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Type 2 diabetes mellitus, impaired glucose tolerance and associated factors in a rural Palestinian village

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Abstract

Aims To investigate the prevalence of Type 2 diabetes mellitus and impaired glucose tolerance (IGT) and to identify risk factors associated with diabetes in a rural Palestinian village.

Methods A cross-sectional, population-based study investigating 500 adults aged 30–65 years (response rate 85%) determined the diabetes status using the oral glucose tolerance test (OGTT). A standard questionnaire, a simple clinical examination and laboratory tests assessed blood lipids, blood pressure, waist-to-hip ratio (WHR), body mass index (BMI) and other risk factors for diabetes

Results The prevalence of Type 2 diabetes was 9.8% (95% confidence interval 7.3–12.3) and IGT 8.6% (6.1–11.1), while the prevalence standardized to the European population was 11.6% (8.8–14.4) for Type 2 diabetes and 10.3% (7.6–13.0) for IGT. Age, positive family history, high triglycerides level, and high WHR were significantly associated with Type 2 diabetes.

Conclusions Of the factors associated with diabetes, WHR and triglycerides levels are potentially modifiable, and should be addressed by preventive health activities. The high prevalence of Type 2 diabetes mellitus and its potential increase as a result of the ageing of the Palestinian population constitutes a major public health problem.

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Keywords Palestinian population, prevalence, risk factors, Type 2 diabetes mellitus

Abbreviations BMI, body mass index; IGT, impaired glucose tolerance; OGTT, oral glucose tolerance test; SES, socio-economic status; WHR, waist-to-hip ratio

Introduction

Diabetes mellitus and impaired glucose tolerance (IGT) are a global health problem [1] and a cause of major public health concern in the region [2]. The contributions and influence of urbanization and negative lifestyle changes to diabetes mellitus and other chronic diseases have been documented [2,3]. The association between obesity and Type 2 diabetes and its relationship with insulin resistance is established [4,5].

Data on the prevalence and risk factors for diabetes in the Palestinian population are scarce. A prior publication reported a high prevalence of Type 2 diabetes (9.8%) in a rural Palestinian population aged 30–65 years [6], where the WHO guidelines and classification criteria had been applied [7,8].

The purpose of the present study was to present detailed prevalence data of Type 2 diabetes and IGT from the rural West Bank, describe the distribution of 2-h blood glucose and body mass index (BMI), and identify factors associated with Type 2 diabetes mellitus.

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Table 1 Prevalence of Type 2 diabetes mellitus (DM) and impaired glucose tolerance (IGT) and plasma glucose concentrations* (in mmol/l, after a 75-g oral glucose tolerance test) by age and sex

Age	Sex	DM**	IGT	Mean	SD	10th	25th	50th	75th	90th
30–39	M	3.4 (0.7–9.5)[a]	2.3 (0.3–7.9)[a]	5.0	2.5	3.4	3.9	4.6	5.3	6.2
	F	1.5 (0–3.7)[b]	3.1 (0.2–6.0)[b]	5.4	1.2	4.0	4.6	5.2	6.1	6.9
40–49	M	11.3 (4.7–21.9)[a]	9.7 (3.6–19.9)[a]	5.6	1.9	3.5	4.3	5.2	6.5	8.4
	F	11.9 (5.3–22.2)[a]	13.4 (6.3–24.0)[a]	6.6	2.4	4.4	5.4	6.1	6.9	8.8
50–59	M	17.1 (6.6–33.7)[a]	8.6 (1.8–23.0)[a]	5.3	2.1	3.2	3.7	4.7	6.2	9.0
	F	10.9 (4.1–22.3)[a]	23.6 (13.2–37.0)[a]	6.8	1.9	4.6	5.3	6.7	8.0	9.4
60–65	M	21.7 (7.5–43.7)[a]	8.7 (1.1–28.0)[a]	6.9	5.2	3.6	4.5	5.8	7.3	12.6
	F	31.6 (17.5–48.7)[a]	10.5 (2.9–24.8)[a]	7.3	3.5	4.4	5.1	6.3	8.2	13.0
30–65	M	10.0 (5.9–14.1)[b]	6.2 (3.1–9.3)[b]	5.4	2.7	3.5	4.0	4.9	6.0	7.7
	F	9.6 (6.3–12.9)[b]	10.3 (6.8–13.8)[b]	6.2	2.1	4.2	4.8	5.8	6.9	8.5

*Previously diagnosed diabetes patients are not included because an oral glucose tolerance test was not performed with them.
**DM, previously diagnosed and study diagnosed.
[a]For $n < 100$ exact 95% confidence intervals were obtained from *Exact Confidence Limits for* P, published in Geigy scientific tables [14].
[b]For $n > 100$, 95% confidence intervals calculated.

Subjects and methods

Kobar is a small Muslim village with 2360 inhabitants living in 368 households (1996) [6] located in the central region of the West Bank. The village is a rural community typical of many communities in the West Bank.

