

# Prevalence of comorbidities in patients admitted with acute exacerbation of COPD in a tertiary care hospital

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Date Received: April 11, 2018

Date Revised: June 21, 2018

Date Accepted: July 14, 2018

## Author Contributions

SAA SNA conceived idea, SS SAA drafted the study, SAA collected data, SAB SAA SNA did statistical analysis & interpretation of data, SAA SNA critical reviewed manuscript, All approved final version to be published

## Declaration of conflicting interests

The Authors declares that there is no conflict of interest.

**Background:** The coexistence of various comorbidities with COPD can be partly explained by their shared risk factor, i.e. cigarette smoking. By 2020, COPD will be the third leading cause of death worldwide.<sup>1</sup> The prevalence of different comorbidities seen with COPD varies tremendously between studies.<sup>2</sup> The presence of both COPD and other comorbidities is often ominous and contributes significantly to poor health outcomes.<sup>3-5</sup> Better understanding of the pathophysiology of COPD and focus on the concept of systemic inflammation has helped in explaining the high frequency of major comorbidities such as cardiovascular, cerebrovascular, skeletal and nutritional disorders<sup>6</sup>.

**Objective:** To study the prevalence of various comorbidities in patients presenting with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) in a tertiary care hospital in Karachi, Pakistan.

**Methodology:** This is a retrospective study carried out at the department of Pulmonology, Liaquat National Hospital, Karachi, Pakistan between January 2014 and December 2017. This study included patients aged 45 years and above who got admitted in hospital with acute exacerbation of COPD. Through the help of EMR (Electronic Medical Records) patients with principal diagnosis of acute exacerbation of COPD on discharge summary were identified. Case records of the selected patients were reviewed and data collected.

**Results:** For the purpose of this study, during the study period 357 patients with AECOPD (acute exacerbation of COPD) were identified. There were 280 men and 77 women. The mean age was 57.5 years. 67% were still smoking at just prior to their admission with an acute exacerbation. 34% had significant coal and/or biomass fuel exposure. Hypertension was identified in majority of cases (31%), followed by coronary artery disease (23%) and diabetes (19%). Other comorbidities included (GORD) gastroesophageal reflux disease 13%, dyslipidemia (11%), anxiety/depression (11%), chronic kidney disease (8%) and pulmonary TB (7 %).

**Conclusion:** There are various comorbidities associated with COPD. Effort should be made to identify each of the comorbidities and its effect on health status. Truly multidisciplinary strategy must be executed to treat not only the airways disease but also any associated disease to improve quality of life and reduce morbidity and mortality.

**Key words:** COPD; Comorbidities; Hypertension; Coronary artery disease.

This article may be cited as: Abbas SA, Saboor S, Abbas SN. Prevalence of comorbidities in patients admitted with acute exacerbation of COPD in a tertiary care hospital. Pak J Chest Med 2018; 24 (3):152-157.

## Introduction

The burden of COPD is rising. By 2020, COPD will account for 6 million deaths annually worldwide and will be the third leading cause of death.<sup>1</sup> According to WHO estimate 90% of COPD-related deaths occur in low and middle income countries. More than 33% of the total human population lives in

Asia and it accounts for more than 66% of the global COPD mortality.<sup>7</sup> The increase in the burden of COPD is considered due to rise in cigarette smoking among men and women, longer survival of populations and high levels of air pollution particularly in developing countries.<sup>8</sup>

The links between COPD and various comorbidities

associated with it are not fully understood. However, a link through the inflammation pathway has been suggested. Independent of cigarette smoking, persistent low-grade pulmonary and systemic inflammation is a known risk factors for cardiovascular disease and cancer as well as COPD. About a decade ago, effectiveness of pharmacotherapy heavily relied upon COPD-specific end-points, such as forced expiratory volume in one second (FEV1) or frequency of exacerbations. However, in the recent years the roles of comorbidities in COPD have been increasingly recognized and all-cause mortality has become an important end point in the evaluation of novel therapies.<sup>9</sup>

Comorbidity is defined as a disease coexisting with the primary disease of interest. In case of COPD, certain coexisting illnesses for example cardiovascular diseases, cerebrovascular disease, lung cancer or osteoporosis may be a consequence of the patients' underlying COPD. Also a comorbidity in COPD may be a distinct disorder or disease that is not part of the spectrum of the natural history of COPD e.g. respiratory infection resulting in a COPD exacerbation.<sup>9,10</sup>

