Original article

The screening for diabetic nephropathy in diabetes clinic in Khartoum- Sudan

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ABSTRACT

Background: diabetes mellitus and its complications is one of the major health problems. This study is about the screening for one of these complications -diabetic nephropathy- in our clinical practice in Khartoum Sudan.

Objectives: The main objective is to determine whether the clinical practice in the diabetes clinics in Khartoum- Sudan is following the recommended guidelines for the screening for diabetic nephropathy.

Study Design: Prospective cross- sectional study.

Populations: during the period from Jan-March 2008, 98 diabetic patients with type 1 or type 2 were randomly selected from patients attending the outpatient diabetes clinic in Omdurman Teaching Hospital.

Methodology: ninety eight adult type1 and 2 diabetic patients were studied using simple, direct, standardized questionnaire, previous records were seen and a urine sample for each patient was examined for proteinuria.

Results: 6.1% of the total number of patients had urine examination on regular bases, 75.5% rarely had urine examination, while 18.4% had their urine never been examined before in the diabetes clinics. None of patients was diagnosed as having diabetic nephropathy or seen by a nephrologist. Only 7.1% of the total patients were using ACE inhibitors or ARB agents and these were prescribed for indications other than diabetic nephropathy. Testing urine of our patients we found that 18.4% had macroalbuminuria, 40.8% microalbuminuria, while40.8% had negative results. The majority of the patients with either type of albuminuria were in the age group 51-65 years and most of them had type 2 diabetes.

Conclusion: A large number of our patients had evidence of diabetic nephropathy. However, none of them had been screened before for that. Despite the small number of patients, this study raises a serious alarm regarding the clinical practice in our diabetes clinics in Khartoum Sudan and it strongly recommends urgent intervention by the authorities to implement the international guidelines of screening and management of these patients.

Key words: macroalbuminuria, microalbuminuria, proteinuria, chronic kidney disease

At least 171 million people worldwide have diabetes; this figure is likely to be more than double by 2030. Diabetes has become one of the major causes of premature illness and death in most countries[1].

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Diabetic nephropathy is the single most important cause of end stage renal disease (ESRD) in the western countries. In the U.K it accounts for20% of patients requiring renal replacement therapy[2].

Around 10% to 42% of patients with type 1 and type 2diabetes develop microalbuminuria, which is largely related to disease duration[3, 4]

Microalbuminuria predicts early mortality in patients with diabetes[5,6] and is an important

cardiovascular risk factor[7] .
The median life expectancy is decreased by four to 14 years, and the effect was greatest in patients who developed diabetes during childhood. It was found that the incidence of ESRD was reduced if screening program is applied[8].
Patients with type 1 diabetes who have microalbuminuria were found to have a relative risk of cardiovascular death that is 1.2 times that of normoalbuminuric type 1 diabetic patients [9].
Screening programs are generally focused on conditions with great effect on health and which benefit from early interventions. Chronic kidney disease (CKD) especially that attributed to diabetes certainly fits this criterion.
Early detection of diabetic nephropathy allows early treatment and hence decreases the number of patient reaching ESRD. This has important psychosocial and financial consequences on the community[10]

Objectives of the study

The main objective is to determine whether the clinical practice in the diabetes clinics in Khartoum Sudan is following the recommended guide lines for screening for diabetic nephropathy, and to determine the prevalence of macro- and microalbuminuria caused by diabetic nephropathy among the diabetic patients attending the diabetes clinics.

Research methods

Study design: this is a cross-sectional prospective study
Populations: during the period from Jan-Mar 2008, 98 diabetic patients with type 1 or type2 were randomly selected from patients attending the outpatient diabetic clinic in Omdurman Teaching Hospital according to the following criteria:
All patients were diabetic according to the W.H.O criteria (for more than 5years in type 1 patients) and were seen regularly in the out patient clinic. The target age group is 20 to 70 years.

Exclusion criteria:[to avoid misleading results of urine analysis]:
Patients with known renal impairment, ESRD, pregnancy, concomitant systemic illness, febrile illness, UTI, or severe hypertension. Formal consents were taken and questionnaires were filled.
A morning urinary sample was taken from each patient in sterile container. Thymol crystals were used as a preserver. Urine was examined for albuminuria using dipstick method and also by sulphsalicylic acid solution. Patients with positive results (1+ or more) were considered to have macroalbuminuria that need confirmation. At the same time urine deposit was examined to exclude other causes such as urinary tract infection.
Patients with negative results were further screened for micro albuminuria by measuring urinary albumin/creatinine ratio, a ratio of >2.5 in males or> 3.5 in females is considered as microalbuminuria. The data were analyzed using the SPSS, the results were discussed.

