Characteristics of type 2 diabetics presenting with end stage renal disease at the Jos University Teaching Hospital, Nigeria

E. I. Agaba
Department of Medicine
Jos University Teaching Hospital
Jos, Nigeria.

Summary

Background: **Diabetes mellitus is an increasingly common cause of end- stage renal disease (ESRD) in Nigeria. We describe the clinical characteristics of Nigerian diabetics presenting with ESRD, as data obtained would provide baseline information for management policy formulation.**

Methods: **Twenty- one diabetics (16 males and 5 females) with ESRD seen in the Nephrology Unit of the Jos University Teaching Hospital were studied. Both clinical and laboratory parameters were assessed.**

Results: **The mean age of the patients was 55.5± 9.8 years with a mean duration of diabetes being 7.7 ± 8.2 years. Retinopathy, hypertension and peripheral vascular disease were present in 75.5%, 71.4% and 57.1% of the patients respectively. The mean fasting blood glucose was 6.0 ± 2.7 mmol/L. Hypertriglyceridemia was the most common dyslipidemia seen in 38.1% of the patients, followed by reduced high- density lipoprotein (HDL) cholesterol in 33.3% and hypercholesterolemia in 23.8%. Common electrocardiographic abnormalities included myocardial ischemia, left atrial hypertrophy and left ventricular hypertrophy.**

Conclusion: **The care of these patients should take into consideration the control of hypertension and dyslipidemia as cardiovascular event is common in them.**

Keywords: ***Diabetes, End Stage Renal Disease.***

Résumé

Introduction: Diabète pancréatique est une cause de plus en plus courante de la maladie rénale étape final (ESRD) au Nigeria. Nous decrivons les traits cliniques des diabétiques Nigerians atteints d'ESRD, étant donné que les donnés obtenuées vont fournir des informations de base pour l'élaboration de la politique de gestion.

Méthodes: Vingt-et-un cas des diabetiques (16 du sexe masculin et 5 du sexe feminin) atteints du ESRD vus dans le services Néphrologie du centre hospitalier universitaire de Jos ont été étudies. Les parametres laboratories et cliniques les deux ont été évalués.

Resultats: L'âge moyen des patients était 55,5±9,8 ans avec durée moyenne de diabètes étant 7,7±8,2 ans. Rétinopathie, hypertension et maladie vasculaire périphérale étaient présent en 75,5%, 71,4%, et 57,1% respectivement chez des patients. Le moyen fasting blood glucose était 6,0± 2,7mmol/L. Hypertriglyceridémie était la dyslipidemie la plus courante vue en 38,1% des patients, suivi par haute densité lipoproteine (HDL) reduite cholesterol en 33,3% et hypercholesterolomie en 23,8%. Anormalités electrocardiographique courantes sont ischémie du myocarde, hypertrophie du côte gauche, et hypertrophie ventriculaire du côte gauche.

Conclusion: La prise en charge de ces patients devrait tenir compte du contrôle d'hypertension et de dyslipidemic parce que l'événement cardiovasculaire est courant chez eux.

Introduction

Diabetic nephropathy, a long- term complication of diabetes mellitus (DM), is a leading cause of end stage renal disease (ESRD) in Nigeria [1]. The prevalence of nephropathy in Nigerian diabetics rose from 7% in 1963 to 56.5% in 1999 [2-5]. This is likely to be due to improved care resulting in diabetics living long enough to develop this complication.

Once overt diabetic nephropathy occurs, there is a relentless progression to ESRD [6-7]. Several factors have been implicated in hastening this progression. Though duration of poorly controlled diabetes and systemic hypertension are the most important factors responsible for this deterioration in renal function, other factors like genetic predisposition, male gender, smoking and hyperlipidemia have been implicated [8-11].

In the advanced world where renal replacement program is funded by the government, the management of diabetics with ESRD is still considered a major challenge, as it is a drain in the health resources. As the prevalence of diabetes increases in Nigeria, the contribution of diabetes to the ESRD population would increase. Currently there is no data on this group of patients with ESRD in Nigeria. This study describes the clinical characteristics of Nigerian diabetics presenting with ESRD, as data obtained would provide baseline information for management policy formulation.

