Microalbuminuria in Newly Detected Type 2 Diabetes Patients: A Pilot Study

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Diabetes mellitus is a major global health problem. It is estimated that more than 13.6 million people of Bangladesh will have diabetes by the year 2030 with an expected increase of population with diabetic complications. In Type 2 diabetes, capillary permeability increases in particularly in glomerular vessels. It induces kidneys to undergo transient proteinuria that is the cause of development of diabetic nephropathy. The changes can be measured by increased levels of microalbuminuria. The aim of this study was to determine the prevalence and risk factors for microalbuminuria among Bangladeshi newly detected type 2 diabetic patients attending at diabetes centre. Sixty newly detected type 2 diabetic patients attending at BIRDEM hospital in Bangladesh recruited for the study. Urinary microalbumin concentration was measured by immunoturbodimetric assay. Microalbuminuria includes a range of urinary excretion of albumin of 20 to 200 mg/L or 20 to 200 µg/min. Overall prevalence of microalbuminuria was 36.3% (95% confidence interval and ranges from 33.8 to 38.9). The overall prevalence of microalbuminuria in Bangladeshi population and its risk factors are similar to that reported in Europeans.

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Introduction

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.[1] It is estimated that more than 13.6 million people of Bangladesh will have diabetes by the year 2030 with an expected increase of population with diabetic complications.[2-4]

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Microalbuminuria is probably a misnomer. It is not a "small" albumin molecule found in the urine, but simply albumin present in low amounts, below the level of detection of the standard multi-test urine dipstick[6]. Diabetic nephropathy is the leading cause of end stage renal disease world wide.[7] One of the long term complications of diabetes is nephropathy which leads to renal failure.[1,8] Diabetic nephropathy is defined by increased urinary albumin excretion (UAE) in the absence of other renal diseases. It is categorized into two stages: microalbuminuria (UAE ≥ 20 µg/min and ≤ 199 µg/min) and macroalbuminuria (UAE ≥ 200 µg/min). Hyperglycemia, increased blood pressure levels and genetic predisposition are the main risk factors for the development of diabetic nephropathy.[8-10]

Most of the authors choose patient of diagnosed case of type-2 diabetes mellitus with different duration of disease but in this study, patients of newly detected type-2 diabetes mellitus were taken to see the evidence of microalbumin in urine at the beginning of the disease.

Data regarding many limitation and ethnic variations, which can influence the following outcome, are limited in Asian subpopulation. The purpose of the study was to see the evidence of microalbumin in urine in newly detected type-2 diabetes mellitus and it may help to prevent diabetic complications such as nephropathy.

Methods

This cross sectional study was conducted at the Department of Laboratory Medicine (Clinical Pathology) in collaboration with Department of Biochemistry and Molecular Biology, BSMMU and BIRDEM General Hospital, Dhaka. Total 60 subjects of newly detected type 2 diabetes mellitus were included. Urinary microalbumin levels in all newly detected type 2 diabetic patients were measured. Urinary microalbumin was measured by microalbumin (MALB) method which had been based on a particle-enhanced turbidimetric inhibition immunoassay (PETINIA) in biochemical auto analyzer (Siemens Dimension RL Max). Other types of diabetes, patients with UTI or Pyelonephritis, patients who were on long term diuretics, with malabsorption or chronic diarrhea, on dialysis were excluded.

Results

Table I: Distribution of the study patients by urine microalbumin (n=60)

Urine microalbumin (mg/dl)	Number	%
Normoalbuminuria (<20)	39	65.0
Microalbuminuria (20-199)	21	35.0
Mean±SD	22.9	±24.7
Range (min, max)	2	105

Table I shows urine microalbumin of the study patients, it was observed that 21(35.0) patients had microalbuminuria and 39(65.0%) normoalbuminuria.

Table II: Comparison between urine microalbuminuria with age (n=60)

Age (in years)	Urine microalbuminuria (mg/dl)				P
	Normoalbuminuria (n=39)		Microalbuminuria (n=21)		
	n	%	n	%	
≤30	2	5.1	4	19.0	
31-40	14	35.9	7	33.3	
41-50	19	48.7	9	42.9	
51-60	3	7.7	1	4.8	
>60	1	2.6	0	0.0	
Mean±SD	44.3	±8.7	40.2	±7.5	0.076 ns
Range (min, max)	30	73	28	55	

ns= not significant

p value reached from unpaired t-test

Table II shows comparison between age with urine microalbuminuria, it was observed that almost half (48.7%) patients were belonged to

41-50 years in normoalbuminuria group and 9(42.9%) in microalbuminuria group. The mean age was found 44.3±8.7 years in normoalbuminuria group and 40.2±7.5 years in normoalbuminuria group. The difference was statistically not significant (p>0.05) between two group.

