

Research

Awareness regarding diabetes control and diabetic nephropathy among Sudanese adults admitted with diabetic foot: a cross-sectional study

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Abstract

Introduction: In Sudan limited data is available regarding the prevalence of diabetes mellitus (DM), its complications as well as patients' awareness and practice patterns. This study aimed to evaluate the knowledge and practice regarding control of DM and occurrence of diabetic nephropathy (DN), among Sudanese diabetics with diabetic foot. **Methods:** A cross-sectional study conducted in Khartoum State - Sudan, during the period from February to April 2013. It targeted adult diabetics admitted to hospital with diabetic foot. Data was obtained from the Hospital Medical Records as well as by direct interviewing of patients. Descriptive analysis of data was done using SPSS computer software. **Results:** A total of 76 patients were included, their mean age was 58 ± 1.01 years and 59.2% were males. Diabetic retinopathy and nephropathy were seen in 56.6% and 27.6% of patients, respectively. Regular follow-up was evident in 59.2% of patient. Following hospital admission and the diagnosis of diabetic foot, 73.7% were unable to tell why they had diabetic complications. Prior screening for DN was done in 31.6% of patients mostly in the form of urine dipstick for protein, and measurement of serum creatinine; whereas 53.9% of patients were not aware of prior screening for DN.

Conclusion: A substantial proportions of Sudanese patients with diabetes remain far from achieving their glycemic goals. A multidisciplinary set-up for screening and management of diabetes, and its complications remains essential.

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Introduction

About 14 million individuals were estimated to have diabetes mellitus (DM) in Africa, a figure expected to rise to 28 million by the year 2030 [1]. In Sudan, no recent data is available regarding the incidence and prevalence of DM, its complications as well as patients' awareness and practice patterns. Prior reports showed that DM was associated with poor glycemic control, high prevalence of complications, low quality of life and increased morbidity [2]. Among Sudanese adults, diabetic foot was reported as the most common diabetes-related cause of hospitalization with major lower limb amputations and mortality reaching 19.2% and 6.7%, respectively [3].

Diabetic nephropathy (DN) a known complication of DM, remains a major cause of end-stage renal disease (ESRD) worldwide, as well as a major causes of death in Sudan [4-5]. The overall prevalence of chronic kidney disease (CKD) in the Sudan was estimated to range from 7.7% to 11% of the population; with 13.3% of CKD patients being diabetics [6]. Diabetic nephropathy was reported as the third most common cause of patients being on dialysis therapy in Sudan, i.e. accounting for 10.4% of all cases [4].

The study aimed to evaluate the knowledge and practice patterns regarding control of DM and occurrence of diabetic nephropathy (DN), among adult Sudanese diabetics, admitted to hospital with diabetic foot.

Methods

A cross-sectional hospital-based descriptive study was conducted in Khartoum State, the capital city of Sudan, during the period from February to April 2013. It targeted all diabetic patients admitted to the Surgical Units in three randomly selected government hospitals, namely Khartoum, Khartoum North and Alba Gadeed Teaching Hospitals. All adult diabetic patients diagnosed as having DM (type 1 or type 2) for more than one year and admitted to any of the study areas with diabetic foot were included in the study. Excluded from the study were those younger than 18 years of age, patients diagnosed as having DM for less than 12 months and those who refrained to give consent for enrollment. The diagnosis of diabetic foot was based on clinical criteria consistent with the international clinical guidelines; defined as the presence of infection in any foot wound in a patient with diabetes. Evidence of infection included the classic signs of inflammation or purulent secretions, with or without additional or secondary signs [7].

Clinical information was obtained from the Hospital Medical Records as well as by direct interviewing of patients using a specially designed questionnaire. The questionnaire included the patients' demography, diagnosis of DM, co-morbid conditions, current treatment for DM, patients' knowledge regarding diabetic complications, patients' knowledge and attitude regarding control of DM and screening for DN. Obtained data was analyzed using Statistical Package for the Social Sciences version 16.0 (SPSS, Inc., Chicago, IL, USA) computer software. Descriptive analysis was done for all variables.

The study was approved by the ethical committee of the Graduate College, University of Khartoum. Ethical clearance was obtained from the corresponding hospitals.

Results

According to the inclusion criteria 76 patients were included in the study, their mean age was 58 ± 1.01 years (range 28-82 years) and the mean age at diagnosis of DM was 49 ± 0.84 years. The majority of patients were males, from urban areas, educated, employed, married and live with families, as well as having significant family history of DM (**Table 1**). In addition to the long standing DM, various diabetic complications were seen (**Table 2**).

On questioning, 60 patients (78.9%) used to believe they were on strict diabetic diet, 61 patients (80.3%) believed they were adherent to the treatment of DM, and 62 (81.6%) said they were adherent to follow-up; despite that only 24 patients (31.6%) believed their DM was controlled. Most patients were aware that uncontrolled DM can be a cause of limb amputation, retinopathy and visual loss (**Table 3**).

