ORIGINAL ARTICLE

ALBUMINURIA AS A PREDICTOR OF DIABETIC LONG TERM COMPLICATIONS

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ABSTRACT: This study was conducted to determine the prevalence of microalbuminuria and macroalbuminuria in insulin dependent diabetes mellitus (IDDM) and non insulin dependent diabetes mellitus (NIDDM) patients and their relationship with some known chronic complications of diabetes. Four hundred sixty two patients attending the diabetic clinic, Chandka Medical College Hospital, Larkana during the period from January 1995 to June 1997 were evaluated for urinary albumin excretion rate (UAE) on 24 hour urine collection. One hundred forty six patients (31.6%), 82 males (56.2%) and 64 (43.8%) females were positive for pathological albuminuria. One hundred eight patients (62 males+48 Females= 23.4%) have microalbuminuria and 38 (2 males+ 16 females = 8.2%) have macroalbuminuria. Disease duration was 11.6±7.3 years (9.8±6 years in patients with microalbuminuria and 13.4±5.6 years in those with macroalbuminuria. This prevalence was associated with retinopathy (19%), neuropathy (5.5), cardiopathy (2.8%). As albuminuria is a good predictor of early diabetic nephropathy, so it is advisable to carry out UAE estimation on first visit and annually so as to prevent and or postpone end stage renal adequate therapy.

KEY WORDS: Diabetes Mellitus Albuminuria Diabetic Nephropathies

INTRODUCTION

Nephropathy is an important cause of morbidity and mortality in diabetes mellitus[1-5]. About 30-35%[6,7] of diabetes ultimately develops end stage renal failure (ERS). This stage develops over the series of phases, progressively through microalbumuria. protienuria, nephrotic syndrome, progressive decline in glomerular filtration rate and renal failure[8]. Microalbuminuria is a sub clinical rise in 24 hours UAE rate to between 20 to 300 mg or between 20 and 200 ug/min. Macroalbuminuria is considered when UAE is greater than 300mg/24 hour or more than 200ug/mn. This corresponds to urinary protein excretion more than 500 ug/ 24 hour of total protein. Various reports[9,10] suggest that diabetic patients with microalbuminuria. are 20 times more likely to develop clinical protienuria and renal failure over the subsequent 10-15 years than those with normal albumin excretion.

Microalbuminuria is not only a very strong predictor of diabetic nephropathy[11,12], but is associated with increased frequency of arterial pressure, left ventricular hypertrophy, coronary artery disease (CAD), retinopathy and foot ulcer[13,14]. Hence the presence of microalbuminuria is taken as an index of microangiopathic and macroangiopathic morbidity and mortality and is a signal for correction of risk factors[15]. I his study was carried out to find out the prevalence of micro and macroalbuminuria and associated macro and microangiopathic complications in diabetic patients.

PATIENTS AND METHODS

Diabetic clinic works in collaboration with local Pakistan medical center and Departments of Ophthalmology, Biochemistry and Pathology of Chandka Medical College, Larkana. From January 1995 to June 1997, 462 patients of IDDM and NIDDM were registered for this study.

A structured interview was conducted and all the relevant data related to diabetes and its chronic complications was inserted in the prepared program for the purpose. Physical examination including weight, height, blood pressure (BP) and fundoscopic findings, age and sex was also recorded. The duration of disease was the period between the age at diagnosis and the age at the time of examination. BP was recorded on first and every visit after 5 minutes rest. Hypertension was defined as a systolic BP- 140 mmHg and or a diastolic BP-90 mmHg and or a history of anti hypertensive medicine at the time or examination in individuals as advised by JNC V (Fifth joint national committee) guidelines for hypertension[16]. Subjective assessment of peripheral nerve impairment and autonomic neuropathy was carried out as well. Tod determine the status of retinopathy, fundoscopic examination was carried out by dilating the pupil with short acting mydriatic drug with the help of ophthalmoscope. The severity of retinopathy was classified as normal background, pre-proliferative and proliferative. Pathological albuminuria was defined as UAE of -300 mg/24 hour. It was measured by sensitive method like immunturbidmetric, after collection of for 24 hour. Microalbuminuria was defined as an UAE of 20-200 ug/mn or 30-300 mg/24 hour on two of three consecutive urine samples. Base line investigations like complete blood picture, erythrocyte sedimentation rate (ESR), haemoglobin (Hb), X-ray chest (Postero-anterior view), lipid profile were routinely performed on first visit and repeated where ever need was felt. Special investigations like, panabdominal ultrasound. ANA (antinuclear antibody) factor, echocardiography, blood urea, serum creatinine and intra-venous urography was requested whenever the diagnosis of diabetic nephropathy was in doubt.

