

Research Article**STUDY OF MICROALBUMINURIA AS A CARDIOVASCULAR RISK FACTOR IN TYPE 2 DIABETES MELLITUS****DR. KEDAM. DURGA PRASAD*, DR. PERUMALLA RAJASEKER**

Department of Biochemistry, santhi ram medical college, nandyal , Email: durgesh_prasad65@yahoo.co.in

Received: 14 October 2011, Revised and Accepted: 04 December 2011

ABSTRACT

BACKGROUND: Microalbuminuria was originally established as predictor of renal failure and an independent risk factor for cardiovascular disease in patients with diabetes mellitus as well as in general population. The aim of our study is to assess the relationship between microalbuminuria as Independent risk factor for cardiovascular disease in diabetics and their prevalence.

METHODS: sixty patients 40 men and 20 women with mean age were Biochemically analyzed with type 2 diabetes as out patients in the department of Biochemistry Santhi ram general hospital, nandyal between 2010 - 2011. These diabetic patients were divided into two groups with (Group A 30 patients) and without (Group B 30 patients) microalbuminuria and each group was evaluated for atherogenic indices(AIs), body mass index(BMI), glycosylated Hemoglobin(HbA1c), lipid profile and microalbuminuria.

RESULTS: The prevalence of microalbuminuria in our study was 50%. the prevalence of microalbuminuria in males was 57.5% and in females 35%. The microalbuminuria patients were older and had a longer duration of diabetes compared with normoalbuminuric patients. the Group A had significantly higher atherogenic indices compared with Group B (5.6999 ± 1.1876 vs 3.02863 ± 0.6367 , $p=0.0001$) the prevalence of obesity($BMI > 30\text{Kg/m}^2$) in our sample was 35%. In Group A the mean BMI (30.097 ± 0.6025) was significantly higher compared with Group B (28.4273 ± 1.2079 , $p=0.0001$) the mean of UMA was higher in Group A compared with Group B(72.07 ± 50.19 vs 17.38 ± 6.291 , $p=0.0001$). There is positive correlation between microalbuminuria and AIs($r=0.7829$)

CONCLUSION: In patients with type 2 diabetes and microalbuminuria, AIs, BMI, duration of diabetes was significantly higher compared with patients with type 2 diabetes and normoalbuminuria.

KEY WORDS: microalbuminuria, type 2 diabetes, cardiovascular risk, atherogenic indice.

INTRODUCTION

Diabetes mellitus is the commonest metabolic syndrome disorder characterized by chronic hyperglycemia and disturbances of carbohydrate, fat and protein metabolism due to absolute or relative deficiency of insulin secretion or action.

Long standing metabolic derangement is frequently associated with permanent and irreversible functional and structural changes in the cells of the body particularly the vascular system changes leading in turn to development of well defined clinical entities called the complications of diabetes mellitus effecting eye, the kidney, microvascular and nervous system. Diabetic nephropathy is the single most common cause of end stage renal disease (ESRD) in the western countries, in fact 44% of all new cases of ESRD in the U.S. were diagnosed in diabetic patients,>80% of whom have type 2 diabetes mellitus.¹

In India, the prevalence of microalbuminuria varies from 19.7% to 28.5% of unselected type 2 diabetic patients, where as the prevalence of diabetic nephropathy in type 2 diabetics is reported to be 5-9% from various Indian studies. However studies using newer diagnostic methods to detect urinary albumin excretion (UAE) subclinically i.e., (detecting UAE even when conventional testing for urinary albumin is negative) have given hopes of detecting early nephropathy and possible intervention to retard or reverse nephropathy at that stage.

The early nephropathy stage when urinary albumin excretion is 30-300 mg/24 hrs or 20-200 μg / min. is known as microalbuminuria, and patients with microalbuminuria are referred to as having incipient nephropathy.² Intervention at this stage can retard or reverse the progression of nephropathy. Type 2 diabetes is an independent risk factor for microvascular and macrovascular disease ³⁻⁵. Diabetic nephropathy in patients with type 2 diabetes has a cumulative prevalence of 30-40% and is currently the leading cause of end stage renal disease (ESRD).^{6,7} Microalbuminuria was originally established as predictor of renal failure in patients with diabetes mellitus.^{8,9}

Microalbuminuria has become a prognostic marker for cardiovascular disease (CVD) and the finding of microalbuminuria is an indication for screening for possible vascular disease and aggressive intervention to reduce all cardiovascular risk factors ^{10,11}. Epidemiological and experimental data show that micro

albuminuria is associated with an increased risk for all cause and cardiovascular mortality, cardiac abnormalities and cerebrovascular disease.^{12,13} Endothelial function and chronic inflammation have been suggested as possible candidates to explain the associations between microalbuminuria and cardiovascular disease.¹⁴

The objective of the present study was to determine the prevalence of microalbuminuria and associated risk factors among type 2 diabetic patients.

