

## Original Research Article

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# Prevalence of microalbuminuria with associated risk factors among diabetics in the urban field practice area of a medical college in Muzaffarnagar, Uttar Pradesh

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## ABSTRACT

**Background:** Diabetes is a major threat to global public health that is rapidly getting worse and its biggest impact is on adults of working age 45-55 in developing countries. Diabetes mellitus causes progressive changes to the kidneys and ultimately results in diabetic nephropathy. Microalbumin measurement is useful in diagnosis at an early stage, before the development of proteinuria.

**Methods:** This is a community based cross sectional study. The study period of 2 months, from September 2019 to October 2019. Adult between 20 to 59 years of age at the time of data collection from house to house visit were included in the study. A total of 138 diabetics were found in the community and accessed for microalbuminuria and other risk factors.

**Results:** Prevalence of microalbuminuria among was 15.1%. Logistic regression model analysis revealed that microalbuminuria was significantly correlated with the diastolic blood pressure ( $p=0.003$ ) and the duration of diabetes ( $p=0.001$ ).

**Conclusions:** Due to the high prevalence of diabetes in India we need to screen all diabetics for microalbuminuria. Control of blood pressure should also be done more vigorously in diabetic patients.

**Keywords:** High blood pressure, Microalbuminuria, Type 2 diabetes mellitus

## INTRODUCTION

Diabetes is a major threat to global public health that is rapidly getting worse and its biggest impact is on adults of working age 45-55 years in developing countries. A EURO symposium in 1957 gave the following definition of chronic disease “an impairment of body structure and/or function that necessitates a modification of the patient’s normal life and persisted over an extended period of time”.<sup>1</sup> Diabetes mellitus is a metabolic disorder characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat, protein metabolism due to defect in insulin secretion, insulin action or both. The most common form of diabetes, is type 2 diabetes, and it

accounts for more than 90 per cent of all diabetes cases. Diabetes is a serious public health problem in all the developed countries and majority of the developing countries. It is recognized as a health problem of enormous magnitude that effect the heart, kidney, eyes, nerves, causing morbidity and mortality among human beings.<sup>2</sup>

The risk of complications in patients of diabetes mellitus depends upon the duration of diabetes and they usually manifest in the second decade of the development of Diabetes mellitus.<sup>3</sup> Diabetes mellitus causes progressive changes to the kidneys and ultimately results in diabetic nephropathy.<sup>4</sup> Micro albumin measurement is useful in

diagnosis at an early stage, before the development of proteinuria.<sup>5</sup> Microalbuminuria in diabetes mellitus is a risk factor for cardiovascular disease.<sup>6</sup>

The presence of micro albumin in the urine of persons with type 2 diabetes is an important early signal for the onset of systemic vasculopathy and associated with end organ damage (brain, heart, kidneys). Microalbuminuria also identifies patients who need more strict cardiovascular risk management, especially blood pressure control, attention to glucose and lipid levels.<sup>7</sup>

The present study was done to assess prevalence of microalbuminuria in diabetic patients and to find out the associated risk factors among the diabetic adult population aged 20 to 59 years in an urban area of Muzaffarnagar district.

## METHODS

This study was a community based cross sectional study. The study period of 2 months, from September 2019 to October 2019 was used for data collection, compilation and presentation of findings. Adult aged 20 to 59 years residing in registered families of Urban Field Practice Area of a Medical College in Muzaffarnagar, Uttar Pradesh. Systematic random sampling technique was used in the house to house survey.

### ***Inclusion criteria***

Adult between 20 to 59 years of age at the time of data collection from house to house visit were included in the study.

### ***Exclusion criteria***

Adults residing in the area for less than six months were excluded from the study, <20 years and more than >59 years were excluded. Type 1 diabetes mellitus and gestational diabetes was also excluded.

