International Journal of Advances in Medicine
Mohan MM et al. Int J Adv Med. 2015 Nov;2(4):383-386
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20151014

Research Article

Prevalence and risk factors of microalbuminuria in type 2 diabetes mellitus

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Received: 14 September 2015
Accepted: 05 October 2015

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ABSTRACT

Background: Microalbuminuria, which arises very early in the disease and is one of the first markers for diabetic nephropathy, is an independent risk factor for cardiovascular disease. This study was conducted to estimate the prevalence and the risk factors of microalbuminuria in type 2 diabetes mellitus.
Methods: 246 patients having type 2 diabetes mellitus were included in the study wherein age, sex, duration of the diabetes and body mass index were noted. Blood pressure was taken for all the patients for detection of hypertension and blood was collected after fasting for a minimum of 12 hour for fasting blood sugar, glycosylated hemoglobin (HbA1C), serum cholesterol, and serum triglyceride levels.
Results: Out of the 246 patients, 185 (75.2 %) of the patients had normal levels of albumin while 61(24.8%) of them had microalbuminuria. Incidence of males was more common and the mean age in which diabetes was detected among the patients enrolled was in the early 40s. High systolic blood pressure with mean value 135, fasting blood sugar 172, cholesterol 181, HbA1C 8.7 was observed among the patients. The average duration of diabetes was found to be 9 years among the patients with microalbuminuria.
Conclusions: There is a high prevalence of microalbuminuria among the patients with diabetes type 2 in our geographical area. Hypertension, duration of diabetes, fasting blood sugar, HbA1c were found to be the risk factors. Therefore, the early identification of patients at greatest risk, and the subsequent initiation of renal and cardiovascular protective treatments, are of the utmost importance.

Keywords: Diabetes mellitus, Microalbuminuria, HbA1C, Risk factor

INTRODUCTION

Diabetes mellitus is an important endocrine disorder which is characterized by variable degrees of insulin resistance, impaired insulin secretion, and increased glucose production.[1] One of the leading causes of morbidity and mortality, type 2 diabetes is becoming rampant worldwide and is now known to be a major risk factor for cardiovascular events.[3] This could be because of ageing of the population and an increasing prevalence of obesity and sedentary life habits which lead to a greater prevalence of diabetes, particularly in Asia.[4] It is estimated by WHO that by 2025, the number of patients with the disease worldwide will increase to 300 million. Half of them will be from the Asian countries.[5]

However, micro vascular complications, such as kidney disease and retinopathy, are frequent and contribute to the total disease burden. Abnormal levels of urinary albumin occur in 30-40% of patients with type 2 diabetes and the presence of kidney disease enhances the mortality from cardiovascular disease.[6]

One of the leading consequences of long standing diabetes is diabetic neuropathy.[2] It accounts for a significant lowering of life expectancy of the diabetic

patients. It is one of the leading causes of renal failure in the western world.[7,8]

Microalbuminuria, which arises very early in the disease and is one of the first markers for diabetic nephropathy, is an independent risk factor for cardiovascular disease. It is defined as the excretion of 30-300 mg of albumin per 24 hours (or 20-200 mcg/min or 30-300 mcg/mg creatinine) on 2 of 3 urine collections.[9] Excretion below these levels is categorized as normal albuminiuria or normoalbuminuria.

The increased levels of urinary albumin secretion may represent a more generalized vascular damage than renal microvascular injury alone.[10] It is reported that during the past decade, due to increase in the incidence of diabetics, the end-stage renal disease has risen dramatically.[11] Glomerular hyperperfusion and renal hypertrophy occurs in the initial phase after the onset of diabetes mellitus and are reflected by an increased glomerular filtration rate.

Microalbuminuria is an important clinical finding because it is not only associated with an increased risk of progression to overt proteinuria (macroalbuminuria) and renal failure, but also cardiovascular events. In patients who progress to overt nephropathy, microalbuminuria usually precedes macroalbuminuria by an interval of 5 to 10 years.[2]

METHODS

This study was conducted on 246 patients having type 2 Diabetes mellitus. It was conducted in the Department of Medicine at Mallareddy Institute of Medical Sciences and Remedy Hospital, Hyderabad over a period of two years.

Demographic details of all the patients were noted, age, sex, duration of the diabetes were noted. Height and weight of all the patients were taken to calculate the Body Mass Index (BMI) below 25 kg/m^2 was considered as normal.

Blood pressure was taken for all the patients for detection of hypertension. A systolic pressure of >130 mmHg or diastolic pressure of >85 mmHg was taken as hypertensive.

Blood was collected for after fasting for a minimum of 12 hour. Fasting blood sugar, glycosylated hemoglobin (HbA1C), serum cholesterol, and serum triglyceride levels.

If the first urine sample indicated macroalbuminuria, the patient was not taken into consideration. If urine tested over three months indicated microalbuminuria i.e. if urine to albumin to creatinine ratio was 30-300 mg/g, twice over a period of three months, then the patient was diagnosed as having microalbuminuria.

RESULTS

Out of the 246 patients, almost 75 % of the patients had normal levels of albumin while around 25% of them had microalbuminuria (Figure 1).

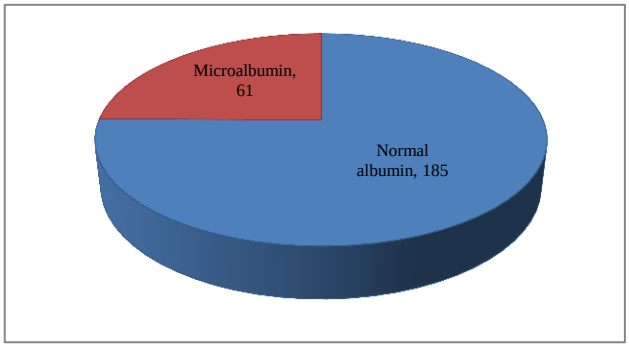

Figure 1: Incidence of normoalbuminuria and microalbuminuria.