The study group comprised of 60 type 2 diabetic patients at santhi ram General Hospital, nandyal. Patients sample were analyzed using semi-auto analyzer (ERBA Chem5, plus V2). Patients with presence of Urinary tract infection, macroalbuminuria, renal failure or heart failure of any stage were excluded. The patients were divided in two groups: Group A with and Group B without microalbuminuria. the clinical data were obtained from the patients history. BMI was calculated and expressed as Kg/m^2 . Atherogenic Indices was calculated by using the following equation(Total cholesterol - HDL cholesterol)/ HDL cholesterol.

A fasting blood sample was drawn after 10 hour overnight fasting and the fallowing investigations were done : plasma glucose, HbA1c, lipid profile and serum creatinine. For microalbuminuria, spot urine samples were collected in the early morning and microalbuminuria was defined as a urinary albumin excretion between 30 and 300mg/L per day.

The plasma glucose is analyzed by GOP-POD Method, Glycosylated Hemoglobin is estimated by Cation-Exchange Resin method, serum creatinine by Alkaline picrate method, total cholesterol is estimated by Cholesterol oxidase / peroxidase method, triglycerides are estimated by Enzymatic colorimetric method, HDL Cholesterol by Phosphotugstate / magnesium precipitation method and Microalbuminuria is estimated by Turbidimetric Immunoassay method.

Statistics

Data were processed descriptively with means and standard deviations; Student's t test was used to find out significant differences between two groups. All the tests were considered statistically significant at $p<0.05$ level.

RESULTS

The present study consisted of 60 patients of which 20 females and 40 males. The prevalence of microalbuminuria among males was 57.5% and among females 35%. The microalbuminuria patients were older and had a longer duration of diabetes compared with normoalbuminuric patients.

Table-1 shows the Glycosylated hemoglobin was higher in cases compared with controls (8.06 ± 1.487 for Group A and 6.743 ± 0.361 for Group B). the prevalence of Obesity($>30\text{Kg}/\text{m}^2$) in type 2 diabetic patients was 35%. In Group A the mean value of BMI was higher compared with that of Group B (30.097 ± 0.6025 vs 28.427 ± 1.207 , $p=0.0001$) and

Table 1: Biochemical characteristics of the study.

	FBS	HbA1c	Sr.Crea	UMA	Total.CHO	HDL-C	A.I	BMI
Cases	182.17 ± 76.32	8.06 ± 1.488	1.293 ± 0.561	72.07 ± 50.19	249.73 ± 38.256	37.567 ± 3.43	5.699 ± 1.187	28.427 ± 1.207
Controls	152.71 ± 17.29	6.743 ± 0.362	0.883 ± 0.164	17.38 ± 6.29	172.13 ± 13.26	41.2 ± 8.044	3.286 ± 0.636	24.223 ± 0.863
t-value	2.061	4.171	3.835	5.922	10.497	2.275	9.81	15.508
P value	0.0438	0.0001	0.0003	0.0001	0.0001	0.0266	0.0001	0.0001

Table 2: Correlation coefficients of different variables and atherogenic indices.

S.NO	Correlation between variables	r-value	P-value
1.	Microalbuminuria and HbA1C	0.4433	0.0004
2.	Microalbuminuria and AIs	0.7829	0.0001
3.	BMI and AIs	0.7290	0.0001

DISCUSSION

The present study provides evidence, that low grade urinary albumin excretion may be associated with other risk factors of CVD. The prevalence of microalbuminuria in patients with diabetes is high (30%-40%) and it is similar to our finding in the present study (50%).⁷

In Our study duration of diabetes and obesity are found to be risk factors for microalbuminuria.

Prevalence of BMI $>30\text{Kg}/\text{m}^2$ is higher in type 2 diabetic patients. In our study this prevalence was 35% and in the microalbuminuria group the mean value of BMI was higher than the normomicroalbuminuric group confirming the role of obesity as independent risk factors for microalbuminuria.