Materials and methods

Study design

This is a cross sectional study of type 2 diabetics presenting with ESRD at the Nephrology Division of the Jos University Teaching Hospital. The study was conducted over a 2- year period.

Correspondence

Data collection

All diabetic patients with ESRD (creatinine clearance of $\leq$ 10ml/min)[2] referred to the nephrology unit over this period were studied. Information obtained were age of patient, duration of diabetes, history of hypertension, type of hypoglycemic and anti- hypertensive agents used and symptoms of cardiovascular and neurological disease. Physical examination included blood pressure measurement in the sitting position, deep tendon reflexes, sensation and a fundoscopy. Evidence of heart failure and neurological deficits were also looked for. The presence of peripheral vascular disease was ascertained clinically during the study.

Investigations carried out on the patients included hematocrit, urinalysis, electrolytes and urea, serum creatinine, lipids, and a resting 12- lead electrocardiography (ECG). Twenty-four hour urine was collected for determination of creatinine clearance and protein excretion. Where urine collection was not possible, creatinine clearance was estimated by the Cockcroft and Gault formula [13].

Statistical analysis was performed using NCSS statistical software for Windows. Results are expressed as means (SD) and proportions where appropriate.

Results

Clinical characteristics

Table 1 shows the clinical characteristics of the study patients. Twenty- one diabetics (16 males and 5 females) with ESRD were seen in the unit over a 2- year period. The mean age of the patients was 55.5± 9.8 years. The patients had a mean BMI of 24.5± 4.1 Kg/M^2. Four patients had BMI values below 20 kg/M^2.

The mean duration of diabetes was 7.7± 8.2 years. Seventeen patients (81%) had hypertension at presentation. Three patients (14.3%) had hypertension before the diagnosis of diabetes was made. Eleven (64.7%)of the patients with hypertension were on thiazides diuretics and centrally acting anti- hypertensives, 4 (23.5%) on calcium channel blockers and only 2 (11.8%) were on angiotensin converting enzyme inhibitors at the time of presentation. Heart failure was present in 2 of the patients. Two of the patients without hypertension were on angiotensin converting enzyme inhibitors on presentation. Fifteen patients (71.4%) were no longer on hypoglycemic agents/ insulin at the time of presentation (ten of whom had been on oral hypoglycemic agents notably chlorpropamide and metformin, three on insulin treatment and two on diet only). Table 2 shows the characteristics of patients who no longer required hypoglycemic agents. There was no history of previous use of nicotine in the patients while only four consented to modest alcohol intake.

Table 1 Clinical characteristics of diabetics with end stage renal disease in Jos University Teaching Hospital, Jos

Clinical characteristic	Value
Number	21
Age (SD), years	55.5 ± 9.8
BMI (SD), Kg/M^2	24.5 ± 4.1
Retinopathy (%)	76.2
Neuropathy (%)	71.4
Hypertension (%)	81
Peripheral vascular disease (%)	57.1
Family history of DM (%)	19
SBP, mmHg	165.7 ± 30.8
DBP, mmHg	102.1 ± 21.6

BMI= body mass index, DM= diabetes mellitus

Table 2 Clinical characteristics of diabetics who no longer required hypoglycemic agents

Characteristics	Value
Age (SD), years	57.7 (10.2)
Duration (SD), years	5.2 (3.1)
Hypertension (%)	73.3
Neuropathy (%)	80
Retinopathy (%)	86.7
Peripheral vascular disease (%)	60

Laboratory characteristics

Table 3 shows the laboratory parameters of the study patients. The mean fasting blood glucose was 6.0 ± 2.7 mmol/L and the mean hematocrit was 27.8 ± 7.5%. One of the patients had 24- hour urinary protein excretion in the nephrotic range. Hypertriglyceridemia was the most common dyslipidemia seen in 38.1% of the patients, followed by reduced high- density lipoprotein (HDL) cholesterol in 33.3% and hypercholesterolemia in 23.8%. Hypoalbuminemia (serum albumin levels less than 28g/L) was present in 14.3% of the patients.

Electrocardiographic findings in the patients included myocardial ischemia (23.8%), left atrial hypertrophy (19.1%), sinus tachycardia (19.1%), and left ventricular hypertrophy and prolonged QT (14.3%) respectively.

