Cardiovascular risk factors in type 2 diabetic patients in Libreville, Gabon

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Abstract

We have evaluated cardiovascular risk in type 2 diabetic subjects living in Gabon. We conducted a cross-sectional study including all type 2 diabetes patients in two medical centres in Libreville, Gabon. After consent, we obtained data on demography, complications, and glycaemic and lipid status. There were 1300 type 2 diabetic patients. Hypertension was present in 35%. Alcohol and tobacco were used by 29% and 11% of patients, respectively. Only 14% practised sport and 50% of patients were not on any particular diet. Neuropathy affected 27%, followed by retinopathy (6%), nephropathy (4%), and large vessel disease (4%). Overweight affected 55%, 53% were hypercholesterolaemic, and 4% hypertriglyceridaemic. Reduction of high-density lipoprotein (HDL) cholesterol was seen in 64% of patients. Mean HbA_{1c} was 9.3%, with 70% having levels over 7.5%. We conclude that the risk factor profile is not optimal in this population. In order to improve the treatment of type 2 diabetic patients, an effort must be made to adopt international guidelines, and educational initiatives must be encouraged.

Introduction

Diabetes is considered a metabolic epidemic.[1] In 1995, the number of diabetic patients worldwide was estimated at 135 million. In 2003, there were estimated to be 189 million, and the projections are 221 million for 2010 and 324 million for 2025, which corresponds to 6.3% of the world population.[2] In Africa, older studies have reported low prevalence rates,[3] but more recently rates reported are around 1% to 2% in rural zones and 1% to 6% in urban areas.[4,5] In Gabon, the prevalence was between 0.3 and 0.7% from 1990 to 1994.[6] Type 2 diabetes, which corresponds to 90% of all diabetes, constitutes the major part of that public health problem,[7] and is associated with an important morbidity and mortality.[8]

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Vascular disease dominates the pathogenesis of these complications. Amongst these, microangiopathy appears to be the most common, as about 80% of type 2 diabetic patients will develop these complications in the course of the evolution of their illness.[9]

The management of cardiovascular risk factors, by treating hypertension and dyslipidaemia, weight reduction, and modification of lifestyle habits, constitute an important part of type 2 diabetes management. Some authors consider that this could be more effective and less expensive than the management and treatment of hyperglycaemia.[10]

The present study aimed to evaluate the extent of cardiovascular risk in type 2 diabetic patients living in Libreville, and to estimate the effectiveness of their management.

Patients and methods

This was a prospective study between January and October 2010 in Libreville, Gabon. Patients were recruited from the Endocrinology Service of the principal hospital (the Libreville Medical Center) and the biochemical laboratory of the Medical School (University of Health Sciences). The study concerned all ambulatory and treated type 2 diabetes patients seen consecutively in these centres during the course of the study. Patients with type 1 diabetes, gestational diabetes, or other secondary diabetes, along with those who refused to sign the free enlightened consent, were excluded. Patients were given a questionnaire enquiring about diet and exercise habits, as well as smoking and drinking. Body mass index (BMI) was determined for each subject. Underweight was set as a BMI under 18.5 kg/m², normal weight corresponded to a BMI between 18.5 and 24.9 kg/m², while overweight and obesity were defined by BMIs from 25.0 to 29.9 and over 30 kg/m², respectively. Hypertension was defined by a systolic and/or diastolic blood pressure over 130 and 80 mmHg, respectively, and/or the use of an antihypertensive drug.[11] Macroangiopathy was defined as past or present angina or myocardial infarcts, intermittent claudication, peripheral pulse loss, or an ischaemic electrocardiogram (ECG). Peripheral neuropathy was determined by ankle and knee reflexes, and sensory loss. Retinopathy was recorded from the patient's notes. Nephropathy was defined by the presence of dipstick proteinuria.

Venous blood was taken for analysis of glucose,

cholesterol, triglyceride, and high-density lipoprotein (HDL)-cholesterol levels. Low-density lipoprotein (LDL)-cholesterol was calculated using the Friedewald formula.[12] Glycated haemoglobin (HbA_{1c}) was measured by affinity chromatography.

Hypercholesterolaemia was defined by the Agence Française de Sécurité Sanitaire des Produits de Santé and the Haute Autorité en Santé in 2006, as LDL cholesterol >3.6 mmol/L and triglycerides <1.8 mmol/L. Hypertriglyceridaemia was a triglycerides level >1.8 mmol/L and LDL cholesterol <3.6 mmol/L. Mixed dyslipidaemia was LDL >3.6 mmol/L and triglycerides >1.8 mmol/L.[13]

We used the medium and one standard deviation (SD) for quantitative results, and frequency for qualitative results. Relations between these two variables were tested using the non-parametric Kruskal–Wallis test. Correlations between quantitative results were assessed using the Spearman Rho test. Differences were considered statistically significant if p was less than 0.05.

Results

There were 1300 patients, of whom 699 were women (54%) and 601 men (46%). Mean age was 53±11 years (range 31–84), with no difference between men and women. Most patients were from Gabon (91%), while others were from Cameroon and West Africa. Demographic and biochemical results are shown in Table 1.

