Correlation between microalbuminuria and severity of coronary artery stenosis in patients of type II diabetes mellitus: A cross sectional study

Kamal Kumar Jain[1*], D D Deol[2], Harsh Kumar Garg[3]

[1]Assistant Professor, [2]Professor, [3]Jr. Resident, Department of Medicine, NIMS Medical College and Hospital, Jaipur, Rajasthan, INDIA.
Email: jaindrkamalkumar@gmail.com

Abstract
Introduction: Diabetes is not an epidemic anymore but has turned into pandemic for the whole world. Microalbuminuria is a marker of endothelial dysfunction and vascular damage. Microalbuminuria is associated with all causes of cardiovascular morbidity and mortality in patients with diabetes. **Objective:** To study correlation between microalbuminuria and severity of Coronary Artery Stenosis in patients of Type II Diabetes Mellitus **Materials and Methods:** The study was a cross sectional study done among a total of 88 type 2 Diabetes Mellitus patients who were suspected for CAD and whom underwent elective coronary angiography at NIMS Medical Hospital during study period. The individuals with a recent history of acute myocardial infarction, precutaneous transluminal coronary angioplasty and renal, infectious, and malignant disease were excluded. The data were collected on demographic and major cardiovascular risk factors including age, duration of DM, hypertension and lipids. The ratio of urine albumin to creatinine was used to define microalbuminuria. Data analysis was done by appropriate statistical tests and using SPSS software (version 13). **Results:** The mean age among patients was 57.63 ± 11.23 years with majority of females (52.27%). In the study 48.86% patients present with microalbuminuria. The association between CAD and Microalbuminuria among patients was positive ($p<0.001$). Microalbuminuria exhibited a significant correlation with the severity of CAD ($r = 0.44$; $p< 0.001$). **Conclusion:** Thus we conclude that, patients with microalbuminuria have more severe angiographically detected CAD than those without microalbuminuria.
Keywords: Microalbuminuria, Coronary Artery Stenosis, Diabetes Mellitus.

[*]**Address for Correspondence:**
Dr. Kamal Kumar Jain, Assistant Professor, Department of Medicine, NIMS Medical College and Hospital, Jaipur, Rajasthan, INDIA.
Email: jaindrkamalkumar@gmail.com

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INTRODUCTION

Diabetes Mellitus is a very commonly occurring metabolic disorder characterized by hyperglycemia and altered metabolism of lipids, proteins, and carbohydrates which is due to absolute or relative deficiency of insulin or insulin resistance. Diabetes is not an epidemic anymore but has turned into pandemic for the whole world.[1] The survey worldwide done reported that diabetes is affecting nearly 10% of the population.[2] In India alone, diabetes is expected to increase to 79.4 million by 2030.[3] Type 2 diabetes mellitus patients are more prone to cardiovascular complications, which can occur earlier and more frequently as compared to non-diabetic patients.[4] Diabetes mellitus (DM) is a chronic metabolic disease widespread through the world which has provoked considerable worrisome for public health care workers. Microalbuminuria (MAU) is a marker of endothelial dysfunction and vascular damage which could be a predictor for coronary artery atherosclerosis.[5,6] It is reported that microalbuminuria is associated with all causes of cardiovascular morbidity and mortality in patients with diabetes,[7,8] hypertension[9] and in the general population.[10] The various studies have shown positive relationship between increased microalbuminuria and Coronary Artery Disease (CAD) in diabetic patients,[11] but there isn't a known specific cut off point for the level of MAU which may accompany with considerable increase in coronary artery stenosis. Thus, the study was designed to determine the correlation between MAU and the severity of coronary artery atherosclerotic disease in diabetic patients whom have been undergone coronary angiography.

OBJECTIVE

To study correlation between microalbuminuria and severity of Coronary Artery Stenosis in patients of Type II Diabetes Mellitus