The results

Out of 98 diabetic patients 36.7% were males. They had the disease for 0.2-40 years. (fig1)
Type 1 DM constituted 24.5% of the population studied.

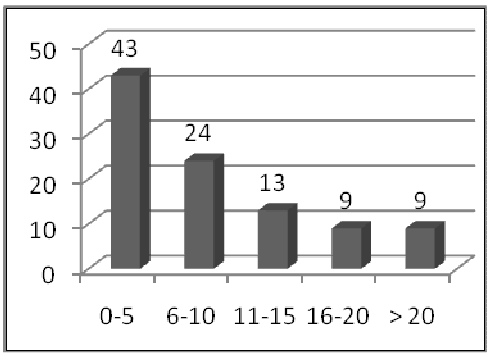
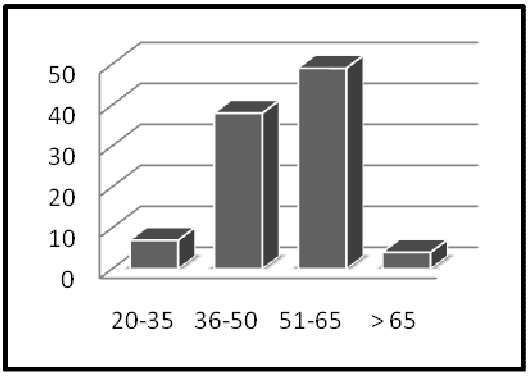


Figure (1): duration of diabetes (in years)

The age ranged between 20 and 70 years (fig 2). Hypertension was detected in 18.4% of the patients, while 6.1% were known to have ischaemic heart diseases (I.H.D), 1% had a history of myocardial infarction, 3.1% had cerebrovascular accident, and 2% had history of limb ischaemia.



Figure(2): age distribution in years

Only 7.1% of the total patients were using ACE inhibitors or ARB agent and they were used for reasons other than diabetic nephropathy.
Only 6.1% of the patients had urine examination on regular bases, 75.5% rarely had urine examination, while the urine was never examined before in the diabetes clinic in 18.4%of the patients. Interestingly, when the urine was examined it was mainly for sugar and acetone (62.2%), or general analysis (19.4 %).(table1).

Table (1) The type of urine examination performed for our patients attending the diabetes clinic

Type of test requested	No.	Percent
Sugar and acetone	61	62.2
General examination	19	19.4
Alb/creatinine	0	0
24hrs urinary protein	0	0
Never done	18	18.4
total	98	100

None of the patients was diagnosed as having diabetic nephropathy or was seen by a nephrologist.
The results of the screening were as follows:-
Macroalbuminuria was detected in 18.4% of the patients while 40.8% were positive for microalbuminuria, and 40.8% had negative results. Half of the patients with macroalbuminuria were in the age group51-65 years (fig3).

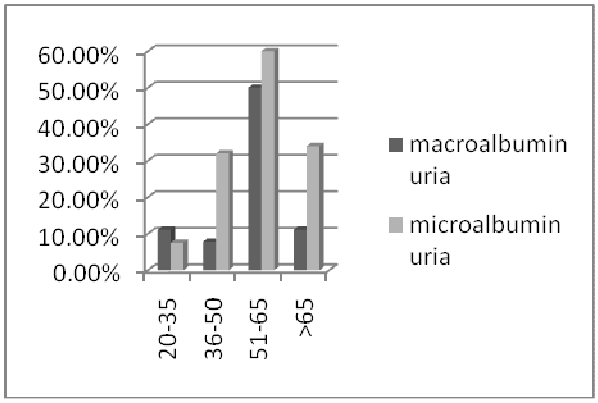


Figure (3) shows the distribution of albuminuria according to the age group in years.

