



A Study of Evaluation of Risk Factors in Patients of Acute Exacerbation of Chronic Obstructive Pulmonary Disease

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Abstract

Background: Many known risk factors for AECOPD can be changed through patient management. Therefore, increasing awareness and knowledge about COPD and using targeted interventions can improve patient outcomes.

Aims and Objectives: To study the risk factors associated with exacerbation of COPD. Pyogenic organisms and comorbidities that causes acute exacerbation of COPD.

Material and Methods: In this Retrospective Observational study in department of Respiratory medicine in our hospital total 102 patients who were admitted with acute exacerbation of COPD from January 2023 to November 2023 who were diagnosed case of COPD by clinical history and whose PFT was FEV1/FVC <70% according to GOLD guideline were enrolled.

Results: we have observed that most commonly affected age group is 51-60 years (76.47%) with male predominance [total male-77(75.49%)]. Smoker (n=58) leads to more exacerbation and more admission. From total 102 sputum culture 39(38.23%) had growth of klebsiella pneumoniae and 16(15.68%) having normal flora. 78(74.56%) had hypertension out of which 66.66% had <2 exacerbation/year and 33.33% had > 2 exacerbation/year. 62(60.78%) had coronary heart disease out of which 72.58% had <2 exacerbation/year and 27.41% had > 2 exacerbation /year. 61(59.80%) had osteoporosis out of which 80.32% had < 2 exacerbation/year and 19.67% had >2 exacerbation/year.

Conclusion: Older male who is current smoker or had history of smoking and having associated other comorbidities had more acute exacerbation of COPD.

INTRODUCTION

Acute exacerbations are common in chronic obstructive pulmonary disease (COPD) and contribute greatly to reduced quality of life, increased morbidity, frequent emergency department visits, hospital admissions and increased healthcare costs.[1] Exacerbations further amplify ongoing inflammatory processes in the airways of COPD patients, and may be triggered by environmental pollutants or infection with bacteria or viruses. It is associated with increased airway inflammation, increased mucus production and marked gas trapping.[2]

These changes contribute to increased dyspnea that is the key symptom of an exacerbation. Other symptoms include increased sputum purulence and volume, together with increased cough and wheeze.[3] Patients with COPD are at increased risk pneumonia, pulmonary embolism that may also mimic or aggravate an AECOPD.[4]

DEFINITION

Chronic Obstructive pulmonary disease (COPD), a heterogeneous lung condition characterized by chronic respiratory symptoms (Dyspnea, cough, sputum production) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that causes persistent, often progressive, airflow obstruction.[5]

EXACERBATION

Global Initiative for Chronic Obstructive Lung Disease (GOLD) define an exacerbation as “an event characterized by dyspnea and/or cough and sputum production that worsens over <14 days often associated with increased local and systemic inflammation caused by airway infection, pollution or other insults to the lungs.[5]

Causes and Risk Factors

COPD results from gene(G)-environment interactions occurring over the lifetime(T) of the individual (GETomics) that can damage the lungs and/or alter their normal development/aging processes.[6]

Environmental exposures, such as air pollution and occupational irritants, contribute to airway irritation and exacerbate respiratory distress. Tobacco smoke, whether through active smoking or secondhand exposure, remains a major risk factor, necessitating smoking cessation for effective COPD management.[7] Weather fluctuations, especially cold temperatures, can trigger airway constriction, further complicating the condition.[8]

Respiratory infections, both viral and bacterial, are primary culprits, amplifying inflammation and intensifying COPD symptoms.[9] Gastroesophageal reflux disease (GERD) and malnutrition add to the complexity, impacting respiratory health and immune function. Non-adherence to prescribed medications, sedentary lifestyles, and comorbidities like hypertension, heart disease elevate the likelihood of exacerbations. [10]

Previous episodes serve as ominous indicators, heightening the risk of subsequent events. To mitigate these risks, comprehensive management strategies encompassing medication adherence, vaccination, environmental modifications, and lifestyle adjustments are crucial.[11]

Grade of exacerbation:[5][12]

Mild: Treated with short acting bronchodilators only, SABAs

Moderate: Treated with SABAs and oral steroids and/or antibiotics

Severe: Requires hospitalization may also associated with acute respiratory failure

AIMS AND OBJECTIVES

- To study the risk factors associated with acute exacerbation of COPD.
- To study pyogenic organisms causing acute exacerbation of COPD.
- To study comorbidities associated with acute exacerbation of COPD.