Our study had a predominance of males to females in both normoalbuminuria and microalbuminuria. 59% of the males had normoalbuminuria while 61% had microalbuminuria (Figure 2).

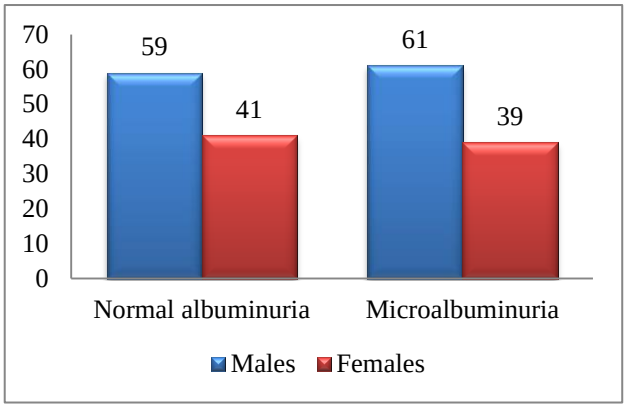

Figure 2: Distribution of normo & microalbuminuria.

The mean age in which diabetes was detected among the patients enrolled was in the early 40s, while the age when microalbuminuria was detected was a little higher than the detection of albumin levels less than 30-300 mg per 24 hours. Body mass index for both normoalbuminuria and microalbuminuria was similar (Table 1).

Table 1: Demographic details of patients.

	Normal albuminuria (n=185)	Microalbuminuria (n=61)
Age	47	53
Age at diagnosis	42	43
Duration of diabetes	6 years	9 years
Body mass index	29.3%	30.2%

Blood pressure was marginally higher among the patients with microalbuminuria, showing that hypertensiveness was one of the complications of diabetes. In our study, the biochemical reactions were on the higher side in microalbuminuria patients with fasting blood sugar above 172 and triglyceride levels 238 (Table 2).

Table 2: Mean of BP and biochemical tests of patients.

	Normal albuminuria	Microalbuminuria
Systolic BP	128	135
Diastolic BP	87	89
Fasting blood sugar	141	172
HbA1C	7.2	8.7
Creatinine (Serum)	82	84
Total cholesterol (Serum)	178	181
Triglycerides	197	238
HDL	44.7	48.1

The most common complication in our study was Non proliferative diabetic retinopathy in both of the categories of patients followed by neuropathy in patients with microabuminuria (Table 3).

Table 3: Complications among normoalbuminuria and microabuminuria.

Complications	Normal albuminuria (n=185)	Microalbuminuria (n=61)
Retinopathy (NPDR)	63 (34.1%)	21 (34.4%)
Proliferative DR	39 (21.1%)	14 (23%)
Neuropathy	32 (17.3%)	18 (29.5%)

DISCUSSION

Over the past decades, there has been a significant worldwide increase in the incidence of diabetes mellitus.[12] This has caused an increase in cardiovascular disease which accounts for the increase in morbidity and mortality in diabetes. Microvascular dysfunctions such as nephropathy also increase the prevalence of end stage renal disease. Hence it becomes essential for such patients to undergo renal replacement therapy.[13-16]

In our study, the incidence of microalbuminuria was 24.8% with males being more in number suffering from diabetes and resulting microalbuminuria. The average age at which diabetes was detected was in the middle or late 40s, while microalbuminuria was detected much later in the early 50s.

Various studies have reported similar incidence of microalbuminuria in diabetes. In India, Vijay et al. reported and incidence of 15.7% in Chennai,[18] while in another study in Chennai by Verghese et al.,[19] 36.3% of prevalence was reported.[19] From North India, Gupta et al. reported an incidence of 26.5% microalbuminuria in type 2 diabetic patients.[20] In other studies around the world, 16.8% in Saudi Arabia,[21] 22.7% in Hong Kong,[22] 7-9% in UK,[23,25] 31% in Mexican Americans[24] was reported

Our study revealed poor glycemic control, high systolic blood pressure, age, HbA1C to be the risk factors for microalbuminuria. Many studies have reported the duration of diabetes, male sex as the major risk factors. Vijay et al have reported duration of diabetes, systolic and diastolic BP age and serum creatinine levels to be associated with proteinuria,[18] while HbA1C was reported to be the risk factor by Gupta et al.[20] In a study by John et al, male sex, age, longer duration of diabetes, poor glycemic control and raised blood pressure was associated with microalbuminuria.[26] Yet in another study by Verghese et al., age, duration of diabetes, diastolic blood pressure, HbA1C, and fasting plasma glucose were reported to be the risk factors.[19] Other factors that have been reported are alcohol intake, foot ulcers and smoking.[27-29]

CONCLUSION

Prevalence of microalnbuminuria was seen in patients with type 2 diabetes. The risk factors associated with this condition are hypertension, HbA1C levels, high fasting sugar levels and creatinine clearance levels.

Therefore, the early identification of patients at greatest risk, and the subsequent initiation of renal and cardiovascular protective treatments, are of the utmost importance.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Mohan MM, Chandra Sekhar V. Prevalence and risk factors of microalbuminuria in type 2 diabetes mellitus. Int J Adv Med 2015;2:383-6.