With advancing age, it is likely to have more than one chronic condition. Because COPD is more likely to occur in older people, such people also commonly report a range of other chronic conditions. These comorbidities may contribute to ill health and risk of death. The incidence of hospitalisation for non-respiratory causes is increased in patients with COPD. Also it is possible that when people are admitted for non-respiratory causes, they have a longer length of hospital stay and are more likely to die if they also have COPD.<sup>9</sup>

It is well recognized now that presence of comorbidities in patients with COPD has significant

impact on patients' quality of life, morbidity and mortality.<sup>10</sup> In a study from the UK it was shown that patients with COPD have fivefold-higher risk for cardiovascular diseases, threefold-higher risk for stroke and twofold-higher risk for diabetes<sup>11</sup>

Aim of our study was therefore to determine the prevalence of various comorbidities in patients presenting with acute exacerbation of COPD.

## Methodology

This retrospective study was carried out at the department of Pulmonology, Liaquat National Hospital, Karachi, Pakistan. Patients admitted either through OPD or ER during the period January 2014 to December 2017 were selected for study purpose. Through our hospital EMR (electronic medical record), we searched patients who had main/principal diagnosis of AECOPD (acute exacerbation of COPD) mentioned on their discharge summary. Medical records of all such patients were retrieved. Those with incomplete or missing records or aged below 45 years were excluded from the study. Also records which could not confirm more than twenty pack years' history of smoking and/or significant exposure to biomass fuel were excluded from the study. Detailed history, clinical findings, abnormalities on routine blood tests, ECG, Chest X-ray, Echocardiogram, spirometry, were recorded and data collected on a predesigned proforma.

## Results

Three hundred fifty seven patients with the diagnosis of AECOPD were identified for the study data collection. There were 280 men and 77 women (table 1). The mean age was 57.5 years, (range 45-84 years, table 2). 77% were active smoker at the time of presentation with an acute exacerbation (Table 3). A