22.2% of the patients were males, and 33.3% had type 1 diabetes, 27.8% were having diabetes for 16-20 years (table 2) , 22.2% were hypertensive while 5.6% were known to have IHD. 44.4% of the patients gave history of hospitalization/year for diabetes control and/or management of metabolic complication of diabetes.

Table (2) shows distribution of albuminuria according to the duration of diabetes in years

Duration	Macro	Micro
0-5 years	4 (22.2%)	15 (3705%)
6-10 years	3 (16.7%)	9 (22.5%)
11-15 years	4 (22.2%)	5 (12.5%)
16-20 years	5 (27.8%)	4 (10%)
>20 years	2 (11.1%)	7 (17.5%)

Among patients with microalbuminuria:
The majority (80%) of patients with microalbuminuria had type 2 diabetes, with female predominance (57.5%) . 60% were in the age group 51-65 years (fig3). The majority of the patients (37.5%) were having diabetes for 5 years only (table 2), 22.5% were hypertensive while one patient (2.5%) had IHD, another one had M.I, two patients(5%) had history of CVA, while two patients (5%) gave a history of limb amputation. The urine examination when done it was for the presence of sugar and acetone in 71.9%.

DISCUSSION

In this study a total number of 98 patients were screened, 36.7% of them were males. This aproximately represents the male: female attendance ratio in the referred clinic which was found to be 1 :2 . This may reflect the distribution of diabetes among Sudanese patients or it may indicate more care about follow up in female diabetic patients. Our finding is in consistence with literature[11,12]

The figures representing co morbid conditions including hypertension, ischaemic heart diseases myocardial infarction, cerebrovascular accident, and limb ischaemia may not represent the real situation in the community as many diabetic patients with vascular complications loose their attendance to diabetic clinics and are followed up in other related specialized clinics (cardiovascular, neurology, nephrology) etc.

Also patient with renal impairment and/or severe hypertension were excluded from the study as mentioned earlier. Those patients are likely to have more incidences of vascular complications of diabetes such as myocardial infarction or ischaemic limb(s).

Urine examination during follow-up was performed regularly on only 6.1% of the total number of patients, 75.5% of the patients rarely had urine examination, while in 18.4% the urine was never examined in the diabetes clinic. This reflects the common wrong believe that as urine examination is not a good reflection of the blood glucose level, it is no longer needed except for exclusion of ketoneuria or when urinary tract infection is suspected. This indicates that the importance of examining the urine to look for possible complications of diabetes in relation to the renal system is underestimated in our clinical practice. Urine examination is not a routine practice in our clinics. This is probably because of absence of clear guidelines mastering that. As a result many abnormalities are missed as far as they remain silent. Even when the urine was examined it was either for sugar and acetone in 62.2%, or the request was for general examination in 19.4% when there is abnormally high blood glucose. Miller and Hirsh[13] reviewed 157 diabetic patients and found that 50% had not had urinalysis during the two years of the study, only 13% had subsequently received a 24 hrs urinary examination. On the other hand another study[14] reported some-what better results. None of our patients had urinary screening for proteinuria neither for macroalbuminuria nor for microalbuminuria. If we assume that general examination of the urine includes testing for macroalbuminuria as part of the general examination, then only 19.4% of the total number of patients had the test. This is an unacceptable low figure. Considering that the test in most of the time was conducted in those patients who have factors that cause false positive results for the presence of macroalbuminuria such as urinary tract infection or fever, then this will complicate things more and draw a conclusion that performing general examination for the urine in this setting is of limited value in detecting macroalbuminuria due to diabetic nephropathy. Similar results were reported elsewhere[15].

Screening test for microalbuminuria was completely ignored in our general practice and in the specialized centers. A number of cases of diabetic renal diseases are missed when there will be a benefit of treatment and are only discovered late. Our results contrasts a report from India that described the practice of primary care physicians related to diabetic nephropathy screening and management [16] which noted that 86% of the physicians reported screening more than 50% of their patients of type 1 diabetes for overt albuminuria, as did 82% of physicians for their patients with type 2 diabetes. As expected none of our patients was seen by a nephrologist or diagnosed as having diabetic nephropathy. This malpractice is present in many parts of the world including some developed countries[12-17].

