Family history as a risk for early-onset type 2 diabetes in Kenyan patients

G N Kiraka, N Kunyiha, R Erasmus, P J Ojwang

Abstract

Early-onset type 2 diabetes is regarded as disease occurring before the age of 40 years. It is well described, and increasing in prevalence, but there is little information from Africa. We therefore assessed the prevalence of early-onset type 2 diabetes in Nairobi, Kenya; and investigated its association with family history. Of 140 patients with type 2 diabetes, 33 (24%) had an early onset. There was a positive family history of diabetes in 85% of those with early onset, compared with 56% of those with usual onset (p=0.009). This suggests that relatives of those with early-onset type 2 diabetes should have regular diabetes screening.

Introduction

Early-onset type 2 diabetes refers to type 2 diabetes diagnosed in patients before the age of 40 years.[1] Recent diabetes surveys show a drastic change in age clustering of diabetes incidence, with a growing number of adolescents and young adults being diagnosed with type 2 diabetes in developed and developing countries.[2–4] Risk factors associated with early onset of type 2 diabetes include genetic factors, strong family history, race/ethnicity, and the various features of metabolic syndrome – i.e. abdominal obesity, hyperlipidaemia, and hypertension.5,6 Studies suggest that a higher prevalence of these clinical risk factors are found in early-onset type 2 diabetes patients compared with those with a more usual age of onset. This is in part due to changes in lifestyle and dietary patterns that predispose to an early onset of insulin resistance, and the development of the metabolic syndrome in younger patients.[5] As a result, the incidence of type 2 diabetes in young adults before the age of 40 years is markedly on the rise.

Patients with early-onset type 2 diabetes make up between 9 and 36% of all type 2 diabetes patients in various ethnic populations studied.[5] In Mexican Hispanics the prevalence has been described as 21%, while among Chinese patients the prevalence of early-onset type 2 diabetes was found to be 29%.[7,8] Increasing prevalence of early-onset type 2 diabetes has led to studies investigating and describing risk factors that may be associated with this younger age of onset. However, very few of these studies have focused on patients of African origin.

Diabetes is a potentially inherited disease and the presence of family history is a known risk for early development of disease. The risk of type 2 diabetes among offspring with one diabetic parent has been shown to be 3.5 times higher, and for those with two diabetic parents it is 6 times higher compared with the offspring of parents without diabetes. Having a parent who developed diabetes before the age of 30 is in itself a major risk factor for early-onset diabetes in their offspring. In black South Africans, a family history of a diabetic relative was demonstrated in the majority of patients, regardless of aetiological subtype, though more strongly suggestive of a genetic or inherited mode of transmission of type 2 diabetes, especially on the maternal side.[9] In Singapore, 80% of patients with early-onset type 2 diabetes reported a positive family history.We aimed to demonstrate an association between family history and age of onset of type 2 diabetes in a cohort of Kenyan patients.

Methods

This cross-sectional study was carried out from February 1, 2012 to April 30, 2012. The study was conducted at the diabetic clinic of the Aga Khan University Hospital, Nairobi, Kenya.

All patients attending the clinic who were aged 18 years and above with a clinical diagnosis of type 2 diabetes were eligible to participate. Exclusion criteria included type 1 diabetes, gestational diabetes, and diabetes resulting from secondary endocrine causes, e.g. thyrotoxicosis, Cushing's syndrome, acromegaly, or steroid use.

Patients were recruited by consecutive sampling. All patients meeting the inclusion criteria had a detailed explanation of the study aims and procedures, after which written consent to participate in the study was obtained. A questionnaire was administered to the patients by the principal investigator or primary physician via a face-to-face interview designed to record age at diagnosis, duration of disease, and family history of diabetes. For the purposes of the study, early-onset type 2 diabetes was defined as having diabetes with onset before the age of 40 years. The study was approved by the Aga Khan University Hospital Scientific and Ethical Review Committees.

G N Kiraka, N Kunyiha, and P J Ojwang, Aga Khan University Hospital Nairobi, Kenya; R Erasmus, University of Stellenbosch, South Africa
Correspondence to: G N Kiraka.
gkiraka@yahoo.com

Results

Of 140 patients who consented to participate, 59% were male. The mean age of the patients was 55 years, and mean age at diagnosis was 48 years. The mean duration of disease was 7 years. The number of patients with early-onset type 2 diabetes in this study was 33 (24%). The distribution of patients by age of onset of diabetes is shown in Figure 1.

