

**PREVALENCE OF MICROALBUMINURIA AMONG TYPE 2 DIABETES MELLITUS PATIENTS AT BENUE STATE UNIVERSITY TEACHING HOSPITAL, MAKURDI, NORTH CENTRAL, NIGERIA**Monday O. Ogiator\*<sup>1</sup>, Joy Ugwuanyi<sup>1</sup>, Paul Asor<sup>1</sup>, Ochoche O. Ijachi<sup>1</sup> and Samuel Onogwu<sup>1</sup>

Department of Medicine, Benue State University Teaching Hospital.

**\*Corresponding Author: Monday O. Ogiator**

Department of Medicine, Benue State University Teaching Hospital.

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**ABSTRACT**

Microalbuminuria is an early marker of overt nephropathy and cardiovascular disease in type 2 diabetic patients. Owing to the above, monitoring microalbuminuria in diabetes is important to prevent or delay overt nephropathy and cardiovascular events which is a common cause of morbidity and mortality in these patients. **Objectives:** To determine the prevalence of microalbuminuria and associated risk factors among Type 2 diabetic patients seen at Benue State University Teaching Hospital, Makurdi. **Methods:** One hundred and four type 2 diabetic patients attending clinic at Benue State University Teaching Hospital, Makurdi were screened for microalbuminuria. **Result:** Thirty eight (36.5%) patients had microalbuminuria while 66 (63.5%) had microalbuminuria. The study also revealed that poor glycaemic control, hypertension and duration of diabetes mellitus is associated with microalbuminuria. **Conclusion:** The prevalence of 36.5% microalbuminuric Type 2 diabetic patients from our study indicates high predisposition to cardiovascular events and renal impairment in these patients. This calls for prevention and early intervention to stop or delay progression to renal damage and end stage renal failure.

**KEYWORDS:** Microalbuminuria, Type 2 diabetes mellitus, Prevalence.**INTRODUCTION**

Diabetes nephropathy is a leading cause of end stage renal disease world wide.<sup>[1,2]</sup> Microalbuminuria is a marker of early stage of diabetic nephropathy.<sup>[3-4]</sup> Microalbuminuria is also a predictor of cardiovascular disease among diabetic patients.<sup>[5-6]</sup>

Microalbuminuria is defined as albumin creatinine ratio (ACR) between 30-300mg/g.<sup>[7]</sup> Microalbuminuria results from glomerular hyperfiltration or from glomerular hypertrophy with mesangial expansion.<sup>[8]</sup> Since albumin molecule is small, it is often among the first protein to enter the urine when the glomeruli are damaged.<sup>[8]</sup> Thus, even minor kidney dysfunction is detectable with proper diagnosis of microalbuminuria. Previous studies have shown that unlike macroalbuminuria, microalbuminuria can revert to normoalbuminuria in patients with diabetes when they are treated with renoprotective and antiproteinuric agents.<sup>[9]</sup>

It is also recommended that diabetic patients should be screened for microalbuminuria annually.<sup>[10]</sup> Screening for microalbuminuria and timely therapeutic intervention has become the standard of care for diabetics globally.

Despite the availability of therapies to reduce microalbuminuria and recommendation to screen

diabetic patients for microalbuminuria, people with diabetes are not routinely screened for microalbuminuria in most low-resource Sub-Saharan African settings including Benue State University Teaching Hospital, Makurdi, Nigeria. Owing to the above, our study aimed to detect the prevalence of Microalbuminuria among type 2 diabetics and use our findings to implement measures which will delay progression to end stage renal disease as well reduce the incidence of cardiovascular events which is a common cause of morbidity and mortality in these patients.

**METHODS**

A total of one hundred and four diabetic patients attending diabetic clinic at Benue State University Teaching Hospital, Makurdi were recruited for the study. Exclusion criteria included proven cause of secondary hypertension, patients with urinary tract infection, pregnant women, patients with established renal disease, overt proteinuria, acute fibrile illness, use of NSAIDS.

The study was conducted over a period of nine months. Patients age ranged from 18 – 70 years. Informed consent was obtained from each patient. Ethical approval was obtained from the institution human ethics and research committee.

The study participants were interviewed using a structured questionnaire. Data obtained included age, gender, family history of DM. weight; height and blood pressure were measured using standard methods. Body mass index (BMI) was calculated as weight (kg)/height (M)<sup>2</sup>

Elevated blood pressure was defined as systolic blood pressure (SBP)  $\geq$  140mmHg and/or diastolic blood pressure (DBP)  $\geq$  90mmHg or use of anti-hypertensive medications. Blood samples were obtained for fasting blood glucose. Morning mid-stream urine sample was used to calculate micro-albuminuria creatinine ratio in mg/g. Normoalbuminuria was defined as albuminuria creatinine ratio albumin creatinine ratio (ACR)  $<$  30mg/g. Microalbuminuria was defined as ACR between 30-300mg/g. Macroalbuminuria was defined as ACR  $\geq$ 300mg/g. Samples positive for microalbuminuria were repeated within 3 months to confirm microalbuminuria.

#### Statistical analysis

The Statistical Package for Social Sciences (SPSS Inc. Chicago II) version 21.0 statistical software was used for data analysis.

Quantitative variable were expressed as means  $\pm$  standard deviation while categorical variables were expressed as proportions. The t-test and the chi-square

test were used in the comparison of means and proportions respectively. P-value  $<$ 0.05 was considered statistically significant.

