Prevalence of Microalbuminuria In Diabetic Patients In Al-Najaf City

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Abstract

Background: Diabetic nephropathy accounts for a significant reduction in life expectancy of diabetic patients, approximately 80% of Type 1 diabetic patients and 30% of type 2 diabetic patients with microalbuminuria progress to overt nephropathy after 10–15 years.

Objective: To determine the prevalence of micro- and macro-albuminuria in diabetic patients in AL-Najaf city and the predictive value of some risk factors.

Method: Urinary albumin-creatinine ratio (ACR) in a spot early morning urine sample was used and the patients were categorized as normo-albuminuric when ACR<30 mg/g, micro-albuminuric when 300>ACR≥30 and macro-albuminuric when ACR≥300 mg/g.

Results: Prevalence of albuminuria among Type1 patients was 4(67%) microalbuminuria, 0% macroalbuminuria, i.e. 67% had abnormal urinary albumin-creatinine ratio (ACR). The corresponding prevalence for Type 2 patients was 26(52%) micro-albuminuria, 4(8%) macro-albuminuria and total of 30(60%) for abnormal urinary albumin-creatinine ratio (ACR).

Conclusion: The occurrence of microalbuminuria detected in this study was much higher than previously reported in other studies and the duration of diabetes was the strongest predictor.

Key words: diabetes mellitus, microalbuminuria, diabetic nephropathy

Introduction

Diabetic nephropathy accounts for a significant reduction in life expectancy of diabetic patients. It is the leading cause of end-stage renal disease in the developed countries, as well as the developing countries [1,2].

Extensive studies in the Western world have demonstrated that diabetic patients with microalbuminuria have increased risk of progression to overt proteinuria, and after some time, renal failure. The progression of diabetic nephropathy from the appearance of clinical proteinuria to end stage renal failure is usually irreversible. Without any intervention, approximately 80% of Type 1 patients with persistent microalbuminuria develop overt nephropathy after 10–15 years. Eventually 50% of these develop end stage renal failure within 10 years and 75% by 20 years [3].

In Type 2 diabetic patients, 20–40% with microalbuminuria progress to overt nephropathy after 20 years from onset of diabetes [4], approximately 20% develop end stage renal failure [5].

There is a racial difference in the prevalence of diabetic nephropathy and end stage renal failure. Early medical treatment and lifestyle adjustments have been shown to halt the progression from micro- to macroalbuminuria and eventually end stage renal failure. Therefore, detection of microalbuminuria as early as possible in the course of the disease is very important. In the developing countries, this is even more so because of the economical constraints, kidney replacement therapy is seldom an option[6, 7].

The aim of this study was to determine the prevalence of microalbuminuria and diabetic nephropathy among Type 1 and Type 2 Iraqi diabetic patients in Annajaf city. We also planned to assess the interrelation of microalbuminuria with basic patient socio-demographic features as well as clinical and biochemical parameters.

Patients and Methods

Patients attending the outpatient clinic in Al-Hakim center for diabetic researches for their regular visits and who accept to participate in the study were included. The study was done from February to October 2007. Informed consent verbally was obtained from all patients and they were interviewed using a standardized questionnaire. The history included age, sex, duration of diabetes since diagnosis, and past history for previously diagnosed hypertension.

Patients were classified into Type 1 and Type 2 according to the WHO clinical stage criteria [8] according to information from each patient's file that is already present in the centre and data collected at enrolment.

Assessment of the control of diabetes:

Because of lack of the laboratory facility to measure the glycosylated hemoglobin, the control of blood sugar in the individual patient was assessed by reviewing the serial fasting serum glucose measurement during the last six months, we considered patients with average serum glucose exceeds or equal to 200 mg/dl to have a poor control, while those with average serum glucose less than 200 mg/dl were considered to have an accepted control for the purpose of this study.

Clinical assessment

Weight was measured without shoes or heavy clothing. Height was determined to the nearest 0.5 cm. Blood pressure was measured with a suitable mercury sphygmo-manometer After a 10 minutes rest with the patient in the sitting position. We defined the "hypertensive" patient as that who has a history of previously diagnosed and treated elevated blood pressure in addition to those with negative history and have a SBP ≥140 and/or DBP of ≥90 mmHg [9].

The presence of sensory neuropathy was tested in every patient by examining the vibration sensation (using a standard tuning fork of 128 hertz frequency on the tip of the big toe, the first metatarsophalangeal joint, the medial malleolus, tibial tuberosity) and the pain sensation (by the perception of pinprick testing five points on the sole of the foot in addition to the rest of the lower limbs). Patient who has an abnormal or absent sensation on two or more areas in either test was considered to have a peripheral neuropathy, with the exclusion of those who have a known neurological defect. [10]

Assessment of urinary albumin excretion

A morning sample was collected for each patient and tested within 1 hour of collection. Urine albumin and creatinine concentrations were measured by spectrophotometry method using standard reagents of BIOLABOFrance Company. Urine albumin/creatinine ratio (ACR) was calculated for each patient and then the patients were categorized as those with normal urinary albumin excretion (ACR of < 30 mg/g), microalbuminuria (30–300 mg/g) and macroalbuminuria (≥300 mg/g) [4]. Patients with fever, urinary tract infection, heart failure, and menstruation were excluded as these conditions may give false positive results of albuminuria. [11]

Statistical analysis

Differences between proportions were assessed by Chi-square test. P value < 0.05 was considered statistically significant.

Results

Socio-demographic characteristics of the study population

Sixty seven patients were consecutively enrolled, 11 were excluded because of concomitant conditions like heart failure, menstruation, urinary tract infection, and fever. Among the remaining patients 30(53.6%) were females and 26(46.4%) males, 6 patients (10.7%) were classified as Type 1 while the other 50 (89.3%) as Type 2.

