Pattern of Comorbidities in Hospitalized Elderly Patients of Chronic Obstructive Pulmonary Disease

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is a leading cause of hospitalization in older adults. Comorbidities are frequent cause or a contributing factor for repeated hospitalizations.

Aims and Objectives: To study the pattern of comorbidities in elderly patients of COPD and to study the outcome of hospitalized elderly patients with these comorbidities.

Material and Methods: Inclusion criteria: Hospitalized patients with a diagnosis of COPD, as per the WHO-GOI criteria were included in the study. Exclusion criteria: Patients with differential diagnosis of bronchial asthma, bronchiectasis, obliterative bronchiolitis and diffuse panbronchiolitis were excluded. This was a prospective observational study of elderly patients admitted with a diagnosis of COPD from September 2008 to August 2009. Comorbidities in major organ systems were identified.

Results: A total of 342 admissions of COPD were considered for study evaluation. Medical comorbidities were identified in 288 (84.2%) patients. A large number of patients (35.67%, n=122) had three or more comorbidities associated. One hundred and nine (31.9%) patients showed evidence of underlying coronary artery disease, either manifest or silent disease. Hypertension was the second commonest (23.4%) followed by anemia in 75 (22%), chest infection in 61 (17.84%), and diabetes in 49 (14.33%) patients. The other common comorbid conditions noticed were congestive heart failure (14.33%) and active pulmonary tuberculosis (10.23%).

Conclusion: On an average one in ten of the hospitalized elderly COPD patients die either due to COPD or other comorbidity.

Key words: Chronic obstructive pulmonary disease, comorbidity, hospitalized, aged.

Introduction

COPD is a major cause of morbidity and mortality worldwide, irrespective of countries of high, middle and low income. Estimates from WHO’s Global Burden of Disease and Risk Factors project show that in 2001, COPD was the fifth leading cause of death in high-income countries accounting for 3.8% of total deaths. It was the sixth leading cause of death in nations of low and middle income, accounting for 4.9% of total deaths. In the same report, COPD was also estimated to be the seventh and tenth leading cause of disability-adjusted life years in countries of high income and in those of low or middle income, respectively.1,2 The burden of the disease is increasing and it is projected to rank fifth in 2020 on worldwide burden of disease despite medical intervention. According to studies (between 1964 and 1986), the prevalence varies from 2.12% to 9.4% in North India.3 The incidence and prevalence of COPD is increasing as a result of increasing urban ambient air pollution and indoor exposure concentrations of particulate air pollution.4,6
Most patients of COPD are aging individuals. Multiple comorbidities such as cardiac disease, diabetes mellitus, hypertension and osteoporosis are often reported in these patients. The spectrum of comorbidities in these elderly COPD patients is complex and there is a tremendous worldwide variability in reporting of these comorbidities.7,8

COPD is a leading cause of hospitalizations in older adults. Comorbidities are frequently a common cause or a contributing cause to repeated hospitalizations. These comorbidities also have an independent detrimental effect on the health outcomes of COPD patients and adversely affect survival. The significance and impact of comorbidities in COPD has been largely a neglected area of research. The associated diagnoses are often missed and seldom comprehensively managed.

Aims and Objectives

(1) To study the pattern of comorbidities in hospitalized elderly patients of COPD.
(2) To assess the outcome of these patients.

Material and Methods

Inclusion criteria: Hospitalized patients with a diagnosis of COPD as per the WHO-GOI criteria were included in the study. Exclusion criteria: Patient with clinical differential diagnosis of bronchial asthma, bronchiectasis, obliterative bronchiolitis and diffuse panbronchiolitis were excluded.

This was a prospective observational study of all elderly patients admitted with a diagnosis of COPD from September 2008 to August 2009. COPD was diagnosed as per diagnostic criteria of WHO-Government of India Guidelines-2003 for management of COPD.3 All elderly COPD patients who were either on treatment or newly diagnosed were enrolled in the study. The patients fulfilling the inclusion criteria were identified from the medicine emergency, general medicine and pulmonary medicine wards. The informed consent was obtained from the patients or their close relatives. The project was undertaken after due clearance from the Institutional Research and Ethics Committee of Government Medical College and Hospital, Chandigarh. The demographic and clinical data of all the patients was recorded in the performa. Comorbidities in major organ systems were looked for keeping in mind the prevalence of the specific comorbidity and feasibility of consultations required. Data on comorbidities was collected from directly questioning the patient and the relatives, physically examining the patient in detail, exploring the past records/hospitalizations and probing the medication usage. A provisional checklist looking at the major organ systems was prepared and the data collected accordingly. The patients were closely followed up from the day of admission to discharge. Patient's vitals, arterial blood gases and oxygen saturation were monitored. Radiological and blood investigations were examined. Hospital records and discharge / death summaries were analyzed to supplement further data. All patients were managed as per hospital protocol of the treating unit. The data was analyzed statistically by using standard indices and software.

