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Prevalence of Microalbuminuria in Newly DiagnosedDiabetic Patients in Cardiology OPD

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Abstract
Introduction: The earliest clinical evidence of nephropathy is presence of microalbuminuria in urine. Newly diagnosed type 2 diabetics can have microalbuminuria shortly after diagnosis. Timely intervention at this stage can prevent or even halt nephropathy progression. We aim to study the presence of microalbuminuria in new diabetic patients, which will help in further appropriate management
Methods:This was cross sectional observational study.Total of 100 consecutive patients of type 2 DM diagnosed within last 6 months irrespective of treatment were enrolled. Evaluation included brief questionnaire followed by clinical examination. Twenty four hour urinary proteinuria was done in all patients fulfilling inclusion criteria. Association between microalbuminuria and various other risk factors were studied
Results: 65% of the patients had microalbuminuria and 17% of the patients had overt proteinuria the time of diagnosis of diabetes. There was significant relation between presence of microalbuminuria with ischemic heart disease. Multivariate analysis showed that increasing trend in number of diabetic complications in patients with microalbuminuria or overt proteinuria as compared with patients without proteinuria. 15% of the patients had GFR between 60-89 ml/min (CKD grade 1) while 3% of the patients had GFR between 30- 59ml/ min (CKD grage2).
Conclusion:The study showed the high prevalence of of microalbuminuria in our newly diagnosed type 2 diabetic patients.This calls for early detection and management to reduce the burden of diabetes, diabetic chronic renal disease and its complications in future.

Keywords:*type 2 diabetes mellitus, microalbuminuria, incipent nephropathy, overt nephropathy*

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I. Introduction:

Type 2 diabetes is one of the fastest growing epidemics. A community-based study by Sharma et al in Eastern Nepal observed 6.3% of the population above 20 years of age to be diabetic.[1]The metabolic deregulation associated with diabetes causes multitude of complicationsincluding nephropathy.The earliest clinical evidence of nephropathy is the appearance of low but abnormal levels (>30mg/day or 20µg/min) of albumin in urine, referred to as microalbuminuria (incipient nephropathy).[2] Type 2 diabetic patients may have microalbuminuria shortly after diagnosis reflecting its long asymptomatic period.[3]

Without intervention, microalbuminuria progresses to overt nephropathy followed by significant but variable rate in decline in GFR (~220 ml/min/year). Onset of microalbuminuriaa critical time in the evolution of diabetic renal disease.The greatest impact of treatment is to intercept this point as we can prevent or halt the earliest stages of damage by vigorous control of hyperglycemia and hypertension.Once overt nephropathy is present, progression cannot be halted, only slowed.[4]Microalbuminuria is also powerful predictor of cardiovascular events and has association with other risk factors.[3]

Therefore, it is important to screen diabetic patients for microalbuminuria and institute measures to prevent renal dysfunction. This study was undertaken to evaluate the presence of microalbuminuria in newly diagnosed type 2 diabetesand its correlation with other complications. The study aimed to provide data regarding burden of microalbuminuria in new diabetic patients in our context and help plan further management.

II. Materials And Methods:

This cross sectional observational study was carried outin the outpatient cardiology department, Shahid Memorial Hospital from May 2015 to May 2016. A total of 100 consecutive patients of type 2 DM diagnosed within last 6 months irrespective of treatment were evaluated. Ethical approval for the study was

obtained from the ethical committee of the hospital. Written informed consent was obtained from all the participants.

Diabetes was diagnosed as per recent ADA criteria .[5] Persons having polyuria, congestive cardiac failure,fever,hematuria, severe hypertension, obstructive uropathy were excluded. Pregnant female and person who undertaken heavy physical activity within last 24 hours were also excluded.

A brief questionnaire that included demographic data along with the history of diabetes, hypertension, cerebrovascular accident, ischemic heart disease and family history of diabetes and hypertension were introduced and recorded. Relevant clinical examination was done including the fundoscopy.

Following medical history and physical examination, participants were subjected for urine routine and microscopic examination.Patients with no detectable protein on routine urinary examination were further investigated for 24 hour urinary microalbuminuria (Fig 1). Detail verbal instruction was given regarding the collection of the urinary sample. They were advised to discard the first volume of urine in the morning and collect 24 hour urine from 8 am to 8 am next day. Immuno –turbimetric method was used for the estimation of urinary albumin.Blood urea, serum creatinine and fasting lipid profile was also done.

