

**Original article:**

## Study of role of High sensitivity C-reactive protein in chronic obstructive pulmonary disease

**\*Dr. Amit Palange, Dr. M Anudeep Reddy**

Department of Medicine, Dr D Y Patil Medical College and Hospital, Pimpri , Pune  
Corresponding author\*

**Abstract:**

**Introduction:** 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.

**Methodology:** The main objective of this study was to assess sensitivity and specificity of High sensitivity C-reactive protein in COPD and study the values and role of High sensitivity C- reactive protein in COPD. At the time of registration the baseline information was taken especially with respect to sociodemographic factors, clinical findings, and other investigations. The data thus collected was analysed to study the role of High sensitivity C- reactive protein in chronic obstructive pulmonary disease.

**Results :** Present study had mean HS-CRP values was  $9.68 \pm 10.14$  mg/dl and majority (66%) were less than 10, followed by 18% were 10.1 to 20 and 16% were more than 20.1

**Conclusion:** Present study confirms that High Sensitivity C-reactive protein levels are increased in chronic obstructive pulmonary disease patients.

**Introduction:**

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.<sup>1</sup> 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.<sup>(2)</sup> 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.<sup>(2,3)</sup> Of the blood-based biomarkers, C-reactive protein (CRP) has shown the greatest promise.<sup>(4)</sup>

In COPD, patient's 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<sup>(2-5)</sup> 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.<sup>(6-10)</sup>

Serum CRP levels are increased in patients with COPD. It is used as a predictive factor for extra-pulmonary complications determining the prognosis of disease. It has not yet been defined whether this increase is due to the disease itself or is accompanied by ischemic heart disease and cigarette smoking.<sup>(6)</sup> Based on the current knowledge that COPD is a multicomponent systemic disease with elevated serum CRP levels, to study the correlation between them, the present study was undertaken.

**Material and methods:**

The present study was a cross section study. Study was conducted on the patients in the Department of Medicine at Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune.

Inpatient department of Medicine of tertiary care hospital. They were registered when admitted under Medicine department. At the time of registration the patients with exclusion criteria were not enrolled for study.

The main objective of this study was to assess sensitivity and specificity of High sensitivity C-reactive protein in COPD and study the values and role of High sensitivity C- reactive protein in COPD. At the time of registration the baseline information was taken especially with respect to sociodemographic factors, clinical findings, and other investigations. The data thus collected was analysed to study the role of High sensitivity C- reactive protein in chronic obstructive pulmonary disease.

**INCLUSION CRITERIA:**

COPD patients whose disease is confirmed by spirometry (FEV 1/FVC<70%, post bronchodilator).

**EXCLUSION CRITERIA:**

- Disease not confirmed by FEV1/FVC<70% or FEV1/FVCmax<70 pulmonary function test (PFT).
- Age <14 years
- Bronchial Asthma
- Connective tissue disorder (Rheumatoid arthritis, SLE)
- Presence of malignancy

**Results:**

In our study, majority 52% of respondents were in the age group of less than 50 years, followed by 46% were in age group of 51 to 60 years and only 2% were more than 71 years.

**TABLE 1: ASSOCIATION BETWEEN HSCRP AND GOLD STAGING AMONG THE STUDY POPULATION**

HS CRP (mg/dl)	I	II	III	IV	Total
<10	10	23	0	0	33
10.1 -20	0	2	7	0	9
>20.1	0	0	7	1	8
Total	10	25	14	1	50

Applying Chi square test=45.67, df=6, p<0.000001

**TABLE 2: ASSESS SENSITIVITY AND SPECIFICITY OF HIGH SENSITIVITY C-REACTIVE PROTEIN IN COPD AMONG THE STUDY POPULATION**