#### RESULTS

Sixty six patients had normoalbuminuria that is ACR  $\leq$  30mg/g of these with normoalbuminuria, there were 25 males and 41 females while among those with microalbuminuria ACR  $\geq$  30mg/g there were 20 males and 18 females. The mean age was 52.63 $\pm$ 12.50 in years. The characteristics of the study population is shown in Table 1. Thirty (45.5%) of patients with normoalbuminuria had family history of DM compared with 18 (47.4%) of patients with microalbuminuria. The result however was not statistically significant. Twenty one (31.8%) of patients with normoalbuminuria had fasting blood glucose  $\geq$  7.0 mmol/l compared with 30 (79.0%) of those with microalbuminuria. The result was statistically significant. Eight (12.1%) of patients with normoalbuminuria had been diabetic for over 10 years compared with 19 (50.0%) of patients with microalbuminuria. The result was statistically significant. The mean systolic and diastolic blood pressure of patients with normoalbuminuria were 130.9 mmHg and 80.45 mmHg respectively compared with 145.3mmHg and 90.0 mmHg of patients with microalbuminuria. The result was statistically significant.

**Table 1: Characteristics of the two groups (Normoalbuminuria and Microalbuminuria).**

		ACR		P value
		Group 1 $\leq$ 30 mg/g (n = 66) Normoalbuminuria	Group 2 $>$ 30 mg/g (n = 38) Microalbuminuria	
SEX	Male	25	20	.146
	Female	41	18	
$\leq$ 30 years		4	0	.075
AGE 31-50 years		25	12	
51-70 years		35	23	
$>$ 70 years		2	3	
Family History of DM				
Positive		30	18	.851
Negative		36	20	
18.5-24.5		19	15	.247
BMI 24.6-29.5		31	17	
30.0-35.0		12	4	
$>$ 36.0		4	2	
$\leq$ 7.0 mmol/L FBS		45	8	.000
$>$ 7.0 mmol/L		21	30	
$<$ 10 YEARS DURATION		58	19	.000
OF DM $>$ 10 YEARS		8	19	
MEAN BP Systolic		130.9	145.3	.009
Diastolic		80.5	90.0	
Total		66	38	.000

**DISCUSSION**

The prevalence of microalbuminuria from our study was 36.5%. Reported prevalence of microalbuminuria varies widely. For instance Lutale KY et al<sup>[11]</sup> reported an overall prevalence of 10.7% in a cross sectional study of Type 1 and Type 2 diabetic patients in Dar Es Salaam, Tanzania. Efundem NT et al<sup>[12]</sup> reported a prevalence of 14:2% in Cameroon. Additionally, Wanjohi F et al<sup>[13]</sup> reported that 26% of diabetics attending the diabetic clinic at Kenyatta National Hospital, Nairobi were microalbuminuric while Eghan BA et al<sup>[14]</sup> reported a prevalence of 43% in Kumasi, Ghana.

Al-Maskari F et al<sup>[15]</sup> in their study done at Al-Ain district United Arab Emirate reported that 61% of diabetics were microalbuminuric.

Studies done across Nigeria also revealed variation in prevalence. Ogbu IS et al<sup>[16]</sup> reported a prevalence of 16.1% in their study done at University of Nigeria Teaching Hospital Enugu, Nigeria. While Udenze IC reported a prevalence of 24% at Lagos State University Teaching Hospital, Lagos.<sup>[17]</sup> Agaba EI et al<sup>[18]</sup> reported that 49.2% of newly diagnosed diabetic patients seen in Jos were microalbuminuric. Ufuoma C et al<sup>[19]</sup> reported a prevalence of 58% at Central Hospital, Warri. The difference observed could be as a result of characteristic of the study population. In our study we recruited only type 2 diabetics. Some studies like that done by Lutale et al recruited both Type 1 and Type 2 diabetics.<sup>[11]</sup> Agaba et al recruited only newly diagnosed diabetics.<sup>[18]</sup> Other factors that could account for these variations include definitions of microalbuminuria, method of urine collection as well as differences in ethnic susceptibility.<sup>[20]</sup>

Our study showed an association between poor glycaemic control with microalbuminuria as there was significant statistical difference in the fasting blood glucose levels among microalbuminuric patients in comparison with the normoalbuminuric patients. The association of glycaemic control with microalbuminuria has been well established in various studies.<sup>[21,22]</sup>

Our results also showed significant difference between duration of diabetes in normoalbuminuric and microalbuminuric groups in line with some studies that have reported a strong association between severity of microalbuminuria and duration of diabetes.<sup>[23,24]</sup>

The blood pressure were also found to be significantly higher in patients with microalbuminuria compared with those with normoalbuminuria. This observation has been reported in several studies.<sup>[24-26]</sup> For instance Svensson Maria et al in their study done in Sweden reported a correlation between microalbuminuria and hypertension. Similar observation was reported by Varghese A et al<sup>[24]</sup> in their study on the prevalence of microalbuminuria among diabetic patients in Southern India.

**CONCLUSION**

The prevalence of microalbuminuria in Benue State University Teaching Hospital, Makurdi is high. Hyperglycaemia, hypertension and duration of diabetes are risk factors for microalbuminuria. The high prevalence of microalbuminuria from our study emphasizes the need to screen type 2 diabetics seen in our clinic for microalbuminuria.

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