

Study of C-reactive protein levels in COPD patients

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Abstract

Background: In COPD patients increased CRP levels are associated with poor lung function, reduced exercise capacity and worse quality of life as well as being a significant predictor of all-cause mortality. As well as COPD itself, smoking, which is the most commonly encountered risk factor for the disease is also responsible for rise in serum CRP levels.

Methods: All subjects were evaluated by taking a detailed clinical history. The duration of COPD, number of exacerbations, symptoms and treatment history was enquired from each patient enrolled in the study with detailed systemic examination of each patient. Routine blood investigations were done with specific investigations such as CRP.

Results: The difference in the distribution of CRP level among levels of Gold staging was statistically significant ($p < 0.05$).

Conclusion: Systemic inflammation is inherent to COPD independent of ever-smoking status and correlates with disease severity, concomitant systemic hypertension and pulmonary hypertension

Keywords: CRP, COPD, Pulmonary hypertension

Introduction

Chronic obstructive pulmonary disease (COPD) a preventable and treatable disease which consists of constant expiratory limitation of the flow of air which is not fully reversible.¹

Detection of COPD is thought in a patient coming with symptoms of cough, excessive production of sputum, or dyspnea and/ or exposure to factors which causing the disease will be present.²

The chronic inflammation in COPD, orchestrated by multiple inflammatory cells and mediators in the airways and the lung tissues, is induced by inhalation of noxious gases and particulate matter.³ This persistent

inflammatory response in the lung is also associated with a significant systemic inflammatory response yielding adverse clinical outcomes, so-called systemic effects of COPD.⁴ Although the origin of systemic inflammation present in COPD remains poorly understood and correlations in the regulation of inflammation in the pulmonary and systemic compartments are not well-documented yet, it is clearly established that some inflammatory markers are risen in systemic circulation. Of the blood-based biomarkers, C-reactive protein (CRP) has shown the greatest promise.⁵

In COPD patients increased CRP levels are associated with poor lung function, reduced exercise capacity and worse quality of life as well as being a significant predictor of all-cause mortality. As well as COPD itself, smoking, which is the most commonly encountered risk factor for the disease is also responsible for rise in serum CRP levels. Though to our knowledge the effect of biomass exposure, potentially initiating inflammatory process in the lungs of COPD patients, on serum CRP levels has not been studied previously.⁶

Materials and Methods

Study design: Hospital based cross-sectional observational study.

Study duration: From the approval of thesis to till achievement of the sample size, whichever is earlier.

Sampling Method: Systematic random sampling

Inclusion criteria

1. Those who will give informed consent
2. Diagnosed cases of COPD

Exclusion criteria

1. Patients with any other acute or chronic infections.
2. Patients with Diabetes Mellitus, Hypertension, CAD
3. Patients not giving informed consent.

Data Collection

All subjects were evaluated by taking a detailed clinical history. The duration of COPD, number of exacerbations, symptoms and treatment history was enquired from each patient enrolled in the study with detailed systemic examination of each patient. Routine blood investigations were done with specific investigations such as CRP.

Data Analysis

To collect required information from eligible patients a pre-structured pre-tested proforma will be used. Data will be collected and will be analysed by required statistical test.

Results

Table 1: Age wise distribution of study subject

Age in yrs	No of cases	Percentage
<45 yrs	02	02.00
45-60 yrs	35	35.00
>60 yrs	63	63.00
Total	100	100.00
Mean age in yrs	63.21±10.12	

Table no 1 shows that maximum patients were found >60 yrs age group. The mean age was 63.21±10.12 yrs.

Table 2: Sex wise distribution of study subject

Sex	No of cases	Percentage
Male	87	87.00
Female	13	13.00
Total	100	100.00

Table no 2 shows that maximum patients were male (87.00%) and 13.00% patients were female.

Table 3: Symptoms wise distribution of study subject

Symptoms	No of cases	Percentage
Breathlessness	100	100.00
Expectoration	60	60.00

Cough	70	70.00
Wheezing	18	18.00
Chest pain	30	30.00

In present study, all patients were present with breathlessness, 70.00% patients were present with cough, 60.00% patients were present with expectoration. 30.00% patients were present with chest pain and 18.00% patients were present with wheezing.

Table 4: CRP level in the study population

CRP level	Mean	SD
	1.37	0.97

Mean CRP level was 1.37 ± 0.97 mg/dl.

Table5: Association between CRP level and GOLD criteria

GOLD stage	CRP level (mg/dl)		p-value
	Mean	SD	
A	1.02	0.23	0.001
B	1.86	0.56	
C	2.36	1.01	
D	3.12	1.02	

The difference in the distribution of CRP level among levels of Gold staging was statistically significant ($p < 0.05$).

Discussion

In this study, Among the study population, 63.00% of the subjects were in >60.00 years age group followed by 35.00% subjects each in 45 – 60 years and 5.00% in less than 45.00years age group. There is increase of COPD patients over age, which is explained by the effect of age in the COPD manifestation. Normally there is decline in FEV1 over age i.e it will usually reduce to half from age of 25 to 75. However, there is an accelerated reduction by two thirds in COPD patients over age.⁷

In this study, 87.00% of the subjects were males and 13.00% were females. In all age groups, the distribution

of males is 5-7 many times the number of females. The main confounding factors are tobacco usage and occupational exposure, which is more among males. The males are more in 61 – 70 years age group and least in less than or equal to 50 years age group. However, females are more in 51 – 60 years age group and no females in less than or equal to 50 years age group. Women with COPD will present differently, may have a different pattern of comorbidities, and may have improved survival after acute exacerbations.⁸ Sorheim et al, studied the gender differences in COPD and concluded that Female gender was associated with lung function reduction and more severe disease in patients with COPD with early onset of disease or low smoking exposure.⁹

The main finding of the present study is that CRP levels are raised in stable COPD patients independent of smoking behavior and history of biomass exposure. Augsti et al also demonstrate higher CRP levels were related to low FEV1% predicted, SpO2 and 6MWD and to high MMRC levels among the prognostic predictors of the disease, in concordance with the previous reports¹⁰ and moreover indicate that serum CRP levels are most strongly related to BODE index and concomitant systemic hypertension.

With the growing awareness of COPD being a complex disease involving several organs with a clearly established low-grade systemic inflammation, biomarkers have been more focus of interest in clarifying the pathogenesis and progression of COPD as well as in designing new therapeutic targets for the disease. Elevated serum CRP levels indicating a low grade persistent systemic inflammation in COPD patients was first described in early 2000's.¹¹⁻¹² Then direct relationship between CRP levels and important

prognostic clinical variables in stable COPD patients was reported in 2006 by de Torres et al.¹³ They published that CRP levels in stable COPD patients are associated with arterial oxygen tension, 6MWD, FEV1, FVC, inspiratory capacity/total lung capacity, GOLD stage of the disease and BODE index

Conclusion

Systemic inflammation is inherent to COPD independent of ever-smoking status and correlates with disease severity, concomitant systemic hypertension and pulmonary hypertension

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