Results

Between September 2008 and August 2009 a total of 396 admissions with a diagnosis of COPD were recorded. Of these 54 admissions were rehospitalizations with more than 50% patients having been readmitted within the same month of prior hospitalization. For the study purposes, these readmissions were excluded. Thus, a total of 342 admissions of COPD were considered for study evaluation.

A seasonal trend was noted in these hospital admissions. The period from September to March accounted for majority (76.6%) of admissions. The average duration of hospital stay was 7.9 days (range 1 day - 45 days). Eighty eight percent (n=301) patients improved during hospitalization and 12% (n=41) died during the course of treatment.

Primary diagnosis of COPD with acute exacerbation was detected in 95.3% (n=326) patients and the rest were admitted with other medical complications at admission namely congestive heart failure, upper gastrointestinal bleed, unstable angina, arrhythmias etc. Seven percent (n=24) of the patients had altered sensorium at admission due to CO2 retention, 4.4% (n=15) had pneumothorax and 5.9% (n=20) had evidence of destroyed lung due to old tuberculosis. However, a large number of the patients had a revision of their diagnosis at admission.

The mean age of the study population was 67 years in the age range of 60-98 years. Sixty four percent individuals were in the age group of 60-69 years, 29.8% were between 70-79 years and the rest 6.4% were 80 years or above. Males constituted 80.7% of the total admissions and females 19.3%. The population included 57.3% from the rural setting and the majority (65.5%) of the patients were from poor socio-economic background. Among COPD patients, 45.3% were current smokers, 31.6% ex-smokers and 23.1% had never smoked.

Among 41 patients who died, 83% (n=34) were males and 17% (n=7) females. The average age of this subgroup of individuals was 69.6 years. Their...
average stay in the hospital was less than 3.26 days though most of the deaths (48.8%) happened in less than 24 hours of admission. The death toll was highest at 32% among patients aged 80 years or more, 12.75% in patients between 70-79 years of age and 9.6% in 60-69 years age group. Majority of the deaths (53.7%) occurred in the younger elderly.

Medical comorbidities were identified in 288 (84.2%) patients and only 54 (15.8%) individuals showed no evidence of additional disease (Fig. 1). Ninety four patients had one comorbidity and 72 had two comorbidities. A large number of patients (35.67%, n=122) on the other hand had three or more comorbidities associated; interestingly a few among these had five or more (Fig. 1). The average number of comorbidities in our COPD patient population was 2.08 per individual. The average number of comorbidities in 41 patients who expired was 3.05 per patient. Among the ones who died, 9.76% (n=4) patients had no comorbidity, and 56.1% (n=23) had 3 or more comorbidities. The common comorbidities identified in our patients are depicted in the Figures 2 and 3. The additional minor conditions observed in the study group were chronic liver disease (9), seizures (8), nasal allergy (7), osteoporotic fractures (7), sepsis (7), obstructive sleep apnea (6) and debilitating osteoarthritis (6). Malignancies of other organ systems were noted in 5 individuals (multiple myeloma-2, gastric carcinoma-1, carcinoma larynx-1, carcinoma esophagus-1). Arrhythmias (atrial fibrillation, supraventricular tachycardia, and Mobitz type 2 heart block) were noted in 5 patients mostly on admission. Similarly, 5 patients each had significant upper gastrointestinal bleed and peripheral vascular disease. One of the patients was found to be HIV reactive during the course of investigations.

![Figure 1. Diagram showing patients according to the number of comorbidities.](image1.png)

![Figure 2. Diagram showing common medical comorbidities in percentages.](image2.png)
Discussion

Comorbidity has been defined as a disease coexisting with the primary disease of interest, though in COPD, the definition is problematic as certain coexisting illnesses may be a consequence of the patient's underlying COPD. For the purpose of the current study, comorbidities are defined as the following: 1) the presence of one or more distinct disorders (or diseases) in addition to COPD, regardless of whether the comorbid conditions are or are not directly related to COPD; and 2) a distinct disorder or disease that is not part of the spectrum of the natural history of COPD (eg. respiratory infection resulting in a COPD exacerbation). Within this case definition, conditions such as ischemic heart disease, cancer and osteoporosis would qualify as comorbid conditions of COPD.

COPD is a major cause of morbidity and mortality worldwide. Prevalence of COPD raises with age with 10% of men over 75 years of age are thought to be affected by this deadly disease. It is a leading cause of hospitalization and death in older adults. It is projected to be the third most common cause of death by 2020. Between 1970 and 2002, death rates due to stroke and heart disease decreased (63% and 52% respectively) while death rates due to COPD increased by 100%. Our study also shows a 12% death rate among the hospitalized elderly COPD patients which is a substantial proportion.

