Study of Microalbuminuria in Non-Diabetic and Non-Hypertensive Patients with Acute Myocardial Infarction

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ABSTRACT

Introduction: Microalbuminuria has relationship on the development of coronary heart disease and it may identify as a new risk factor of this disease. The MA happens more often in diabetic patients with AMI but it has been reported even in non –diabetic patients with AMI. The aim of the present study was to assess the prevalence of microalbuminuria in non diabetic and non hypertensive patients suffering from AMI. To evaluate the relationship between MA and AMI in non- diabetic and non hypertensive patients admitted in ICCU cardiology department at Rajshree Medical Research Institute Bareilly (UP).

Matereial and methods: The study was carried out in the department of Biochemistry and ICCU in RMRI, Bareilly (UP) to establish the correlation between MA with 50 non diabetic, non hypertensive patients of AMI and in 50 healthy age matched controls. MA was determined by immunoturbidimetric method and plasma glucose were measured by enzymatic method.

Result: There was a significant increase in the level of MA in patients with AMI who were non diabetic, non hypertensive as compare to those in the healthy control.

Conclusion: MA may have an association with AMI in absence of traditional risk factors like diabetes and HTN. So MA can be used as an adjunct biochemical parameter in non diabetic, non hypertensive AMI patients.

Keywords: Microalbuminuria, AMI, HTN and Diabetes Mellitus

INTRODUCTION

The term coronary artery disease (CAD), ischemic heart disease(IHD) and coronary heart disease(CHD) are synonymous and commonly known as atherosclerotic cardio vascular disease or ASCVD. This is always due to atherosclerosis of coronary arteries long before it manifests as angina pectoris, unstable angina, myocardial infarction and chronic IHD with heart failure.[1] Acute myocardial infarction (AMI) is one of the commonest diseases amongst hospitalized patients in industrialized countries. The mortality rate of AMI is approximately 30% and for every one in 25 patients who survive the initial hospitalization, dies in the first year after AMI.

Indians are four times more prone to AMI as compared to the people of other countries due to a combination of the genetic and lifestyle factors that promote metabolic dysfunction. The risk of cardiovascular disease is predicted by various factors such as age, sex, smoking,hypertension and dyslipidemia. In most of the cases, the cardiovascular changes are detected only after a person exhibits the classical symptoms and the signs of AMI. This indicates the need for a marker which can detect the risk of cardiovascular changes in the early stages, so that an effective prevention can be made possible. Comprehensive research in this field has emerged with multiple new biomarkers and inflammatory markers of ASCVD such as increased lipoproteins levels, total plasma homocysteine, elevated plasma fibrinogen levels, plasminogen activating inhibitor, C-reactive protein, different cytokines and microalbuminuria.

The excretion of albumin in urine, in the range of 20 – 200 μg\min (30-300 mg\day) is called microalbuminuria (MA).[3] This range of albumin in urine cannot be detected by routine urine tests. MA is considered tobe a predictor of early renal damage in patients with diabetes. Previous studies had shown that MA is associated independently with cardiovascular morbidity and mortality in diabetic and hypertensive patients.[4-9] In clinically healthy subjects the atherogenic risk factors are increased when associated with microalbuminuria. It is also noticed that the patients with MA have more severe angiographic CADthan those without MA.[10] MA is observed as an early response to myocardial infarction and urinary excretion of microalbumin is proportional to the size of infarct size.[11] A study by Berton et al. showed that microalbuminuria occurs in AMI and predicts early mortality.[12]

Moreover, MA is independently associated with cardiovascular morbidity, after adjusting the known cardiovascular risk factors of the prevalence of CAD in men and women. As MA may be considered as a useful indicator of an absolute high cardiovascular risk in the community, this study was carried out to determine the predictive value of MA is non-diabetic and non-hypertensive acute MI patients.

MATERIAL AND METHODS

The study was carried out in the department of Biochemistry and Intra-Cardiac Care Unit (ICCU) in Rajshree Medical Research Institute, Bareilly,Uttar Pradesh to establish the relationship of microalbuminuria in non –diabetic and non-

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hypertensive patients with AMI. Ethical committee clearance was obtained prior to the study. The study group consisted of 50 patients with AMI and an equal number of age and sex matched controls were also included after obtaining their or their family members' consent.

AMI diagnosis was made based on ECG finding and level of cardiac markers. Blood pressure were measured using a standard mercury sphygmomanometer and appropriately sized cuff. Patients with a history of diabetes, hypertension, systemic infection, UTI, arthritis, nephropathy were excluded from the study. Patients with elevated urea and creatinine levels were also excluded from the study. Random plasma glucose levels were determined for all the cases and controls at the time of admission. For glucose estimation 2ml of random venous sample was collected in a fluoride containing collection tube. Random mid-stream urine sample was collected in a sterile container without any preservatives for the determination of urinary microalbumin. Samples were estimated with the help of ERBA Chem 5 plus analyser.

STATISTICAL ANALYSIS

All the data was compiled on standardized tables and was expressed in percentage, range, mean ± standard deviation using Microsoft Excel and SPSS version 17.0. Data was presented in the form of tables and graphs. The mean was analysed by student "t" test and analysis of variance (ANOVA) wherever appropriated. P value less than 0.05 was considered as a cut-off for significance.

