

Assessment of Prevalence of Microalbuminuria in Patients with Type 2 Diabetes Mellitus

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Abstract

Background: To assess prevalence of microalbuminuria in patients with type 2 diabetes mellitus. **Subjects and Methods:** Patients were interviewed and weight, height, and blood pressure were measured during the clinic visit. Body mass index (BMI) was calculated by dividing weight in kilograms by the square of the height in meters. The patients were instructed to give a clean catch, mid-stream urine sample from their first morning void on the day following the visit, and the UACR ratio was requested. Ratio of albumin to creatinine of less than 30mg/g is considered normal. The ratio between 30-300 mg/g signifies microalbuminuria and values above 300 mg/g. **Results:** There were 153 males and 147 females. 82 participants had microalbuminuria which accounted for 27.33%. 73% of the study population had a fasting blood sugar more than 126mg/dl and 65% of them had HbA1c more than 6.5. Serum creatinine level <1/2 mg/dl was seen among 197 and >1.2 mg/dl in among 103 study population. **Conclusion:** The prevalence of microalbuminuria in this clinic based study is 27.33%.

Keywords: Body mass index, cardiovascular diseases, Diabetes mellitus, Microalbuminuria

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Introduction

Diabetes mellitus is a metabolic disorder of global importance and is characterized by varying degree of insulin resistance, impaired insulin secretion and increased glucose production. This disease is associated with increased morbidity and mortality.^[1] Among the most prevalent complications that are associated with diabetes mellitus, cardiovascular diseases are the most important, as it is associated with the excess morbidity and mortality associated with this disease. However, microvascular diseases like nephropathy and retinopathy contribute to total disease burden.^[2]

Diabetic nephropathy is one of the most common causes of chronic kidney disease (CKD) leading to end-stage renal disease (ESRD) and its prevalence is increasing because of the increasing burden of T2DM.^[3] For early detection of diabetic nephropathy, the American Diabetic Association (ADA) recommends screening for microalbuminuria once a year for diabetic patients as microalbuminuria is often considered the first sign of renal involvement.^[4] Studies have demonstrated that without specific interventions, 20–40% of T2DM patients with microalbuminuria progress to overt nephropathy. For this reason, measurement of urine albumin is often used as a sensitive marker and predictor of overt nephropathy in patients with diabetes mellitus. Approximately one-third to half of patients with diabetes develop renal manifestations.^[5] Previously, a 24-hour urine

collection was used for measurement of urinary albumin excretion. However, a spot morning sample for urinary albumin: creatinine ratio (UACR) is now used for screening of microalbuminuria. It is convenient and correlates well with 24-hour collection results in adults.^[6] The present study was conducted to assess prevalence of microalbuminuria in patients with Type 2 Diabetes Mellitus.

Subjects and Methods

The present study was conducted at diabetic clinic of NIMS hospital, a secondary care hospital in Wandoor, Malappuram district, Kerala. Inclusion criteria was all diabetic patients above the age of 18 years and on an oral hypoglycemic drug(s) and /or insulin treatment. Exclusion Criteria was those having acute infection, fever, congestive heart failure, recent or current pregnancy, history of vaginal discharge, known case of CKD, diagnosed cases of nephrotic syndrome, patients reporting after vigorous exercise and patients of type 1 diabetes mellitus, those not willing to participate in the study and those not willing to give informed consent.

Patients were interviewed and demographic and clinical data such as age, sex, duration since diagnosis of diabetes, history of ischemic heart disease and hypertension, smoking, and medication history were recorded. Weight, height, and blood pressure were measured during the clinic visit. Body mass index (BMI) was calculated by dividing weight in kilograms by the square of the height in meters. The patients were

instructed to give a clean catch, mid-stream urine sample from their first morning void on the day following the visit, and the UACR ratio was requested. Ratio of albumin to creatinine of less than 30mg/g is considered normal. The ratio between 30-300 mg/g signifies microalbuminuria and values above 300 mg/g is considered macroalbuminuria as suggested by National Kidney Foundation / Kidney Disease Outcomes Quality Initiative guidelines (NKF/KDOQI) and American Diabetic Association. Data was entered in Microsoft Office Excel 2007 and SPSS (Statistical Package for Social Sciences) Version 17.0 was used for analysis.

Results

Table 1: Age distribution of the study population

Age distribution	No. of patients	Percentage
25 – 29 Years	9	3 %
30 – 34 Years	7	2.33 %
35 – 39 Years	12	4 %
40 – 44 Years	16	5.33 %
45 – 49 Years	21	7 %
50 – 54 Years	32	10.66 %
55 – 59 Years	54	18 %
60 – 64 Years	39	13 %
65 – 69 Years	55	18.33 %
70 – 74 Years	33	11 %
75 – 79 Years	14	4.66 %
80 – 84 Years	3	1 %
85 – 89 Years	5	1.66 %

Most of the participants (18.33%) belonged to 65 to 69 Years of age group followed by 10.66% in the 50 – 54 years age group. Least number of people (<3%) were above age of 80 years and below 29 years. The mean age group of the study population was 58.54 ± 12.45 (Table I).