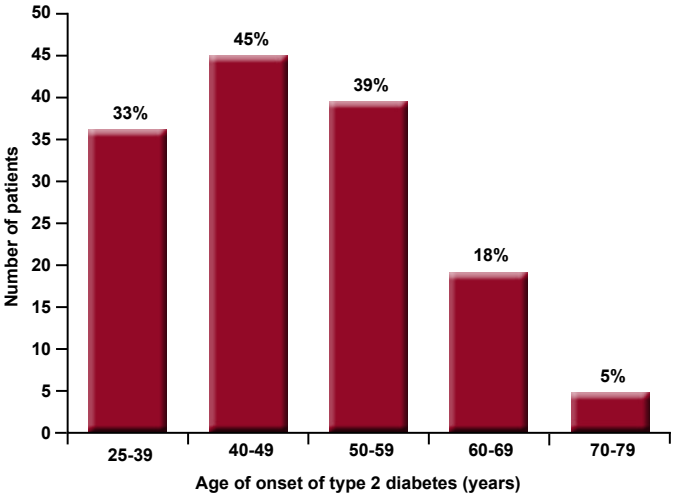

Figure 1 Age of diabetes onset compared with age groups

Figure 1. Age of diabetes onset compared by age

In all, 88 out of 140 patients reported having at least one relative with type 2 diabetes. This was higher for the early-onset group than the usual-onset group. A patient with early-onset type 2 diabetes was 3.6 times more likely to have a diabetic relative compared with a patient with usual-onset diabetes. This association was statistically significant ($p<0.009$). Patients with early-onset type 2 diabetes were 3.9 times more likely to report a first-degree relative (parent, sibling, or child) with diabetes. Having two diabetic relatives was also associated with early- onset diabetes with an odds ratio of 5.1 ($p<0.017$). Patients with early-onset type 2 diabetes were also 2.7 times more likely to report more than three relatives with diabetes, although this association was not statistically significant ($p<0.137$). These results are summarised in Table 1.

Discussion

Early-onset type 2 diabetes was found in 24% (95% confidence interval (CI) 17-33%) of type 2 diabetes patients in our institution. This suggests a high incidence in our population. There was a strong association between family history and early onset of type 2 diabetes, and an increased risk for patients with a first-degree relative with type 2 diabetes, and for patients having two relatives with type 2 diabetes.

A positive family history of type 2 diabetes was present in 63% of patients. It is generally expected that the rates of a positive family history will be higher for diabetic patients as reported in South African blacks where 27% of diabetic patients had a diabetic relative compared with 3% of healthy controls.

Family history of type 2 diabetes was associated with early onset of disease, as was having a first-degree relative with diabetes and having two or more relatives with

	Early-onset type 2 diabetes (n=33)	Usual-onset type 2 diabetes (n=107)	Odds ratio	95% confidence interval	p value
Positive family history	28 (85%)	60 (56%)	3.58	1.37-9.36	0.009
Family history: at least one first-degree relative	23 (70%)	45 (42%)	3.92	1.46-10.52	0.007
Family history: at least one second-degree relative	5 (15%)	15 (14%)	2.56	0.68-9.59	0.164
Family history: one relative	17 (51%)	37 (35%)	3.52	1.26-9.83	0.016
Family history: two relatives	6 (18%)	9 (8%)	5.11	1.34-19.48	0.017
Family history: three or more relatives	5 (15%)	14 (13%)	2.74	0.72-10.34	0.137

Table 1 Association of family history with age of onset of diabetes

diabetes. Eighty-five per cent (85%) of the early-onset group reported at least one diabetic relative compared with 56% of the usual-onset group. In a similar African study, family history was an independent risk factor for type 2 diabetes.[11] In a Canadian survey more than 90% of children and youths with type 2 diabetes reported a diabetic first- or second-degree relative.[12] A strong family history suggests a genetic predisposition to both type 2 diabetes and metabolic syndrome, and may increase the risk of early-onset of diabetes. Thus, screening family members of diabetic patients is a proposed public health strategy. A targeted family member diabetic screening programme would have to start at a much earlier age (perhaps early twenties) in order to be effective.

In conclusion, this study showed a high proportion of early-onset type 2 diabetes among type 2 patients in our institution. We also found a significant association between family history of type 2 diabetes and an early onset of diabetes, especially for those having first-degree and multiple diabetic relatives. Relatives of patients with type 2 diabetes should be offered screening early in adulthood to allow for early detection and treatment.

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