### ***Tools for collection of data***

A pre tested questionnaire including demographic data and duration of diabetes for all patients was administered, and their heights and weights were measured to estimate the body mass index. Weight was measured using the standard weighing machine; a body mass index <24.99 kg/m<sup>2</sup> was considered to be normal.<sup>8</sup>

Blood pressure was recorded with an aneroid sphygmomanometer in right upper arm in sitting position after five minutes of rest. Patients were considered as hypertensive if the systolic blood pressure was >130 mmHg and / or diastolic blood pressure was >85 mmHg.<sup>9</sup> A blood sample was drawn after overnight fasting to measure fasting blood sugar, glycosylated haemoglobin (HbA1c), serum cholesterol, and serum triglyceride levels.

Fasting blood sugar, triglyceride, and cholesterol levels were determined by enzymatic methods. HbA1c <7% was considered to be normal.<sup>10</sup> Urine samples were collected in the morning after overnight fasting. A diagnosis of microalbuminuria was made if the ratio of urinary albumin to creatinine was 30–300 mg/g in two out of three readings. Normoalbuminuria was said to exist if this ratio was <30 mg/g.<sup>9</sup>

Data was analysed using the software SPSS 23.0. The prevalence rates were expressed as percentages under 95% confidence intervals. Discrete data was entered in MS-Excel sheet and suitable statistical software was used.

## **RESULTS**

A total of 138 type 2 diabetic patients were found during the study comprising of 85 males and 53 females. The characteristics of subjects in this study are given in Table 1. The mean age was 47.2±8.1 years and mean body mass index was 26.7±3.11 kg/m<sup>2</sup>. The mean of the duration of diabetes was found to be 9.3±6.3 years. Mean fasting blood sugar was found to be 167.5±46.5 mg/dl and mean HbA1c 1 was 9.1±2.1. The mean serum triglyceride was found to be 210.8±87.5 and mean cholesterol level was 204.7±40.7 mg/dl. The mean of systolic and diastolic blood pressure was found to be 124.4±14.6 and 74.0±6.6 mmHg, respectively as shown in Table 1. The prevalence of microalbuminuria was found as 15.2%.

**Table 1: Patients' characteristics (n=138).**

Variable	Minimum	Maximum	Mean ±SD
<b>Age (years)</b>	22	59	47.2±8.1 years
<b>Duration of diabetes (years)</b>	2	27	9.3±6.3 years
<b>Body mass index (kg/m<sup>2</sup>)</b>	17.4	46.2	26.7±3.11 kg/m <sup>2</sup>
<b>Fasting blood sugar (mg/dl)</b>	98	215	167.5±46.5 mg/dl
<b>HbA1c (%)</b>	4.2	16.5	9.1±2.1%
<b>Triglyceride (mg/dl)</b>	142	305	210.8±87.5 mg/dl
<b>Cholesterol (mg/dl)</b>	163	315	204.7±40.7 mg/dl
<b>Systolic blood pressure (mmHg)</b>	110	205	124.4±14.6 mmHg
<b>Diastolic blood pressure (mmHg)</b>	67	96	74.0±6.6 mmHg

The chi-square test was used to analyze the results. Prevalence of microalbuminuria was not found statistically significant between various age groups (p=0.6). Prevalence of microalbuminuria among males and females was found to be 15.2% and 15.0% respectively. No statistical significance was found between the prevalence of microalbuminuria and gender (p=0.754). In patients with a duration of diabetes ≤10 the

prevalence of microalbuminuria was 9.5% and with duration of diabetes >10 years the prevalence was 16.2%. The correlation between microalbuminuria and duration of diabetes was found to be significant ( $p=0.001$ ) as shown in Table 2.

In patients with systolic blood pressure  $\geq 130$  mmHg the prevalence of microalbuminuria was 14.5% and with

$<130$  mmHg prevalence was 11.2% respectively. There was no significant correlation between systolic blood pressure and microalbuminuria ( $p=0.075$ ). In patients with diastolic blood pressure  $<85$  and  $\geq 85$  mmHg the prevalence of microalbuminuria was 5.7 and 18.4% respectively. A significant correlation was found between microalbuminuria and raised diastolic blood pressure ( $p=0.003$ ) (Table 2).