Table III: Comparison between urine microalbuminuria with sex (n=30)

Sex	Urine microalbuminuria (mg/dl)				P
	Normoalbuminuria (n=39)		Microalbuminuria (n=21)		
	n	%	n	%	
Male	17	43.6	15	71.4	0.039[s]
Female	22	56.4	6	28.6	

s= significant

p value reached from chi square t-test

Table III shows comparison between sex with urine microalbuminuria, it was observed that majority (43.6%) patients were male in normoalbuminuria group and 15(71.4%) in microalbuminuria group. The difference was statistically significant (p<0.05) between two group.

Discussion

Microalbuminuria includes a range of urinary excretion of albumin of 20 to 200 mg/L or 20 to 200 µg/min.[11] The causes of microalbuminuria includes short term hyperglycemia, exercise, urinary tract infections ,marked hypertension , heart failure, acute febrile illness, dehydration. Some others condition that damage glomerulus cause microalbuminuria and then progress toward microalbuminuria to proteinuria. Such conditions are hypertension, diabetes, vasculitis etc.[11,12] The findings of this study is compared with the results of some other published articles elsewhere in the world to verify the results.

In this study, urinary microalbumin level was measured in 6o subjects of newly detected type 2 diabetes mellitus. They were grouped into microalbuminuria (21 subjects) and normoalbuminuria (39 subjects).It was observed that 21(35.0%) patients had microalbuminuria and 39(65.0%) had normoalbuminuria. The mean microalbumin level was found 22.9±3.1 mg/L with range from 2-105 mg/L. Xu B et al., (2013) had shown that 11.37% of the study population had microalbuminuria,[13] In another study done by Varghese et al., (2016) found that overall prevalence of microalbuminuria 36.3%.[14] So, the findings of present study are within the range of previously published studies but more than the study done by Xu B et al., (2013).This difference in result might be due to demographical variation.

It was observed that in normoalbuminuria group, 48.7% patients were belonged to 41-50 years and in microalbuminuria group, it was 42.9%. The mean age was found 44.3±8.7 years in normoalbuminuria group and 40.2±7.5 years in microalbuminuria group. The difference was statistically not significant (p>0.05) between two groups. In a study done by Anesh T et al., (2016) found that the mean age of microalbuminuria group was 57.15±10.17.[15] This difference in result might be due to demographical variation.

In present study, It was observed that majority of the patients 15(71.4%) in microalbuminuria group were male and it is 17(43.6%) patients in normoalbuminuria group. The difference was statistically significant (p<0.05) between two group. In a study done by Anesh T et al., 2016 found that 63.8% microalbuminic patients were male.[15]

In another study, Rao P P et al., (2015) shown that about 66% were males and 34% were females in both group.[16] So this study is

consistent with the previously published studies.

Prasad I et al., (2010) conducted the study to assess the presence of microalbuminuria in newly detected diabetes mellitus (DM) cases in a small group of Bangladeshi population attending BIRDEM outpatient department and to find out the relationship (if any) of microalbuminuria with different clinical and biochemical parameters. Out of 110 DM cases, 10 (9.1%) were found to have microalbuminuria. Blood pressure, both systolic (r=0.190) and diastolic (r = 0.30) had significant positive correlation with urinary albumin. There was no association of microalbuminuria with waist circumference, waist to hip ratio, serum triglycerides, HDL cholesterol, fasting blood glucose, age, sex, weight, height or BMI. This suggests that all newly detected diabetes mellitus should be screened for raised blood pressure and if found positive be given the same importance as blood glucose. They should be treated meticulously to revert or prevent microalbuminuria and thus prevent complications.[9]

As such this study will fill the gap, open new forum of discussion and will provide knowledge and information regarding the medical workup of patients with newly detected type-2 diabetes mellitus.

Conclusion

This necessitates that all newly detected diabetes mellitus should be screened for urine microalbumin level. Any increased level should be treated meticulously to delay complications.

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