Table 1 Demographic and biochemical results in study population (means ±SD)

Age	53±11
Abdominal circumference (cm)	104.2±14.4
Weight (kg)	75.7±15.6
BMI (kg/m^2)	28.0±6.0
Systolic BP (mm)	141±17
Diastolic BP (mm)	87±9
Hypertension (BP>130/80)	454 (35%)
Total cholesterol (mmol/L)	5.2±1.6
Triglycerides (mmol/L)	2.0±0.9
LDL cholesterol (mmol/L)	3.2±1.9
HDL cholesterol (mmol/L)	1.5±0.3
HbA_{1c} (%)	9.3±1.2

The mean BMI was 28.0±6.0 kg/m^2; 383 (29%) patients were obese, with a total of 55% overweight or obese. Of this latter group, females were heavier than males (32.6 vs 29.4, p=0.009).

Of the total population, 84% were on oral hypoglycaemic agents (OHA) and 10% on insulin. Only 2% were on statin drugs. HbA_{1c} was >7.5% in 76% and >10.0% in 35%. There were 28% with a family history of diabetes.

The pattern of dyslipidaemia (as defined in the 'Methods' section) is shown in Table 2. Overall, 69% had some pattern of abnormal lipid levels

There were 542 (42%) patients with chronic diabetic complications. The most frequent was neuropathy (27%), followed by retinopathy (6%) and nephropathy (4%). Patients with neuropathy and retinopathy tended to be older than those without, which was not the case with nephropathy or macroangiopathy (see Table 3).

Table 2 Pattern of dyslipidaemia

Pattern of dyslipidaemia	Number (%)
Hypercholesterolaemia	689 (53%)
Hypertriglyceridaemia	58 (4%)
Mixed hyperlipidaemia	157 (12%)
Normal profile	396 (31%)
Total	1300

Table 3 Comparison of mean age of patients with and without chronic complications

Complications	Present (mean age)	Absent (mean age)	p value
Retinopathy	61 years	53 years	0.0127
Nephropathy	57 years	53 years	0.346
Neuropathy	60 years	51 years	0.0001
Macroangiopathy	67 years	53 years	0.1092

The questionnaire survey showed that 374 (29%) used alcohol (more common in men – 40% vs 15%, p=0.002). Tobacco was used by 138 (11%), and 88 (7%) used both tobacco and alchohol. Only 404 (31%) were on a low-calorie diet, and 226 (17%) were on a low-calorie and salt-free diet. Nibbling between meals was practised by 304 (23%) – more commonly in women (77% vs 23%, p=0.036). Only 178 (14%) undertook regular sport, more commonly in men (20% vs 3%, p=0.0001).

Discussion

We have shown that the mean age of our type 2 diabetic patients was 53 years, ranging from 34 to 84 years. This is similar to that observed by other researchers. Indeed, Ntyonga-Pono and colleagues found a predominance of patients 40 to 60 years old.[6] In Cameroon, where lifestyle habits are similar, Ducorps and colleagues noted a range of 49±11 years for type 2 patients;[14] and Oga et al, in Côte d'Ivoire recorded 50 years.[5] These results confirm that type 2 diabetes is affecting young adults and older subjects in Gabon. Interestingly, Barruet and Gbadoe reported type 2 diabetes in children aged from 11 to 15 years in Togo,[4] and Theintz has made similar observations in Switzerland.[15] That reduction in age of type 2 diabetes is probably related to the adoption of a Western lifestyle, reduction of energy expenditure, and a growth in obesity. These factors are increasing everywhere in Africa and particularly in Gabon, and need urgent attention to reduce type 2 diabetes prevalence.

Our population comprised 601 men and 699 woman (sex ratio 0.86). A previous study in our area described a ratio of 2–3,[16] and work from Cameroon described a ratio of 1.6. Overall, this suggests an increase in diabetes

prevalence amongst women.

A large number of our patients were hypertensive (35%), though rates are higher in some African countries – for example 55% in Eritrea.[17] Our questionnaire survey showed significant rates of smoking and alcohol use, poor dietary habits, and low rates of exercise. All of these factors will expose our patients to increased cardiovascular risk.

In our subjects, we observed 29% to be obese, and 26% overweight. In France, the study called 'Echantillon National Témoin Représentatif des Personnes Diabétiques' (ENTRED) showed that the prevalence of obesity was 36%, while 41% of diabetic patients were overweight.[18] The lower rates in our study suggest the presence in Africa of type 2 diabetes without overweight.[19] Nevertheless, the relationship between obesity and diabetes is underlined here, particularly in women.[20]

We found 42% of our patients to have established diabetic complications – most commonly neuropathy. Patients with neuropathy and retinopathy tended to be older than those without. Nephropathy was relatively uncommon in our study, compared with France[18] and some other parts of Africa.[21]

Dyslipidaemia was common in our patients, and statin use very low. Our rate of isolated hypercholesterolaemia was 53%, which is even higher than in the French ENTRED study,[18] which reported 21%. Also, 64% of our patients had low HDL-cholesterol levels, increasing vascular risk further. As well as low statin use (perhaps because of cost), no patients were on antiplatelet therapy, which is inexpensive and may contribute to cardiovascular risk reduction.[22] National guidelines for the management of diabetes, such as in South Africa,[23,24] may be very helpful. However, application of such guidelines does depend on adequate drug supply and availability.

We conclude that type 2 diabetic patients in Libreville have sub-optimal glycaemic,[25] lipid, and blood pressure control. Cardiovascular risk needs to be reduced in these patients, by vigorous educational initiatives, and the adoption of international guidelines for care.

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