

ORIGINAL ARTICLE

Frequency of Blood Eosinophilia in Patients of Acute Exacerbation of Chronic Obstructive Pulmonary Disease (AECOPD)

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Objective: To determine the frequency of eosinophilia in patients presenting with acute exacerbation chronic obstructive pulmonary disease (AECOPD).

Patients and Methods: A total number 217 patients presenting with AECOPD were included from August-2021 to March-2022. Data regarding patients age, gender, diabetes, hypertension, smoking and duration of COPD was collected for each patient. After inclusion, venous blood samples were taken and were analyzed for presence of eosinophilia.

Results: Mean age of patients was 59.32±8.92 years. Mean duration of COPD was 6.56±2.49 years. There were 127 (74.7%) male and 43 (25.3%) female patients. Out of 170, 121 (71.2%) patients were smokers, 66 (38.8%) diabetic and 79 (46.5%) hypertensive patients. Eosinophilia was diagnosed in 37 (21.8%) patients.

Conclusion: Based on the data of our study including 170 patients hospitalized for AECOPD, we found that 21.8% patients had blood eosinophilia (defined as ≥300 cells/μL). So Peripheral blood eosinophilia can be used a significant biomarker in patients with acute exacerbation of COPD.

Keywords: Acute exacerbation, Eosinophilia, chronic obstructive pulmonary disease.

INTRODUCTION

Chronic obstructive pulmonary disease, also known as COPD, is a major contributor to morbidity and mortality rates all over the world.¹ COPD is a disease that may be prevented and managed, but it also has a number of significant extrapulmonary consequences that might exacerbate the condition in some people. The pulmonary manifestation of this illness is characterised by a restriction in airflow that cannot be reversed to its previous state in its entirety. In most cases, the limitation of airflow happens gradually and is associated with an incorrect inflammatory response of the lungs to hazardous substances or particles.² Acute exacerbations of COPD, also known as AECOPD, were responsible for over 700 000 hospitalizations and between 50 and 70 percent of the costs associated with COPD in the United States.^{3,4}

Patients who have COPD are considered to be a subset of a variety of phenotypes.^{5,6} In patients diagnosed with COPD, eosinophils have come to be regarded as a significant mediator over the course of the past few years. They are involved in a variety of pathophysiological mechanisms, such as the contractility of the bronchial smooth muscle, in addition to the processes of humoral and cell-mediated immune responses.⁷

The aim of the present study is to determine the frequency of eosinophilia in patients presenting with AECOPD. The determination of eosinophilia in AECOPD patients can help in early decision making in our patients. recent meta-analysis has reported to start inhaled corticosteroids therapy in patients with eosinophil count ≥2.0%, the analysis on 12496 patients reported significantly higher reduction in eosinophilic COPD exacerbations by adding corticosteroids in comparison to standard COPD treatment.¹⁰ So the results of this study will help us to determine burden of eosinophilia associated AECOPD in our patients and therefore will help in deciding standard treatment for the preventions and AECOPD in our patients.

MATERIAL AND METHODS

A total of 170 patients of AECOPD who were presented in emergency department of the hospital were included from August-2021 to March-2022. A written consent was taken from each participant after explaining them the objectives of study. Patients of age ≥40 years, having COPD duration >1 years were included. While known case of hypereosinophilic disease or those taking systemic steroids were excluded from analysis.

Patients having age ≥40 years, having of smoking of > 10 packs per year, a post-bronchodilator FEV₁ of < 80% predicted (or

< 60%) and a post-bronchodilator FEV₁/forced vital capacity of < 70% were labelled as having COPD.⁸

Patients presenting with increased dyspnea, sputum and increased purulence in sputum necessitating admission in emergency department were labelled as having AECOPD.

Data regarding patients age, gender, diabetes, hypertension, smoking and duration of COPD was collected for each patient.

After inclusion, venous blood samples were taken by staff nurse on duty and were sent to the central hospital laboratory for determination of eosinophil levels. Patients having eosinophil levels ≥300 cells/μL were labelled as having eosinophilia.

Data analysis was done using SPSS v25 software. Mean and S.D. were used for quantitative variable such as age, and duration of COPD. Qualitative variables like gender, smoking, diabetes, hypertension and eosinophilia were presented in the form of frequency and percentage.

RESULTS

Mean age of patients was 59.32±8.92 years. Mean duration of COPD was 6.56±2.49 years. There were more males as compared to the females.

Table 1. Data of baseline Characteristics.

Age (Years)	59.32±8.92
Duration of COPD (Years)	6.56±2.49
Male Gender	127 (74.7%)
Female Gender	43 (25.3%)
Smoking	121 (71.2%)
Diabetes	66 (38.8%)
Hypertension	79 (46.5%)

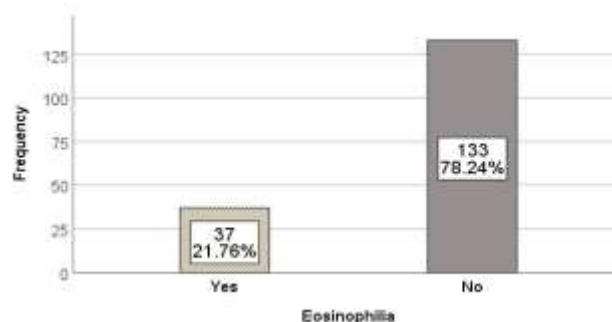


Figure 1. Frequency of Eosinophilia.