RESULT

The study included a total of 100 subjects out of which 50 were cases of AMI and another 50 were apparently healthy controls. Non- diabetic, non- hypertensive AMI group consisted of 42 males with a mean age of 51.61 ±7.83 years and eight females with a mean age of 50.40 ± 9.14 years. In the non - diabetic non- hypertensive apparently healthy controls there were 43 males with a mean age of 50.37 ± 7.83 years and seven females with a mean age of 50.57 ± 6.67 years. (Table 1,2)

As shown in table-3, the controls had a mean Random Plasma Glucose concentration ± standard deviation (SD) of 104.54 ± 21.64, ranging from 78 mg/dl to 141 mg/dl. Whereas
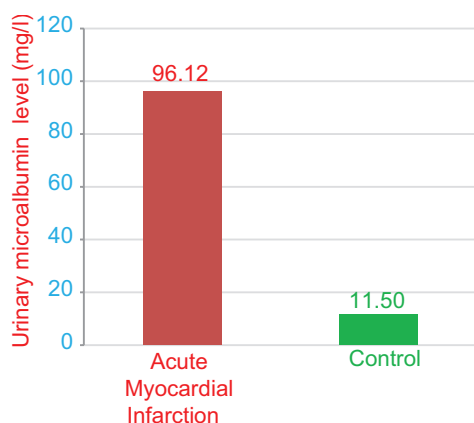
Figure-1: A bar graph showing the urinary microalbumin levels in Cases and Controls

	Cases	Controls	Total
Male	42	43	85
Female	08	07	15
Total	50	50	100

Table-1: Showing the distribution of males and females in cases and controls

	Cases	Controls
Male (Age in years)	51.61±7.83	50.37±7.83
Female (Age in Years)	50.40±9.14	50.57±6.67

Table-2: Mean age (mean ± SD) among cases of AMI and healthy controls

	Cases	Controls
Random plasma glucose (mg/dL)	108.94 ± 20.85	104.54 ± 21.64

Table-3: Comparison of random plasma glucose levels of cases andcontrols (expressed as mean ± S.D)

	Cases	Controls
Urinary microalbumin level (mg/L)	96.12 ± 75.85*	11.50 ± 4.08
p value < 0.001 when compared with controls		

Table-4: Urinary microalbumin levels in cases and control at the time of admission

in cases of AMI without DM, the mean random glucose concentration was 108.94 ± 20.85, ranging from 76 to 146 mg/dl. The glucose level between the non – diabetic, non-hypertensive AMI patients was statistically non significant when compared with controls.

Urinary microalbumin levels were also determined for both the cases and controls. The mean urinary microalbumin level in non – diabetic, non – hypertensive AMI cases was 96.12 ± 75.85 mg/L. The mean urinary microalbumin excretion in controls was 11.50 ± 4.08 mg/L. This increased excretion of microalbumin in AMI patients was clinically and statistically significant (P< 0.001) when compared with controls. (Table 4, Figure 1)

DISCUSSION

Microalbuminuria is considered to be a strong and independent indicator for cardiovascular risk. Many studies have been done to establish microalbumin excretion in the urine in non –diabetic, non – hypertensive patients with AMI. Haffner et al. considered MA to be marker of cardiovascular risk in non –diabetic patients.[13] Hillage et al. demonstrated microalbumin prevalence rate of 66% in non- diabetic, non-hypertensive population.[14]

However, Memon and Kolachi et al. in their study shows that the microalbuminuria may have an association with acute myocardial infarction in absence of traditional risk factors like diabetes and hypertension.[15] Hilal Bahjet AL-Saffar, Hussein Nassir et al. suggested that patients with UA/ NSTEMI found a strong correlation of microalbuminuria with echo-graphic changes and findings in coronary angiography.[16]

The result of our study indicates that there is highly significant microalbuminuriain non- diabetic,non – hypertensive AMI patients. The level of significance (P< 0.001) of microalbuminuria in our study, was comparable to that observed, in other international study.[17]

Our study agrees with some of the recent studies like the Klauser et al., where they found microalbuminuria to be independent risk factors of cardiovascular disease and death, independent of renal insufficiency, diabetes and hypertension.[18] Corona AJ, Martinez DR et al. study shows significant relationship was found between microalbuminuria and myocardial infarction. This significance was obtained after adjusting for other cardiovascular risk factors.[19]

In our study we found microalbuminuria to be related to acute myocardial infarction independent of renal disease,diabetes and hypertension. In this respect our study agrees with some of the recent studies.[18] We excluded not only hypertension but also patients with renal insufficiency. We therefore excluded any gross kidney damage causes of microalbuminuria and even in increased hydrostatic pressure. Thus the major pathophysiological cause of microalbuminuria in our clinical setting seems to be a systemic inflammatory response. This leads to an increased capillary permeability to proteins. This effect is amplified by the kidneys and manifests as MA. However a tubular dysfunction leading to decreased tubular reabsorption cannot be ruled out. It is therefore suggested that more such studies to be taken up in the clinical study with a larger sample size to elucidate the exact pathophysiology.

CONCLUSION

In our study we found a significantly high MA in non-diabetic, non-hypertensive AMI patients. In the absence of any renal insufficiency microalbuminuria is a non-specific yet highly sensitive marker of myocardial infarction. Since MA is a simple investigation and relatively an inexpensive test which could be used as an adjunct biochemical parameter in non- diabetic, non- hypertensive AMI patients. However, more studies are required with a large sample size to ascertain whether MA can predict in hospital mortality and its pathophysiology in the clinical study.

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