Comorbidities are very frequent in the patients suffering from COPD although their prevalence varies tremendously between various studies. In an epidemiological study of general population by Anecchino et al, 98% of these COPD patients received at least one prescription of "non-respiratory drugs". Another study by Ferrer et al has reported a prevalence of comorbidities to the tune of 84% in hospitalized COPD patients. In our study medical comorbidities were identified in 84.2% patients quite similar to the results of Ferrar et al. van Manen et al reported that over 50% of COPD patients had 1 to 2 comorbidities, 15.8% had three or more comorbid conditions while 6.8% had 5 or more comorbid conditions. A large number of our patients (35.67%) had three or more comorbidities associated; interestingly a few had even five or more. The average number of comorbidities in our COPD patient population was 2.08 per individual. These observations reiterate the previously drawn conclusions that comorbidities are universal accompaniments of COPD patients.

The presence of comorbidities in COPD is often ominous and contributes significantly to poor health outcomes. COPD patients with comorbidities have a higher risk of hospitalization due to non-pulmonary causes, longer duration of hospital stay, larger pill burden and higher risk of drug interactions and worst of all increased risk of dying. A recent evaluation of USA National Hospital Discharge Survey analyzed more than 47 million hospital discharges for COPD from 1979 to 2001 in adults >25 yrs of age. COPD was associated with a higher rate of age-adjusted, in-hospital mortality for pneumonia, hypertension, heart failure, ventilatory failure and thoracic malignancies. Comorbidity has been shown to be an important determinant of quality of life (QOL) in COPD independent of FEV1. We too observed that the patients who died had a higher average number of comorbidities (3.05) as compared to the total population average (2.05).

Cardiovascular conditions are the commonest comorbidities in the studies worldwide. A number of studies and healthcare databases of COPD patients reported an approximately two-to-four fold increased risk of death due to cardiovascular
diseases compared with age and sex-matched controls without COPD. Anecchino et al in their study group observed that 64.4% of COPD were being treated for cardiovascular diseases. The commonest comorbid conditions in the study by Ferrar et al included coronary artery disease, heart failure and hypertension. In another study of 270 hospitalized patients with COPD, Antonelli et al noted hypertension in 28%, ischemic heart disease in 10% and diabetes in 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. Curkendall and coworkers found that the prevalence of all cardiovascular diseases was higher in patients with COPD compared with control subjects and that the risk of hospitalization and mortality due to cardiovascular causes was also elevated in patients with COPD. Specifically, patients with COPD had a significantly higher risk of congestive heart failure, arrhythmia and acute myocardial infarction. Comparable to above observations, in our study we found CAD to be the commonest comorbidity. Hypertension was the second commonest comorbid condition among our patients seen in 23.4% patients and congestive heart failure in 14.33% cases.

Diabetes has also been frequently reported in COPD patients; the prevalence typically ranging from 11-14% in the hospitalized patients. We observed 14.33% patients to be diabetic and all cases were those of Type 2 diabetes mellitus. Another interesting finding was that of anemia which was present in 22% of our patients of COPD. Many recent large studies have documented that anemia is common in COPD and is associated with higher comorbidity, mortality and health costs. Mannino and coworkers presented data indicating anemia is present in one third of 2,404 patients with COPD, whereas Halpern et al and John et al reported anemia prevalence to be 21% and 23% respectively.

Chest infection (pneumonia) was a common complication noted and it was present in 17.84% cases. Holguin and colleagues have found pneumonia as comorbidity in 12% of their COPD patients. Literature review suggests that COPD is more frequently associated with pneumonia compared with other chronic diseases. The data published by Pifarre et al shows that of their 707 patients presenting with community acquired pneumonia 19% had COPD. Presence of COPD in these patients contributed to longer hospital stay and mortality. Lieberman et al found that unlike patients of COPD with acute exacerbation, patients with pneumonia in COPD had more abrupt onset of symptoms, more severe illness, longer hospital stay and higher mortality.

Another interesting finding in our patients was the presence of active tuberculosis in 10.23% patients which has not been well documented in previous studies. There are a few studies documenting that use of high-dose inhaled corticosteroids is associated with pulmonary tuberculosis in patients with chronic obstructive pulmonary disease. Conversely, a recent review has tried to establish pulmonary tuberculosis as an emerging important risk factor for the development of COPD especially in developing countries. COPD is an independent risk factor for lung cancer with chronic bronchitis and/or emphysema increasing lung cancer risk two- to five-fold, compared with incidence rates in smokers without COPD. We have found that bronchogenic carcinoma was prevalent in 5% of our COPD patients.

Finally, COPD and comorbidities have a complex bidirectional relationship. COPD is characterized by an abnormal/excessive inflammatory response of the lung parenchyma to inhaled irritants and toxins, mostly but not exclusively tobacco smoking and by the presence of systemic inflammation. Recently, some evidence has implicated systemic and pulmonary inflammation as the common link between COPD and certain comorbid conditions, such as lung cancer, cardiovascular disease and cachexia. The chronic medical disorders prevalent in the elderly and COPD may have a common fertile ground of origin and propagation.

Accurate diagnosis of the cause for the acute health deterioration in an elderly patient with COPD needs a wider perspective on the part of the emergency care givers. Since elderly COPD patients are at a high risk to die from COPD or associated comorbidity, they should never be denied hospitalization and intensive multidisciplinary care.

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