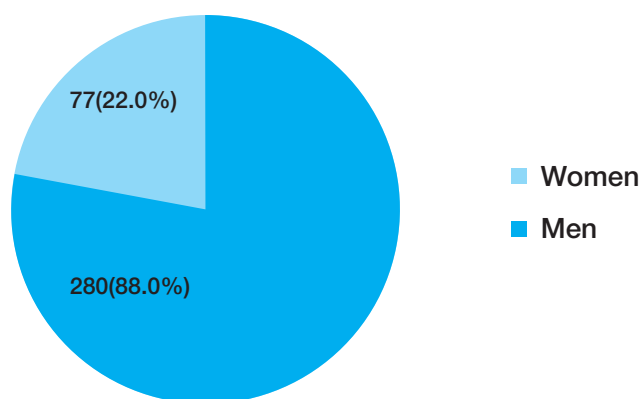


Figure 1: Gender distribution of study cases

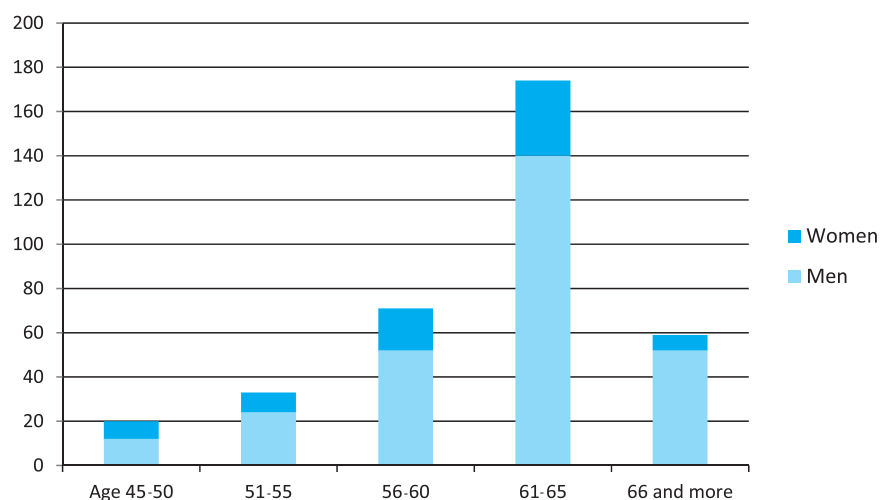


Figure 2: Age wise distribution of study cases

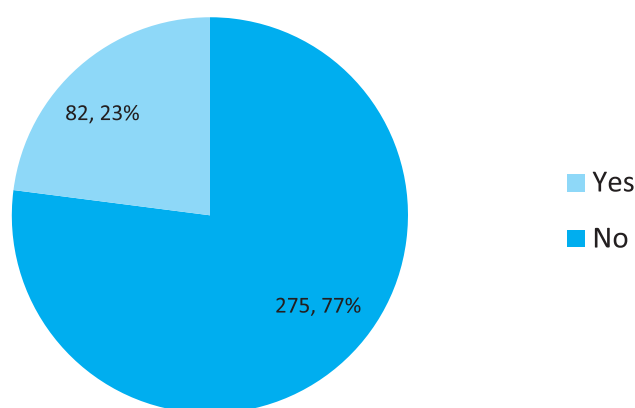


Figure 3: Distribution of study cases on the basis of smoking

total 34 % (122) admitted significant history of exposure to biomass fuel, 26% men and 64% women (table 4). The most common comorbidity identified was systemic hypertension in 111 (31%) patients. It was followed by coronary heart disease (CHD) in 82 (23%) and diabetes mellitus in 67 (19%). Gastroesophageal reflux was seen in 50 (13%), dyslipidemia, anxiety and depression in 39 (11%), chronic kidney disease in 29 (8%) and pulmonary TB in 25 (7%) cases. 25 patients (7%) also had cerebrovascular disease (CVD, including TIAs).<sup>11</sup> (3%) with osteoporosis and 7 (2%) patients with lung cancer were also identified. (Table 5).

## Discussion

Chronic obstructive pulmonary disease (COPD) is characterized by a largely irreversible obstruction of the airways. The obstruction of the airways is usually progressive and often associated with an abnormal inflammatory response of the lungs to harmful particles or gases such as tobacco smoke.

COPD is a very common all across the globe particularly in Asia. In Asia, indoor pollution, particularly exposure to coal and biomass fuels also contributes towards the development of COPD particularly in women. On the other hand cigarette

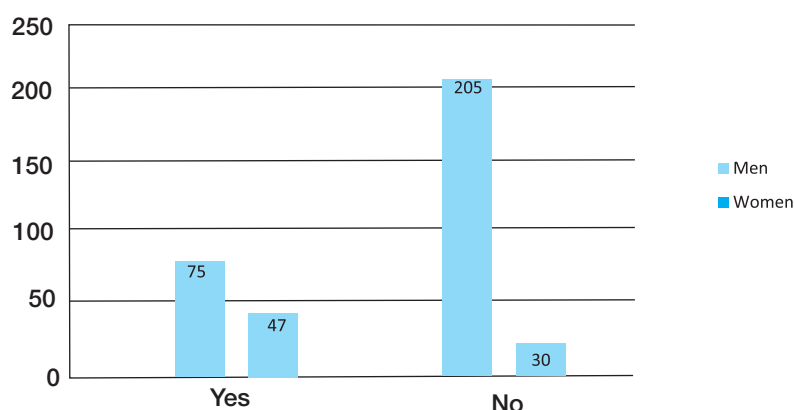


Figure 4: History of coal and biomass fuel exposure

smoking is not only a major risk factor for COPD but also for many other diseases including ischemic heart disease and cerebrovascular disease. It is highly likely that a patient with COPD will simultaneously have other comorbidities and this fact has significant clinical implications.<sup>12</sup> The GOLD guidelines have also recognised the presence and impact of comorbidities with COPD and have recommended standard treatment for any comorbid condition regardless of COPD.<sup>13</sup>

In our study majority of the patients with COPD were men. This is due to the fact that the prevalence of cigarette smoking is far higher amongst men compared to women in our part of the world. The global trend is not so different but is changing. Global prevalence of smoking was recorded at 41% among men vs 9% among women in year 2005.<sup>14</sup> However, global male smoking rates have peaked and are on the decline while women's rates are still rising.<sup>15</sup> The true prevalence of smoking amongst different gender in Pakistan is not known.