Type 1 patients were younger than Type 2 patients (median age 24.5 vs 54.3 years) and had shorter known duration with diabetes (6.5 vs 10.8 years) [table1].

Table 1: Criteria of the patients.

Type of DM	Total No. of patients	Mean age (years) M ± SD	Mean duration of DM in years M ± SD	Percentage of albuminuric patients
I	6	24.5 ± 10.97	6.5 ± 1.97	66.67%
II	50	54.3 ± 7.72	10.8 ± 6.94	60%
Total	56	51.61 ± 12.4	10.23 ± 6.71	60.71%

Albuminuria

The overall prevalence of albuminuria in diabetic patients was 60.71%. Prevalence among Type 1 patients recruited was 4(66.67%) microalbuminuria, 0% macroalbuminuria, i.e. 66.67% had abnormal urinary albumin-creatinine ratio (ACR). The corresponding prevalence for Type 2 patients was 26(52%) microalbuminuria, 4(8%) macroalbuminuria and total of 30(60%) for abnormal urinary albumin-creatinine ratio (ACR). [Table 2]

Albuminuria and the associated risk factors

There was significant correlation of the prevalence of proteinuria in diabetic patients with duration of diabetes, control of blood glucose, presence of neuropathy, hypertension, and age. But there was no significant correlation of proteinuria with sex and body mass index. [Table 2 , 3]

Table 2: Relation between micro- and macroalbuminuria and of risk factors

variable		proteinuria			p- value
		Micro-albuminuria	Macro-albuminuria	Total proteinuria	
Type of DM	type 1	2 (33 %)	4 (67 %)	4 (67 %)	0.06
	type2	20 (40%)	26 (52%)	30 (60%)	
Duration	<5 yrs	6 (67 %)	3 (33 %)	3 (33 %)	0.02
	>5 yrs	16 (34 %)	27 (58 %)	31 (66%)	
control	good	3(75%)	1(25%)	1(25%)	0.03
	poor	19(37%)	29(55 %)	33(63 %)	
neuropathy	absent	15(50 %)	14(47 %)	15(50 %)	0.02
	present	7(27 %)	16(62 %)	19(73 %)	
BP	normal	18(47 %)	19(50 %)	20(53 %)	0.04
	hypertension	4(22 %)	11(61 %)	14(78 %)	
age	<40 yrs	4(57 %)	3(43 %)	3(43 %)	0.04
	>40 yrs	18(37 %)	27(55 %)	31(63 %)	
sex	male	10(38 %)	14(54 %)	16(62 %)	0.10
	female	12(40 %)	16(53 %)	18(60 %)	
BMI	<25	8(40 %)	11(55 %)	12(60 %)	0.10
	>25	14(39 %)	19(53 %)	22(61 %)	

Table 3: the difference in duration of diabetes between the normal and the high ACR groups in diabetes type I and type II.

Type of diabetes	Mean duration (years) ± SD	
	Normal ACR	Albuminuria
Type I	6 ± 1.4	9.25 ± 2.36
Type II	7.75 ± 5.98	12.63 ± 6.94

Discussion

This cross sectional study reveals the prevalence of microalbuminuria and its determinants in a selected population from a diabetic clinic in Al-Hakim centre in Annajaf city, Iraq.

In this study, the prevalence for albuminuria among type 1 diabetic patients who had median diabetes duration of 6 years was 66.67% which is higher than prevalence found by other similar studies among Caucasian and African type 1 diabetic patients, Other studies in Caucasians have reported prevalence of microalbuminuria in Type 1 patients from 7–22% and in Africans from 12-53% [12-15].

Among the Type 2 patients in our study albuminuria was 60%, this is also higher than findings in Caucasian (8– 32%) and African (10-57%) Type 2 patients [12, 13, 15-18].

Differences in methods for collection of urine and assessment of microalbuminuria, and patient populations may contribute to the differences found between the results of this study and the others. Some studies have shown decay in albumin concentration when urine samples were stored [19-21], unlike this study in which the samples was not stored for more than one hour. The way of assessing albuminuria in this study should not have caused lower prevalence of microalbuminuria.

This factor in addition to great percentage of the patients with poorly controlled blood glucose in our target group (95%) may contribute to the higher prevalence in this study. Racial difference may have a role.

Decreasing prevalence of microalbuminuria and micro-vascular complications have been reported from western countries, which is attributed to improvement in metabolic control, better treatment of hypertension, the use of angiotensin converting enzyme inhibitors and angiotensin receptor blockers [22, 23].

Among Type 2 Caucasian patients (unlike Africans), the association of diabetes duration and microalbuminuria was equivocal [24, 25]. In the current study, patients with abnormal ACR had longer known diabetes duration than those with normal ACR (9.25 versus 6 years), for Type 1 and (12.63 versus 7.75 years, $p < 0.05$) for Type 2.

Poor glycaemic control is well defined contributor to the development and progression of microalbuminuria among Type 2 patients [24-27], as well as Type 1 patients [28, 29].Hypertension is documented as the most significant contributing factor in the pathogenesis and the progression of abnormal albumin excretion rate and eventually development of diabetic nephropathy in both Type 1 and Type 2 diabetic patients [30-32].

In this study the patients with poor glycemic control and hypertension have significantly higher prevalence of micro- & macro-albuminuria as compared with the well-controlled and the normotensive groups respectively (P value < 0.05).

Conclusion

1-The occurrences of microalbuminuria detected in this study are much higher than previously reported in other studies performed in other countries.

2-The duration of diabetes was the strongest predictor; peripheral neuropathy, control of blood sugar, and hypertension as well predicted increased albumin excretion rate.

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