



Association between Absolute Eosinophils Counts & Acute Exacerbation of COPD.

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INTRODUCTION

- Chronic Obstructive Pulmonary Disease (COPD) Is a Common Disease That Is Characterized By Persistent Respiratory Symptoms And Airflow Limitation. Due To Abnormalities Of The Airway Or Alveoli Or Both Caused By Exposure To Noxious Particles And Gases[1].COPD is a leading cause of morbidity and mortality world wide (3 most common causes of death world wide and 90% of death occurs in low -middle income countries).[2]
- Acute exacerbation COPD can occur due to multiple causes including infectious causes (viral and bacterial respiratory tract infection) and non infectious causes air pollution , biomass exposure , drug default. Around 10- 40% of COPD exacerbation are due to TH2 mediated- Eosinophilic airway inflammation[3]. The mechanism by which eosinophilic inflammation may contribute to exacerbations is unclear, but it may be a combination of oedema, airway remodelling, mucus production and changes in airway geometry.[4]
- AEC (Absolute eosinophils count) it represents the actual number of eosinophils per microliter of blood . the absolute count is the percentage of Eosinophils multiplied by white blood count(WBCs) . Normal ranges is between 30-350 cells/microliter of blood.
- Currently, the best predictor of COPD exacerbation is a previous history of exacerbation[5]. It is clear that a subset of COPD patients has raised eosinophil levels [6], and that having higher eosinophil levels may be associated with an increased risk of exacerbations [7].

AIMS AND OBJECTIVES

- To assess the relationship between blood eosinophils level and COPD exacerbations.
- The comparison of clinical outcome between normal AEC ranges group and elevated AEC groups

ELIGIBILITY

INCUSION CRITERIA-

- Male or female above 40 years of age.
- A patient diagnosed with Chronic Obstructive Lung Disease according to GOLD guideline (Post bronchodilator- FEV1/FVC <70%)
- Patient who has severe exacerbation of COPD according to GOLD 24 who needed hospitalization.

EXCLUSION CRITERIA-

- Bronchial asthma or ABPA patients
- Asthma COPD overlap syndrome
- H/O allergy or hypersensitivity
- H/O parasitic infections
- Hyper eosinophilic syndrome

METHODOLOGY

- Retrospective Observation study In Department Of Respiratory medicine In SVP Hospital Ahmedabad in duration of 1 year(From December 2022 To NOVEMBER 2023)in patient who was admitted with exacerbation of COPD whose baseline stable state Absolute eosinophil count values were available.
- Patients who were diagnosed case of COPD by clinical history, exposure and occupation history and whose PFT post bronchodilator FEV1/FVC <70% according to Global Initiative For Chronic Obstructive Lung Disease (GOLD) Guideline 2023 were taken for the study. Exacerbation of COPD as defined by GOLD 2023 – patients with dyspnoea and/or cough and sputum production that worsen over <14 days with tachycardia and /or tachypnoea with signs of local and systemic inflammation were considered.

According to this patient who was needed hospital admissions were admitted.

- We extracted the following data from the medical records: patients' demographics, the history of hospital admissions in the previous year, laboratory data (eosinophil counts during stable COPD and AECOPD at the time of hospital admission),duration of hospital stay, admission to the intensive care unit (ICU), length of ICU stay, any need for Non invasive ventilation &The duration of for Non invasive ventilation mechanical ventilation & the duration of mechanical ventilation and treatment outcomes(discharge and death).
- The cut of value for AEC ≤ 300 CU/MM were considered normal.
- Values were compared of Eosinophilic (>300 cu/mm)and Non-eosinophilic (<300 cu/mm)groups.

OBSERVATION & RESULTS-

- Baseline demographics and clinical outcomes were compared between patients with normal AEC and raised AEC during the exacerbations.

- From total 1 year of duration 86 patient had exacerbation of COPD , 56 patient’s baseline absolute eosinophils count in stable stat were available, these patients were included for the study.
- From total 56 patients- 51(91%) patients were male and 5 (9%)were female. Median age group in eosinophilic and non eosinophilic group was respectively was 65.87 and 64.71 years.
- From 56 Patients 54(96%) patients had AEC Within Normal Range And 2(4%) Patients Had Elevated AEC in stable state .From 56 patient only 7 (12.5%) patients had elevated AEC and 49(87.5%)patients still had within limit values AEC during exacerbations.
- In comparison with stable state , during exacerbation AEC was increased only in 7 (12.5%) patients from total 56 patients , with 2(4%) patient having baseline elevation during the stable state.
- From this 56 patients 10 (17.85%) patient had previous h/o exacerbation from 7 from the AEC group <300(14.28%) and 3(42.85%) from the >300 group.
- Average hospital stay during exacerbation in normal and raised AEC group was almost equal respectively 7 and 6 days. From normal AEC group 10 (17.85%) patient required ICU admission , from this 5 required non invasive ventilation(NIV) and 5 required Mechanical ventilation. From raised AEC group 1 patient required ICU admission and was kept on non invasive ventilation(NIV).Total 2 patient died that belonged to normal AEC Group, no mortality noted in AEC > 300 group. with 47(83.92%) getting discharged in AEC<300 and 7(12.5%)in AEC >300.

