increased lung inflammation, they also tend to have signs of "systemic" inflammation. "Systemic" inflammation meant there will be evidence of markers of inflammation in the blood. Many experts now believe that in COPD is an ongoing lung inflammation which leads to an increase in "systemic" inflammation. This can contribute to other organ damage such as to the heart, muscles or bones. [11]

This theory has led to the concept that COPD is not just a disease of the lungs, but a "systemic" disease which involves other parts of the body. [13-14]

In the present study cardiovascular diseases [coronary artery disease and cardiac failure] constitute 28%. Curkendal *et al* found that cardioavascular diseases were higher in patients with COPD and so was the risk of mortality. [15]

In our study prevalence of anemia was 17%. Chambellan *A et al* have reported a prevalence of 13% and Mannino *DM et al* found that one third of 2,404 patients with COPD studied were anemic. Contrary to common teaching, recent studies have shown that there is a high prevalence of anemia in COPD patients, ranging 15–30% particularly in patients with severe disease, whereas polycythaemia (erythrocytosis) is relatively rare (6%). The level of hemoglobin is strongly and independently associated with increased functional dyspnea and decreased exercise capacity, and is therefore an important contributor to functional capacity as well as a poor quality of life. In some studies, anemia is an independent predictor of mortality. The anemia is usually of the normochromic normocytic type characteristic for diseases of chronic inflammation and appears to be due to resistance to

the effects of erythropoietin, the concentration of which is elevated in these patients. Whether the treatment of anemia will result in the improvement in functional outcome measures remains to be determined. Treatment with erythropoietin is unlikely to be useful as there is end-organ resistance, indicating that blood transfusion may be necessary. In a small study in anemic COPD patients, blood transfusion improved their exercise performance. Iron supplements are likely to be detrimental as iron cannot be utilized correctly and may increase systemic oxidative stress in pulmonary disease.[16-19] Kidney disease is frequently found in COPD patients. In this study it constituted 15% of which 33.3% had chronic kidney disease and 13.3% acute kidney injury, the rest had renal cysts and stones. Chronic kidney disease is frequently found even in patients with mild COPD. Microalbuminuria frequently occurs in hypoxemic patients and reverts with oxygen therapy. [20-22]

Obstructive Sleep Apnea

In this study obstructive sleep apnea (OSA) was present in 12% of patients. Epidemiological studies have shown that approximately 20% of patients with OSA also have COPD, whereas approximately 10% of patients with COPD have OSA independent of disease severity. OSA patients also share several of the comorbidities of COPD, such as endothelial dysfunction, cardiac failure, diabetes and metabolic syndrome. There is recent evidence that patients with OSA have local upper airway inflammation, as well as systemic inflammation and oxidative stress. [23-26]

Arthritis was present in 10% of patients. The association between osteoporosis and increased arterial wall stiffness as well as between these variables and the systemic level of IL-6 suggests a common association with the degree of systemic inflammation. Indeed, several inflammatory mediators, including TNF- α , IL-1 β and IL-6 act as stimulants of osteoclasts. [27]

Eye problems in the form of cataract, glaucoma and buphthalmos constituted 12%. 11% had liver diseases two of them had acute Hepatitis A and C, and two with fatty liver, four of them had gallstones.

In conclusion there is consistent evidence that these comorbidities have a greater negative impact in COPD patients in terms of quality of life, exacerbations and mortality. Thus, diagnosis and management of comorbidities is an important challenge in the treatment of COPD.

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