Outcome of COPD Exacerbation in Relation to Eosinophilic Count at Abbassia Chest Hospital

Thesis

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In Chest Disease

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List of Contents

List of Abbreviations

Abb.	Full Term
ACE	Angiotensin-Converting Enzyme
AECOPD	Acute exacerbations of COPD
AERIS	Acute Exacerbation and Respiratory Infections
BOLD	The Burden of Obstructive Lung Disease
CB	Chronic Bronchitis
CC-16	Clara Cell Protein
COPD	Chronic Obstructive Pulmonary Disease
CPD	cigarettes smoked per day
CSF	Cerebro-Spinal Fluid
DCs	Dendritic Cells
ECLIPSE	The Evaluation of COPD Longitudinally to Identify Predictive Surrogate Endpoints
EPX	Eosinophil Peroxidase
EXACT	EXAcerbation of Chronic Pulmonary Disease Tool
FER	Forced Expiratory Ratio
FEV1	Forced Expiratory Volume In 1 Second
FVC	Forced Vital Capacity
GM-CSF	Granulocyte- Macrophage Colony-Stimulating Factor
GVHD	Graft-versus-host disease
HIS	The Heaviness of Smoking Index
IA	Intracranial Aneurysm

List of Abbreviations (Continued)

Abb.	Full Term
IBD	Inflammatory Bowel Diseases
ICS	Inhaled Corticosteroid
IDO	Indoleamine-2 3-Dioxygenase
IL	Interlukins
ISOLDE	The Inhaled Steroid in Obstructive Lung Disease in Europe
JVP	Jugular Venous Pulse
LABA	Long-Acting Inhaled B2 Agonist
LAMA	long-acting muscarinic antagonist
MDI	Metered Dose Inhaler
NAC	N Acetylcysteine
NIV	Noninvasive Positive Pressure Ventilation
NSAIDs	Non-steroidal Anti-inflammatory Drugs
NTHi	Nontypeable Haemophilus Influenzae
PAH	Pulmonary Arterial Hypertension
PaO2	Partial Pressure Of Arterial Oxygen
PDE4	Phosphodiesterase 4
SABAs	Short-Acting Inhaled β2 Agonists
SAH	Subarachnoid Hemorrhage
TGF-β	Transforming Growth Factor Beta
TNF-α	Tumor Necrosis Factor Alpha
UPLIFT	Understanding the Potential Long-Term Impacts on Function with Tiotropium
WBC	White Blood Cell

List of Tables

List of Tables (Continued)

List of Tables (Continued)

List of Figures

List of Figures (Continued)

Abstract

Background: COPD exacerbations are heterogeneous in terms referred to airway inflammation by different etiology. It contributors to impaired lung function and quality of life, in addition to emergent healthcare use and mortality burden.

Objectives: To evaluate the correlation of blood and sputum eosinophils count with COPD exacerbation severity as a primary outcome, then reporting the impact of steroid use in patients with higher eosinophils counts as a secondary endpoint.

Subjects and Methods: 100 COPD cases were evaluated in outpatients clinic and inpatients words depending on their characters of exacerbation, and subjected for blood and sputum sample collections to estimate the level of eosinophils; once at examination and one more time after regular treatment protocol.

Results: Repeated hospital admission from COPD exacerbation was significantly correlated with eosinophils level in blood and sputum; ($r = 0.29$; $P = 0.003$ and $r = 0.3$; $P = 0.002$) respectively. Moreover, the level of eosinophils in blood and sputum was significantly higher in severe exacerbation groups, $P < 0.001$ and lower in groups treated with steroid therapy; $P < 0.001$ and 0.004 respectively.

Conclusion: Eosinophils either in blood or tissue could be used as a biomarker for evaluating COPD exacerbation severity, besides, it could guide the treatment by steroid therapy.

Keywords: Exacerbations, Chronic Obstructive Pulmonary Disease, Eosinophilic Count.

INTRODUCTION

Chronic obstructive pulmonary Disease (COPD) is a chronic inflammatory lung disease, that causes obstructed airflow from the lungs ***(Ferri et al., 2016),*** COPD is now the third leading cause of death in the world ***(Brooks et al., 2014).***

Symptoms of COPD include breathing difficulty; cough; nucus (sputum) production and wheezing.

