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## Prevalence of Microalbuminuria in Type 2 Diabetes Mellitus Association with Sex, Age, Duration of Diabetes.

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### ABSTRACT

Type 2 Diabetes Mellitus is the most common health problem in India. Microalbuminuria is the earliest clinical evidence to diagnose diabetic nephropathy. The objective of this study is to find out the prevalence of microalbuminuria in Type 2 DM in association with sex, age, duration of diabetes, BMI in south Indian population. A sample of hundred patients with Type 2 DM was randomly selected for this study. All patients completed an interviewer-administrated questionnaire and underwent complete clinical examination. First morning urine collections were obtained and were tested for microalbuminuria. The prevalence of microalbuminuria in this study was 39%. Among these 100 patients, 60 men and 40 women. Sex-wise correlation analysis of microalbuminuria doesn't show any statistical significance. There was a statistically significant correlation of microalbuminuria and duration of diabetes.

**Keywords:** Type 2 Diabetes Mellitus, Microalbuminuria, Body Mass Index, Blood Pressure.

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## INTRODUCTION

Diabetes mellitus has been recognized as a major health problem not only for its complication but also for its financial burden on the health care system [1] Diabetic patients are at risk of microalbuminuria, if they have any of the following factors: 1) Systolic BP is >130mmHg. 2) The total cholesterol level is >5.24mmol/l. 3) Urine albumin excretion is in the upper range of normal (20-30mg/dl) 4) The glycosylated hemoglobin level is >0.09. Microalbuminuria is also characterised by increased prevalence of arterial hypertension, proliferative retinopathy, and peripheral neuropathy. Microalbuminuria is diagnosed when the urine albumin level is 30mg/dl. Microalbuminuria is defined by a urine albumin excretion rate higher than normal, the lowest detection limit of proteinuria by standard lab test [2, 3] in the absence of any acute illness including UTI, MI [4].

Microalbuminuria is considered to be an early stage of diabetic nephropathy [5-8] the presence of microalbuminuria indicates the development of overt diabetic nephropathy by 10 -14 years of duration. We can prevent the progression to ESRD at this stage by effective interventions include intensified glycemic control, use of ACE inhibitors. Prevalence of microalbuminuria in Type 2 DM varies from 8-47% [8, 9]. A diagnosis of microalbuminuria can be made by measuring its excretion rate during 24 hours or in an overnight urine collection or measuring albumin/creatinine ratio or albumin concentration in the morning or a random urine sample or by using semiquantitative reagent dipsticks. Microalbuminuria is the strong predictor of diabetic nephropathy, which is the main cause of morbidity and mortality in Type 2 DM patients. Determination of urine albumin excretion is the ideal test for screening. Overnight urine collection might be the test of choice for monitoring microalbuminuria. Microalbuminuria increases the frequency of cardiac illness and the progression to end-stage renal disease (ESRD) [10-13]. CKD /ESRD increase the cost of managing DM [14]. Renal impairment is present in one-third of Type 2 DM patients [15]. Sex correlation of microalbuminuria was not seen in Type 2 DM. There is a linear association of microalbuminuria with BMI, blood pressure and duration of diabetes.

## METHODS AND MATERIALS

General Cross-sectional study in a random sample of 100 Type 2 DM patients treated under primary care during the year of 2013. This study was done to find out the prevalence of microalbuminuria in Type 2 DM association with sex, age, duration of diabetes. Study was approved by institutional research and ethics committee. Patients were screened for eligibility for this study. After receiving a prior informed written consent that is written one from literate patient, orally informed one from illiterate patients. Patients with congestive cardiac failure, UTI, recent MI, febrile patients, marked hypertension, pregnant patients, patients on ACE inhibitors, patients confined to bed for more than 2 weeks were excluded from the study.

Participant patients were interviewed about DM type, duration, treatment profile, level of control. Other causes of microalbuminuria like heavy metal poisoning, connective tissue disorders and chronic NSAIDS use were ruled out.

Complete clinical examination was done in all patients. BMI was calculated from the height and weight measurements of the patients. Height was measured without shoes. BMI was calculated by weight in kg divided by height in meters squared. The WHO classification for BMI was used to find out the degree of obesity [16]. BP was measured in the early morning before taking blood samples by using standard mercury sphygmomanometer after 15 minutes rest. Early morning urine sample was collected and microalbumin was measured. Variables of renal function were defined as follows: 1) normoalbuminuria: albumin excretion rate < 30 mg/g or 3.5 mg/mmol, 2) Microalbuminuria: albumin excretion rate 30 to 300 mg/g or 3.5 to 35 mg/mmol, 3) Macroalbuminuria: albumin excretion rate > 300 mg/g or 35 mg/mmol, 4) Kidney disease (KD): glomerular filtration rate according to Modification of Diet in Renal Disease < 60 ml/min/1.73 m<sup>2</sup> and/or the presence of albuminuria, 5) Renal impairment (RI): glomerular filtration rate < 60 ml/min/1.73 m<sup>2</sup>, 6) Nonalbuminuric RI: glomerular filtration rate < 60 ml/min/1.73 m<sup>2</sup> without albuminuria.