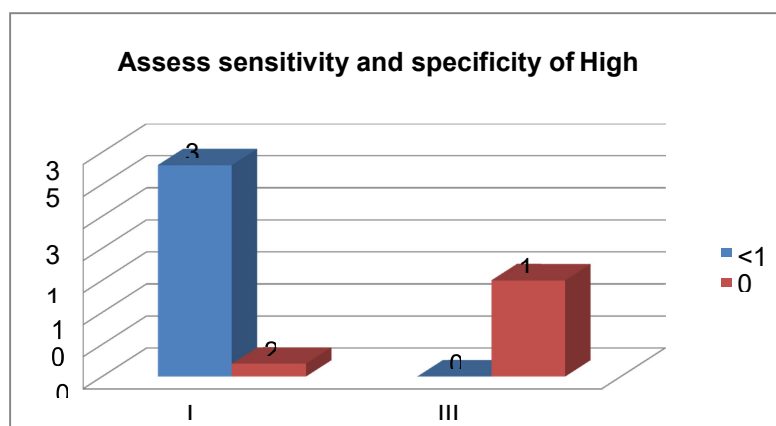
Hs-CRP/Gold staging	I and II	III and IV	Total
<10	33	0	33
>10	2	15	17
Total	35	15	50

**TABLE 3: CORRELATION OF HS-CRP WITH OTHER VARIABLES AMONG THE STUDY POPULATION**

Hs-CRP	Correlation coefficient	p value
age	0.38	0.005
Smoking status	0.32	0.02
BMI	0.3	0.02
FEV1	-57	<0.0001
Pco2	0.68	<0.0001

Negative correlation was seen in FEV1 and all the parameters had statistical significance.

**FIGURE 1: ASSESS SENSITIVITY AND SPECIFICITY OF HIGH SENSITIVITY C-REACTIVE PROTEIN IN COPD AMONG THE STUDY POPULATION**



p<0.0001

Sensitivity= 94%

Specificity =100%

Positive predictive value= 100%

Negative predictive value=88%

Accuracy= 48%

### Discussion:

COPD is a leading cause of morbidity and mortality in countries of high, middle and low income worldwide representing the largest fraction of mortality for respiratory diseases. COPD affects over 5% of adult population worldwide. Estimates from WHO's Global Burden of Disease and Risk Factors project show that in 2001, COPD was the fifth leading cause of death in high income countries, and it was the sixth leading cause of death in nations of low and middle income. In the same report, COPD was also estimated to be the seventh and tenth leading cause of disability –adjusted life years in countries of high income and in those of low or middle income, respectively. By 2020 the WHO predicts that COPD will become the third leading cause of death and the sixth leading cause of disability worldwide. <sup>(4)</sup>

In COPD, subsets of patients may have dominant features of chronic bronchitis, emphysema or asthma. The result is irreversible airflow obstruction. COPD is a disorder that causes a huge degree of human suffering and currently is the fourth leading cause of death in United States. Development of the 20th century included the wide spread use of spirometry, recognition of airflow obstruction as a key factor in determining disability in COPD. <sup>(5-7)</sup>

In our study, shows that mean age was  $51.78 \pm 6.67$  years and majority 52% of respondents were in the age group of less than 50 years, followed by 46% were in age group of 51 to 60 years and only 2% were more than 71 years.

Present study had mean HS-CRP values was  $9.68 \pm 10.14$  mg/dl and majority (66%) were less than 10, followed by 18% were 10.1 to 20 and 16% were more than 20.1

In study by Funda Aksu et al <sup>(8)</sup> it is observed that serum CRP levels were significantly higher in COPD patients than in healthy subjects ( $7.22 \pm 9.84$  vs.  $3.14 \pm 2.27$  mg/L,  $P=0.005$ ).

In study by Agarwal R et al <sup>(11)</sup> mean HS-CRP levels were  $4.82 \pm 1.97$  mg/l. Present study shows increased levels.

In a study by Pinto-Plata et al <sup>(14)</sup> there was a significant higher level of CRP in COPD patients ( $50.03 \pm 1.51$  mg/L) rather than smoking ( $2.02 \pm 1.04$  mg/L) and non-smoking control groups ( $2.24 \pm 1.04$  mg/L) ( $P < 0.001$ ).

Present study shows statistical significance between HSCRP and gold staging. In a study by Milacic N et al <sup>(12)</sup> the higher the CRP concentration, the higher was the disease severity determined according to GOLD classification ( $p < 0.001$ ).

### Conclusion:

Present study confirms that High Sensitivity C-reactive protein levels are increased in chronic obstructive pulmonary disease patients.

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