Table 3 Laboratory parameters of diabetics with end stage renal disease in Jos University Teaching Hospital, Jos

Parameters	Mean (SD)	Range
Cclr, ml/min	6.1 ± 3.6	1.9 – 7.0
Urea, mmol/L	30.5 ± 12.6	28.0– 56.9
Creatinine, µmol/L	938 ± 404	491–2310
FBS, mmol/L	6.0 ± 2.7	3.3–8.7
Hematocrit (%)	27.8	13–33
Total cholesterol, mmol/L	5.32 ± 2.57	2.71–12.20
Triglyceride, mmol/L	1.86 ± 1.02	0.70–5.07
HDL cholesterol, mmol/L	1.55 ± 1.14	0.3–4.3
LDL cholesterol, mmol/L	2.89 ± 2.07	0.6–7.5
Protein excretion, g/24hr	1.28 ± 1.04	0.40–3.7

Cclr= creatinine clearance, FBS= fasting blood glucose, HDL= high- density lipoprotein, LDL= low- density lipoprotein

Discussion

The mean duration of DM in the study patients was 7.7 ± 8.2 years. This contrasts the finding in North Africa and the advanced world where the mean duration of DM in patients presenting with ESRD is between 15 and 25 years [14, 15]. This discrepancy, though possibly due to historical dependence for duration of disease, is likely to have resulted from late diagnosis of DM in our patients as all of them had type 2 DM. It has been established that patients with type 2 DM in the western world, have had hyperglycemia for an average of 6 to 10 years before having a diagnosis made [16, 17]. It is very likely then that in resource poor countries like ours where access to health care is not readily available, that the duration of hyperglycemia before diagnosis would be longer, hence the duration of disease at presentation of patients with target organ damage would appear shorter.

Of interest is the normal glucose blood levels observed in the majority of our patients despite the withdrawal of hypoglycemic agents. This is in keeping with previous observation [14]. As renal failure ensues, the renal clearance of insulin decreases and diabetics need little or no doses of hypoglycemic agents [18]. This underscores the need for a high index of suspicion of the onset of ESRD in the diabetic who no longer requires hypoglycemic agent for glycemic control.

Hypertension was a common finding in our patients. Hypertension, though maybe a manifestation of renal disease, has been found to occur frequently in patients with type 2 DM [19] and also contributes to the development of ESRD [10]. The pattern of anti- hypertensive drug use in our patients is similar to what obtains in Libya where choices of drugs were not compatible with current recommendations for management of diabetic persons [14]. Blood pressure control and choice of anti- hypertensive agents are cardinal to the prevention and management of nephropathy in diabetics.

Retinopathy occurred in 75% of our patients. This may suggest that a quarter of the patients may have non-diabetic nephropathy, as there is almost always an accompanying diabetic retinopathy in advanced diabetic nephropathy because of their common etiology [20]. It is believed that the absence of diabetic retinopathy in such advanced stages of nephropathy calls for a review of the diagnosis. It has however, been reported that 41% to 60% of proteinuric type II diabetics with biopsy proven diabetic nephropathy lacked retinopathy [21], though up to a third of patients with type 2 DM with renal disease may have non- diabetic nephropathies [22].

Cardiovascular risk is elevated in patients with ESRD [23]. Factors present in our patients included hypertension and dyslipidemia. These factors predispose to atherosclerosis with its attendant risk of cardiovascular event. This is evident in this study as a relatively large proportion of our patients had ECG evidence of myocardial ischemia. We believe that a stress ECG tracing if it were available, would have properly estimated the magnitude of this problem.

In conclusion, this study has demonstrated that DM is an important cause of ESRD in Nigeria. It highlights the need for screening for ESRD in patients who no longer requires hypoglycemic agent for glycemic control. The care of these patients should take into consideration the control of hypertension and dyslipidemia as cardiovascular event is common in them.

