Med Arh. 2012; 66(3): 159-160

DOI: 10.5455/medarh.2012.66.159-160
Received: December 21st 2011
Accepted: April 11th 2012

ORIGINAL PAPER

Correlation of CRP and Serum Level of Fibrinogen with Severity of Disease in Chronic Obstructive Pulmonary Disease Patients

Biljana Lazovic
Departement of pulmology, University Clinical Hospital Center Zemun- Belgrade, Serbia

Background and objectives: Data of a previously published study have shown that Chronic Obstructive Pulmonary Disease (COPD) patients have increased serum levels of CRP and fibrinogen. The aim of this work is to investigate if there was any correlation between inflammation factors and severity of COPD. **Design and settings**: A case control study conducted on 43 COPD patients and 40 healthy controls. Patients and methods: COPD were selected according to GOLD criteria. Exclusion criteria were acute exacerbation of disease in the past 4 weeks, usage of oral corticosteroids and presence of any comorbidity which could raise level of inflammatory proteins. Control group were healthy individuals. Serum levels of CRP and fibrinogen were measured. **Results:** The mean serum level of CRP in COPD patients was significantly higher than that of controls (p=0.03). No significant difference was found in the mean serum level of fibrinogen between cases and controls. Also, there were no significant correlation between the serum level of CRP or fibrinogen and severity of the disease and arterial O2 saturation. **Conclusion:** According to our study results, COPD, per se, can increase serum CRP level. Attenuation of systemic inflammation may offer new perspectives in the management of COPD and its comorbidities.
Keywords: CRP, FEV1, fibrinogen.

Corresponding author: Biljana Lazovic, MD. University Clinical Hospital in Zemun, Belgrade, Serbia.

1. INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a disease state characterized by poorly reversible airflow limitation that is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases, particularly cigarette smoke (1). Systemic effects of smoking may significantly contribute not only to) respiratory abnormalities, symptoms and functional impairment associated with COPD, but also to its chronic comorbidities (2).

COPD can no longer be considered a disease only of the lungs (3). It is associated with a wide variety of systemic consequences, most notably systemic inflammation. Systemic inflammation is a risk factor for most of the complications that occur in these patients including cachexia, skeletal muscle abnormalities, hypertension, diabetes, coronary artery disease, cerebrovascular accidents. The origin of systemic inflammation in COPD is unresolved, although several potential mechanisms have been proposed (4). Circulatory cytokines released due to the inflammation of the lungs are considered as a possible cause (5). A potential central player in this inflammatory process is interleukin (IL-6) which may be responsible for the increased serum level of fibrinogen and hypercoagulability in these patients and tumor necrosis factor α (TNFα) may contribute to weight loss and skeletal muscular dysfunction. In addition to this, it is proved that fibrinogen is increased in current smokers only (6). HsCRP has involved as the most robust reproducible marker of vascular inflammation and it is considered the prototypic downstream marker of inflammation. Traditional assays for CRP had a sensitivity of about 5 mg/l, only allowing for the detection of CRP in patient with a significant degree of inflammation. Smoking known to be associated with decreased value of FVC and FEV1. Some studies have shown that the presence of inflammatory proteins is likely to predict the significant COPD or its severity (7).

The aim of this study is to estimate association between serum level of CRP and fibrinogen with pulmonary function in order to find better treatment for these patients.

2. METHOD

The study was conducted as a case control on 43 COPD outpatients and 40 healthy controls. Inclusion criteria for COPD patients were FEV1/FVC<0.7 and no response to bronchodilator. Exclusion criteria were acute exacerbation of disease in the past 4 weeks, usage of oral corticosteroids and presence of any comorbidity which could raise level of inflammatory proteins (rheumatic, liver disease, cancer, renal fail-

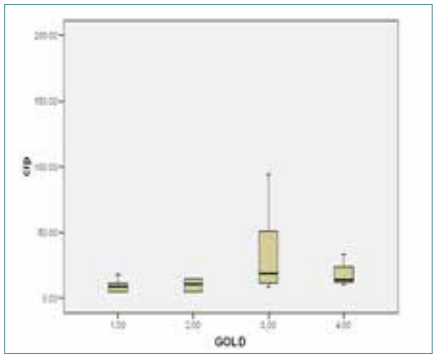

Figure 1. GOLD and serum level of CRP

ure, chronic heart failure). Healthy controls were patients who came on regular check up to pulmonary outpatient clinic without respiratory symptoms and without inflammation on radiological finding. All subjects indicated whether they were never smokers, ex-smokers, or current smokers. An estimate of lifetime tobacco exposure (in pack-years) was calculated as daily tobacco consumption (g) times duration of smoking (yr) divided by 20 (g/pack).

3. RESULTS

In this study, 43 COPD patients and 40 healthy controls were evaluated. The mean age of COPD patients was 61.8 (10.1) years (range 32-85 yrs). There were 17 female (39.5%) and 26 male (60.5%). Severity of disease according to the GOLD criteria was mild in 14 cases (32.6%), moderate in 14 cases (32.6%), severe in 12 cases (27.9%) and very severe in 3 patients (7%) Average pack/year was 28.2(14.51); one pts was nonsmoker, 37 current smokers and 7 ex-smokers. Mean concentration of CRP was 23.72 (33.92) mg/L and the mean concentration of fibrinogen was 6.03(2.29) mg/dl (Figure 1, 2). The mean FEV1/FVC ratio was 68.5 (21.95). Average arterial oxygen was 64.1(14.82) mmHg, carbon dioxide 43.6(10.77) mmHg and average oxygen saturation was 86.87(11.76)%. No significant correlation was found between the serum level of CRP and FEV1 (p=0.81), neither in case of serum level of fibrinogen and FEV1 (p=0.994). Also, there was no significant correlation between the serum level of CRP and fibrinogen and SaO2 (p=0.37, 0.17 respectively). In controls, the mean age of patients was 45.45(9.58) years. There were 19 female (47.5%) and 21 male (52.5%). The mean concentration of CRP was 6.31(5.89) mg/L and mean concentration of fibrinogen was 4.14(1.63) mg/dl. Average number of pack/years was 5.94 (9.85) (27 pts were nonsmokers). The mean serum level of CRP in COPD patients was significantly higher than that of healthy controls (p=0.03). However, no significant difference was found in the serum level of fibrinogen between patients and controls (p=0.72).

