

## STUDY OF MICROALBUMINURIA AS A CARDIOVASCULAR RISK FACTOR IN TYPE 2 DIABETES MELLITUS

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### 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.

**METHODES:** 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 ( $5.6999 \pm 1.1876$  vs  $3.02863 \pm 0.6367$ ,  $p=0.0001$ ) the prevalence of obesity (BMI>30Kg/m<sup>2</sup>) in our sample was 35%. In Group A the mean BMI ( $30.097 \pm 0.6025$ ) was significantly higher compared with Group B ( $28.4273 \pm 1.2079$ ,  $p=0.0001$ ) the mean of UMA was higher in Group A compared with Group B ( $72.07 \pm 50.19$  vs  $17.38 \pm 6.29$ ,  $p=0.0001$ ). 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.<sup>1</sup>

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.<sup>2</sup> 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<sup>3-5</sup>. 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).<sup>6,7</sup> Microalbuminuria was originally established as predictor of renal failure in patients with diabetes mellitus.<sup>8,9</sup>

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<sup>10,11</sup>. 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.<sup>12,13</sup> Endothelial function and chronic inflammation have been suggested as possible candidates to explain the associations between microalbuminuria and cardiovascular disease.<sup>16</sup>

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<sup>2</sup>. 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 following 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(>30Kg/m<sup>2</sup>) 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 Als	0.7829	0.0001
3.	BMI and Als	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%).<sup>7</sup>

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

Prevalence of BMI>30Kg/m<sup>2</sup> 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 be influenced by a glycemic control. Diabetics with a better glycemic control maintained near normal lipid values. In our study Als 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<sup>14,15</sup>. 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.

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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)

Als for microalbuminuria patients was significantly higher compared with normoalbuminuric patients.(5.6999 ± 1.187 for Group A and 3.286 ± 0.6367 for Group B)

Table 2 shows the simple correlation coefficients of Als with various variables for both sexes. There was moderate correlation between HbA1c and microalbuminuria(r=0.443), good correlation between Als and microalbuminuria(r=0.782) and there was good correlation between BMI and Als(r=0.72903).

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