

PREVALENCE OF MICROALBUMINURIA IN TYPE 2 DIABETES MELLITUS AT A DIABETIC CLINIC IN KING ABDULAZIZ UNIVERSITY HOSPITAL

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ABSTRACT

Objective: To determine the prevalence of microalbuminuria and associated risk factors among type 2 diabetic patients with no proteinuria by urine dipstick test, attending a diabetic clinic in King Abdulaziz University Hospital.

Patients and Methods: Three hundred and thirty one type 2 diabetes patients were recruited for the study. Urinary albumin concentration was measured by immunoturbidimetric assay. Microalbuminuria was diagnosed if the urinary albumin excretion more than 30mg/g of creatinine.

Results: Microalbuminuria was diagnosed in 151 patients out of the total numbers of the patients included in the study (45.6%).

Conclusion: The overall prevalence of the microalbuminuria in our patients with type 2 diabetes visiting our clinic in King Abdulaziz University Hospital were high and similar to that reported in other studies.

KEYWORDS: Type 2 diabetes, Microalbuminuria, Proteinuria, Diabetes in Saudi Arabia.

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INTRODUCTION

Increased urinary protein excretion is the earliest clinical finding of diabetic nephropathy.¹⁻⁴ The urine dipstick, however, is relatively insensitive marker for proteinuria, not becoming positive until protein excretion exceeds 300-500 mg/day. Using a specific assay for albumin is a more sensitive technique. The normal rate of albumin excretion is less than 20 mg/

day; a persistent value between 30 and 300 mg/day in a patient with diabetes is called microalbuminuria, and is usually indicative of diabetic nephropathy (unless there is some co-existent renal disease).¹ Values above 300 mg are considered to represent overt proteinuria.⁵ Microalbuminuria is considered to be an early stage of diabetic nephropathy.⁶⁻⁹

Microalbuminuria is also considered to be a predictor for cardiovascular disease both among diabetic and non diabetic subject.¹⁰⁻¹² Recent statistics from the World Health Organization (WHO) project an increase in the prevalence of the diabetes worldwide particularly in developing country.¹³ In Saudi Arabia the prevalence of diabetes has increased in the last 20 years hence studies on diabetes related complications are essential to assess the burden of diabetes. In this study we report on the prevalence of microalbuminuria in Saudi Arabia type 2 diabetic patients attending diabetic clinics in King Abdulaziz University Hospital.

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PATIENTS AND METHODS

The study group comprised of 331 consecutive type 2 diabetic patients attending the diabetic clinic in King Abdulaziz University Hospital, a large teaching hospital in Saudi Arabia, during the period of September 2004 to April 2005. Type-2 diabetes was diagnosed based on the WHO study report criteria.¹⁴ Patients with no complete records, presence of urinary tract infection, or heart failure were excluded.¹⁰ The patients with positive urine dipstick for protein were excluded.

In all study patients, a complete clinical work up was done including height, weight, and body mass index. The body mass index was calculated and expressed as kg/m. The blood pressure was recorded in the right upper arm in the sitting posture after five minutes rest. Patients were categorized as being hypertensive if they were receiving antihypertensive treatment or if the systolic blood pressure more than 140 mm Hg and/ or diastolic blood pressure more than 90 mmHg. A fasting blood sample was drawn after ten hours overnight fast and the following investigations were done plasma glucose, serum cholesterol, serum triglyceride, Hb₂-cholesterol, and serum creatinine. Urine samples were collected in the early morning after overnight fast. Urine creatinine was measured using Jaffes method. Urine microalbumin concentration was measured using commercially available immunoturbidometric assay kits from Randox, on Opera Technicon Auto Analyser. The urine sample was added to a buffer containing antibody specific for human serum albumin. The absorbance of the resulting turbid solution is proportional to the concentration of the albumin in sample solution. By constructing a standard curve from the absorbance of the standards, the albumin concentration in the sample can be determined.

Presence of chronic complication were determined. The ocular fundi were examined by retinal specialist by direct and indirect ophthalmoscopy. So all abnormal finding were documented. History of chest pain and ECG

findings were used for diagnosis of ischemic heart diseases. Neuropathy was diagnosed if vibration sensation reduced in the big toes, or/ and absence of ankle jerk reflex. Peripheral vascular disease was diagnosed by Doppler ultrasound.

