Original Article

Microalbuminuria in Diabetes Mellitus Type 2: Association with Age, Sex, and Body Mass Index: A Cross Sectional Study

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ABSTRACT

Objective: This study was aimed to determine the association of microalbuminuria with age gender, body mass index (BMI) and duration of type 2 diabetes mellitus (T2DM).

Study Design: Prospective Cross sectional.

Place and Duration of study: This study was carried out at District Head Quarter Hospital Mirpur Azad Kashmir from July 2011and June 2012.

Materials and Methods: This study included 300 patients (199 females and 101 females) with T2DM of duration of six months to 43 years. The evaluation included structured questionnaires clinical, neurological examinations and laboratory tests. Negative for albumin in urine by albustic method and micral tests were used for estimation and categorization of microalbuminuria.

Results: Chi square test revealed statistical significant association of microalbuminuria with age (<0.015) blood sugars random (p <0.015) but no statistical significant association with gender, weight, and old & new diabetics. One sample t test had shown statistical significant association of degree of microalbuminuria with BMI (p<0.001), cholesterol (p<0.001) and numbers of years of diabetes (p<0.050)

Conclusion: In type 2 diabetic statistical significant associations has shown between degree of microalbuminuria, age, blood sugars, cholesterol, body mass index and duration of diabetes mellitus

Key Words: Microalbuminuria, T2diabetes, cholesterol, random blood sugars, body mass index

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INTRODUCTION

Microalbuminuria is defined by a urinary albumin excretion (UAE) rate higher than normal but lowers than 200µg/min. This is measured by standard laboratory methods,[1-3] in the absence of urinary tract infection and acute illness. Albumin excretion in healthy individuals ranges from 1.5–20µg/ min.[4-5] Microalbuminuria precedes the overt diabetic nephropathy by 10–14 years which can be reversed by therapeutic intensified glycemic control and use of ACE inhibitors. Microalbuminuria can be diagnosed by measuring albumin excretion rate during 24 hours or in an overnight urine collection. UAE in the morning for screening, and overnight are best choice for monitoring microalbuminuria. In type-2 diabetes mellitus (T2DM) prevalence of microalbuminuria is the strong predictor of diabetic nephropathy (DN). In addition to DN microalbuminuria is main cause of morbidity and mortality in both types of diabetes mellitus (DM).[6-8] Diabetic having microalbuminuria has increased prevalence of arterial hypertension, proliferative rtinopathy,[9] peripheral neuropathy and diabetics nephropathy.[10] Our study has established relationship of degree of microalbuminuria with body mass index (BMI), cholesterol, and duration of diabetes. Statistical significant gender association of microalbuminuria was not seen in T2DM. This study was aimed to determine the association of microalbuminuria between type-2 diabetic patients and age, sex, duration of diabetes, body mass index and biochemical parameters in comparison to earlier studies.[10-11]

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MATERIALS AND METHODS

This study was carried out between July 2011 and June 2012, to investigate the association between microalbuminuria and risk factors. Study was approved by the ethics committee.Outpatient were screened for eligibility. Three hundred patients with T2DM of duration (Mean± SD, 31.6 ± 12.7 years) and negative for albumin in urine by albustic method were included in the study. Patients with overt albuminuria (>350 mg/day), bed ridden patients for more than two weeks, congestive cardiac failure, urinary tract infection, pregnant ladies, metal poisoning, connective tissue disorders, and chronic NSAIDs use were excluded. The

history, physical examination and neurological examination were done in each case. Body mass index (BMI) was calculated from the height and weight measurements of the patients. Routine investigations and serum creatinine were done in all patients. Micral test-strip method color reaction is mediated by an antibody-bound enzyme.[12] was used for estimation of microalbuminuria.

Morning mid-stream urine samples were collected and strip was immersed for five seconds in sterile container. Microalbuminuria was graded as mild (20–50 mg/L), moderate (50–100 mg/L), or severe (100–300 mg/L) depending on the color change in the strip and test was repeated twice in order to avoid bias.

Data was analyzed by utilizing SPSS 20. Quantitative data was expressed as mean ± SD and chi-square tests were done where appropriate. One sample t test was used to analyze the association of microalbuminuria with, BSR, cholesterol, BMI and duration of diabetes. Probability (P) value < 0.05 was regarded as statistically significant.

