Prevalence, risk factors and awareness of hyperglycaemia in Mafia Island, Tanzania

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Abstract

Type 2 diabetes is of increasing prevalence and importance in Africa. We have surveyed a total of 570 adults in the Mafia Archipelago in Tanzania. Data were collected through questionnaires, anthropometric measurements, blood pressure, and random blood glucose measurements. Twenty seven percent (27%) of the participants were aged between 41 and 50 years and the male:female ratio was 1.05:1.00. Most (53%) of the participants had primary level education, while 28% had no formal education. Moderately elevated random blood glucose (RBG) was seen in 6.7% of the participants (10.0–20.0 mmol/l), while 2.5% had a severely elevated RBG (>20.0 mmol/l). In addition, a further 1.0% had known diabetes, but with a normal (<10.0 mmol/l) RBG. This gives a total prevalence of type 2 diabetes of 10.2%. This was significantly associated with increasing age, higher body mass index (BMI), and a family history of diabetes. We conclude that there is a high prevalence of diabetes in this area of Tanzania. Many patients were unaware of the diagnosis and/or had significant hyperglycaemia. There is an urgent need for raised awareness and greater availability of screening and treatment.

Introduction

Diabetes mellitus is now a rapidly emerging condition across the globe, and contributes to high morbidity and mortality due to the serious complications it is known to have. Type 2 diabetes is a complex disorder characterised by increased resistance to insulin or impaired secretion of insulin. The strongest known risk factors include obesity, physical inactivity, unhealthy diet, and a family history of diabetes.[1–4] This is an under-prioritised disease, especially in low-income countries.[5] The 2010 International Diabetes Federation Atlas found that only four African countries possessed data, which is crucial for planning and implementation of prevention and control of diabetes.

The prevalence of type 2 diabetes is rising rapidly, particularly in the developing world. The prevalence is higher in men than in women, and particularly high in those over 65 years old.[6] Surveys conducted in 75 Oriental communities showed prevalence rates of 14–20%.[7] The prevalence of diabetes in Africa ranges from 2.5% in Seychelles to 16.0% in the Democratic Republic of Congo.[8,9] A 1984 study in Tanzania showed a diabetes prevalence of 1.6%,10 but it is likely to be much higher now. We have therefore undertaken a prevalence study in the Mafia District of Tanzania.

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Methods

A cross-sectional study was carried out in Mafia Island, Tanzania from 13 to 16 October 2011. The population of the Mafia District is 40 801.[11] The economy is based on fishing and subsistence agriculture. Mafia's infrastructure is limited: it has electricity only in the district capital and in Utende. The vast majority of Mafia's population is extremely poor.[12]

An Eye and Medical Camp was held at a primary school compound in which questionnaires were completed by medical students, medical personnel, and research assistants. Measurements were done by medical students and medical personnel only. Using a questionnaire in Kiswahili, information was collected on demographics, smoking habits, alcohol consumption, family history of diabetes and hypertension, and personal medical history (only a diagnosis made by a doctor was considered) including drug treatment. Treatment was defined by the use of oral antidiabetic agents. Diabetes was considered to be controlled if the random blood glucose (RBG) was less than 10.0 mmol/l among those receiving medication.

Anthropometric measurements (weight and height) were taken, and body mass index (BMI) calculated. Weight was taken using a regular weighing machine after removal of shoes and excess weight in pockets, while height was taken using a measuring board resting on the wall. Weight was calculated to the nearest 0.5kg and height to the nearest 1cm. RBG measurements were taken using an Acucheck metre after swabbing the finger of the client and puncturing with a sterile disposable lancet. Data were entered and processed in SPSS version 17.

Permission to conduct the study was obtained from the School of Medicine at Muhimbili University of Health

and Allied Sciences. In addition, permission was sought from responsible authorities in Mafia Island.

Anormal RBG was defined as 3.5–10.0 mmol/l, elevated RBG was 10.1–20.0 mmol/l, and severely elevated was >20.1 mmol/l. Patients were assigned as underweight, normal weight, overweight, obese and morbidly obese with BMI values of <18.5, 18.5–25.0, 25.1–30.0, 30.1–40.0, and >40.1 kg/m^2 respectively.

Results

A total of 570 participants were enrolled, of whom 30 (5.3%) were known to have diabetes. Of these 30 participants, 24 (80%) were on oral antidiabetic medication (six had an RBG <10.0 mmol/l, 10 had an RBG of 10.1–20.0 mmol/l, and eight had an RBG >20.1 mmol/l). This pattern of glycaemia was not dissimilar to the six with known diabetes who were on no medication (p=0.343).

