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Frequency of Occurrence of Leukocytosis in Patients with Acute Exacerbation of COPD at A Tertiary Centre

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Abstract:
COPD is a major cause of chronic morbidity and mortality; it is currently the fourth highest cause of death in the world, and is predicted to be the third leading cause of mortality worldwide by the year 2020 [1-2]. COPD is identified mainly according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines; [post bronchodilator forced expiratory volume in 1 s (FEV1)/forced vital capacity ratio less than 0.7; severity determined by FEV1 alone] combined with a history of exposure to risk factors [2]. Exacerbations of respiratory symptoms in COPD are of major importance because of their profound and long lasting adverse effects on patients [3]. Frequent episodes accelerate loss of lung function, affect the quality of life of patients, and are associated with poor survival. There are some specific blood biomarkers for predicting lung function decline, acute exacerbation, or even mortality from big longitudinal cohort studies. However, their performance is depressing [4] . Peripheral blood leukocytosis has already been well investigated in the aspect of inflammatory biomarkers for COPD. The level of leukocytes is a key parameter in the clinical assessment of patients with COPD exacerbation, with and without fever. The presentation of high WBC count makes it important to distinguish the effect of the glucocorticosteroid from the effect of the possible infection [5-7].

Keywords: Chronic obstructive pulmonary disease, exacerbation, inflammatory biomarker, leukocytosis, lung funtion.

Introduction:

COPD is a major cause of chronic morbidity and mortality; it is currently the fourth highest cause of death in the world, and is predicted to be the third leading cause of mortality worldwide by the year 2020 [1-2]. COPD is identified mainly according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines; [post bronchodilator forced expiratory volume in 1 s (FEV_1)/forced vital capacity ratio less than 0.7; severity determined by FEV1 alone] combined with a history of exposure to risk factors [2]. Exacerbations of respiratory symptoms in COPD are of major importance because of their profound and long lasting adverse effects on patients [3]. Frequent episodes accelerate loss of lung function, affect the quality of life of patients, and are associated with poor survival. There are some specific blood biomarkers for predicting lung function decline, acute exacerbation, or even mortality from big longitudinal cohort studies. However, their performance is depressing [4] . Peripheral blood

leukocytosis has already been well investigated in the aspect of inflammatory biomarkers for COPD. The level of leukocytes is a key parameter in the clinical assessment of patients with COPD exacerbation, with and without fever. The presentation of high WBC count makes it important to distinguish the effect of the glucocorticosteroid from the effect of the possible infection [5-7].

Aim: Study of frequency of occurrence of leukocytosis in patients with acute exacerbation of COPD at a tertiary centre.

Methods: Approval of the ethical committee was obtained in May 2017. This study was done from June 2017 to April 2019. COPD patients more than 40 years of age, having acute exacerbation and presenting to SS Hospital were screened and those meeting the inclusion and exclusion criteria were selected for the study.

Table 1: Inclusion criteria:

COPD patients with:	
	Post Bronchodilator FEV_1/FVC <70%
	Post-bronchodilator reversibility <200ml and < 12%
	Indian population
	Aged >40years.

Table 2: Exclusion Criteria:

Domiciliary oxygen therapy
Hypertension
Diabetes mellitus
Inflammatory diseases
Hemodynamically unstable patients
Coagulopathies
Renal diseases
Liver diseases
Malignancies
Long term steroids use
Anticoagulant and antiplatelet medication use
Drug abuse
Alcoholics
Active smokers
Pregnancy

Control group:
Adult aged >40 years among indian population and hemodynamically stable.

Study Design:
A single center case control cross-sectional observational study design including 50 cases and 50 controls (healthy volunteers) was done.

Data Analysis:
Data was analyzed using Trial version of SPSS 20 utilizing ANOVA, Student t-test, chi-square, Mann-Whitney test.

Table 3:Base line characteristic of controls (healthy volunteers) and cases (COPD patients) .