The lack of the appropriate facilities is one of the factors that may not allow clinician to follow a guideline in their clinical practice in the developing countries, but the condition is

not so regarding screening for early diabetic nephropathy as urine examination has the advantage of being simple, quick, cheap and reliable for detecting early nephropathy in diabetes .On the other hand the care of the patients with renal diseases secondary to diabetes is much more costly than a program that detects and treats diabetic nephropathy in its earlier stages.

In our study we found that 18.4% of the patients had a positive urine test for macroalbuminuria, 40.8% were positive for microalbuminuria. In a study done in K.S.A[18] nephrotic range proteinuria was detected in 5.6%, clinical proteinuria in30.4% and microalbuminuria in 16.8% of diabetic patients. In our patients nephrotic range proteinuria was not reported. This can be explained by the fact that this group of patients is either excluded from the study because of renal impairment or they are not attending the diabetes clinic as they are followed up by the nephrology clinics. The percentage of patients with either type of proteinuria is higher in our patients, this may reflect true increased prevalence of diabetic nephropathy in our patients as a result of the absence of screening for early diabetic nephropathy and consequently patients do not receive early treatment that regress or stop the progression of the disease. Although these patients need further confirmatory tests as recommended by the guidelines, but one need to consider that a lot of our patients have poor or no attendance for regular follow up so they are likely to be missed by a screening program dealing with patients in the referred clinics. We believe that determinacy of the prevalence of diabetic nephropathy needs a more large scale study.

Strikingly 93.7% of the patients with positive tests for macroalbuminuria had their urine been tested for sugar and acetone in the past.

These results of this study reflect two facts firstly as the diagnoses of diabetic nephropathy is missed due to the lack of screening, our patients with early diabetic nephropathy did not receive proper treatment as recommended. Secondly even when there was concomitant hypertension, in the majority of patients the choice of the anti hypertension drug was not the right one according to the guidelines.

In our study we found that the majority of the patients with positive results were in the age group 51-65 years (50% of patients with macroalbuminuria and 60% of patients with microalbuminuria), this can be explain by the fact that these nephropathic changes are more likely to develop in patients who have diabetes for longer period and, this is evident in patients with macroalbuminuria as the largest percent was among patients who have diabetes for 16-20 years(fig3) a durations at which complications are expected to develop. However, this is not true for patients with microalbuminuria as the majority were diabetic for 5years (table1). This can be explained by the fact that the majority of patients with microalbuminuria (80%) were type 2diabetic patients who may have the disease for longer period before they are diagnosed and who are likely to present with complications of diabetes at the time of diagnoses. In fact this is the idea behind screening of type 2 diabetic patients for diabetic nephropathy at the time of the diagnoses. Another point is that this age group is likely to have other risk factors for diabetic nephropathy such as hypertension more than younger age groups.

The study found that in patient with macroalbuminuria there was a history of hospitalization for diabetes control and/or metabolic complication of diabetes per year in 44.4% of the patients with macroalbuminuria and in 44% of patients with microalbuminuria indicating poor glycemic control and hence predisposition to diabetic nephropathy.

Only 5.6% of our patients were using ACEI and these agents were prescribed for reasons other than diabetic nephropathy in all patients. Our results are not in concordance with the studied done by others[16] who found that ACEI was prescribed frequently (62%-76% -82% of patients) to treat albuminuria when hypertension is present but less often when hypertension is absent (in 48% to 58% of patients). Some studies [19] had found that

the use of ACEI in all diabetic patients is cost-effective and might be applied instead of performing screening test; this point should be considered in our situation because if we treat all patients with these agents we can overcome the problems of the lack of screening as well as the patients' regular follow-up attendance

Limitations: the small number of the studied patients, the inappropriate recording of old information in the patients' files and the need for confirmation of albuminuria according to the guidelines are the main limiting factors in this study.

Conclusion

A large number of our diabetic patients have abnormal urinary protein excretion and they need further tests to confirm the presence of proteinuria and proper management to prevent or slow their progression towards ESRD. The clinical practice in the diabetes clinic in Sudan is not following the international guidelines regarding the screening for diabetic nephropathy; hence a significant number of patients with diabetic nephropathy are missed. Consequently these patients loose the benefit from early intervention which is found to be the most important point in the management of these patients.

The use of ACEI and ARB is very limited in our diabetes clinic even in the presence of hypertension a point that needs further attention in our practice.

Diabetic nephropathy is found to be more common in patients above 50 years old, in type 2 patients and in females.

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