STUDY DESIGN: Retrospective Observational Study

MATERIALS AND METHOD

In this Retrospective Observational study in department of Respiratory medicine in our hospital total 102 patients who were admitted with acute exacerbation of COPD from January 2023 to November 2023 who were diagnosed case of COPD by clinical history and whose PFT was FEV1/FVC <70% according to GOLD guideline were enrolled.

A detailed clinical history including Age, Gender, Addiction and occupation history Were collected using questionnaire. General examination and vital sign was analyzed. All routine blood investigation, chest x ray, sputum AFB and culture and sensitivity and arterial blood gas analysis was analyzed. Base line lung function test like 6 minute walk test and spirometry (FEV1/FVC,FEV1) was recorded. Clinical data included the number of acute exacerbations in the past 12 months (including acute episodes leading to hospital admission) and comorbidities during the course of the disease. All this data will analyzed and study of risk factor associated with acute exacerbation of COPD was evaluated.

ELIGIBILITY CRITERIA**INCLUSION CRITERIA**

- Male or female above 40 years of age.
- A patient diagnosed with Chronic Obstructive Lung Disease according to GOLD guideline ($FEV_1/FVC < 70\%$) and admitted with AECOPD in past 1 year.

EXCLUSION CRITERIA

- Patients with acute cerebrovascular disease with impaired consciousness; pulmonary embolism; or active tuberculosis.
- Patients with other significant respiratory diseases such as asthma, bronchiectasis, or interstitial lung disease.

OBSERVATION AND RESULT

TABLE 1 Various parameters	
Parameters	patients(n=102)
Age (most commonly affected)	51-60 years
Sex	
Male, n (%)	77(75.49%)
Female, n (%)	25(24.50%)
Gold staging	
A , n (%)	13(12.74%)
B , n (%)	55(53.92%)
E , n (%)	34(33.33%)
Organism isolated on sputum culture	
KLEIBSEILLA PEUMONIAE	39(38.23%)
PEUDOMONAS AERUGINOSA	15(14.70%)
STREPTOCOCCUS PNEUMONIAE	14(13.72%)
STAPHYLOCOCCUS AUREUS	6(5.88%)
E.COLI	2(1.96%)
ACENATOBACTER BAUMANI	8(7.8%)
NORMAL FLORA	16(15.68%)

In this study, Out of 102 patients (77 males and 25 females). Most commonly affected age group is 51-60 years.[n=78(76.47%)]