### Statistical Analysis

The collected data was coded and processed by using the statistical packages for social sciences software. Descriptive analysis using standard statistical methods was performed. Independent t-tests, Chi-

square test and pearson correlation coefficient were used to ascertain the association of microalbuminuria in Type 2 DM with independent variables like sex, age, BMI. Probability (p) value less than 0.05 was accepted as statistically significant.

**RESULTS**

The total 100 patients studied included 60 men and 40 women. The prevalence of microalbuminuria as per study is 39%. Among the 39 diabetic patients with microalbuminuria, 21 (53.84%) were men, 18 (46.15%) were women. among 39 microalbuminuric patients, 11 had mild albuminuria. 16 had moderate albuminuria, 12 had severe albuminuria. Age of patients at diagnosis ranged from 30 to 70 years.

Variable	All patients	Range	Microalbuminuric	Normoalbuminuric	P value
Mean age (years)	46.5±10.5	32-65	62.49±12.14	49.3±12.25	< .001
Duration of diabetes (YEARS)	4.97±5.98	1-15	12.66±3.02	3.21±2.01	< .001
BMI(Kg/m <sup>2</sup> )	23.45±3.85	11.2-38.6	22.88±6.06	21.64±4.23	0.023

**Table 1: Shows baseline characteristics of the patients. Age of patients at diagnosis ranged between 32-65 years mean age at onset of diabetes mellitus was 62. 49±12.14 years and in normo-albuminuric patients 49.3±12.25 years.**

Variables	Mean±SD	Correlation coefficient(r)
Age(years)	54.18±13.13	0.529
Sex(M/F)	60/40	0.062
BMI	23.45±3.85	0.063
Duration of diabetes	4.97±5.98	0.839

**Table 2: Shows Gender wise analysis of micro albuminuria was not significant mean BMI of micro albuminuric patients was 22.88±6.06 kg/m<sup>2</sup> and for normo albuminuric patient it was 21.64±4.23 kg/m<sup>2</sup>. The difference between the groups was not statistically significant. Pearson correlation analysis also did not show any significance for microalbuminuria and BMI**

Mean duration of diabetes in micro albuminuria patients was 12.66±3.02 years while in normo albuminuric patients it was 3.21±2.01 years which was statistically highly significant. Pearson correlation analysis showed statistically significant correlation of micro albuminuria with duration of diabetes. Relationship between severity of diabetes and micro albuminuria was significant.

**DISCUSSION**

Microalbuminuria is the first clinically detectable stage of involvement of the kidney and affects between 20-40% of diabetic patients. The variation in prevalence rate is mostly due to the stage of the diseases, method of assessment, difference in diagnostic criteria. Diabetic nephropathy defined as the presence of microalbuminuria or overt nephropathy in patients with diabetes who lack indicators of other renal diseases. If once microalbuminuria is present, it is mostly progress to proteinuria over the next 5 – 10 years in 20-50% of subjects. In the presence of microalbuminuria, the average loss in glomerular filtratoin remains around 10-12 ml/min/year.

Similar to studies elsewhere, this study confirms that the prevalence of microalbuminuria across the genders were not statistically different. It has shown statistically significant linear relationship of degree of microalbuminuria with age. Previous studies have also shown positive correlation of microalbuminuria with the age of the patients. The causal risk factor for microalbuminuria is increased blood pressure and poor glycemc control. Some studies have revealed duration of diabetes, man sex and preexisting retinopathy as major risk factors for microalbuminuria. John et al reported man sex, older age, longer duration of diabetes, poor glycemc control and raised blood pressure as risk factors of microalbuminuria, While Vijay et al reported duration of diabetes, systolic and diastolic BP, age of the patient and serum creatinine to be associated with proteinuria. Other factors which are reported to be associated with microalbuminuria are alcohol intake [17], foot ulcer [18], and smoking [19]. The association of glycemc control with microalbuminuria as been well established by various studies [17, 20, 21] .

One of the limitations of the study is that it is clinic based study. There may be some chance of referral bias. However the prevalence of microalbuminuria is similar to that reported in other studies. The level of glycemic control seems to be the strongest factor influencing the change from normoalbuminuria to microalbuminuria. Another limitation of the study is that it is based on the general population; Selection bias may affect the outcome of the study. Larger population study may reduce this bias.

### CONCLUSIONS

Our study found linear relationship with microalbuminuria and duration of diabetes. There is a positive correlation of microalbuminuria with age of the patients. It has found higher prevalence of microalbuminuria (39%) in type 2 DM. Creatinine clearance will be within normal range in microalbuminuric patients. If microalbuminuria is present, early interventions like good glycemic control, ACE inhibitors etc. are needed to prevent the progression.

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