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PREVALANCE AND PREDICTORS OF MICROALBUMINURIA IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT

Microalbuminuria represents the earliest clinical evidence of diabetic nephropathy. Early detection of microalbuminuria and early control of diabetes retards the development of structural changes in early diabetic nephropathy. This study aimed to determine the prevalence and correlation of microalbuminuria with age, duration of diabetes, sex and BMI in type 2 diabetic patients. 100 diabetic patients (48 male and 52 female) of age 40-75years were included in this study. Fasting blood samples and morning urine samples were collected for analysis of glucose, urea, creatinine and microalbumin respectively. Statistical analysis was done in SPSS version 13. Prevalence of microalbuminuria in this study is found to be 51%. Microalbumin had a highly significant correlation with age, duration of diabetics and body mass index (BMI). The high prevalence (51%) of microalbumin observed in these patients is alarming and indicates an impending pandemic of renal disease.

KEY WORDS: **Diabetes Mellitus; Microalbumin; Diabetic Nephropathy; Albumin Creatinine ratio**

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INTRODUCTION

Diabetic Nephropathy is a common consequence of chronic and uncontrolled diabetes mellitus. It is characterized by the presence of large amount of urinary protein, mostly albumin. One of the earliest markers of Diabetic Nephropathy is microalbuminuria[1] which is defined as the urinary excretion of albumin at the rate of 30-299mg/24hr[2-4]. Increased level of microalbuminuria is associated with increased risk of progressive kidney disease leading towards End stage Renal Disease and cardiovascular morbidity and mortality in diabetic patients[5,6]. Early detection of microalbuminuria, treatment with ACE (Angiotensin converting enzymes) inhibitors and control of diabetes retards the development of structural changes in diabetic nephropathy. The American Diabetes Association (ADA) recommended that people with diabetes should do an annual microalbuminuria test and measurement of serum creatinine[7]. The microalbuminuria generally appears within 5 – 15 years duration of diabetes[8]. It is at this stage that one can hope to reverse diabetic nephropathy or prevent its progression. Determination of Urinary Albumin Excretion (UAE) in the morning sample constitutes the ideal test for screening and overnight urine collection might be the best choice for monitoring microalbuminuria[9,10]. Since the appearance of microalbuminuria is the first sign of nephropathy, patients with persistent microalbuminuria are referred to as having incipient nephropathy. Hyperfiltration is the first detectable alteration in renal function in the course of diabetic renal disease and occurs soon after the emergence of microalbuminuria. Without intervention, 20 – 40% of type -2 diabetic patients with microalbuminuria progress to overt Nephropathy.

AIM

The study was aimed to determine the prevalence of microalbuminuria in Type 2 diabetic patients and to evaluate the relationship of Microalbuminuria with various demographic and biochemical parameters.

MATERIALS AND METHODS

100 known diabetic patients (48 male and 52 female) with age range from 40 to 75 were included in this study. The study was approved by the institutional ethical committee of Madras Medical College and written informed consent was taken from all the patients. Question regarding the demographic data such as age, sex, duration of DM, family history of DM, renal failure were recorded for each patient. Height, weight, waist, hip measurements were taken and BMI and W/H ratio was calculated. Fasting venous blood was collected for measuring serum creatinine, glucose and urea. Morning urine sample was collected in container for analysis of creatinine and Micro albumin. Creatinine was analyzed by Jaffes method, Micro albumin by immunoturbidometric method using spine react kit (Spain). Subjects were classified according to urinary albumin (UA) to creatinine ratio (ACR) <30mg/gm as normoalbuminuric, 30 mg/gm to 299 mg/gm as microalbuminuria and more than 300 mg/gm as macroalbuminuric. Data was presented as mean ± SD. Pearson correlation was applied to observe an association of microalbuminuria with different parameters. All p values <0.05 is considered as statistically significant.

RESULTS

A total of 100 [patients 52 females and 48 males) were included in this study. Overall prevalence of microalbuminuria is 51%. Among the patients with microalbuminuria 24 were males and 27 were females.

Table: 1 shows a comparison of characteristic between patients with normoalbuminuric Vs microalbuminuria. Duration of diabetes, BMI, ACR were significantly higher in patients with microalbuminuria (P<0.05).