The initial treatment for DM was in the form of oral hypoglycemic agents in 44 patients (57.9%). Currently, and after the development of diabetic complications most patients, 63 (82.9%), were maintained on insulin therapy. Thirty six patients (47.4%) were on hypotensive therapy, 35 (46.1%) had prior Laser therapy, 17 (22.4%) were on antiproteinuric therapy in the form of Angiotensin Converting Enzyme (ACE) inhibitors or Angiotensin Receptor Blockers (ARBs), 8 patients (10.5%) were on antiplatelets, 8 patients (10.5%) were on lipid lowering agents and 19 patients (25%) said they were having regular physical exercise.

Regarding the pattern of follow-up, 45 patients (59.2%) had been on regular follow-up for their DM, every two to six months. Most patients, 43 (56.6%), were having their follow-up with non-specialized resident physicians. Monitoring of blood sugar was via untimed random blood sugar testing in 50 patients (65.8%); only 24 patients (31.6%) had their HbA1C% monitored. Referrals for endocrinology, ophthalmology, dietitian and nephrology consults and / or follow-up were done in a limited number of patients (**Figure 1**).

Following hospital admission and the diagnosis of diabetic foot, 14 patients (18.4%) mentioned that a poor dietary control was the main reason for their current condition, 6 patients (7.9%) said that adherence to therapy was the cause; whereas 56 patients (73.7%) were unable to tell why they had diabetic complications. Further questioning regarding life style and measures to reduce the risk of diabetic complications revealed that only 27 patients (35.5%) knew their current body weight, 25 patients (32.9%) had tested their blood lipids before, 19 patients (25%) were on regular exercise; whereas 53 patients (69.7%) were non-smokers. Further knowledge regarding these issues are shown (**Figure 2**).

According to the hospital medical records and patients' history, 24 patients (31.6%) had documented previous assessment of their renal parameters. Proteinuria was tested in 22 patients (28.9%) using urine dipsticks, among these 12 patients (15.8%) were diagnosed as having proteinuria and 9 patients (11.8%) did 24 hour urine collection for protein. Twenty-nine patients (38.2%) had their blood tested for serum creatinine levels, in 9 patients (11.8%) elevated levels were reported. None of the study population had their urine being screening for microalbuminuria. The majority of respondents, 41 patients (53.9%), were not aware of any prior screening tests done for DN.

Discussion

Health services in the form of multidisciplinary care centers remain scarce in Sudan, with the personnel trained in diabetes care being very few or almost non-existent. Illiteracy, lack of health education, poverty and dominance of wrong beliefs adversely affect the management of diabetes among the Sudanese patients [4]. Prior reports estimated the overall prevalence of long-term complications in Sudanese adults, with a median duration of diabetes of 9 years, as 67% [8]. Among these the prevalence of retinopathy, neuropathy, cardiovascular disease, nephropathy, peripheral vascular disease, and cerebrovascular accidents were 43%, 37%, 28%, 22%, 10% and 5.5%, respectively [2].

Our survey showed that the majority of diabetics admitted to hospital with diabetic foot were males, who tend to have diabetic retinopathy and nephropathy as part of the generalized microvascular complication of the disease. The impact of urbanization was clearly demonstrated in our study as 68.4% of patients were from urban areas; these tend to have sedentary lifestyles, obesity and aging thus increased risk of diabetes and its complications [9-10]. On the other hand, almost 60% of our patients had primary education level or received no official education at all. It is known that the management of diabetes is dependent to a great extent on patients' ability to carry out their daily self-care; where patient's education remains an essential component to achieve this goal [10]. Various studies showed the importance of education in the management of DM [11]. Among our patients, adequate control of modifiable risk factors such as proper monitoring of blood sugar, blood pressure, lipid levels, and body weight; together with weight reduction, cessation of smoking, and having regular physical exercise were all achieved in a humble fashion.

The mean duration of DM among the study population was 8 ± 0.49 years, despite that a limited number of patients had been screened for DN; none of them had urine screened for microalbuminuria and thus early detection of DN. Proteinuria developing in diabetic patients is considered an important marker for DN though atypical presentations can occur. In patients with type 1 DM overt nephropathy and proteinuria are expected to be seen after 10 years from the onset of DM. Regarding those with type 2 DM atypical presentations are often seen, with considerable number of diabetics being diagnosed as having clinically significant CKD at the time of diagnosis of DM. These facts raises the importance of early and regular screening for DN via urine testing, measurement of serum creatinine and estimating the glomerular filtration rate [12-15].

It is essential that at the primary health care level patients are educated regarding DM and diabetic control, drug adherence, a diabetic diet, optimum blood sugar and blood pressure controls, and the ideal body weight. Adherence to therapy and use of ACE inhibitor and / or ARBs should also be considered where appropriate [16]. Screening protocols, including those directed toward early detection of kidney disease should also be implemented [16, 17].