Out of 102 patients, most of patients come under GOLD STAGE B

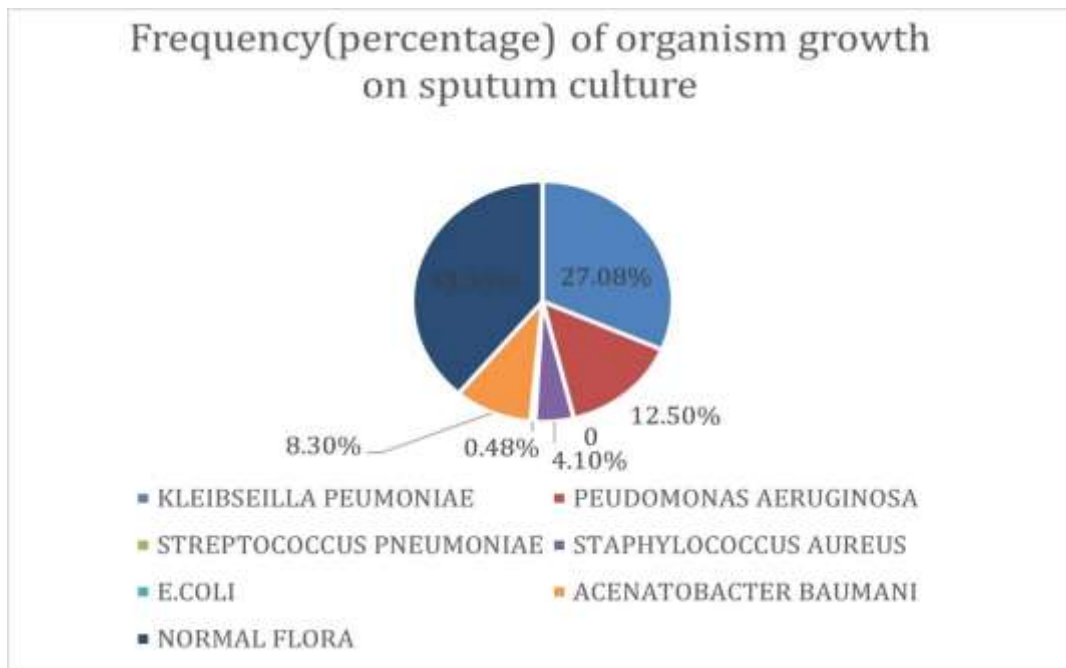


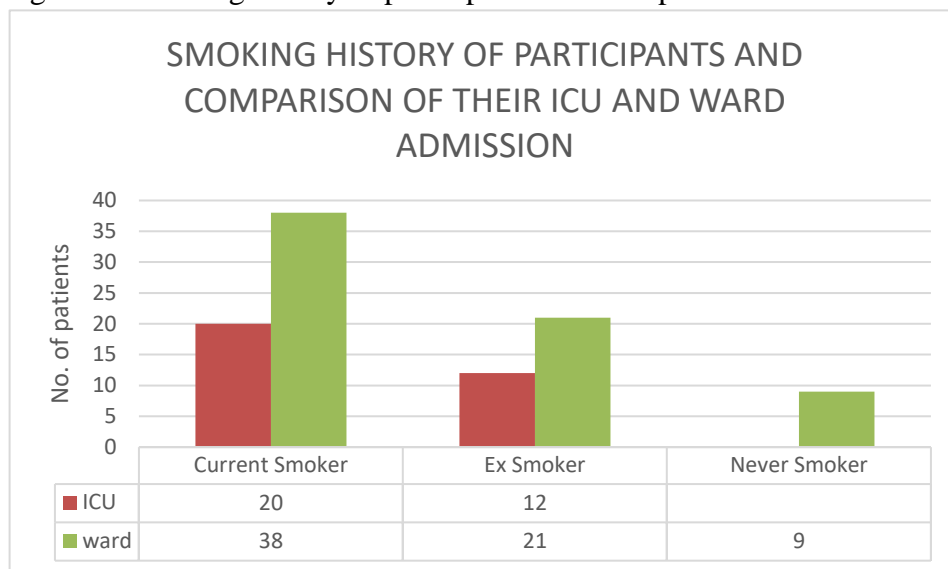
Figure 1 -Frequency (Percentage) of organism growth on sputum culture

- So, the remaining 15.68% who is having normal flora , in these case exacerbation can be due to viruses, atypical bacterias and environmental pollutions

TABLE-2:- SMOKING HISTORY

SMOKING HISTORY	NO. OF PATIENTS	ICU	WARD
CURRENT SMOKERS	58	20(34.48%)	38(65.57%)
EX SMOKERS	33	12(36.36%)	21(63.63%)
NEVER SMOKER	9		9

Figure 2- Smoking history of participants and Comparison Of their ICU and Ward admission.



Out of 102 patients current smokers (n=58) have higher ICU(n=20) and ward (n=38) admission.

Table 3 :-Comorbid condition among study population.

comorbidity	total population(N=102)	study	
		<2 exacerbation/year	>=2 exacerbation/year
hypertension	78(74.56%)	52(66.66%)	26(33.33%)
coronary heart disease	62(60.78%)	45(72.58%)	17(27.41%)
OA	61(59.80%)	49(80.32%)	12(19.67%)
DM2	60(58.82%)	48 (80%)	12(20%)
PVD	35 (34.31%)	26(74.28%)	9(25.71%)
GERD	16(15.68%)	10(62.5%)	6(37.5%)
Stroke	4(3.92%)	3(75%)	1(25%)
CKD	1(0.98%)	1(100%)	0(0%)
depression	5(4.90%)	4(80%)	1(20%)
OSA	4(3.92%)	3(75%)	1(25%)