Among the total 570 participants, 518 (90.8%) had a normal (<10.0 mmol/l) RBG, 38 (6.7%) had an elevated (10.1–20.0 mmol/l) RBG, and 14 (2.5%) had a severely elevated (>30.1 mmol/l) RBG. Thus, a total of 52 (9.2%) had levels of RBG compatible with a diagnosis of diabetes. Adding to this figure, the six with known diabetes who had a RBG <10.0 mmol/l, this gives a total prevalence of 58/570 or 10.2%.

Table 1 shows details of gender, age, educational status, family history of diabetes, BMI, smoking, and alcohol consumption, all stratified by normal, elevated and severely elevated RBG levels. Higher RBG levels were associated with higher age, positive family history, and raised BMI (all p<0.05).

Discussion

In our screening programme of a large number of individuals, 6.7% had an elevated RBG (10.1 –20.0 mmol/l), and 2.5% a severely elevated RBG (>20.0 mmol/l) – a total of 9.2%. In addition, a further 1.0% were known to have diabetes, but had a normal RBG on screening.

	Normal RBG <10.0 mmol/l (n=518)	Elevated RBG 10.1–20.0 mmol/l (n=38)	Severely elevated >20.1 mmol/l (n=14)	Significance
Gender				
Male	252 (90%)	20 (7%)	8 (3%)	p=0.743
Female	266 (92%)	18 (6%)	6 (2%)	
Age				
<40 years	196	6	2	
40–50 years	146 (95%)	8 (5%)	0 (0%)	p<0.05
>50 years	176	24	12	
Educational status				
No formal	148	8	4	
Primary	272	22	10	p=0.448
Secondary	86	8	0	
College	12	0	0	
Family history				
Yes	104	14	10	p<0.05
No	76	10	0	
Don't know	338	14	4	
Awareness of diabetes				
Yes	6	14	10	p<0.05
No	24	2	0	
Don't know	488	22	4	
BMI				
Underweight	24 (92%)	2 (8%)	0 (0%)	p<0.05
Normal	240 (94%)	8 (3%)	6 (2%)	
Overweight	154 (87%)	18 (10%)	6 (3%)	
Obese	96 (92%)	6 (6%)	2 (2%)	
Morbidly obese	4 (50%)	4 (50%)	0 (0%)	
Smoking				
Yes	46 (100%)	0 (0%)	0 (0%)	p=0.081
No	472 (90%)	38 (7%)	14 (2%)	
Alcohol				
Yes	32 (89%)	2 (5.5%)	2 (5.5%)	p=0.451
No	486 (91%)	36 (6.7%)	12 (2.2%)	

Table 1. Details of patients stratified by random blood glucose (RBG)

This makes a very high total of 10.2% with likely type 2 diabetes; much higher than previous local estimates.

Hyperglycaemia was associated with increased age and this was statistically significant ($p<0.05$). It was also significantly associated with increased BMI ($p<0.05$). There was positive correlation with a family history of diabetes ($p<0.05$). Sedentary lifestyle, poor diet, and low level of awareness may be contributing factors for this, although level of education was not statistically significant ($p=0.448$) in this study. There was no significant relationship between glycaemia and smoking or alcohol use ($p=0.451$), or with gender ($p=0.743$).

Out of the 30 participants who were aware of having diabetes, only six (20%) had a controlled RBG. Fourteen (47%) had an RBG of 10.1–20.0 mmol/l, while 10 (33%) had an RBG of more than 20.0 mmol/l. In addition, 24 (80%) out of the 30 known diabetic patients were taking oral antidiabetic agents, while the remaining 6 were not. Although this was not statistically significant ($p=0.343$), this suggests poor control, which may be due to numerous factors including lack of follow-up, low level of education (particularly health education), and non-compliance with oral agents.

In this survey in Mafia Island, 10.2% had diabetes, much of which was not known. This is alarming and therefore there is a need to raise awareness and availability of screening, treatment and follow-up. This study can also act as a baseline for more studies to be undertaken and more evidence to be gathered.

From the prediction of the rise in non-communicable diseases (NCDs), to the actual prevalence rates, poor awareness and poor control, together with the lack of priority given to NCDs, there is a clear message: 'The best time to put emphasis was yesterday, the next best is today'. Health education is of the utmost importance; it should be initiated by health professionals using whatever means possible. This can only be envisioned if priority is given to NCDs by governments and necessary funds are allocated.

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Author declaration

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