References

1. Agaba IE, Agbaji OO, Anteyi EA. Pattern of Renal Diseases In North Central Nigeria. *Journal of Medicine In The Tropics*, 2002; 4: 33- 37.
2. Kinnear TWG. The pattern of diabetes in a Nigerian Teaching Hospital. *East Afr. Med. J.* 1963; 40: 288 -294.
3. Adetuyibi A. Diabetes in Nigerian African I. Review of longterm complications. *Trop. Geog. Med* 1976; 28: 155 - 168.
4. Wokoma FS. The clinical profile of Nigerians with long - standing diabetes mellitus. *Int Diab Dig* 1998; 9:44 - 45.
5. Agaba IE, Anteyi EA, Puepet FH, Omudu PA, Idoko JA. The Clinical Pattern Of Diabetic Nephropathy In Type II Diabetes Mellitus In North Central Nigeria. *Journal Of Medicine In The Tropics,* 2002; 4: 10- 14.
6. Mogensen CE, Christensen CK, Vittinghus E. The stages in diabetic renal disease: With emphasis on the stage of incipient nephropathy. *Diabetes* 1983; 32 (Suppl 2): 64 - 78.
7. Krolewski AS, Warram JH, Christlieb AR, Busick EJ, Kahn CR. The changing natural history of nephropathy in type 1 diabetes. *Am J Med.* 1985; 78: 785 - 794.
8. Maher JF. Diabetic nephropathy: Early detection, prevention and management. *AFP* 1992; 45: 1661 - 1668.
9. UKPDS Group. Intensive blood glucose control with sulphonyl-ureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 1998; 352: 837 - 853.
10. Breyer JA, Huniscker LG, Bain RP, Lewis EJ and the Collaborative Study Group. Angiotensin-converting enzyme inhibition in diabetic nephropathy. *Kidney Int.* 1994; 45 (Suppl): S56 - S60.
11. Parving HH, Gall MA, Skott P. Prevalence and causes of albuminuria in non-insulin dependent diabetic patients. *Kidney Int.* 1992; 41: 758 – 762.
12. N/DOQI Clinical Practice Guidelines for Chronic Kidney Disease. www.kidney.org/professionals/kdoqi/guidelines (visited April 23, 2003).
13. Cockcroft DW, Gault MH. Prediction of creatinine clearance from serum creatinine. *Nephron* 1976; 16: 31- 41.
14. Bosseri S, Beshyah SA. Characteristics of diabetic pa-

tients with end- stage renal failure on chronic hemodialysis in Tripoli, Libya. Diabetes International 2001; 11: 19 – 21.

15. Mogensen CE. Diabetes and the Kidney. *Kidney Int.* 1982; 21:673 – 674.

16. Harris MI, Flegal KM, Cowie CC et al. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. adults. The Third National Health and Nutrition Examination Survey, 1988- 1994. *Diabetes Care* 1998; 21: 518- 524.

17. U.K. Prospective Diabetes Study Group. U.K. Prospective Diabetes Study 16. Overview of 6 years' therapy of type II diabetes: *Diabetes* 1995; 44: 1249- 1258.

18. Skorecki K, Green J, Brenner BM. Chronic renal failure. In: Braunwald E, Fauci AS, Kasper DL, Hauser SL, Londo DL, Jameson JL eds. Harrison's principles of internal medicine. 15th ed. New york, McGraw- Hill, 2001, 1551- 1562.

19. Parving HH, Osterby R, Anderson PW, Hsueh WA. Diabetic nephropathy. In: Brenner BM, ed. The Kidney 5th ed. Vol 2 Philadelphia, W.B. Saunders, 1996, 1864 - 1892.

20. Working Group On Hypertension In Diabetes: Statement on hypertension in diabetes mellitus: Final report. Arch Intern Med 1987; 147: 830-842.

21. Gambasra V, Mecca G, Remuzzi G, Bertani T: Heterogenous nature of renal lesions in type II diabetes. *J Am Soc. Nephrol* 1993; 3: 1458 - 1466.

22. Lipkin GW, Yeats C, Howie A et al. More than one third of type 2 diabetes with renal disease do not have diabetic nephropathy: A prospective study (ABSTRACT). *J Am Soc Nephrol* 1994; 5: 379.

23. Avram MM, Goldwasser P, Burrell DE, Antignani A, Fein PA, Mittman NA. The uremic dyslipidemia: a cross-sectional and longitudinal study. Am J Kidney Dis 1992; 20: 324-335.