Table 1
A Comparison of characteristics of patients with normo albuminuria Vs microalbuminuria

S.NO	Parameters	Diabetic Patients with normal albumin	Diabetic Patients with Micro albumin	p value
1	Number	49	51	
2	Age (years)	53.02 ± 8.9	56.25 ± 9.199	0.07 NS
4	Duration of diabetes(years)	7.95 ±3.29	9.98 ± 4.921	0.017*
5	BMI(kg/m^2)	24.55 ± 3.70	26.84 ± 4.20	0.004*
6	Waist Hip ratio	0.88 ± 0.06	1.01 ± 1.1	0.387 NS
7	Systolic BP(mmHg)	122.44 ± 110.71	122.549 ± 9.55	0.961 NS
8	Diastolic BP(mmHg)	81.95 ± 10.88	82.82 ±5.94	0.627 NS
9	Glucose(mg/dl)	167.97 ± 33.4	163.902 ± 39.77	0.579 NS
10	Serum creatinine(mg/dl)	0.91 ± 0.36	1.029 ± 0.33	0.155 NS
11	Urine creatinine(mg/dl)	1.50 ± 3.55	0.92 ±0.34	0.26 NS
12	Urea(mg/dl)	23.79 ± 5.29	26.86 ± 8.01	0.026 *
13	Micro albumin (mg/g)	16.87 ± 5.96	75.66 ± 52.76	<0.0001**

BMI: Body Mass Index
Value is expressed as mean ± SD
****p<0.05 is significant; **p<0.001 is highly significant***
NS: non significant when compared with normoalbuminuric subjects.

Table: 2 shows gender wise comparison of baseline characteristic of Diabetic patients. The mean ACR value is found to be high in male gender (54.45±61.28) that the female gender (40.79 ± 31.49) and this difference was not statistically significant (P = 0.17).

Table 2
Gender wise comparison of baseline characteristics of study population

S.NO	PARAMETERS	MALE	FEMALE	p value
1	Number	48	52	
2	Age (years)	55.38 ± 9.76	54.15±8.8	0.511
4	Duration of diabetes(years)	9.25 ± 5.45	8.826 ±2.90	0.633
5	BMI(kg/m^2)	25.64 ± 3.65	25.83 ± 3.4.54	0.247
6	Waist circumference	0.87 ± 0.15	1.02 ±1.11	0.339
7	Systolic BP(mmHg)	123.75 ± 9.13	121.35 ±10.85	0.233
8	Diastolic BP(mmHg)	82.20 ± 10.81	82.69 ± 6.29	0.785
9	Glucose(mg/dl)	163.60 ± 38.15	168.56 ± 35.95	0.532
10	Serum creatinine(mg/dl)	1.03 ± 0.43	0.92 ± .86	0.416
11	Urine creatinine(mg/dl)	1.43 ± 3.59	.96 ± .33	0.371
12	Urea(mg/dl)	25.29 ± 5.95	25.35 ± 7.88	0.966
13	Micro albumin (mg/g)	54.45 ± 61.28	40.79 ± 31.49	0.178

BMI: Body Mass Index
Value is expressed as mean ± SD
****p<0.05 is significant***

In Table 3 patients were categorized according to their age and it was found that mean ACR value is found to be higher at the age of 60-75 years and prevalence increases from age 40-49 years to 60 -65 years.

Table 3
Comparison of ACR with various age groups

	AGE 40-49 (years)		AGE 50-59(years)		AGE 60-75(years)	
PARAMETERS	ACR less than 30 *(mg/g)*	ACR more than30*(mg/g)*	ACR less than (30 *mg/g)*	ACR more than(30 *mg/g)*	ACR less than (30 *mg/g)*	ACR more than(30 *mg/g)*
Number	21	12	11	15	31	32
ACR(mg/g)	14.04±5.3	86.80±74.5	17.10±6.54	72.44±23.02	20.60±3.67	116.07±61.97

Value is expressed as mean ± SD
ACR: Albumin Creatinine Ratio

In Table 4 Pearson's correlation analysis showed statistically significant correlation of microalbumin with BMI (0.038), with duration of diabetes p (<0.001) in table 5, with age (p<0.012) in table 6.

Table 4
Co- relation of Micro albumin with BMI (n=100)

BMI (kg/m^2)	Pearson Correlation	1	.706*
(25.72 ±4.11)	Sig. (2-tailed)		.038
	N	100	100
ACR***(mg/g)***	Pearson Correlation	.706*	1
(46.87±47.91)	Sig. (2-tailed)	.038	
	N	100	100

p <0.05 is significant

Table 5
Co- relation of Micro albumin with duration of diabetes (n=100)

Duration(8.99+±4.3) (years)	Pearson Correlation	1	.327**
	Sig. (2-tailed)		.001
	N	100	100
ACR(46.87±47.91) *(mg/g)*	Pearson Correlation	.327**	1
	Sig. (2-tailed)	.001	
	N	100	100