MATERIALS AND METHODS

The present cross sectional study was done among enrolled Diabetes Mellitus type 2 patients who were suspected for CAD and whom underwent elective coronary angiography at NIMS Medical Hospital. A total of 88 patients were taken for the study during study period. The individuals with a recent history of acute myocardial infarction, precutaneous transluminal coronary angioplasty and renal, infectious, and malignant disease were excluded. Patients who were receiving atenolol, and angiotensin converting enzyme inhibitors and angiotensin receptor antagonists were not included in the study either, due to possible effect on urine albumin excretion. The data were collected on demographic and major cardiovascular risk factors including age, duration of DM, hypertension and lipids. Urinary albumin concentration was measured by method of nephelometry using the Behring protein kit. The ratio of urine albumin to creatinine was used to define microalbuminuria. Patients with albumin levels less than 30 mg/g of creatinine were defined as having normoalbuminuria, those with albumin levels 30–300 mg/g as having microalbuminuria. CAD was defined significant if there was $\geq$ 50% diameter stenosis in $\geq$ 1 major coronary artery. Hypertensive diabetic patients were defined as systolic $\geq$ 130/80 mm Hg. Patients who had a total serum cholesterol level $\geq$ 200 mg/dL were classified as having hypercholesterolemia. The study was approved by the local ethical committee and all patients gave their informed consent. Chi-square and two-tailed t-tests were used to examine baseline differenced between two proportions or means using SPSS software (version 13). All p-values were considered significant if p-values were <0.05.

RESULTS

Table 1: Demographic profile and clinical features among patients

Variable		Frequency	Percentage
Mean Age (years)		57.63±11.23	----
Sex	Male	42	47.73
	Female	46	52.27
Duration of DM (years)	<1	16	18.18
	1-5	49	55.68
	>5	23	26.14
Associated Factors	Hypertension	12	13.64
	Hyperlipedimeia	18	20.46
	Microalbuminuria	43	48.86

The mean age among patients was 57.63±11.23 years with majority of females (52.27%). The patients with DM with duration 1-5 years were maximum (55.68%). In the study 48.86% patients present with microalbuminuria and hypertension was found among 13.64%.

Table 2: Distribution according to CAD and Microalbuminuria among patients

CAD	Microalbuminuria (+)	Microalbuminuria (-)	Total
Present	40	22	62
Absent	03	23	26
Total	43	45	88

(X_2=20.58 DF=1; p<0.001 highly significant)

In the study, it was observed that 40 patients present with microalbuminuria among patients with presence of coronary artery disease. The association between CAD and Microalbuminuria among patients was positive. (p<0.001)

Table 3: Correlation between severity of CAD and Microalbuminuria among patients

Severity of CAD	Microalbuminuria (+)	Microalbuminuria (-)	P value
Normal CAD	03	23	----
One vessel	06	02	<0.001
Two vessel	21	12	<0.001
Three vessel	13	08	<0.001

(P<0.001; highly significant)

The results in table 3 showed that in patients with microalbuminuria compared with the normal CAD, shows significant difference among the one, two, and three vessel disease. Microalbuminuria exhibited a significant correlation with the severity of CAD (r = 0.44; p< 0.001).

DISCUSSION

The present cross sectional study was done among enrolled Diabetes Mellitus type 2 patients who were suspected for CAD and whom underwent elective coronary angiography. The mean age among patients was 57.63±11.23 years with majority of females (52.27%). In the study 48.86% patients present with microalbuminuria. (Table1) It was observed that 40 patients present with microalbuminuria among patients with presence of coronary artery disease. The association between CAD and Microalbuminuria among patients was positive (p<0.001). The results of the present study showed that microalbuminuria was more prevalent in CAD patients. In addition, the patients with microalbuminuria had much greater atherosclerotic burden in the form of multi-vessel disease than those without microalbuminuria. Microalbuminuria exhibited a significant correlation with

the severity of CAD (r = 0.44; p< 0.001). The results are in accordance with the study done by Y. Wang[12] *et al* where microalbuminuria subgroup had significantly higher coronary artery stenosis score and number of diseased vessels as compared with a non-microalbuminuria subgroup in diabetic patients. It is proposed that microalbuminuria indicates early and possibly reversible glomerular damage.[9] In diabetic patients, microalbuminuria is associated with four-six fold increase in risk of cardiovascular mortality.[10,13] The mechanism whereby microalbuminuria accelerates atherosclerosis is uncertain. The various mechanism involved may be abnormal vasodilatation,[14] endothelial dysfunction,[15] inflammation,[16] insulin resistance or abnormal coagulation.[16]

CONCLUSION

In conclusion, the results of the present study indicate that microalbuminuria is associated with the severity of CAD in type 2 DM patients. However, due to cross-sectional nature of this study a causal relationship cannot be established. Prospective studies are needed to determine with certainty the degree of risk of CAD associated with microalbuminuria in such patients**.**

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