Emphysema and chronic bronchitis are the most common conditions that contribute to COPD ***(Han et al., 2016)*** chronic bronchitis is inflammation of the living of the bronchial tubes; which carry air to and from the air sacs (alveoli) of the lungs.

Emphsyema is a condition in which the alveoli at the end of the smallest air passages (bronchioles) of the lungs are destroyed as a result of damaging exposure to cigarette smoke and other irritating gases ***(Balkissoon et al., 2011)*** chronic bronchitis is defined clinically as presence of chronic production cough for 3 months during 2 consecutive years.

The sensitivity of physical examination in detecting mild to moderate COPD is relatively poor; but physical signs are quite specific and sensitive for severe disease. Findings in severe disease include the following: tachypnea and respiratory distress with simple activities, use of

accessory respiratory muscles and paradoxical indreawing of lower intercostals spaces (Hoover Sign), cyanosis, elevated Jugular venous pulse (JVP) and Peripheral edema ***(Maclay et al., 2009).***

Thoracic examination reveals the following: hyperinflation (barrel chest), wheezing - frequently heard on forced and unforced expiration, diffusely decreased breath sounds, hyperesonance on percussion, prolonged expiration, and coarse crackles ***(Maclay et al., 2009).***

The Formal Diagnosis of COPD is made with spirometry; when the ratio of forced expiratory volume in 1 second over forced vital capacity (FEV1/FVC is less than 70% of that predicted for a match control; it is diagnostic for a significant obstructive defect ***(Casanova et al., 2008).***

There are inflammatory cells involved in pathogenesis of COPD which includes: Neutrophils; CD+8 thymphocytes; macrophage; eosinophil.

Presence of eosinophilic inflammation is a distinguishing feature between asthma and COPD ***(Barnes et al., 2004).***

Eosinophils are end- stage cells; derived from the Bone marrow under the influence of granulocyte-macrophage colony- stimulating factor (GM - CSF); interleukin (IL)-3; The late differentiation factor IL-5 ***(Birring et al., 2002).***

Exacerbations are important events with a significant influence on prognosis; and prevention of exacerbation is a central element in the management of COPD ***(McChan et al., 2007).***

An Exacerbation is defined as an event in the natural course of the disease characterized by a change in the patient's baseline dyspnea; cough, and/or sputum that is beyond normal day - today variations; is acute in onset; and may warrant a change in regular medication ***(Longo et al., 2016).***

Systemic inflammation and elevated inflammatory biomarkers have been linked to increase risk of exacerbations in COPD which includes: elevated plasma fibrinogen and C- reactive protein and eosinophilic count ***(Hurst et al., 2009).***

Eosinphilic count is sputum or blood sample is closely related to COPD exacerbations.

Aim of the Work

The aim of the work is to discuss the outcome of COPD exacerbation in relation to eosinophilic count.

Chapter 1: COPD

Chronic obstructive pulmonary disease (COPD), a common preventable and treatable disease, is characterized by persistent airflow limitation that is usually progressive and that is caused by an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. COPD is a major cause of morbidity and mortality worldwide and results in an economic and social burden that is both substantial and increasing. COPD prevalence, morbidity and mortality vary across countries. In the USA, COPD affects approximately 24 million Americans, results in about 120,000 deaths a year and is now the third leading cause of death ***(Riera et al., 2018).***

The natural history of COPD is punctuated by exacerbations which have major implications on the patient and healthcare system. In this review we provide a concise overview of COPD exacerbations and their impact, outlining the population at risk, etiology and current management and preventive strategies ***(To et al., 2018).***

Etiology of COPD exacerbation

It is estimated that 70–80% of COPD exacerbations are triggered by viral or bacterial respiratory infections **(Table 1).** The remaining 20–30% are associated with exposure to environmental pollution or have an unknown etiology. COPD exacerbations may be mimicked by other medical conditions. Occasionally, the presence of congestive heart failure and pneumonia may be difficult to