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RESEARCH ARTICLE

Association of serum procalcitonin with the risk of coronary artery disease

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ABSTRACT

Introduction
Procalcitonin (PCT), a calcitonin precursor is awell established novel systemic inflammatory biomarker. Inflammation in body plays important key role in pathogenesis of coronary artery disease (CAD) . In previous studies, the results shows that the increase in PCT level have strong association with the severity of atherosclerosis, which leads to increase the risk of coronary artery disease (CAD) in the patients. Various studies have been done to investigate the role of PCT in the pathogenesis and risk of CAD,yet their results have been inconsistent. So, in the current study we evaluate the correlation between the serum procalcitonin levels and risk of CAD.
Aims and Objectives: The aim of the study was to find the association between the serum procalcitonin levels and risk of coronary artery disease .
Materials and Methods: 100 patients selected for the study, after taken the written consent form the patients were equally divided into two group's case and control group. In case group 50 patients with angiographically proven CAD as case group and 50 apparently healthy age and sex matched adults as control group. Serum procalcitonin levels were measured in both the groups using ELISA based kits.
Results: Levels of Serum procalcitonin were 252.52 ± 17.43 ng/ml in case group as compared to 40.84 ± 15.6 ng/ml in control group and their difference was statistically significant ($p < 0.0001$).
Conclusion: The results of our study shows that there was strong relation between serum procalcitonin levels and coronary artery disease risk.

KEYWORD

Serum procalcitonin levels, coronary artery disease

History

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INTRODUCTION

Procalcitonin (PCT) is a well-established biomarker for the diagnosis of sepsis. PCT reflects the severity of bacterial infection and is in particular used to monitor progression of infection into sepsis, severe sepsis, or septic shock.[1]The level of Procalcitonin increase in patient suffering from bacterial infection and sepsis.[2] Sepsis is a clinical condition in which inflammation in body was increased due to bacterial infection, if not treated on time becomes life-threatening condition.[3] PCT is one of the most efficient biomarker for diagnosis of sepsis in body. Procalcitonin tells the severity of bacterial infection load in body and used to monitor the progression of sever sepsis or septic shock. It helps in diagnosis and measure the systemic inflammatory response, treatment plan and prognosis of the treatment outcome. PCT plays an important role in monocyte adhesion and migration in the patients of sepsis.[4-6]In recent studies, PCT levels were found to correlate with the extent of atherosclerosis in patients with CAD and were even associated with an adverse outcome.

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MATERIALS & METHODS

Study setting: The study was conducted in the Department of Biochemistry, VMMC and Safdarjung Hospital, New Delhi.
Study design: A case control study.
Study subjects: The study population included 50 patients with angiographically proven CAD as case group and 50 apparently healthy age and sex matched adults as control group.

INCLUSION CRITERIA

- Patients of both sexes aged >18 years.
- Patients with angiographically proven Coronary Artery Disease

EXCLUSION CRITERIA

- Patients on antibiotics.
- Patient with documented HIV and other systemic disease
- Patients with malignancies.
- Not able to give the consent form.

INVESTIGATIONS

Serum procalcitonin levels were measured in both the groups using ELISA based kits.

Routine Investigations

a) Complete blood count& ESR
b) Urine for routine and microscopic examination
c) Chest X-ray
d) Kidney Function Tests
e) Liver Function Tests
f) Serum Electrolytes
g) Random Blood Sugar

METHODOLOGY

Approval from the institutional ethics committee and a written informed consent from all the subjects enrolled into the study were taken. Patients were evaluated by detailed history and clinical examination. Once the diagnosis of angiographically proven CAD confirmed the patients underwent routine and microbiological investigations.
All the samples collected as per standard procedure and processed immediately in the department of biochemistry.
Indications for coronary angiography were complaints of chest pain, dyspnea on exertion, pathology imaging, pathologic changes on the ECG on presentation or results from drawn blood indicating acute coronary syndrome (ACS) through elevations in the cardiac necrosis markers (troponin I and creatinine kinase).

RESULTS

All analyses were performed using the SPSS21.0 Statistical Package Program for Windows (SPSS Inc, Chicago, Illinois). The non-parametric test was used to assess normality of distribution.Continuous variables were expressed as mean ± standard deviation, while categorical variables were represented as numbers and percentages.Levels of Serum Procalcitonin were 252.52 ± 17.43ng/ml in case group as compared to 40.84 ± 15.6ng/ml in control group and their difference was statistically significant ($p < 0.0001$).

