A 7-year retrospective study of diabetes-related deaths in a Nigerian tertiary hospital

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Abstract

A total of 362 diabetics were admitted over a 7-year period (January 1995 to December 2002) to a Nigerian tertiary hospital. Forty (40) of these (8.8%) died as in-patients. Twenty-six (26) were male and 14 were female. Thirteen (32%) were newly diagnosed with diabetes. Seventy percent (70%) of deaths occurred within 1 week of admission. A case-controlled study of the diabetic deaths revealed that presentation with any of the following were associated with in-patient death: diabetic emergencies ($p<0.001$), infective process ($p<0.001$), fever ($p<0.001$), systolic hypertension ($p=0.001$), and short duration of hospitalisation ($p=0.001$). It is suggested that greater awareness of diabetes and education of newly diagnosed cases may reduce this high mortality. In addition, the national health insurance system should cover all disease care, including diabetes.

Introduction

Diabetes mellitus is a significant cause of morbidity and mortality worldwide. It is common in African communities.[1,2] Morbidity and mortality is higher among diabetic patients when compared with the general population. Leading causes of death in the developing world include infection and acute metabolic complications,[3] in contrast to coronary artery disease and cerebrovascular disease in the developed world.[4] Socio-cultural peculiarities in Africa may contribute to morbidity and mortality.

Reducing morbidity and mortality and improving the quality of life for persons with diabetes are challenges for healthcare providers as well as public health practitioners.[5]

It is in view of this challenge that we have studied the pattern of diabetes-related deaths in one of Nigeria's tertiary health institutions. The study looks at the causes, pattern, and factors contributing to diabetic mortality among patients admitted to the medical wards.

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Patients and methods

The medical records of all admissions into the medical wards of the Federal Medical Centre, Owo, Ondo State, Nigeria, from January 1995 to December 2002 were retrieved and studied. All cases with the diagnosis of diabetes were selected. The records of those that died while in hospital were studied and compared with the records of a randomly selected age- and sex-matched diabetic patient group who were admitted during the same period, and who did not die (to serve as a control group).

The data collected included age and gender, duration of diabetes, and blood pressure using the JNC 7 criteria.[6] In addition, body temperature and the type of diabetic emergency present were recorded. Type of infection identified at presentation, with or without any systemic complication, was noted. The duration of hospitalisation and cause(s) of death (for those who died during admission) were also noted. Regarding causes of death, 'diabetic emergencies' (ketoacidosis, hyperosmolar coma, and hypoglycaemia) were grouped together. Regularity of the patient's clinic attendance was also recorded. A patient was considered regular if she/he attended clinic with no record of default.

Selection criteria used for the cases of diabetes mellitus included the following:

- known history of diabetes;
- history consistent with diabetes and a random blood glucose ≥11.1 mmol/L, or a fasting plasma glucose ≥7.0 mmol/L, or a 2-hour plasma glucose ≥11.1 mmol/L;
- death resulting from diabetes while in the hospital (for those that died during admission).

The data collected were subjected to simple descriptive statistical analysis, using means, standard deviation and frequencies and percentages. Differences between mean values were tested using Student's t-test. The Chi-square test was employed to test the relationship between proportionate variables. Statistical significance was set at $p<0.05$.

Results

During the study period, a total of 4174 patients were admitted into the medical wards. The mean (±SD) annual admission rate was 521 ± 43 patients. Three hundred and seventy-six (376), i.e. 9.7% were diagnosed as cases of diabetes. Four hundred and fifty-four (454) deaths were recorded during the study period, and 40 (8.8%)

Table 1 Age and sex distribution of the deceased patients and controls

	Deceased patients			Controls		
Age group (years)	M n (%)	F n (%)	Total n (%)	M n (%)	F n (%)	Total n (%)
10–29	2 (5.0)	4 (10.0)	6 (15.0)	2 (5.0)	4 (10.0)	6 (15.0)
30–49	6 (15.0)	2 (5.0)	8 (20.0)	5 (12.5)	2 (0.5)	7 (17.5)
50–69	10 (25.0)	6 (15.0)	16 (40.0)	11 (27.5)	6 (15.0)	17(42.5)
70–89	7 (17.5)	2 (5.0)	9 (22.5)	6 (15.0)	2 (0.5)	8 (20.0)
90–100	1 (2.5)	–	1 (2.5)	1 (2.5)	–	1 (2.5)
Total	26 (65.0)	14 (35.0)	40 (100)	26 (65.0)	14 (35.0)	**40 (100)**

were amongst diabetic patients. Twenty-six (26) of the diabetic deaths were male (65%), while 14 (35%) were female (male:female ratio of 2:1). Eleven (11) had type I diabetes. The diabetic group's ages ranged from 17–90 years (mean 53±19 years).

Table 1 shows the age and gender distribution of the patients and controls. Table 2 shows baseline characteristics of the study group and controls. Twenty-six patients (65%) – 22 males and 4 females – had diabetes co-existing with hypertension. Systolic blood pressure (SBP) was 169±32 mmHg and diastolic blood pressure (DBP) was 96±19 mmHg. The duration of diabetes ranged from 2 months to 13 years, with a mean of 5 years for known cases of diabetes.