Statistics: Statistical analysis were done using SPSS version 10. Multiple logistic regression analysis was done using microalbuminuria as the dependent variable and age, body mass index, duration of diabetes, fasting blood glucose, glycosylated hemoglobin, serum cholesterol, serum triglyceride, and serum creatinine, systolic and diastolic blood pressure as independent variables.

RESULTS

The 331 patients studied included 150 female and 181 males. Overall 151 patients had microalbuminuria. The prevalence of microalbuminuria among males was 83 and among females were 68 patients (Table-I). The microalbuminuric patients were older and had a longer duration of diabetes compared with the normoalbuminuric group ($p < 0.001$). The microalbuminuric patients had significantly increased systolic and diastolic blood pressure compared to normoalbuminuric patients ($p < 0.01$). Diabetic control was poor in microalbuminuric patients compared with the normoalbuminuric patients. Fasting blood glucose and glycosylated hemoglobin were significantly higher in those patients with microalbuminuria patients ($p < 0.001$). Chronic complications prevalence were significantly higher in patients with microalbuminuria than those with normoalbumin urea in the urine ($p < 0.001$).

DISCUSSION

The prevalence of microalbuminuria in patients with diabetes in different institutions in Saudi Arabia is high (30-49%) and it is similar to our finding in the present study.¹⁵ Studies in the white UK populations revealed a prevalence of microalbuminuria of 7% - 9%, while in Mexican Americans, it was 31%. This

Table-I: Clinical and biochemical characteristics of the study subjects

<i>Parameter</i>	<i>Normoalbuminuria Group</i>	<i>Microalbuminuria Group</i>	<i>p-value</i>
Age in years	49	51	<0.001
Male (%)	52.3%	52%	---
Female (%)	47.7%	48%	---
Age at diagnosis	41	42	---
Duration of diabetes	6	8	<0.001
Body mass index(kg/m ²)	30.7%	31%	NS
Systolic BP	133	138	<0.001
Diastolic BP	88	89	0.011
Fasting blood glucose	9.1	12.7	<0.001
HbA1c	9.3	10.7	<0.001
Serum creatinine (umol/L)	86	87	NS
Serum cholesterol (mmol/L)	5.1	5.1	NS
TG (mmol/L)	2.1	2.1	NS
HDL	1.0	1.0	NS
No (%) with ischaemic heart disease			
Ischaemia	11	10	NS
Infarction	12	13	NS
No (%) with retinopathy			
NPDR	41	51	<0.001
Proliferative retinopathy	23	29	<0.001
Peripheral vascular disease	15	21	<0.001
Neuropathy	23	31	<0.001

variation in prevalence can be attributed to factors such as differences in population, in definition of microalbuminuria, method of urine collection or difference in ethnic susceptibility.

Microalbuminuria is a useful predictor of renal failure in patients with diabetes, and even an independent predictor of mortality in type 2 diabetes.¹⁶ The Centers for Disease Control and Prevention (CDC) recommended early detection of microalbuminuria in patients with diabetes.¹⁷ Fortunately, the early detection of microalbuminuria and early control of diabetes retard the development of structural changes in early diabetic nephropathy.¹⁸

The causal risks factors for microalbuminuria are raised blood pressure and poor glycaemic control. Some studies have revealed duration of the diabetes, male sex, and pre-existing retinopathy as major risk factors for microalbuminuria.^{19,20} Analysis of our study revealed that, the age, duration of diabetes, diastolic blood pressure, HA1c, and fasting

blood glucose as the risk factors for microalbuminuria. Gupta et al reported raised HA1c to be associated with microalbuminuria, John et al reported male sex, old age, longer duration of diabetes, poor glycaemic control, and raised blood pressure as risk factors of microalbuminuria, while Vijay et al reported duration of diabetes, systolic and diastolic blood pressure, age of the patients, serum creatinine to be associated with proteinuria.²¹⁻²³ The association of glycaemic control with microalbuminuria has been well established by various studies.^{19,24-26} Other factors which are reported to be associated with microalbuminuria are alcohol intake, foot ulcers and smoking.^{19,27}

Cardiovascular diseases and retinopathy are significantly more in patients with microalbuminuria than those with normal microalbuminuria. These finding were similar to previous reports.^{26,28} Presence of microalbuminuria necessitates a better control of blood glucose, and blood pressure to

prevent a progression to more serious and irreversible diabetic renal disease.

In conclusion the prevalence of microalbuminuria in our study is 45.6%, and the risk factors similar to that reported in other studies. These findings encourage us for tight blood glucose control to reduce the burden of diabetic kidney disease in the future.

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