The mean age of our patients presenting with acute exacerbation of COPD was recorded at 57.5 years. In this retrospective study, it could not be ascertained if it was the first episode of acute exacerbation or patients has had similar exacerbations in the past requiring hospitalization. In a recent study from Abbottabad, Pakistan, the mean age at the time of diagnosis of COPD was 56 years<sup>16</sup>. In two different studies mainly from west, the mean ages at first presentation with AECOPD were 67.5 and 67.1 years.<sup>17,18</sup>

It was interesting to note that 34% of study population had significant history of exposure to coal or biomass fuel. History of exposure was more common in women 64% vs 24% in men. In third world countries where coal or biomass still remains a source used for heating

and cooking, COPD and related diseases cause huge burden on countries economy.

The study identified various comorbidities either pre-existing at the time of admission or identified during hospital stay. The commonest one was hypertension (31%). It is known that COPD is associated with a high risk of hypertension, coronary artery disease, arrhythmia, stroke, hypertension, and peripheral artery disease.<sup>19</sup> Coronary artery disease was also seen frequently (23%) in our patients. Coronary artery disease has been found in 7.1 to 13.3% patients with COPD in different studies from Europe<sup>19</sup>. In a study from Middle East 28% women and 18 % men with COPD were found to have coronary artery disease.<sup>20</sup>

Smoking is an established risk factor for diabetes.<sup>21</sup> In our group of patient with AECOPD, diabetes mellitus was seen in 19% of the cases. COPD also appears to be a risk factor for diabetes development and vice versa. The increased incidence of diabetes in COPD may be explained on the basis of physiological changes like inflammation, resistance to insulin, weight gain associated with COPD. Effect of diabetes on immune system may result in increase in the occurrence of lung infections and exacerbation of COPD symptoms. In Pakistan the prevalence of diabetes in general population is approximately 10%.<sup>22</sup> In our small study in patients with COPD the prevalence was almost double (19%). A study from India revealed presence of diabetes in 25% of patients with COPD.<sup>22</sup>

Many other comorbidities were also found in our study, all had some effect on patients quality of life, morbidity and mortality. These include gastroesophageal reflux disease, dyslipidemia, anxiety /depression, chronic kidney disease and pulmonary tuberculosis. These comorbidities were also identified in other studies from other parts of the world with

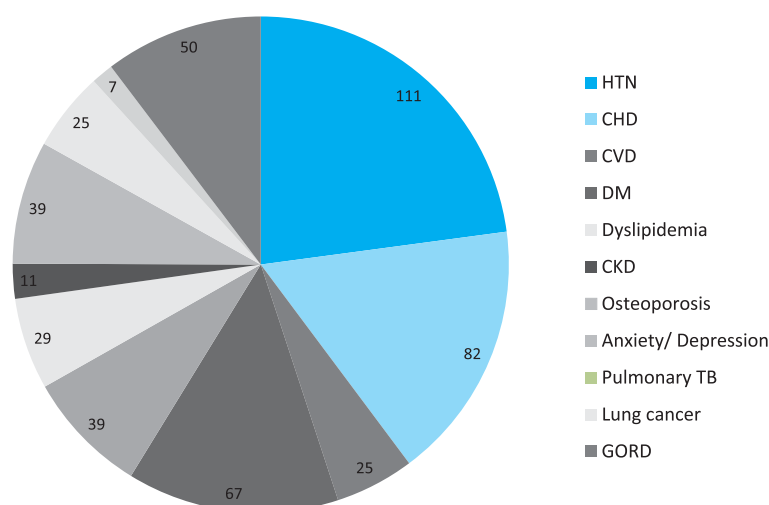


Figure 5: Distribution of comorbidities in patients with AECOPD

slightly different prevalence rates.<sup>23,24</sup>

In summary, our small group of patients who presented with AECOPD, we found significant comorbidities as noticed elsewhere in the world. Many studies have proven that these comorbidities have a greater negative impact in COPD patients in terms of quality of life, exacerbation and mortality. Thus, diagnosis and management of comorbidities in patients with COPD must be undertaken.

## Conclusion

Patients with COPD presenting during an acute exacerbation may have various comorbidities. Attempt must be made to identify and treat all comorbidities associated with COPD as they may affect patients' quality of life, morbidity and mortality.

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