

# Frequency of Blood Eosinophilia in Patients of COPD Exacerbations

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## ABSTRACT

**Objective:** To determine frequency of blood eosinophilia in patients with COPD exacerbation

**Study Design:** *Cross-sectional Study*

**Place and Duration of Study:** This study was conducted at the Department of Pulmonology, Services Hospital Lahore from 01-02-2017 to 31-07-2017.

**Material and Methods:** 150 patients fulfilling inclusion criteria for all types of COPD with acute exacerbations before treatment were included in study from outdoor and indoor of pulmonology department of Services Hospital, Lahore. Informed consent was taken. The data was collected through a predesigned proforma. Bias effect was controlled by having eosinophil count measured from single laboratory of Services hospital by digital method followed by manual verification for those having >2% eosinophilia. All the information was written in pre-designed proforma.

**Results:** Out of 150 cases 90 % (n=135) were males and only 10% (n=15) were females. Mean age of presentation was 60.27±9.7.42% (n=63) patients were found to be having raised peripheral blood eosinophilia while 58% (n=87) patients had normal eosinophil count. Male to female ratio was 9:1

**Conclusion:** Peripheral blood eosinophilia is a significant biomarker in patients with acute exacerbation of COPD for our population.

**Key Words:** COPD, Acute exacerbation of COPD, Peripheral blood eosinophilia, airway eosinophilia.

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## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease with some significant extrapulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases.<sup>1</sup>

Chronic obstructive pulmonary disease (COPD) has an extensive, adverse effect on both patients and the healthcare system. It is the fourth-ranked cause of death in the United States, killing more than 120,000 individuals each year.<sup>2</sup>

The diagnosis of COPD required pulmonary function tests (PFTs) in symptomatic patients with history of

exposure to tobacco smoke, occupational dust, or occupational chemicals<sup>3</sup>. COPD is confirmed when a patient who has symptoms that are compatible with COPD is found to have airflow obstruction (ie, a forced expiratory volume in one second [FEV1]/forced vital capacity [FVC] ratio less than 0.70) and there is no alternative explanation for the symptoms and airflow obstruction. Any exacerbation of COPD is an acute event which is characterized by worsening of the patient's respiratory symptoms (shortness of breath, increase in sputum production and change in sputum colour) that is beyond normal day to day variation and leads to a change in medications<sup>4</sup>.

Current guidelines advocate use of systemic steroids in acute exacerbation of COPD but the treatment responses are heterogeneous, efficacy is marginal and treatment is not without side effects<sup>8</sup>. Airway eosinophilia is associated with corticosteroids responsiveness in COPD and peripheral blood eosinophil count is a sensitive and specific biomarker for airway eosinophilia during exacerbation of COPD<sup>9</sup>. Empirical antibiotics and systemic steroids for 7-10 days are usually prescribed for the treatment of exacerbation according to GOLD guideline for COPD. A biomarker directed treatment strategy using the peripheral blood eosinophil count to guide corticosteroid prescription can be used to treat exacerbation of COPD. Peripheral blood eosinophils are a highly sensitive and specific marker of sputum eosinophilia during exacerbation of COPD<sup>11</sup> as COPD patients with eosinophilia respond better to

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corticosteroid treatment. A randomized placebo controlled trial conducted in United Kingdom by Bafadhel and colleagues included 166 subjects, out of which biomarker directed arm (86) showed 51% (44) patients to be having blood eosinophilia<sup>12,13</sup>.

## MATERIALS AND METHODS

This was a cross-sectional study that was performed in Department of Pulmonology Services Hospital Lahore from 01-02-2017 to 31-07-2017. One hundred and fifty patients (both gender) of age >20 years and with acute COPD exacerbation before treatment were included in the study. Patient with known case of hypereosinophilic disease or taking systemic steroids in last 2 weeks were excluded from the study. Informed consent was taken. The data was collected through a predesigned proforma. Bias effect was controlled by having eosinophil count measured from single laboratory of Services hospital by digital method followed by manual verification for those having >2% eosinophilia. All the information was written in pre-designed proforma. The collected information was entered in SPSS version 20.0 and analyzed. Quantitative variable of the study like age were presented as mean  $\pm$  standard deviation. The qualitative variables like gender and blood eosinophilia were presented as frequency and percentages. As this was a cross sectional study, therefore no test of significance will be applied.