**Table 2: The relationship between microalbuminuria and variables in diabetic patients (n=138).**

Variables	Albuminuria	Microalbuminuria		Normo-albuminuria		P value
		N	%	N	%	
Age (in years)	20-29	01	25	03	75	0.6
	30-39	04	28.5	10	71.5	
	40-49	07	13.2	46	86.8	
	50-59	09	13.8	56	86.2	
Sex	Male	13	15.2	72	84.8	0.75
	Female	08	15.0	45	85	
Duration of diabetes (years)	<10	02	9.5	19	90.5	0.001
	>10	19	16.2	98	83.8	
Diastolic blood pressure (mmHg)	<85	02	5.7	33	94.2	0.003
	>85	19	18.4	84	81.5	

In patients with fasting blood sugar  $<140$  and  $>140$  mg/dl prevalence of microalbuminuria was 12.9 and 13.4% respectively. No significant correlation was found ( $p=0.826$ ). In diabetics with HbA1c  $\leq 7\%$  and  $>7\%$  prevalence of microalbuminuria was 14.7 and 15.2% respectively. No significant correlation between HbA1c and microalbuminuria was found ( $p=0.515$ ).

In patients with a body mass index  $<25$  and  $>25$  kg/m<sup>2</sup> prevalence of microalbuminuria was 14.9 and 15.9% respectively. Correlation between microalbuminuria and body mass index was statistically not significant ( $p=0.212$ ).

In patients with triglyceride  $<200$  and  $>200$  mg/dl prevalence of microalbuminuria was 14.1 and 14.4% respectively. Correlation between microalbuminuria and serum triglyceride was also statistically not significant ( $p=0.944$ ).

In patients with cholesterol  $\leq 200$  and  $>200$  mg/dl prevalence of microalbuminuria was 11.5 and 17.5% respectively. There was no statistical correlation between the two ( $p=0.061$ ).

We used logistic regression for analysis and SPSS for Windows (version 23) for data analysis. After applying the logistic regression model, it was found that two variables: the duration of diabetes and the diastolic blood pressure (DBP) played a part in the model and regression values of:  $g^*(x) = -8.233 + 0.069 \text{ DBP} + 0.124 \text{ Duration}$  was obtained.

So, both the diastolic blood pressure and the duration of diabetes directly correlate with microalbuminuria. The correlation of diabetes with duration of diabetes is stronger than the correlation with diastolic blood pressure but both the duration of diabetes ( $p=0.001$ ) and diastolic blood pressure ( $p=0.003$ ) pose a risk of microalbuminuria in diabetic patients.

## DISCUSSION

In the present study, 138 type 2 diabetic patients were studied and the overall prevalence of microalbuminuria was found to be 15.2%. A statistically significant correlation was found between the prevalence of microalbuminuria and diastolic blood pressure and the duration of diabetes.

Various other studies have reported many variations in the prevalence of microalbuminuria.<sup>11-17</sup> Vijay et al reported a prevalence of 15.7% in 600 type 2 diabetic patients in Chennai.<sup>11</sup> Varghese et al reported a prevalence of 36.3% in 1425 type 2 diabetic patients in Chennai.<sup>14</sup> The variation in the prevalence of microalbuminuria may be due to several factors such as different populations, definition of microalbuminuria, methods of measurement and urine collection etc.

Prevalence of microalbuminuria among males and females was 15.1 and 15% respectively in the present study which was statistically not significant. But Varghese et al reported increased prevalence of microalbuminuria in men compared to women.<sup>17</sup>

In present study we found microalbuminuria was significantly correlated with duration of diabetes, and diastolic blood pressure DBP. Which was similar to many other studies.<sup>12,19-21</sup>

## CONCLUSION

Due to the high prevalence of diabetes in India we need to screen all diabetics for microalbuminuria. Control of blood pressure should also be done more vigorously in diabetic patients. Microalbuminuria may be seen as an early marker for diabetic nephropathy and its early detection may reduce the progression of nephropathic complications associated with it.

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