Thermational	Research Paper	Medical Science
	Association of C-Reactive Protein with the cardiac co- morbidities in COPD –a cross-sectional study.	
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ABSTRACT and a strength of the strength of th	round: Acute-phase reactants like CRP, could provide good markers of prog and objectives: 1. To study the prevalence of various cardiac comorbidities in re Protein. TOPD were studied over a period of 2 years in a tertiary hospital.	nosis in COPD. COPD. 2. To study its relationship with

Observation and results: C Reactive protein is positive in 31% of

study population. The prevalence of hypertension in COPD is 45.38%. Out of 59 patients of hypertension in COPD, 32 were C Reactive protein positive and 27 were CRP negative. The prevalence of Ischemic heart disease in COPD patient is 18.46% and that of heart failure is 19.23%.

Conclusion: All the 3 cardiac co-morbidties i.e. Hypertension, Ischemic heart disease and Heart failure are significantly associated with the CRP in COPD patients.

KEYWORDS : COPD, CRP

Introduction:

COPD is a condition characterized by an abnormal inflammatory response beyond the lungs with evidence of low-grade systemic inflammation (Gan WQ et al¹; Smith MC et al ² Cavaillès A et al³) which causes systemic manifestations such as weight loss, skeletal muscle dysfunction, an increased risk of cardiovascular disease, osteoporosis and depression, among others. More direct measures of systemic inflammation, like acute-phase reactants, could provide good markers of prognosis in COPD. C-reactive protein (CRP) is one of these systemic inflammatory markers. It is an acute phase protein synthesized predominantly by the hepatocytes in response to tissue damage or inflammation. Mounting evidence now suggests that increased serum CRP levels associate with lung inflammation in stable COPD (Gan WQ et al¹, de Torres JP et al⁴ Pinto-Plata VM⁵). It reflects the total systemic burden of inflammation of individuals (Pepys MB et al⁶) and has been shown to be increased in COPD in stable condition (Gan WQ et al1) and during exacerbations. It also predicts hospitalizations and mortality in patients with chronic respiratory failure (Cano NJM7). The present study was undertaken with an aim to study the prevalence of various cardiac comorbidities in COPD and its relationship with inflammatory marker C Reactive Protein.

Methodology:

Study Design: Institutional based cross sectional study Study setting: Department of Pulmonary Medicine. Tertiary care Medical College Hospital. Study duration: November 2013 to October 2015. Subject selection: Inclusion criteria:

• Patients aged 40 years and above.

- Patients who had dyspnoea, chronic cough, sputum production and risk factors, such as tobacco use and occupational exposures to dust and chemicals with all degree of airflow severity were consecutively included if they had a post bronchodilator FEV₁/FVC ratio of <0.7 after 400 micrograms of inhaled salbutamol.
- Patients not using systemic steroids.

Exclusion criteria:

Patients not fitting into inclusion criteria.

- Known chronic systemic infection or inflammatory condition such as SLE, Rheumatoid arthritis etc.
- Patient using systemic steroids.
- Hemodynamically unstable patients and patients in acute exacerbations.
- Acute myocardial infarction within last 6 months.

The CRP was estimated by a standardised semi quanititative method. Cardiac comorbidities like Hypertension, IHD and heart failure were studied in a total of 130 patients on which appropriate statistical tests were applied.

Observation and results:

Out of the total 130 COPD patients, 111 were males and 19 were females and 40 were C Reactive protein positive and 90 were negative for C Reactive protein. C Reactive protein is positive in 31% of study population.

Hypertension: Out of 130 COPD patient studied 59 patients have hypertension. The prevalence of hypertension in COPD is 45.38%. Out of 59 patients of hypertension in COPD, 32 were C Reactive protein positive and 27 were CRP negative. In CRP normal group 30% are hypertensive while in CRP positive group 80% are hypertensive and hence CRP positive group has higher proportion of hypertension, which is statistically significant.

Ischemic heart disease: Out of 130 COPD patients 24 have Ischemic heart disease. The prevalence of Ischemic heart disease in COPD patient is 18.46%. Out of 24 patients of ischemic heart disease in COPD, 21 were C Reactive protein positive and 3 were CRP negative. In CRP normal group 3.3% have ischemic heart disease while in CRP positive group have 52.5% ischemic heart disease and hence CRP positive group has higher proportion of ischemic heart disease, which is statistically significant.