Pyuria was defined as WBC count > 10 in high power field in routine urinalysis.[6] Congestive cardiac failure was considered if patients Framingham criteria for diagnosis of Congestive Cardiac Failure were fulfilled.[3]Hematuria was said to be present if more than two red blood cells per high power field was noted.[7]Presence of back pressure changes in ultrasonography (USG) or presence of renal calculi or the obstructive pathology in USG or X- ray KUB fulfilled the criteria for obstructive uropathy.

Data were entered in a Microsoft Excel spreadsheet. All the entries were checked for any keyboard error. Data were tabulated and interpreted in terms of percentage, mean and standard deviation the computer using SPSS version 11.5(SPSS Inc., Chicago, IL, USA). To test the significance of the association Chi square test was applied.

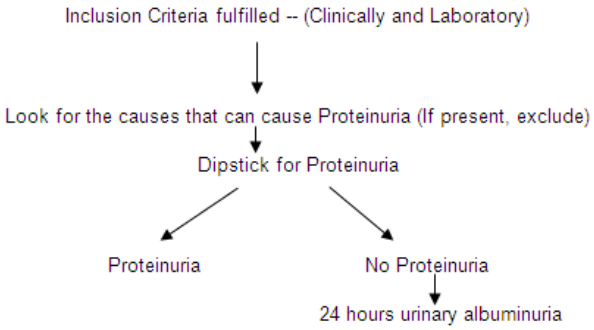

Figure 1. Flow chart: Screening for microalbuminuria

III. Results

Mean age of the newly diagnosed diabetic patients was 50.1 years (SD±11.7years.). There were more male patients with male to female ratio of 1.17. Majority (61%) of the patients were evaluated for osmotic symptoms and were diagnosed as diabetes. Rest of the patients were diagnosed on routine screening for medico-surgical conditions.

39% of the patients had positive family history of the diabetes.25% of the patients were already hypertensive when detected to have diabetes mellitus for the first time. 45% of the patients were smokers among which 21% had smoked less than 20 pack years and 24% had smoked more than 20 pack years. 6% had non-proliferative diabetic retinopathy (NPDR) and 1 patient had proliferative diabetic retinopathy at the time of diagnosis of diabetes. 5% of the patients had both NPDR and cataract. Cataract was detected in 17% of the patients.39% of the patients had some evidence of peripheral neuropathy (tingling sensation, numbness, decreased joint sensation). 10% of the patients had some evidence of ischemic heart disease like positive history, ischemic changes in ecg or history of acute coronary event in the past.

Biochemical evaluation of the patients are shown in table 1

Tables

	mean	**SD ±**	**minimum**	**maximum**
Urea	27.62	6.96	12	52
Creatinine	.892	0.263	0.1	2.1
TAG	166.92	157.72	46	1344
HDL	45.09	7.87	29	67
LDL	98.09	33.47	38	196
Cholesterol	143.67	52.86	67	339

Table 1. Renal function and lipid profile

Number of diabetic complication		Nephropathy		
		Absent	**Microalbuminuria**	**Overt proteinuria**
	None	4(18%)	13(20%)	1(5.8%)
	1	11(61%)	37(56.92%)	9(52%)
	2	2(11.1%)	13 (20%)	5 (29%)
	3	1(5.55%)	2 (3%)	1(5.8%)
	Total	18	65	17

Table 2. Number of complications in relation to nephropathy

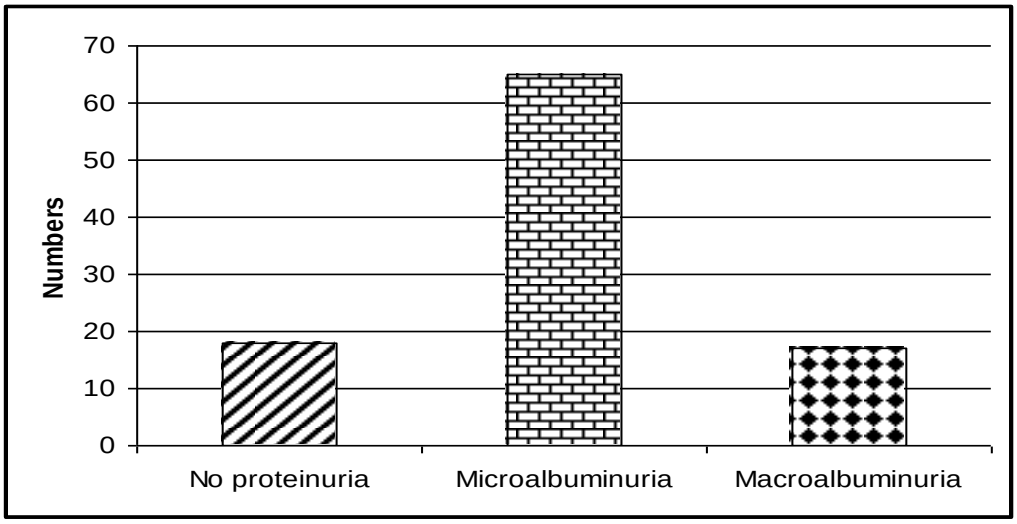

Figure 2. Nephropathy at the time of diagnosis.