Baseline characteristic and clinical outcome during exacerbation of COPD.

	AEC <300	AEC>300	p value
SEX(n total -56)			
MALE (n -51)	45(80.35%)	6(10.71%)	
FEMALE(n-5)	4(7.14%)	1(1.78%)	
Average age (in years)	65.87	64.71	
Previous h/o of exacerbation	7(14.28%)	3(42.85%)	0.064

CLINICAL OUTCOME	n-49	n-7	0.047
Average days of hospitalization(in days)	7(5-9)	6(5-8)	
ICU admission	10(10.26%)	1(14.28%)	0.70
Non invasive ventilation	5(50 %)	1(14.28%)	0.129
Mechanical ventilation	5(50%)	0	0.044

TREATMENT OUTCOME			1
DISCHARGE	47(95.91%)	7(100%)	
DEATH	2(4.08%)	0	

AEC(in cu/mm)	STABLE	EXACERBATION	P VALUE-0.1617
≤300	54 (96%)	49(87.5%)	
>300	2 (4%)	7(12.5%)	

- In our study We applied chi square test in the comparison of previous history of exacerbation we got p value of 0.064(>0.05)which is non- significant -no increased risk of exacerbations with AEC values.
- In clinical outcome(days of hospitalization and need of ICU admission) we got p value of 0.047 which is significant suggestive of increased risk of admission and hospital stay in AEC <300 group.
- There is no increased risk of requirement of icu admission (p value 0.68- non significant) but requirement of mechanical ventilation is significant with p vale of 0.044.
- In treatment outcome(discharge and death) p value is 1 which non- significant suggestive of no increased risk of death in aec group<300.
- Also there is no significant relation ship between the AEC value in stable state and during the exacerbation.

DISCUSSION-

- The association between eosinophilic inflammation of COPD, its dynamics and exacerbation risk are controversial. Schumann et al. suggested that blood eosinophil levels are variable throughout the course of COPD and phenotyping are difficult based on a single measurements [11]. In the ECLIPSE study, half of the patients were an intermittent group with variable eosinophil counts that oscillated above and below 2%, the results of the ECLIPSE study, in which only 13.6% of subjects had persistently low blood eosinophils, and 49% and 37.4% had variable and persistently high blood eosinophils, respectively [12]. However, Kim et al. reported that blood eosinophils at a time-point were a useful predictor of being in the persistent eosinophilia group over the next 12 months demonstrating longitudinal stability of blood eosinophilic infammation within individuals [13].
- The reference was taken from the paper published Marc Miravittles et al [8] and The article published Dave Singh et at[9]in both the studies they did not find a clinically important relationship between baseline blood eosinophils count and exacerbation rate.
- Another reference study was taken from the paper published Hye seon kang et al[10]they found positive correlation between eosinophil count and exacerbation COPD.
- Comparing our study with et at[9] & et al [10]

DEMOGRAPHY	Our study			et al[9] Dave		Hye seon	Et al 10	
	<300	>300		<300	>300	<300	>300	
AEC	n-49	n-7		n-17,677	n-4448	n-299	n-48	
MALE	45	6		12904	3584	217	37	
Mean age	65.87	64.71		65.15	64.6	73.36	68.79	
Previous history of exacerbation	6	4	0.037	3050	766	95	11	0.216

CLINICAL OUTCOME								
Average days of admission (in days)	7(5-9)	6(5-8)		-	-	8(6-12)	5.5(3.25-9.5)	
ICU	10	1	0.70	-	-	28	2	0.234
NIV	5	1	0.129	-	-	5	0	0.367
Mechanical ventilation	5	-	0.044	-	-	22	2	0.419
Resolve	47	7	1	-	-	286	47	0.459
Death	2	-		-	-	13	1	0.459

- Some comparison between our study with study Dave Singh et al [9] and Hye seon kang et al [10], in all these studies previous history of exacerbation were noted more in AEC < 300 group, so currently previous history of exacerbation tends to be a more potent indicator. In a recent study analysing data from the ECLIPSE and the COPD Gene cohorts, a blood eosinophil concentration > 300 cells/l was a good predictor of future risk of exacerbations only in patients with frequent exacerbations, but not in patients with 0 or 1 exacerbation in the previous year.
- Also the need of ICU admission as well as need of mechanical and non-invasive ventilation found to be more required in the group of AEC < 300. In our study and study Hye seon kang et al [10]
- In comparison with the above study, exacerbation was found more in the normal eosinophilic population, days of hospitalization are almost equal in both groups, need of ICU admission and mechanical ventilation requirement was more observed in the normal AEC group.

CONCLUSION-

- We found no clinically important relationship between baseline blood eosinophil count and exacerbation rate. Hence, the current analysis does not support the use of blood eosinophils to predict exacerbation risk and as well as to be used as a biomarker.

Pitfalls-

- Large study population would provide better outcome.
- Further studies are necessary to determine whether those with persistently high eosinophils during short-term follow-up (i.e., 6 months) have consistent results.

Abbreviations-

AEC- absolute eosinophil count

COPD -chronic obstructive pulmonary disease AECOPD- acute exacerbation of COPD

ICU-intensive care unit

NIV non invasive ventilation

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