Heart failure: Out of 130 COPD patients 25 have heart failure, 105 have no heart failure. The prevalence of heart failure in COPD patient is 19.23%. Out of 25 patients of heart failure in COPD, 21 were C Reactive protein positive and 4 were CRP negative. Out of the total 130 COPD patients 40 were C Reactive protein positive, out of 40 C Reactive protein positive patient 21 have heart failure. In CRP normal

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group 4.4% have heart failure while in CRP positive group have 52.5% heart failure and hence CRP positive group has higher proportion of heart failure, which is statistically significant.

(figure 1 comes here) (figure 2 comes here) (table 1 comes here)

Discussion: In the cross-sectional study on 130 patients of COPD we studied Hypertension, IHD and Heart failure with respect to C Reactive Protein.

HYPERTENSION

Out of 130 COPD patient studied 59 patients have hypertension. The prevalence of hypertension in COPD is 45.38 %, which is in accordance with other studies. In a study conducted by **Smith MC et al**² found out the prevalence of hypertension in COPD as 32 - 55%. In a study done by **Vanfleteren LE et al**⁸ prevalence of hypertension in COPD were found to be 48%.

In a study conducted by **Lakoski S et al**⁹ among 3543 non-hypertensives at baseline, 714 individuals developed incident hypertension. Cox proportional hazard models were used to determine the relationship between baseline levels of IL-6, CRP and fibrinogen and future risk of hypertension. One s.d. difference in baseline concentration of IL-6, CRP or fibrinogen was associated with 20–40% greater risk of incident hypertension.

ISCHEMIC HEART DISEASE

Out of 130 COPD patients 24 have lschemic heart disease, 106 have no lschemic heart disease. The prevalence of lschemic heart disease in COPD patient is 18.46%, which is in accordance with other studies. **Vanfleteren et al**¹⁰ reviewed comorbidities in 213 patients with COPD in pulmonary rehabilitation as part of the CIRO Comorbidity (CIROCO) study and found out the prevalence of lschemic heart disease in COPD patient is 9%. In a study conducted by **Smith MC et al**² found out the prevalence of lschemic heart disease in COPD as 16 – 53%.

In CRP normal group 3.3% have ischemic heart disease while in CRP positive group have 52.5% ischemic heart disease and hence CRP positive group has higher proportion of ischemic heart disease, which is statistically significant. In coronary heart disease, the activation of immune cells in the atheromatous plaque induces the production of cytokines such as interferon-c, IL-1, tumour necrosis factor (TNF)-alpha, IL-6 and acute-phase inflammatory proteins (fibrinogen, C-reactive protein (CRP) and amyloid protein) (Hansson GK et al) 11. The same mediators are involved in the inflammatory reaction observed in the bronchus in COPD. In addition to these shared pathophysiological determinants, the presence of COPD could contribute to the development of cardiovascular disease through hypoxia, systemic inflammation and oxidative stress. (MacNee W et al) ¹² In a study conducted by Auer J et al¹³ CRP as a marker of Inflammation is significantly increased in patients with acute myocardial Infarction and unstable angina shortly after the onset of symptoms (after a period of 12 hours), supporting the hypothesis of an activation of inflammatory mechanisms in patients with an acute coronary syndrome or acute myocardial infarction.

HEART FAILURE

Out of 130 COPD patients 25 have heart failure, 105 have no heart failure. The prevalence of heart failure in COPD patient is 19.23 %,which is in accordance with other studies. In a study conducted by **Smith MC et al** ² found out the prevalence of heart failure in COPD as 5 - 24%.

Shared etiological factors such as increased age and smoking, together with the high prevalence of hypertension and IHD in patients with COPD, confer much of the increased risk of heart failure in COPD patients. In a study conducted by **de Miguel Diez J et al**¹² systemic inflammation is thought to accelerate atherosclerosis and thereby increase the risk of heart failure.

Conclusion: All the 3 cardiac co-morbidties i.e. Hypertension, lschemic heart disease and Heart failure are significantly associated with the CRP in COPD patients. Volume-5, Issue-4, April - 2016 • ISSN No 2277 - 8160

Tables and figures:

Figure 1: Showing prevalence of various cardiac co-morbidities in COPD.



Figure 2: Distribution of CRP in various cardiac co-morbidities.



Cardiac co-morbidities	CRP posi- tive (no.)	CRP negative (no.)	Total	Analysis		
Hyperten- sion Present Absent	32 8	27 63	59 71	Chi square=27.9,p=.000*		
Ischemic heart dis- ease Present Absent	21 19	3 87	24 106	Chi square=44.4,p=.000*		
Heart failure Present Absent	21 19	4 86	25 105	Chi square=41.1,p=.000*		

Table 1: Association of Cardiac co-morbidities with theC-Reactive Protein in 130 COPD patients.

*very highly significant

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