Comparison of microalbuminuria w ith hs-CRP and low density lipoprotein levels in nondiabetic, nonhypertensive myocardial infarction patients

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ABSTRACT

Introduction: Microalbuminuria (MA), defined as urine albumin to urine creatinine ratio (UACR) of 30 to 300 mg/G of creatinine, is an established risk factor for cardiovascular morbidity and mortality and for end-stage renal disease in individuals with an adverse cardiovascular risk profile such as those with hypertension or/and diabetes mellitus. **Materials and Methods:** Thirty five patients were included in the study and equal number of age- and sex-matched controls were also included. 2 ml of venous blood was collected for hs-CRP determination and early morning mid stream urine sample was collected under strict aseptic precautions. The lipid profile was estimated in cobas autoanalyzer. **Results:**There was significant increase in levels of Low density lipoprotein (LDL) cholesterol, microalbumin, and hs-CRP ($P < 0.001$) in patients with myocardial infarction compared to healthy controls. **Conclusion:** Therefore, MA and hsCRP evaluation may have potential role in improving cardiovascular risk prediction, when used along with traditional lipid profiles.

Key words: Low density lipoprotein cholesterol, microalbumin, myocardial infarction, Non diabetics

INTRODUCTION

Microalbuminuria (MA), defined as urine albumin to urine creatinine ratio (UACR) of 30 to 300 g/mg of creatinine,[1] is an established risk factor for cardiovascular morbidity and mortality and for end-stage renal disease in individuals with associated cardiovascular risk conditions such as hypertension or/and diabetes mellitus.[2,3] Accordingly, national and international guidelines recommend screening for microalbuminuria in patients with diabetes or hypertension.[4-6]

Atherosclerosis is currently regarded as an active inflammatory process, not as a passive accumulation of lipids, fibrin, and extracellular matrix components in the walls of blood vessels, as described in earlier theories. It is a process consisting of intravascular development of a chronic inflammatory condition, resulting from local interactions between modified lipoproteins, macrophages, lymphocytes and thrombocytes with normal components of the wall of veins and arteries.[7] One of the most significant markers of inflammation

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appearing in the course of atherosclerosis is C-reactive protein (CRP). This is formed in the liver in response to the development of the inflammatory condition or due to infections.

There appears to be a significant relationship between an increase in plasma CRP concentration particularly hsCRP and local disturbances in the structure and function of blood vessels particularly with lipid status.[8] The low density lipoprotein (LDL) to a large extent, is responsible for the changes occurring in blood vessels.

On the contrary an important role in the transport of lipids to the extracellular space is played by the high-density lipoprotein fraction (HDL). It has been shown that high LDL or low HDL concentrations are important stimuli in the formation of the atheromatous plaque. Thus, they are commonly accepted risk factors in the development of atherosclerosis and later myocardial infarction.[9]

The present study was undertaken to measure the levels of microalbumin in urine with serum hs-CRP and serum LDL levels in nondiabetic, nonhypertensive acute myocardial infarction patients to know the relationship between MA with hs-CRP and LDL levels and to compare their levels with healthy controls.

MATERIALS AND METHODS

Study sample

In the present study, we investigated the relation between the MA with hsCRP and LDL cholesterol in nondiabetic and nonhypertensive patient. The study was carried out on patients who suffering from myocardial infarction for the first time and were admitted in cardiology department. Thirty-five patients were enrolled for the study and equal number of age- and sex-matched controls were also included. The sample size was calculated using statistical software.

The patients with history of diabetes, hypertension, urinary tract infection, arthritis, nephropathy (serum creatinine >1.0 mg/dl) at the time of admission to the ICU, myocardial infarction following surgery, patients on cholesterol lowering medications and major trauma were excluded from the study as these conditions will affect independently the parameters to be estimated.

Two milliliter of venous blood was collected for hs-CRP determination and early morning midstream urine sample was collected under strict aseptic precautions. The lipid profile was recorded from the patient data.

Biochemical estimations

Estimation of CRP was done in serum sample by using RX Daytona analyzer.[10] Sample reacts with specific antiserum to form a precipitate which is measured turbidimetrically at 340 nm. Serum total cholesterol, HDL-cholesterol, triglycerides, and VLDL levels were estimated by enzymatic method.[11] LDL-cholesterol was calculated by Friedwalds formula.[12] Albumin in urine was estimated by Turbidimetric method[13] and creatinine was determined by alkaline picrate method[14] and the ratio was determined. The presence of MA in early morning mid stream urine samples was defined as urinary albumin excretion in the range of 30--300 mg/G creatinine.

Statistical analysis

The results were expressed as mean ± standard error of mean (SEM). A $P< 0.05$ was considered statistically significant. Statistical analysis was performed using the statistical package for social sciences (SPSS-16, Chicago, USA). Independent student 't' test was used to compare the mean between the groups. The Pearson's correlation was done between the parameters in cases as well in controls.

RESULTS

As depicted in Table 1 there was significant increase in levels of LDL cholesterol, microalbumin, and hs-CRP ($P< 0.001$) in patients with myocardial infarction (MI) compared to healthy controls. On applying Pearson's correlation microalbumin levels correlated positively with LDL cholesterol levels ($P = 0.010$, $r = 0.952$) but found to be statistically not significant. The other parameters show no significance.

DISCUSSION

Many researches have been focused on the use of high-sensitivity C-reactive protein (hs-CRP), as a marker of inflammation, in the detection of patients at increased risk for cardiovascular disease. Several prospective studies have demonstrated that hs-CRP is an independent predictor of future risk for cardiovascular events among healthy

Table 1: LDL, hs-CRP, and microalbumin levels in controls and cases (values expressed in mean ± SD)

	Controls (n = 35)	Cases (n = 35)
Age (years)	52 ± 11	59 ± 12
LDL (mg/dl)	95.03 ± 21.67	145.17 ± 30.88*
MA (mg/g of creatinine)	19.24 ± 8	166 ± 89.4*
Hs-CRP (mg/l)	0.709 ± 0.38	26.16 ± 18.00*

****P< 0.001 compared to healthy control*

individuals, as well as among patients with acute coronary syndromes. In several studies, it has been reported that there is a correlation between serum CRP levels and microalbuminuria in diabetic patients and even in the general population.[15] These observations suggest that low-grade inflammation, reflected by high serum hs-CRP levels, may play a role in the induction of microalbuminuria, which can be considered as a risk factor for cardiovascular diseases.[16]

Based on these facts our study observed that hsCRP levels along with microalbumin and LDL cholesterol levels were significantly higher in patients with MI compared to healthy individuals. The correlation study between the parameters in case found no significance and needs to be concluded by large-scale study.

The studies have suggested that measurement of the serum hs-CRP level may improve risk stratification among patients suspected of having CAD (coronary artery disease). The strong correlations of serum hs-CRP with LDL may be due to the putative proinflammatory effects of these two parameters which can lead to increase in the concentration of both.[17]

The CRP measurement has a lot of advantages. Firstly it is a stable compound and secondly it can be measured at any time of the day.[18]

In conclusion, the hsCRP levels along with lipid parameters are increased in non-diabetic, non-hypertensive patients with MI. The MA seen in these patients will prove the association of inflammatory markers and LDL-cholesterol plays an important role in diagnosis of MI.

So, MA and hsCRP evaluation may have the potential role in improving cardiovascular risk prediction, when used along with traditional lipid profiles.

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