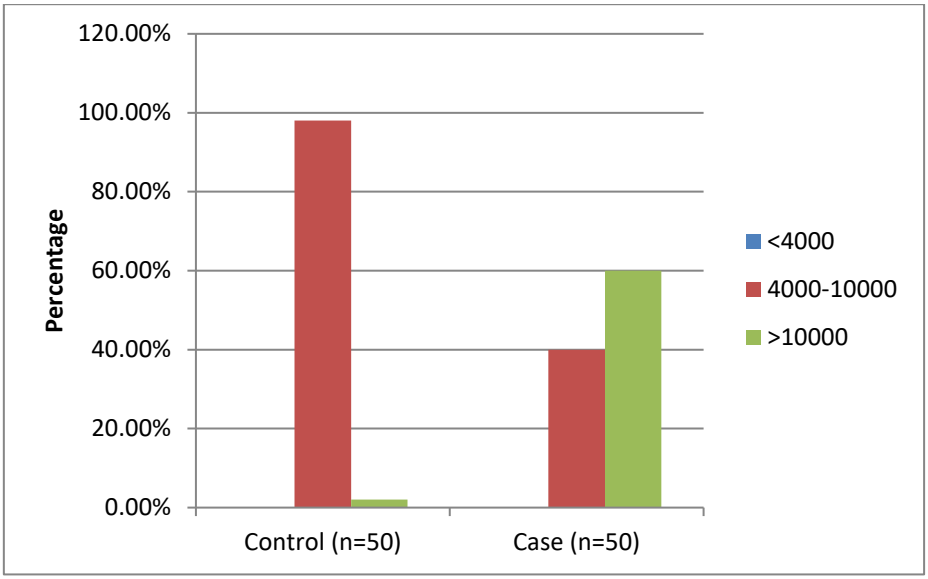
Variables	GroupI (control)	Group II (cases)	P-value
Age in years	60.68±7.78	60.82±8.68	0.933
Sex			
Male	46.0% (n=23)	36.0% (n=18)	0.309
Female	54.0% (n=27)	64.0% (n=32)	0.309
BMI in kg/m2			
<18.5	14.0% (n=7)	2.0% (n=1)	0.051
18.5-24.9	80.0% (n=40)	80.0% (n=40)	
25-29.9	6.0% (n=3)	16.0% (n=8)	
>30	0.0% (n=0)	2.0% (n=1)	
FEVI/FVC			
<70%	0.0% (n=0)	100.0% (n=50)	
>70%	100.0% (n=50)	0.0% (n=0)	
FEV1			
>80%(GOLD 1)	100.0% (n=100)	0.0% (n=0)	0.000
>50-80%(GOLD 2)	0.0% (n=0)	32.0% (n=16)	
>30-50%(GOLD 3)			
<30% (GOLD 4)	0.0% (n=0)	46.0% (n=23)	
	0.0% (n=0)	22.0% (n=11)	
mMRC grading			
0	84.0% (n=42)	0.0% (n=0)	0.000
1	12.0% (n=6)	0.0% (n=0)	
2	4.0% (n=2)	14.0% (n=7)	
3	0.0% (n=0)	30.0% (n=15)	
4	0.0% (n=0)	56.0% (n=28)	
CAT Score			
0-40	1.52±1.86	25.84±6.58	0.000

Observation:

Table 4: TLC

TLC	Control (n=50)		Case (n=50)		Total	
	N	%	N	%	N	%
<4000	0	0.0%	0	0.0%	0	0.0%
4000-10000	49	98.0%	20	40.0%	69	69.0%
>10000	1	2.0%	30	60.0%	31	31.0%
Total	50	100.0%	50	100.0%	100	100.0%

$\chi 2=39.317$, p=0.000



Conclusion:

Among 50 patients, 30 of them had an increased leukocytes at the time of presentation whereas 20 of them had counts within normal range. Out of control only one presented with increased counts. Thus it is clear from the table that maximum cases of acute exacerbations of COPD presented wih an increased counts. Statistically highly significant difference was seen among the groups.

Result:

Stressors like infection resulted in exacerbation and hospital visit in most of the COPD patients. 60 % of the patients with acute exacerbation of COPD had increased leucocyte counts.

Discussion:

This study looked at the reason for patients visit to hospital; it was observed that increase in sign and symptoms leading to acute exacerbation of COPD was associated with infection with leukocytosis. Potential pathways by which bacteria could contribute to the pathogenesis of acute exacerbation include (*1*) primary infection of the lower airways, (*2*) secondary infection of the airways after an antecedent viral infection, and (*3*) bacterial antigens inducing bronchial hyperreactivity and eosinophilic inflammation [8]. The above evidence just addressed the association between COPD and levels of leukocytes. However, the level of leukocyte is affected as a consequence of current smoking and other factors like glucocorticoid use as well. GCS are known to increase the number of white blood cells (WBC), a phenomenon called “glucocorticoid induced leukocytosis”. The increase is mainly in the

neutrophilic cells, while the count of the other circulating cells, especially the eosinophils, decreases [9].Hence, further prospective, longitudinal, and well-designed cohort studies are needed. Potential confounders, such as current smoking and glucocorticoid intake can affect serum lipid status.

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