## RESULTS

One hundred and fifty patients were enrolled with mean age of  $60.27 \pm 9.7$  years [range 44 – 79]. Majority of the patients 51% (n=76) were between 40 -59 years of age (Table 1). Out of 150 patients, there were 135 (90%) male patients, while remaining only 15 (10%) patients were females. Male to female ratio was 9:1 (Table 2). Peripheral blood eosinophilia was present in 42% (n=63) while 58% (n=87) were having normal peripheral blood eosinophil count (Table 3). Our results showed that 90% (n=57) patients with blood eosinophilia were males and 10% (n=6) patients were females (Table 4).

**Table No.1: Distribution of cases by age**

Age	Number of Cases	Percentage
40-49	28	19%
50-59	48	32%
60-70	44	29%
>70	30	20%
Total	150	100%
Mean $\pm$ SD	<b>60.27<math>\pm</math> 9.7</b>	

**Table No.2: Distribution of cases by sex**

	Number of Cases	Percentage
Male	135	90%
Female	15	10%
Total	150	100%

**Male: female 9:1**

**Table No.3: Distribution of Subjects According To blood eosinophilia**

Eosinophilia	Frequency	Percent
Present	63	42
Absent	87	58
Total	150	100.0

Eosinophilia : Blood eosinophil count >2%

**Table No.4: Gender distribution according to blood eosinophilia**

Gender	Frequency	Percent
Females	06	10 %
Males	57	90 %
Total	29	100 %

**Male: Female 8.5:1**

## DISCUSSION

COPD affects 329 million people or nearly 5% of the population. In 2011, it ranked as the fourth-leading cause of death, killing over 3 million people<sup>14</sup>. The number of deaths is projected to increase due to higher smoking rates and an aging population in many countries.<sup>15</sup> Chronic obstructive pulmonary disease (COPD) has an extensive, adverse effect on both patients and the healthcare system<sup>3</sup>. Acute exacerbations of COPD are associated with significant morbidity and mortality<sup>6,20</sup>.

A randomized placebo controlled trial conducted in United Kingdom by Bafadhel and colleagues included 166 subjects, out of which biomarker directed arm (86) showed 51% (44) patients to be having blood eosinophilia<sup>8</sup>.

In our study we found out 42% patients to be having peripheral blood eosinophilia. The lesser percentage as compared to Bafadhel study is possibly because of the ethnic differences among two populations. Differences in COPD by ethnicity were identified and significant differences in drug and non-drug management and hospital admissions observed<sup>17</sup>. Study conducted by Barbara Bain revealed that there is difference in eosinophil count in white and black population in UK<sup>16</sup>. Mean age at presentation in our study was  $60.27 \pm 9.7$  which is quite similar to results of study by Mohan et al<sup>16</sup>, having mean age of  $62.1 \pm 9.8$ .

Moreover our study showed lesser magnitude of problem in females i.e., only 10% which is significantly closer to data by Mohan<sup>16</sup> i.e., 12% but lower than western population.

This indirectly coincide with lesser percentage of smoking in our female population as compared to west as revealed by study by Nasir K i.e., 25.4% smokers were males while only 3.5% of females smoked<sup>17,19</sup>. By contrast in 2008, 21.1 million (18.3%) women smoked in United States compared to 23.1% men<sup>18</sup>.

Our study is first of its kind in Pakistan to target the judicious use of systemic steroids with the help of simple and easily accessible eosinophil count that may

help to avoid the well documented side effects of this treatment. Further studies are required to evaluate the results for the better management of our patients.

## CONCLUSION

Peripheral blood eosinophilia can be used to curtail the steroid prescribing practice in Pakistan to avoid potential side effects.

We recommend further studies on a larger population scale to strengthen our data.

### Author's Contribution:

Concept & Design of Study: Huma Batool  
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**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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