Table : 1 Comparison of procalcitonin (pct) (ng/ml) between cases and controls.

Procalcitonin (PCT) (ng/mL)	Case (n=50)	Control (n=50)	Total	P value	Test performed
Mean ± Stdev	252.52 ± 17.43	40.84 ± 15.6	146.68 ± 107.64	<.0001	Mann Whitney test;0
Median(IQR)	256 (241.25-264.75)	41 (27-47)	144.5 (41-256)		
Range	201-288	22-88	22-288		

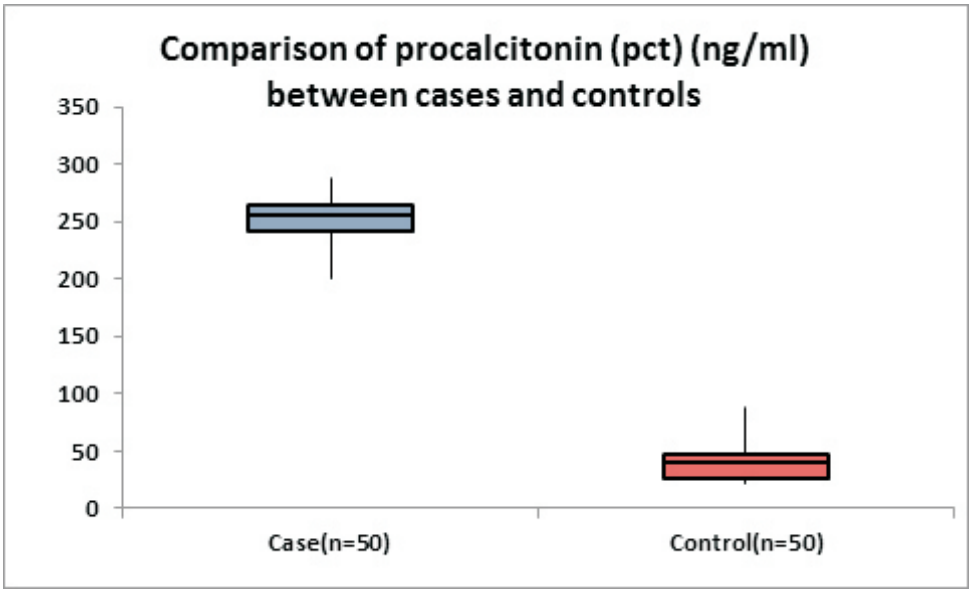

Figure : 1 Comparison of procalcitonin (pct) (ng/ml) between cases and controls. (non-parametric variable, Box-whisker plot)

DISCUSSION

In the present study we have demonstrated that increased PCT concentration is a predictor of cardiovascular mortality rate. Serum Procalcitonin is inflammatory biomarkers has been used to assess the risk in CAD patients. Procalcitonin tells the severity of bacterial infection load in body and used to monitor the progression of sever sepsis or septic shock.[7]Its help in diagnosis and measure the systemic inflammatory response, treatment plan and prognosis of the treatment outcome. PCT plays an important role in monocyte adhesion and migration in the patients of sepsis.[8] Meisneret al[2] showed that PCT levels are more in cardiovascular patients in 245 patients. Other than inflammatory response other factors cause lower effect in lower concentration like non infectious stimulation. PCT production increase due to local and systemic inflammatory factor due to monocytic activation.PCT acts as a chemoattractant and is initially produced in adherent monocytes that later recruit parenchymal cells of the tissue with present inflammation for further PCT production.[9-11] In peripheral blood mononuclear cells in vitro study we noticed that the expression of PCT in mRNA directly via by lipopolysaccharides and indirectly by the pro-inflammatory cytokines Like TNF- α, Interleukin-1β, interleukin-2, interleukin-6. These pro-inflammatory markers plays a vital role in the process of formation atherosclerotic plaque.[12] Kafkas et al showed in the study that the increase in the level of PCT levels in the body are correlated with the extent of atherosclerosis in the patients of chronic heart disease and peripheral arterial disease.[13] In patients having ischemia and inflammatory processes with atherosclerosis are lead to the production of procalcitonin. In the present study the ELSIA test was done to recorded low level of PCT if present in the test group. Many studies and our study suggested that PCT can be potent marker to detect chronic heart disease in early stage, but it is not superior to CRP to predict outcomes.[13-15]

CONCLUSION

In our study we found that there is a strong association between serum procalcitonin levels and coronary artery disease risk. For further diagnosis and treatment plan the large sample size should be taken, randomized control trial should also be done.

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