Mean body temperature on admission was 38.16^{0}C (range 35.0–39.7°C). As many as 28 patients (70%) presented with an infective process (urinary tract infection, diabetic foot disease, chest infection, or unidentified source). Duration of hospitalisation ranged from 1 hour to 30 days with a mean of 7 days.

Fifty percent (50%) of patients who died did so within 72 hours of admission, while 70% died within 1 week of admission; 13 newly diagnosed patients had a shorter duration of hospitalisation with almost half dying within 72 hours of admission. The causes of death among those that died were: diabetic emergencies, nine cases (22.5%); septicaemia, seven cases (17.5%); also renal failure, sepsis, cerebrovascular disease, and diabetic emergencies with sepsis – all the latter contributing five cases each, respectively (50%).

Table 3 shows the comparison of medical parameters between the diabetic deaths and controls. Thirteen patients in each group were diagnosed with diabetes for the first time at admission. Factors found to have positively contributed to death in the study group, when compared with controls, were:

- infection at presentation (p<0.001);
- systolic hypertension (p=0.001);
- fever (p<0.001);
- short duration of hospitalisation (p=0.001);
- presentation with any diabetic emergency (p<0.001).

Regular clinic attendance was not associated with a favourable outcome, in fact more patients that died compared with controls had regular clinic attendance (p<0.001). Table 4 shows the causes of death. Diabetic emergencies followed by sepsis were the most common causes of death.

Table 2 Baseline characteristics of the deceased patients and controls (means±SD)

		Deceased patients (n=40)	Controls (n = 40)	Significance
Sex	Male Female	26 (65%) 14 (35%)	26 (65%) 14 (35%)	pNS pNS
Diabetes type	Type I Type 2	11 (27.5%) 29 (72.5%)	10 (25%) 30 (75%)	pNS pNS
Age (years)		53±19	53±19	pNS
Duration (years)			5±4	6±7 pNS

Discussion

The death rate of 8.8% obtained in this study is similar to other studies previously conducted in Nigeria.[7] In one of these studies it was noted that the high mortality may have been due to chronic default from clinic, as well as ignorance about diabetic symptoms.[7] Many Africans and family members of diabetic patients are ignorant of diabetic symptoms and their treatment.[8–10]

In two separate studies carried out in Tunisia[8] and Cameroon,[9] it was found that there was limited knowledge of diabetes among patients. Relations of diabetic patients lacked adequate knowledge about the disease, leading to poor care and treatment at home.[10] In the present study, when diabetic deaths were compared with age- and sex-matched controls, it

Table 3 Comparison of medical parameters in deceased and control patients

	Deceased patients (n=40)	Controls (n = 40)	Significance
Hypertensive patients	26 (65%)	20 (50%)	pNS
Systolic BP	169±23	153±17	p=0.001
Diastolic BP	96±19	94±11	pNS
Febrile patients	21 (52%)	7 (17%	p=0.0001
Diabetic emergencies	26 (65%)	9 (22%)	p<0.001
Duration of hospitalisation (days)	7±8	13±9	p=0.001
Signs of infection	28 (70%)	6 (15%)	p<0.001
Regular clinic attendees	18 (45%)	7 (17%)	p<0.001

Notes
BP is given in mmHg.
Means are given with standard deviations.

Table 4 Causes of death

Causes	Number (%)
Diabetic emergencies	9 (22.5)
Sepsis	7 (17.5)
Sepsis + acute renal failure	5 (12.5)
Cerebrovascular disease	5 (12.5)
Diabetic emergencies + sepsis	5 (12.5)
Diabetic nephropathy	5 (12.5)
Diabetic emergencies + acute renal failure	2 (5)
Sepsis + cerebrovascular disease	1 (2.5)
Respiratory failure	1 (2.5)
Total	**40 (100)**

was found that only systolic blood pressure, fever, presentation with a diabetic emergency, short period of hospitalisation, and signs of infection were significantly associated with in-hospital death. These findings contrast sharply with previous studies, suggesting that newly diagnosed patients and clinic defaulters were those most likely to die in hospital.[7]

Interestingly both our groups had the same number of newly diagnosed patients, further strengthening the fact that being diagnosed on admission for the first time may not be a strong parameter for intra-hospital death. These findings agreed with those of Kolawole and Ajayi,[11] which involved 51 hypertensive type 2 patients, and compared them with 54 normotensive type 2 patients over a period of 15 months. In-hospital death was strongly associated with those who had stroke, hyperosmolar non-ketotic diabetic coma (HONK), and a Glasgow Coma Scale (GCS) less than 10. High mortality was observed more amongst males than females, as well as amongst hypertensive rather than normotensive patients. The findings in our study further corroborate those of Kolawole and Ajayi, in that male patients were more likely to die, and also had a higher co-morbidity with hypertension than their female counterparts.

Conclusion

We concluded that diabetes in Nigeria is still associated with high mortality, especially among those presenting to health facilities with infections, diabetic emergencies, and hypertension. Furthermore, diabetic emergencies and sepsis (as previously observed by other researchers) continue to take their toll as a major causes of death in diabetic patients.

It is recommended that improved community-based education of diabetic patients, good laboratory services, and treatment facilities may help to reduce this excess hospital mortality. Improvement in the living conditions of Nigerians through the introduction of social securities, and expansion of the National Health Insurance scheme to cover diabetes, would also help reduce morbidity and mortality of the disease in Nigeria.

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