RESULTS

A total of 300 patients having microalbuminuria were included in our study. Out of 300 microalbuminuric patients, 224 patients had mild albuminuria, 38 had moderate albuminuria, and 38 had severe albuminuria. Baseline clinical and laboratory characteristics of the patients are shown in table. Mean age of diabetic with microalbuminuria was 53.2 ± 11.9 years. Age had statistically significant as compared to no significant gender-wise association of microalbuminuria. Mean BMI of microalbuminuric patients was 27.48 ± 5.01kg/m^2.

Table No.1: Characteristic of association of Microalbuminuria with demography and anthropometry

Variable	Mean ± SD	P-Value
N =300		
Age (mean ± SD)	53.2 ± 11.19	.015
Female N (%)	199(66.3)	.357
Male N (%)	101(33.7)	
BMI(kg/m^2)mean± SD)	27.48 ± 5.01	<0.001*
Weight(kg)		.808
Serum cholesterol(mmol/L)	5.88 ± 1.30	<0.001*
Combination drugs	39(27.9)	.003
Old and new diabetic	1(.7)	.160
Numbers of years of T2DM	31.6 ± 12.7	.050
Blood sugar random	238.70 ±108.3	<0.001*

Chi-Square; *one sample t test

The association between the micro-albuminuria and BMI was statistically significant. Mean duration of diabetes in microalbuminuric patients was 31.6 ± 12.7 years, which was statistically significant when compared with degree of albuminuria. Among the 300 patients, 200 were only on oral hypoglycemic agents, 70 were on insulin, and 30 were on both insulin and oral hypoglycemic agents. Average random blood sugar was 238.70 ± 108.3 mg/dl in microalbuminuric. Association between blood sugars of diabetes and microalbuminuria was statistically significant.

DISCUSSION

This cross-sectional study in type-2 diabetes mellitus patients has shown higher prevalence of microalbuminuria at 30% when compared to 25% prevalence of previous studies. Higher prevalent microalbuminuria may be due to irregular medication with poor glycemic control, small sample size and difference in method of estimation of laboratory .The level of glycemic control is strongest predictors of progression of microalbuminuria. Ours research has shown comparable results with earlier study in regard of statistical significant association of microalbuminuria with age.[13] Female preponderance of microalbuminuria in previous studies is similar to ours study. Association between BMI and microalbuminuria has been demonstrated by ours study as shown previously. Diabetic nephropathy can be the initiated from renal hypertensive stage followed by clinical latency with raised glomerular filtration and absent albuminuria. Subsequently incipient nephropathy with normal glomerular filtration and microalbuminuria appears 5–15 years after the diagnosis of diabetes mellitus. Glomerular filtration rate (GFR) further decreases with appearance of macroproteinuria and clinical diabetic nephropathy which ends up in end stage renal disease (ESRD) with massive albuminuria. Microalbuminuria may not be associated with abnormal creatinine clearance but can be an important warning signal result in irreversible renal damage.

Our study was in accordance with many previous studies regarding association of microalbuminuria with duration of diabetes mellitus. Duration of diabetes is strong predictor for microalbuminuria by predisposition of hyperglycemia-induced advanced glycosylation end products. Hypercholesterolemia is associated with microalbuminuria in previous study as shown in ours study. Types of control of diabetes with therapeutic intervention is ultimate determinant of development of diabetic nephropathy.[14] Limitations in ours study was hospital based base and small samples size that were not true representative of general population. Moreover hypertension had been not evaluated for its association with microalbuminuria [15-16].

In conclusion we have found in T2DM age, BMI, hypercholesterolemia, hyperglycemia and duration of diabetes are the strong predictors of later development of microalbuminuria resulting in diabetic nephropathy. There is no association of sex and microalbuminuria in T2DM in ours study.Microalbuminuria should be prevented in order to avoid renal damage by timely administration of ACE inhibitors, good glycemic

control and correction of other risk factors. UEA should be monitored routinely in patients with diabetes mellitus.

CONCLUSION

In type 2 diabetic statistical significant associations has shown between degree of microalbuminuria, age, blood sugars, cholesterol, body mass index and duration of diabetes mellitus

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