Significant alterations in the lipid levels were found to influenced by a glycemic control. Diabetics with a better glycemic control maintained near normal lipid values. In our study AIs in microalbuminuric patients was high when compared with normomicroalbuminuric patients, considering microalbuminuria as risk factor for cardiovascular disease.

A substudy of the heart outcomes prevention evaluation (HOPE) study found that microalbuminuria was a strong predictor of cardiovascular diseases^{14,15}. Our present study also shows a significant correlation in accordance with the HOPE study.

CONCLUSION

In conclusion the prevalence of microalbuminuria and obesity in patients with type 2 diabetes is high. The microalbuminuria is independent risk factor for cardiovascular diseases in type 2 diabetic patients with incipient nephropathy.

REFERENCES

1. 1999 United States Renal Data System Annual Report: National Technical Information Service. US Department of Health and Human Services, Springfield, VA
2. Bouhanick B, Berrut G, Chaneau A.M., Hailab M, Bled F, et al. Predictive value of Testing Random Urine sample to detect microalbuminuria in Diabetic patients on outpatient basis. Diabete Metab. 1992; 18: 54 - 58.
3. Boronat M, varillas VF, Saavedra P, et al. Diabetes mellitus and impaired glucose regulation in the Canary Islands(Spain): microalbuminuria was found to be significantly elevated in cases then in control Group (72.067 ± 50.18 for Group A and 17.383 ± 6.291 for Group B, $p=0.0001$)
4. Almdal T, Scharling H, Jensen JS, Vestergaard H. the independent effect of type 2 diabetes mellitus on ischemic heart disease, stroke and death: a population based study of 13000 men and women with 20 years follow up. Arch Internal Med 2004;164:1422-1426
5. Stamler J. Impact of diabetes on cardiovascular mortality in MRFIT. Diabetes care 2006; 26:498-503
6. American diabetes Association , cardiovascular risk factors and disease management in type 2 diabetes with diabetes Nephropathy.
7. Parving HH, Lewis JB, Ravid M, Remuzzi G, Hunsicker LG DEMAND investigators. Prevalence and risk factors for microalbuminuria in a referred cohort of type II diabetic patients: a global perspective. Kidney int 2006; 69: 2057-2063.
8. Ruggenenti P, Remuzzi G, Nephropathy of type 2 diabetes mellitus J Am Soc Nephrol 1998; 9: 2157-2169.
9. Al-Shaikh A. Prevalence of microalbuminuria in type 2 diabetes mellitus at a diabetic clinic in king Abdulaziz University hospital Pak J Med Sci 2007; 23 223-226.
10. Morrish NJ, Wang SL, Stevens LK, Fuller JH, Keen H. Mortality and the cause of death in the WHO Multinational study of vascular disease in diabetes. Diabetologia 2001; 44(Suppl2): S14-S21.
11. Cec-Calvo L, Conthe P, Gomez-Fernandez P, de Alvaro F, Fernandez-Perez C, RICHARD investigators . Target organ damage and cardiovascular complications in patients with Hypertension and type 2 diabetes in Spain; a cross-sectional study. Cardiovasc Diabetol 2006;5:23.
12. Keller C, Bergis KH, Fliser D, Ritz E. Renal findings in patients with short-term type 2 diabetes J Am Soc Nephrol 1996; 12: 2627-2635.
13. Charpentier G, Genes N, Vaur L, et al; Control of diabetes and cardiovascular risk factors in patients with type 2 diabetes mellitus; a national wide french survey. Diabetes Metab 2003; 29: 152-158.
14. Gerstein HC, Mann JF, Pogue J, et al. prevalence and determinants of microalbuminuria in high-risk diabetic and nondiabetic patients in the Heart outcomes prevention Evaluation study. The HOPE study investigators. Diabetes care 2000; 23:B35-B39.
15. Mann JF, Gerstein HC, Pogue J, Bosch J, Yusuf S, renal insufficiency as a predictor of cardiovascular outcomes and the impact of ramipril: the HOPE randomized trial. Ann Intern Med 2001; 134:629-636.
16. Guerci B, Böhme P, Kearney-Schwartz A, Zannad F, Drouin P. Endothelial dysfunction and type 2 diabetes. Part 2: altered endothelial function and the effects of treatments in type 2 diabetes mellitus. Diabetes Metab 2001; 27(4 Pt 1): 436-447