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TABLE I Distribution of 462 diabetic cases according to level of UAE

mg/24 hrs in urine	IDDM	NIDDM	Male	Female	No.	%
<20	128	188	144	64	316	68.4
20-300	40	68	62	46	108	23.4
>300	14	24	22	16	38	8.2

TABLE II Distribution of diabetic cases with pathological albuminuria according to duration of DM (n=146)

Duration of DM	Female	Male	No.	%
<5 years	5	7	12	2.6
5-10 years	15	22	37	8.0
10-20 years	44	53	97	31.6

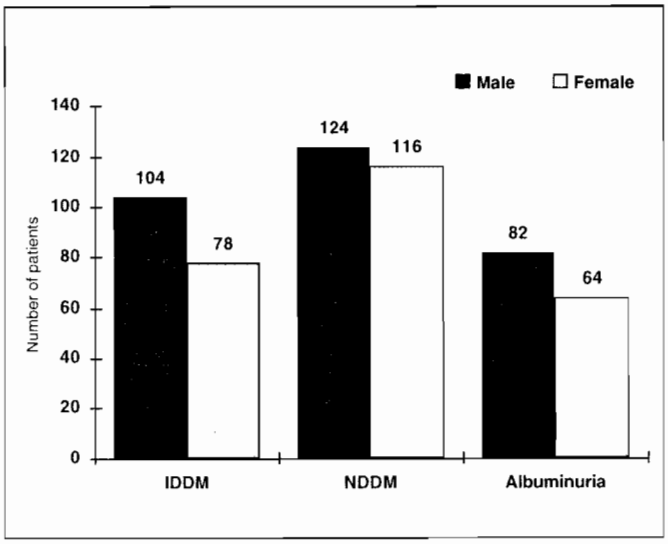

Figure 2 Distribution of 462 diabetes cases according to type and presence of pathological albuminuria.

RESULTS

Out of 462 diabetic patients (Fig. 1), 146 patients, 82 (56.2%) males and 64 females (43.8%) were found to have albumin output greater than 300 mg/24 hour (Fig 2, Table I and II). One hundred eight cases (23.4%) have microalbuminuria (62 males+48 females) and 38 (22 males+16 females=8.2%) macroalbuminuria (Fig III and Table I). Disease duration in these patients was 11.6±7.3 years (9.8±6 years in patients with microalbuminuria) as against 8.4±6.8 years ($p<0.01$) with normal albumin excretion in terms of the age of onset of duration of 62 hypertensives (35 maes + 27 females) which constitutes 13.4%, 49 have pathological albuminuria. Disease duration was 6.5±3.1 years for all cases, 6.4±3.5 years for males and 6.5±2.8 years for females. Thirty six (7.8%) patients of hypertensive group had also an attach of ischaemic heart disease. The mean age of onset was 45.6± years. All these patients have pathological albuminuria. The presence of retinopathy in these patients upon entry was 19% (50 male + 38 female=88). Background retinopathy was observed in 68 cases, preproliferativee retinopathy in 02 cases on fundoscopy. Out of 88, 67 had UAE greater than 300 mg/24 hour. Duration of diabetic was 13.8± 7.1 years. The risk of developing neuropathy was in 30 cases (6.5%). The mean duration of diabetic was 9.6 ± 4.2 years. All the patients had abnormal albuminuria.

DISCUSSION

In the present study, the prevalence of microalbuminuria was in 23.4% of all types of diabetes, which correlates with the world literature[17,18] i.e. 10-28%. However, prevalence of macroalbuminuria in our study is too low as compared to same reports i.e. 8.2% Vs 30.3%. This can be explained on the basis of that the duration of diabetes in our study was less than 20 years where as in world literature duration was more than 25 years. More over in our study there was no sample representation of our population as was done in world literature reports. There are the reports[19,20] that the diabetic subjects have microalbuminuria and macroalbuminuria 32.1% and 17.6% respectively. The prevalence of microalbuminuria in IDDM is established in 8.7% which is very low as compared to various studies, e.g. 20% by Mathiesen[21], 13% by viberti et

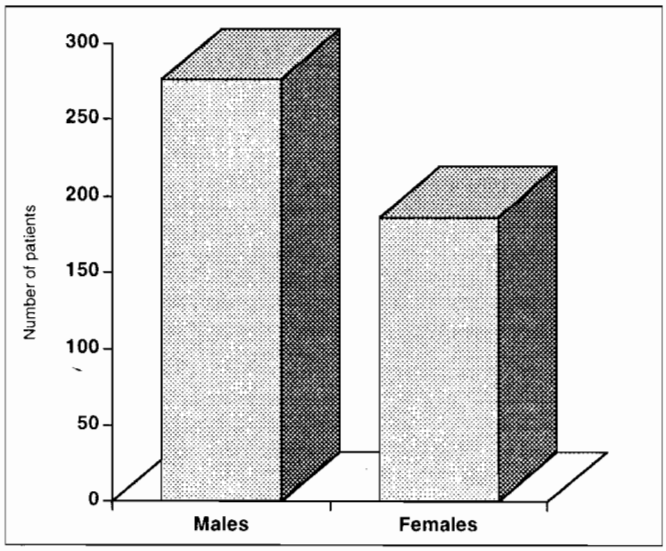

Figure 1 Sex distribution of 462 diabetes cases.