Conclusion

In our survey, as well as in previous reports from the Sudan, it is alarming to note that a considerable proportion of patients with diabetes remain far from achieving their glycemic goals [2, 18-19]. This again raises the issue of having a multidisciplinary set-up for implementing the international guidelines of screening and management of diabetes; as well as early detection of its complications [10, 20].

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

All authors contributed fully in formatting the research proposal, data collection and analysis, as well as the manuscript editing and submission.

Tables and figures

Table 1: Characteristic features of the study population

Table 2: Co-morbid conditions seen among the study population

Table 3: Patients' awareness regarding complications of Diabetes Mellitus

Figure 1: Pattern of follow-up among the study population

Figure 2: Patients' knowledge regarding control of diabetes and prevention of its complications.

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Table 1: Characteristic features of the study population

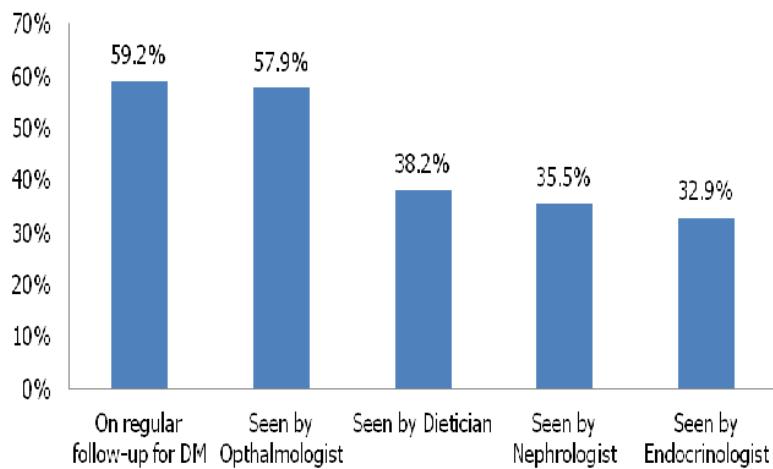
Characteristics	Frequency (%)
Total number of patients studied	76 (100%)
Male / Female ratio	45(59.2%) / 31(40.8%)
Centers of admission	
Khartoum Teaching Hospital	41 (53.9%)
Khartoum North Teaching Hospital	25 (32.8%)
Alban Gadeed Hospital	10 (13.2%)
Residency	
Urban	52 (68.4%)
Rural	24 (31.6%)
Employment	
Office work	21 (27.6%)
Laborer	15 (19.6%)
Farmer	5 (6.6%)
Unemployed	35 (46.1%)
Education	
Graduate	9 (11.8%)
High school	22 (28.9%)
Primary school	34 (44.7%)
None	11 (14.6%)
Married	31 (40.7%)
Family history of Diabetes mellitus	64 (84.2%)

Table 2: Co-morbid conditions seen among the study population

Co-morbid conditions	Frequency	Mean duration
Diabetes mellitus	76 (100%)	8 ± 0.49 years
Diabetic retinopathy	43 (56.6%)	2 ± 1.76 years
Hypertension	36 (47.4%)	4 ± 1.4 years
Peripheral vascular disease	8 (10.5%)	1 ± 0.55 years
Ischemic heart disease	6 (7.9%)	1 ± 0.81 years
Diabetic nephropathy	21 (27.6%)	3 ± 0.26 years
Multiple co-morbid conditions were seen in some patients		

Table 3: Patients' awareness regarding complications of Diabetes Mellitus

Diabetic complications	Aware patients (%)
Amputations	69 (90.8%)
Retinopathy	57 (75%)
Blindness	57 (75%)
Neuropathy	49 (64.5%)
Ischemic heart disease	48 (63.2%)
Chronic Kidney disease	44 (57.9%)
Cerebrovascular accidents	43 (56.6%)
Proteinuria	39 (51.3%)
Some patients were aware of more than one complication	

**Figure 1:** Pattern of follow-up among the study population

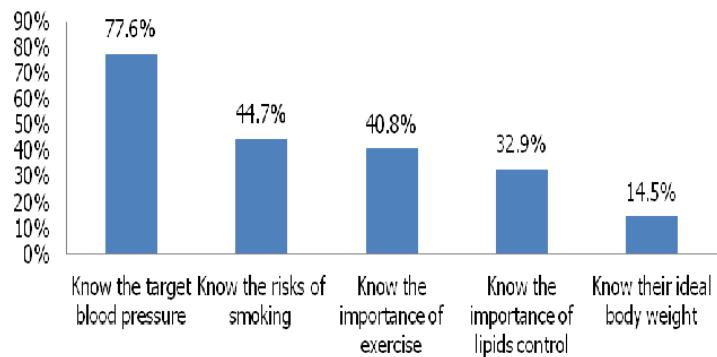


Figure 2: Patients' knowledge regarding control of diabetes and prevention of its complications.