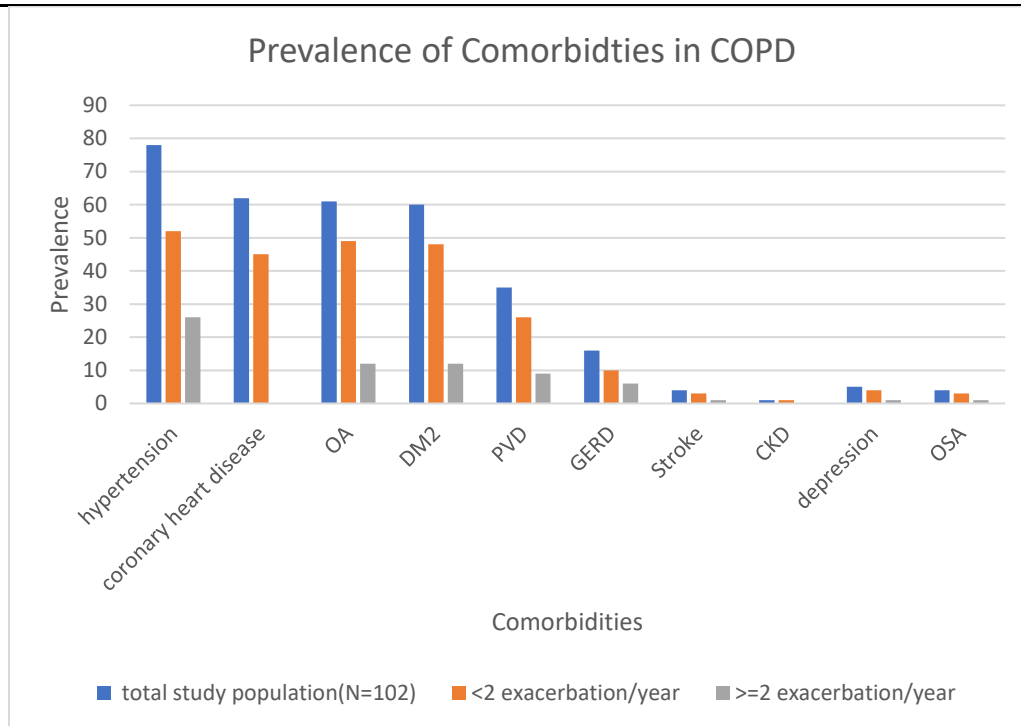


Figure 3- Prevalence of Comorbidities in COPD

Most prevalent comorbidity is hypertension (74.56%). Other comorbid condition which are more frequent is coronary heart disease, osteoarthritis and DM2.

Patient with comorbid condition had a higher risk of having frequent exacerbation compare to who did not suffer from these comorbid condition.

DISCUSSION

- In this retrospective study, we have observed that most commonly affected age group is 51-60 years (76.47%) with male predominance [total male-77(75.49%)].
- We have also observed that smoker (n=58) leads to more exacerbation and more admission (ICU-34.48%, ward-65.57%) compare to nonsmokers.
- From total 102 sputum culture 39(38.23%) had growth of klebsiella pneumoniae and 16(15.68%) having normal flora.
- 72(74.56%) had hypertension out of which 66.66% had <2 exacerbation/year and 33.33% had > 2 exacerbation/year. 62(60.78%) had coronary heart disease out of which 72.58% had <2 exacerbation/year and

27.41% had > 2 exacerbation /year. 61(59.80%) had osteoporosis out of which 80.32% had < 2 exacerbation/year and 19.67% had >2 exacerbation/year.

- This study demonstrate that older male who is current smoker or had history of smoking and having associated other comorbidities had more acute exacerbation of COPD.
- Bacterial pathogen is most common cause of acute exacerbation of COPD.
- A study done in Department of Cardio-respiratory Physiology, Vallabhbhai Patel Chest Institute, University of Delhi, India, most isolated organisms are streptococcus pneumoniae and pseudomonas aeruginosa. In our study most isolated organism is klebsiella pneumoniae. we assume that low detection rate of these pathogens may be related to regional differences and laboratory environmental factors.
- The main cause of COPD is smoking, which is closely related to a decline in lung function. Other studies have shown that smoking cessation can delay lung function decline and improve survival. However, in our study, smoking was not an independent risk factor for AECOPD, which might be due to geographic heterogeneity of the disease.
- Age is a risk factor for AECOPD, which may be due to the decline in lung function with age. These findings agree with our study, wherein the risk of exacerbation increased as the disease progressed, probably because of poor lung function and other risk factors such as comorbidities and smoking. In addition, disease duration was an independent risk factor for AECOPD.
- The finding of this study suggest that hypertension and coronary heart disease is more prevalent. Compared to Westerik et al. *Respiratory Research* (2017) which is done in 16,427 patients of COPD, the prevalence rates of most comorbidities in this study were similar. Many patients with COPD have comorbidities, and those with more advanced COPD are more likely to have comorbidities. This is associated with an increased risk of experiencing acute exacerbation and mortality. Moreover, many patients with COPD have more than one comorbidity. Comorbidities are highly prevalent among patients experiencing AECOPD, which was associated with longer hospitalization and a higher likelihood of mortality. Therefore, the presence of comorbidities must be recognized in the management of patients with AECOPD, which require more complex and individualized therapy.

CONCLUSION

- Our study shows that most COPD patients are older and male, with a history of smoking, lower education level, and comorbidities. Smoking, older age, and comorbidities predispose to AECOPD.

- Other potential contributors to AECOPD are poor treatment compliance, air pollution, and long and cold winters, which limit outdoor activities and vitamin D synthesis.
- Many known risk factors for AECOPD can be changed through patient management. Therefore, increasing awareness and knowledge about COPD and using targeted interventions can improve patient outcomes.

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