Diabetic complication: Majority of the patients in this study had diabetic renal disease. 65% of the patients had microalbuminuria and 17% of the patients had overt proteinuria.

When patients were classified to CKD classification, 81%, 15% and 3%were in CKD stage 1, 2 and 3 respectively. None were in CKD stage 4or 5 respectively.

The estimated glomerular filtration rate of the patients were also calculated using Cockcroft- Gault equation. 85% of the patients had glomerular filtration rate(GFR) more than 90 ml/ min. 15% of the patients had GFR between 60-89 ml/min (CKD grade 1) while 3% of the patients had GFR between 30- 59ml/ min (CKD grage2). There was positive association between BMI, smoking and hypertension to that of microalbuminuria or overt protienuria though it was not statistically significant.Only one patient with ischemic heart disease had no evidence of proteinuria while all others had microalbuminuria (94.4%).

Multivariate analysis showed that increasing trend in number of diabetic complications in patients with microalbuminuria or overt proteinuria as compared with patients without proteinuria as shown in table 2.

III. Discussion

Various epidemiological and cross sectional studies have reported marked variation in the prevalence of microalbuminuria in diabetic patients. In the present study, the prevalence of microalbuminuria in newly diagnosed diabetic was 65% while 17% of the patients already had overt proteinuria at the time of diagnosis of diabeteswhich clearly reflects the high prevalence of microalbuminuria. Similar pilot study done in Eastern Nepal found 71% of recently diagnosed type 2 diabetic patients had nephropathy.8Studies in the white UK population revealed a prevalence of microalbuminuria of 7%-9% 9 while in Mexican Americans, it was 31%, Pima Indians 26%,10 and Hispanic Americans 35%.11

This variation in prevalence can be attributed to factors such as differences in populations, in the definitions of microalbuminuria, method of urine collection, etc. However this could also reflect true differences in the ethnic susceptibility to nephropathy though it is difficult to conclude from our study. The higher prevalence of microalbuminuria in our population as well as other under-privileged population may also be attributed to limited health awareness of those populations, thereby unaware of the their ongoing diabetic process for the long duration.

In our study, urine for microalbuminuria was not repeated in subsequent follow up. It might have caused some degree of over estimation of the microalbuminuria. However, strict exclusion criteria were used to screen patients for microalbuminuria and we believe that false positive results are reduced to minimum. In the

other hand, studies have demonstrated underestimation of albumin concentration is more likely than overestimation particularly in diabetic patients.12 So, though adequacy of collection was not documented by measurement of urinary creatinine in our study, the above observation holds relevance considering the fact of higher prevalence of microalbuminuria.

Factors which are reported to be associated with microalbuminuriaare hypertension, obesity, dyslipidemia, retinopathy, neuropathy and smoking.[13]We also find that the similar trend with these risk factors though not statistically significant.

Microalbuminuria has also been reported to be associated with generalized vascular disease including the strong risk factor for ischemic heart disease. The incidence of coronary heart disease events have been shown to increase significantly from 16.4% in type 2 diabetic patients without proteinuria to 34.8% in those with clinical proteinuria.[14]In our study also, we observed all but one patient with evidence of ischemic heart disease had microalbuminuria.

We found that 15% of the patients were already at risk or in CKD grade 1 and 3% of the patients are in CKD grade 2. This raises the alarm as it indicates the burden of diabetic kidney disease in the patients even when they present for the first time

One of the limitations of this study is that it is a clinic-based study. This could have introduced some degree of referralbias. Many of patients in our population who come to hospital are due to symptoms or for some other problems. These patients who had actively sought medical advice, in general, are likely to be more health conscious.Therefore the present opportunistic screening for diabetes and its complication may not completely reflect the general population of Nepal.

IV. Conclusion

The prevalence of microalbuminuria in this clinic based type 2 diabetic study is 65% and therisk factors are similar to that reported to other studies. Giventhe increased burden of diabetes and its complication rates like diabetic nephropathy, cardiovascular events; it would difficult to cope the burden in the country like Nepal due to limited financial and human recourses.

This calls for early detection and management to reduce the burden of diabetes, diabetic chronic renal disease and its complications in future.Further itnecessitates strong focus on population-based study of renal disease, translating epidemiological and therapeutic knowledge into policy, planning and improve outcomes.

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