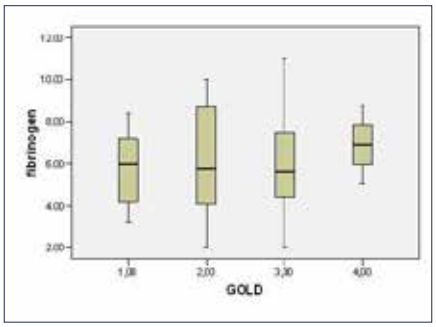

Figure 2. GOLD and serum level of fibrinogen

4. DISCUSSION

According to our study results, the mean serum level of CRP was significantly higher in COPD patients compared to controls which were in accord with previously reported studies (8), but there were no difference among these groups in serum fibrinogen level, despite all studies which confirms correlation between FEV1 and increased level of fibrinogen. Therefore, further comparative studies with larger sample sizes are required in this regard. Previous studies have reported that COPD patients have higher systemic fibrinogen levels than healthy control group, regardless smoking (9). These findings fit with a shift of the hemostatic balance to favor the activation of coagulation in COPD. Different studies have suggested this prothrombotic condition to exist in COPD (10). Markers of the hypercoagulation thrombin-antithrombin III complex, fibrinopeptide A, and plasminogen activator inhibitor-1 have been shown to be significantly higher in COPD patients This shift in the hemostatic balance can be further distorted during acute exacerbations due to increased rate of platelet aggregability as a consequence of acute disturbances in gas exchange (9).

However, elevated serum levels of CRP and fibrinogen were found in GOLD III and IV stadium, which could points that higher airflow obstruction increases these inflammatory markers.

5. CONCLUSION

Our study has shown that serum level of CRP is increased in COPD patients. It is well known that this inflammatory marker cause a systemic inflammatory process and increase the chance of cardiovascular and cerevbrovascular accidents, cachexia and osteoporosis.

Therefore, it is recommended to measure the serum level of CRP in COPD patients during their routine clinical visits. These patients should be considered for a more aggressive treatment.

Attenuation of systemic inflammation may offer new perspectives in the management of COPD and its comorbidities.

Conflict of interest: none declared.

REFERENCES

1. Rabe KF, Hurd S, Anzueto A, Barnes PJ, Buist SA, Calverley P, Fukuchi Y, Jenkins C, Rodriguez-Roisin R, van Weel C, Zielinski J; Global Initiative for Chronic Obstructive Lung Disease. Global Strategy for the diagnosis, management, and prevention of COPD: GOLD executive summary. Am J Respir Crit Care Med. 2007; 176: 532–555.
2. Broekhuizen R, Wouters EF, Creutzberg EC, Schols AM. Raised CRP levels mark metabolic and functional impairment in advanced COPD. Thorax. 2006; 61 (1): 17-22.
3. Fabbri LM, Ferrari R. Chronic disease in the elderly: back to the future of internal medicine. Breathe. 2006; 3: 40-49.
4. Agusti A. Thomas A. Neff lecture. Chronic obstructive pulmonary disease: a systemic disease. Proc Am Thorac Soc. 2006; 3: 478–481.
5. Cracowski JL, Yaici A, Sitbon O, Reynaud-Gaubert M, Renversez JC, Pison C, et al. Biomarkers as prognostic factors in pulmonary arterial hypertension. Rationale and study design. Rev Mal Respir. 2004; 21(6 Pt 1): 1137- 1143.
6. Eliasson M. The epidemiology of fibrinogen and fibrinolysis. Determinants of plasma fibrinogen levels and fibrinolytic variables in the population of northern Sweden. Umeå: Umeå University Medical Dissertations; 1995: 42-54.
7. Lind P, Engström G, Stavenow L, Janzon L, Lindgärde F, Hedblad B. Risk of myocardial infarction and stroke in smokers is related to plasma levels of inflammation-sensitive proteins. Arterioscler Thromb Vasc Biol. 2004 Mar; 24(3): 577-582
8. Dahl M, Tybjaerg-Hansen A, Vestbo J, Lange P, Nordestgaard BG. Elevated plasma fibrinogen associated with reduced pulmonary function and increased risk of chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2001; 164: 1008-1011.
9. Donaldson GC, Seemungal TA, Patel IS, Bhowmik A, Wilkinson TM, Hurst JR, Maccallum PK, Wedzicha JA. Airway and systemic inflammation and decline in lung function in patients with COPD. Chest. 2005 Oct; 128(4): 1995-2004.
10. Ferroni P, Basili S, Martini F, Vieri M, Labbadia G, Cordova C, Alessandri C, Gazzaniga PP. Soluble P-selectin as a marker of platelet hyperactivity in patients with chronic obstructive pulmonary disease. J Investig Med. 2000; 48: 21-27.