Table 2: Gender distribution of the study population

Gender	No. of patients	Percentage
Male	153	51 %
Female	147	49 %

Table II shows that there were 153 males and 147 females.

Table 3: Frequency of microalbuminuria

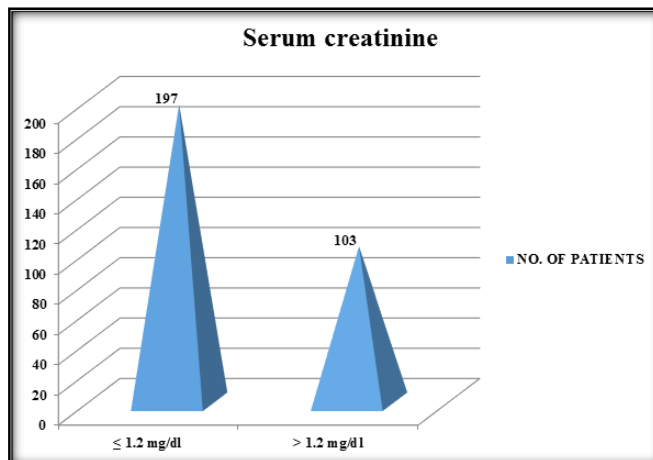
Microalbuminuria	No. of patients	Percentage
Present	82	27.33 %
Absent	218	72.66 %

82 participants had microalbuminuria which accounted for 27.33% (Table III).

Table 4: Biochemical parameters related to glycemic control

Parameters	Variables	No. of patients	%
FBS	< 100 mg/dl	24	8 %
	100 to 125 mg/dl	57	19 %
	≥126 mg/dl	219	73 %
HbA1c	≤ 5.7	25	8.33 %
	5.7 to 6.4	79	26.33 %
	> 6.5	196	65.33 %

73% of the study population had a fasting blood sugar more than 126mg/dl and 65% of them had HbA1c more than 6.5 (Table IV).



Graph 1: Serum creatinine in the study population

Graph I shows that serum creatinine level <1/2 mg/dl was seen among 197 and >1.2 mg/dl in among 103 study population.

Discussion

Globally, the prevalence of T2DM is on the rise. In a report estimating the worldwide burden of diabetes, King et al^[7] reported an expected rise of 122% in the incidence of diabetes between 1998 and 2025. Local statistics show the mortality of around 120,000 patients, annually, owing to diabetes-related complications. As per the National Health and Nutrition Examination Survey (NHNES), kidney disease was the most prevalent complication (27.8%) between 1998 and 2004 in diabetic patients.^[8,9] Microalbuminuria is an early predictor and a sensitive assay to detect urinary albumin excretion which can precede the development of overt nephropathy in T2DM. Prompt detection and treatment can reduce the risk and possibly delay the development of ESRD.^[10] The American Diabetes Association recommends annual screening for microalbuminuria in patients of T2DM. However, due to poor healthcare infrastructure and lack of education, people are not routinely screened in developing or underdeveloped countries and end up presenting late in the disease course.^[11]

The present study revealed a prevalence of microalbuminuria of 27.33% among patients of Type 2 Diabetes Mellitus visiting a secondary care hospital at Malappuram, Kerala. Various epidemiological and cross sectional studies have reported marked variation in the prevalence of microalbuminuria.^[12]

This variation in prevalence can be attributed to factors such as differences in populations, in the definitions of microalbuminuria, method of urine collection, etc. However, this could also reflect true differences in the ethnic susceptibility to nephropathy. Earlier studies by Vijay et al^[13] from Madras (Chennai) have demonstrated a familial clustering of diabetic nephropathy among south Indian type 2 diabetic subjects.

In the present study the prevalence of microalbuminuria

across the genders were not statistically different. Earlier studies have reported an increased prevalence of microalbuminuria in men compared with women. Because women have a lower creatinine excretion than men there is, however, a problem about using the albumin creatinine ratio when comparing prevalence across genders. Thus, some authors use a lower threshold for men than women.^[14,15]

We observed that 73% of the study population had a fasting blood sugar more than 126mg/dl and 65% of them had HbA1c more than 6.5. Sana et al^[16] in their study a total of 133 patients with T2DM were consecutively included and their co-morbidities, body mass index, mode of treatment of diabetes (oral hypoglycemic drugs and/or insulin), duration since diagnosis of T2DM, and hemoglobin A1c (HbA1c) levels were recorded. A morning, mid-stream urine sample was collected and a urine spot for albumin: creatinine ratio (UACR) was assessed. The mean age of the participants was 54.5 ± 10.3 years which included 60.9% males and 39.1% females. The overall incidence of diabetic nephropathy was 30.1%, with 25.6% having microalbuminuria and 4.5% having macroalbuminuria. Pearson correlation test was used to compare UACR and duration of diabetes.