There were 127 (74.7%) male and 43 (25.3%) female patients. On frequency of smoking, 121 (71.2%) patients were smokers. On frequency of diabetes, there were 66 (38.8%) diabetic and 104 (61.2%) non-diabetic patients (Figure 12). On frequency of hypertension, there were 79 (46.5%) hypertensive patients and 91 (53.5%) non-hypertensive patients (Table 1).

Frequency of eosinophilia also derived; eosinophilia was diagnosed in 37 (21.8%) patients (Figure 1).

DISCUSSION

COPD is a leading cause of mortality and morbidity in the entire world. 109 COPD's acute exacerbation was responsible for roughly 700,000 hospitalizations in the United States and 50–70 percent of the costs connected with the disease.⁹ In the hospital, there has been minimal variation in the treatment of AECOPD. It is becoming more common to see a variety of phenotypes within the COPD clinical syndrome, including those with airway inflammation caused by eosinophils.¹⁰

Biomarkers for COPD have sparked interest in finding a way to treat the condition on an individual basis. However, thus far there has been no reliable biomarker either alone or in combination that can be used in clinical practise. Based on the observation that the amount of a single blood eosinophil count appears to be linked with subsequent risk for exacerbation and to predict the response to ICS therapy in clinical investigations, circulating eosinophils have recently emerged as a promising biomarker in selected individuals.¹¹ According to the ECLIPSE trial, 36% of patients had chronic blood eosinophil concentrations of >2%, and these patients had lower St. George's Respiratory Questionnaire, mMRC scores, and higher FEV₁. Surprisingly, the number of patients with a death rate of 2% or less was the same as the healthy participants in the cohort. Post-hoc analysis of clinical studies confirmed this cut-off number, showing that individuals with 2 percent and 300 cells/L cut-off values were more likely to worsen the condition.¹²

Even though eosinophilic airway inflammation is more common in patients with AECOPD than in any other cause of hospitalisation, few studies have looked at the prevalence of blood eosinophilia, a marker for that condition.¹³ Eosinophilia is common in individuals with AECOPD, so we examined the prevalence of blood eosinophilia in those patients.

Eosinophilia prevalence was the key outcome. For purposes of this definition, an absolute eosinophil count of less than 300 cells/L was considered to be eosinophilia if it was found in peripheral blood samples taken at the beginning of the patient's hospital stay (including any visits to the emergency department or clinic prior to admission). In addition, depending on the findings of earlier investigations into COPD.¹⁴

In present study, eosinophilia was diagnosed in 22.12% among a sample of 217 patients who were admitted with AECOPD in our hospital.

A cross sectional study by Batool et al. conducted at pulmonology department including 150 patients 135 (90%) male and 15 (10%) female with mean age of 60 years reported eosinophilia in 63 (42.0%) patients presenting with AECOPD.¹⁵

While another retrospective study by Hasegawa and Camargo including 3084 patients with median age 70 years and 1542 (50%) male and 1542 (50%) female, reported eosinophilia in only 513 (17%) patients presenting with AECOPD.¹⁶

About 20 percent of patients with moderate-to-severe COPD had eosinophil counts of 300 cells/mL or higher in both the COPD Gene and ECLIPSE investigations at one point in time. Eosinophil counts above 300 cells/mL were associated with an increased risk of exacerbation, but in the ECLIPSE research only 6.7% had this condition. Patients with COPD, particularly those with higher baseline eosinophil counts, have more fluctuating blood eosinophil counts, according to a recent UK Clinical Practice Research Datalink research.^{17,18}

Eosinophil counts should be measured in patients who have frequent AECOPD. As a biomarker for further risk classification, we demonstrated that eosinophil levels in a high-risk group can be

useful. COPD patients with few exacerbations may not benefit from eosinophil count measurements. Mepolizumab trials have shown that patients with frequent exacerbations may benefit from antieosinophilic medication based on eosinophil levels.¹⁹ There were two randomised, double-blind studies, METREX and METREO, in which patients with moderate or severe exacerbations received triple inhalation treatment were enrolled. Those with eosinophilic COPD were included in METREO, but not METREX, based on blood eosinophil counts.²⁰ These parallel studies also indicated that even in patients with a considerable prior history of exacerbation, it is possible to further stratify exacerbation risk based on blood eosinophil counts.¹⁹

CONCLUSION

Based on the data of our study including 170 patients hospitalized for AECOPD, we found that 21.8% patients had blood eosinophilia (defined as ≥ 300 cells/ μ L). So Peripheral blood eosinophilia can be used a significant biomarker in patients with acute exacerbation of COPD.

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