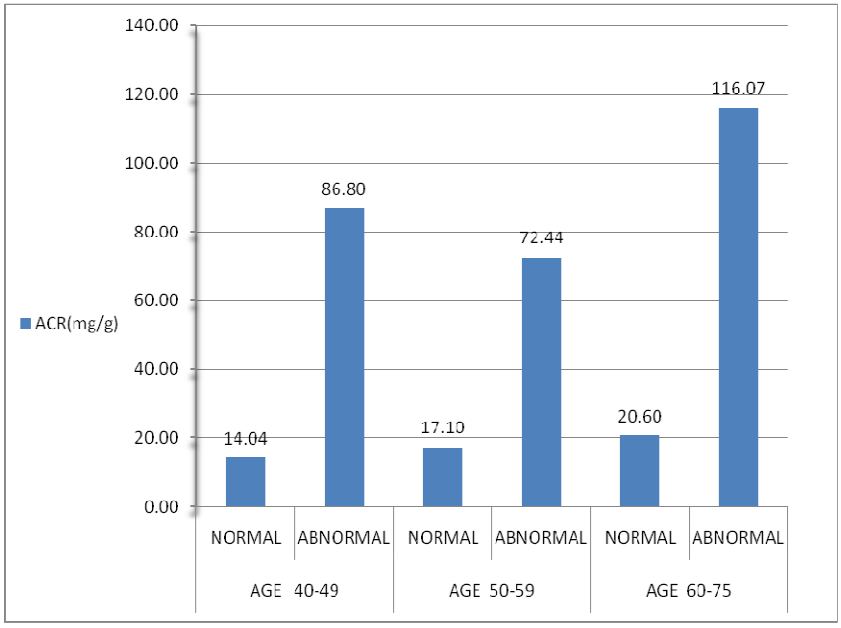
Correlation is significant at the 0.01 level (2-tailed).
ACR: Albumin Creatinine Ratio

Table 6
Co- relation of Micro albumin with Age (n=100)

Age (54.67±9.15) (years)	Pearson Correlation	1	.250*
	Sig. (2-tailed)		.012
	N	100	100
ACR(46.87±47.01) *(mg/g)*	Pearson Correlation	.250*	1
	Sig. (2-tailed)	.012	
	N	100	100

Correlation is significant at the 0.05 level (2-tailed).

Graph 1
Histogram of ACR Vs Age



DISCUSSION

Diabetic nephropathy is asymptomatic until the complication become obvious and among those affected one third will eventually have progressive deterioration of renal function[11]. This cross sectional study presents data on prevalence and association of microalbuminuria with various parameters in type 2 Diabetes Mellitus. We have observed the prevalence of microalbuminuria as 51% which is higher when compared to studies by N. K. Chowta etal where the prevalence is reported 37% [9]. However earlier studies on Asians and native Indians have suggested a high prevalence of microalbuminuria (MAU). In non white populations, cross section studies indicate a prevalence of microalbuminuria of 30% -40%[12-15]. The American Diabetes association recommends screening adults ≥45 years of age and especially those with BMI ≥25kg/m^2. BMI value of 19.5-24.9 is taken as healthy weight while 25-29.9 is considered as overweight and BMI ≥ 30 as obese[16]. Weight gain is significantly associated with DN which we have observed in this study. The diabetic microalbuminuric patients had a BMI of (26.84±4.20) indicating that the patients were overweight. A study on Type 2 diabetic patients by Mokdad etal reported a co relation between obesity and micro albumin[17]. Present study also found a significant correlation ($p<0.03$) between micro albumin and BMI as shown in table 4. The frequency of microalbuminuria increased with increase in duration of diabetes. Microalbuminuria had significant correlation with duration of diabetes ($p<0.001$) as shown in table 5. Present study also found high prevalence of micro albumin as the age increases in type 2 diabetic patients. Our study has shown statistically significant linear relationship of degree of micro albumin with age, BMI, ACR level, Duration of diabetes mellitus.

CONCLUSION

In our study we found higher prevalence of micro albumin (51%) in type 2 diabetic patients which is the predictor of impending Diabetic Nephropathy. According to our Study, duration of diabetes, BMI and Age, increased the incidence of Nephropathy in diabetic patients. Hence these patients must be screened for nephropathy complications and also advised for periodic follow up. There is a need to include microalbuminuria testing in both newly diagnosed as well as already diagnosed Type 2 diabetic patients as an early marker of renal risk factor. Strict glycemic control, healthy life style, maintenance of body weight is important for diabetic patients and for those with family history of Diabetes.

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