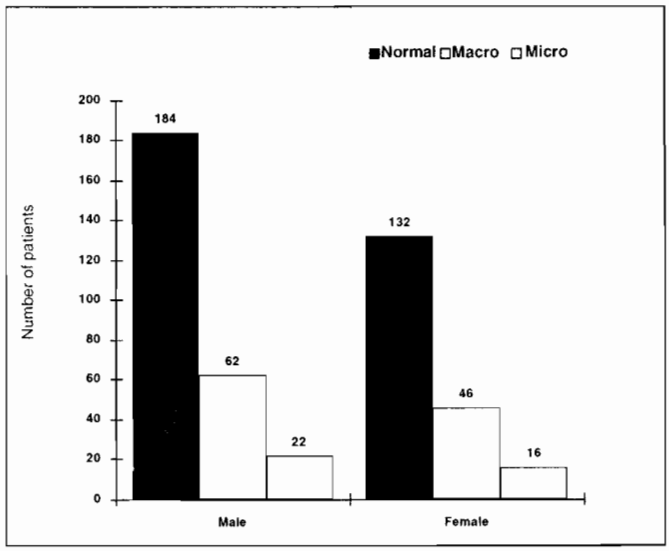

Figure 3 Distribution of 462 diabetic cases according to UAE/24 hrs.

al[22], 12% by vasquaz et al[23] but it is in consistent with a study reported 9% by Mogensien[24]. However the prevalence of microalbuminuria in NIDDM in present study is 14.7% which is much below to that reported by Gall et al[25] and Fabre et al[26] i.e. 27% and 25% respectively. The mean duration of diabetes in patients with increased UAE per 24 hour was less than 10 years in 10.6% while 21% had duration less than 20 years. This is in consistent with the report of Mogensien[24]. The prevalence of macroalbuminuria (>300 mg/24 hour) was 8.2% in all the diabetic patients. This is similar to the figures of 8% reported by Bergland[27] and Mogensien[24]. The association[28,29] between an increase in albumin excretion, coronary artery disease, retrunopathy and neuropathy is well established and is proved with our observations (Table III).

TABLE III **Distribution of 462 diabetics with prevalence of pathological UAE and its relationship with various long-term diabetic complications**

Character	No.	Incidence of patholog. UAE	Duration of DM (years)
Sex			
Male	268 (58.0)	82 (30.6)	10.4±9.4
Female	194 (42.0)	64 (32.0)	11.0±8.7
Type of DM			
IDDM(I)	182 (39.4)	72 (15.6)	11.0±8.8
Male	104 (22.5)	46 (44.2)	10.6±9.2
Female	78 (16.9)	26 (35.7)	12.0±7.7
NIDDM(II)	280 (60.6)	74 (16.0)	11.2±8.6
Male	164 (35.5)	36 (24.7)	10.4±8.7
Female	116 (25.1)	38 (32.8)	9.8±8.8
Retinopathy	88 (19.0)	73 (82.5)	13.8±7.1
Background	68 (14.7)		
Preproliferative	18 (03.9)		
Proliterative	2 (00.4)		
Hypertension	62 (13.2)	49 (73.0)	11.0±7.1
Male	35 (07.6)		12.0±6.1
Female	27 (05.8)		10.0±8.1
I.H.D.	36 (07.8)	33 (92.6)	13.2±5.7
Neuropathy	30 (0.65)	27 (90.0)	9.6±4.2

Conclusion

The prevalence of nephropathy in our diabetic patients in our setting was 31.6%, with 23.4% have microalbuminuria and 8.2% have macroalbuminuria. The prevalence of nephropathy increased with longer duration of diabetes and was associated with raised BP, retinopathy, cardiopathy and neuropathy. In this patients group, the long-term complication of DM like microangiopathic and macroangiopathic were more frequent than in those patients with no evidence of abnormal albumin excretion. Henceforth, it is advisable to carry out estimation of UAE on first visit and every 6-12 monthly, so that diabetic nephropathy and associated long term chronic complications can be evaluated and further progression can be prevented or atleast delayed.

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