We observed that serum creatinine level <1/2 mg/dl was seen among 197 and >1.2 mg/dl in among 103 study population. Varghese et al^[17] determined the prevalence and risk factors for microalbuminuria among south Indian type 2 diabetic patients attending a diabetes centre. 1425 type 2 diabetic patients attending a diabetes centre in south India were recruited for the study. Urinary albumin concentration was measured by immunoturbidimetric assay. Microalbuminuria was diagnosed if the urinary albumin excretion was >30 mg/g of creatinine. Overall prevalence of microalbuminuria was 36.3%. The prevalence of microalbuminuria increased with the increase in duration of diabetes. Multivariate regression analysis revealed age, diastolic blood pressure, glycated haemoglobin, fasting plasma glucose, and duration of diabetes to be associated with microalbuminuria. John et al^[18] reported male sex, older age, longer duration of diabetes, poor glycaemic control, and raised blood pressure as risk factors of microalbuminuria.

Conclusion

The prevalence of microalbuminuria in this clinic based study is 27.33%.

References

- Roshan B, Stanton R C. A story of microalbuminuria and diabetic nephropathy. *J Nephropathol* 2013;2(4):234-240.
- Heerspink HJL, Holtkamp FA, Zeeuw D de, Ravid M. Monitoring Kidney Function and Albuminuria in Patients with Diabetes. *Diabetes Care*. 2011 May 1;34(Supplement 2):325-9.
- Pecoits-Filho R, Abensur H, Betonico CCR, Machado AD, Parente EB, Queiroz M et al. Interactions between kidney disease and diabetes: dangerous liaisons. *Diabetol Metab Syndr* 2016;8:50.
- American Diabetes Association: Microvascular complications and foot care: standards of medical care in diabetes-2020. *Diabetes Care*. 2020, 43:135-151.
- Lambers Heerspink HJ, Gansevoort RT, Brenner BM, Cooper ME, Parving HH, Shahinfar S, de Zeeuw D: Comparison of different measures of urinary protein excretion for prediction of renal events. *J Am Soc Nephrol*. 2010, 21:1355-1360.
- Warram JH, Manson JE, Krolewski AS. Glycosylated hemoglobin and the risk of retinopathy in insulin dependent diabetes mellitus. *N Engl J Med*. 1995;332:1305-6.
- King H, Aubert RE, Herman WH: Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes Care*. 1998;21:1414-31.
- Pezzolesi MG, Poznik GD, Mychaleckyj JC, Paterson AD, Barati MT, Klein JB, et al. Genome-wide association scan for diabetic nephropathy susceptibility genes in type 1 diabetes. *Diabetes*. 2009;58:1403-10.
- Ninomiya T, Perkovic V, de Galan BE, Zoungas S, Pillai A, Jardine M, et al. Albuminuria and kidney function independently predict cardiovascular and renal outcomes in diabetes. *J Am Soc Nephrol JASN*. 2009;20:1813-21.
- Go AS, Chertow GM, Fan D, McCulloch CE, Hsu C. Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization. *N Engl J Med*. 2004;351:1296-305.
- Bakris G L, Molitch M. Microalbuminuria as a risk predictor in diabetes: the continuing saga. *Diabetes Care* 2014;37:867-75.
- Patterson CC, Harjutsalo V, Rosenbauer J, Neu A, Cinek O, Skrivvarhaug T et al. Trends and cyclical variation in the incidence of childhood type 1 diabetes in 26 European centres in the 25 years period 1989-2013: A multi- centre prospective registration study. *Diabetologia* 2019;62:408-417.
- Vijay V, Snehalatha C, Shina K. Familial aggregation of diabetic kidney disease in type 2 diabetes in south India. *Diabetes Res Clin Pract* 1993;43:167-71.
- Wang L, Gao P, Zhang P, Huang Z, Zhang D, Deng Q et al. Prevalence and ethnic patterns of diabetes and prediabetes in China in 2013. *JAMA* 2017;317(24):2515-2523.
- Igo RP, Iyengar SK, Nicholas SB, Goddard KAB, Langefeld CD, Hanson RL, et al. Genomewide Linkage Scan for Diabetic Renal Failure and Albuminuria: The FIND Study. *Am J Nephrol*. 2011;33:381-9.
- Sana MA, Chaudhry M, Malik A, Iqbal N, Zakiuddin A, Abdullah M. Prevalence of microalbuminuria in type 2 diabetes mellitus. *Cureus*. 2020 Dec 27;12(12).
- Varghese A, Deepa R, Rema M, Mohan V. Prevalence of microalbuminuria in type 2 diabetes mellitus at a diabetes centre in southern India. *Postgraduate medical journal*. 2001 Jun 1;77(908):399-402.
- John L, Rao PS, Kanagasabapathy AS. Prevalence of diabetic nephropathy in non- insulin dependent diabetes. *Indian J Med Res* 1991;94:24-29.

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