According to a key informants method to assess socio-economic status (SES), 95 households in the village were categorized as poor, 224 as middle and 48 as wealthy [6].

All males and females aged 30–65 years who were identified in a household survey completed in June 1996 (585) were invited to the second phase of the study. Two hundred and ninety-one females and 209 males, who were all of Palestinian Arab ethnicity agreed to participate (85%). The mean ± SD age for men and women, respectively, was 43.9 ± 10.2 and 43.8 ± 11.0 years. The second phase included a structured interview, anthropometric measurements, medical checkup, and blood sampling. Glucose measurement was carried out using a fully automated clinical chemistry analyser (Kone Supra Specific, Espoo, Finland) and utilizing the glucose oxidase method. Type 2 diabetes mellitus and IGT were defined using OGTT according to WHO criteria [8]. Both internal and external quality control programs were utilized [6].

Further description of the methods including questionnaires, selection criteria, measurements and quality control is detailed elsewhere [6].

For selected associated factors among various groups, means, 95% confidence intervals (CI) and proportions were calculated. The strength of association between the dependent and selected independent variables was assessed using odds ratio (OR) in logistic regression analyses.

Results

The response rate in males and females was 75% and 95%, respectively.

The prevalence (95% CI) of Type 2 diabetes in males was 10.0% (5.9–14.1) and 9.6% (6.3–12.9) in females, while IGT was 6.2% (3.1–9.3) and 10.3% (6.8–13.8) in males and females, respectively. Age-specific prevalence rates are shown in Table 1.

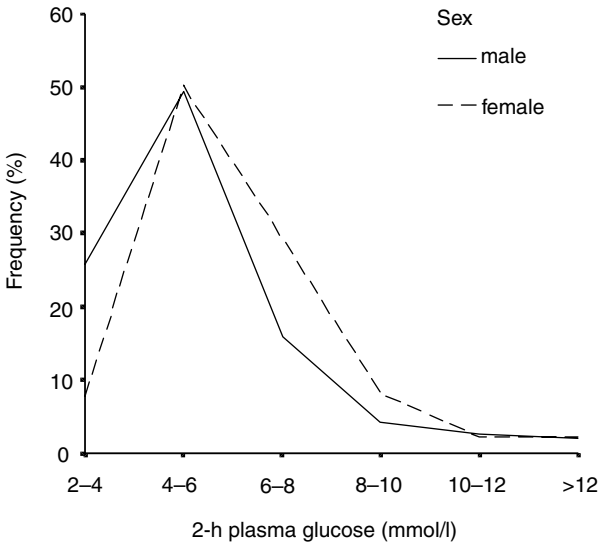

Figure 1 Frequency distribution of 2-h plasma glucose in mmol/l in males and females *Previously diagnosed diabetes patients not included because an oral glucose tolerance test was not performed with them.

Standardized prevalence estimates according to the European population [9] were 11.6% (8.8–14.4) for Type 2 diabetes and 10.3% (7.6–13.0) for IGT.

As shown in Table 1 there is a consistent increase in 2-h plasma glucose with age, in both males and females. Figure 1 shows the frequency distribution of 2-h plasma glucose.

Figure 2 shows frequency distribution for BMI in males and females categorized as follows: 1 = < 18.5 (underweight), 2 = 18.5–24.9 (normal), 3 = 25–29.9 (pre-obese), 4 = 30–34.9 (obese class I), 5 = 35.0–39.9 (obese class II), 6 = > 40 (obese class III), according to the WHO proposed classification [10].

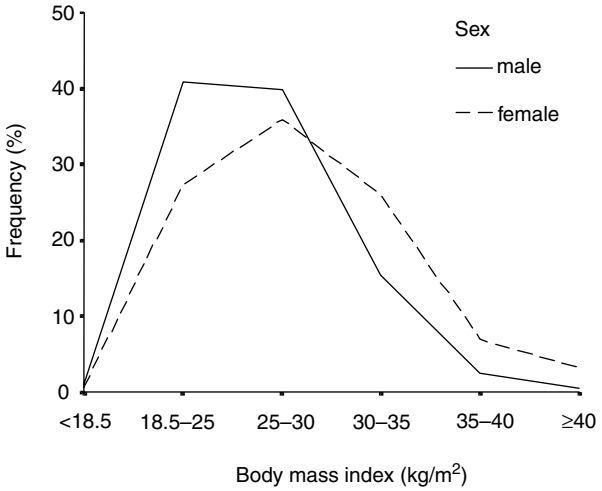

Figure 2 Frequency distribution for body mass index (BMI) in males and females categorized into six categories according to WHO criteria.

In conditional logistic regression analysis controlling for confounders, the following variables were significantly associated with Type 2 diabetes: age-adjusted OR (95% CI) 1.09 (1.05–1.13); positive family history of diabetes 2.94 (1.46–5.90); high triglycerides 1.006 (1.002–1.010); and high WHR 2.17 (1.34–3.53).

Discussion

Kobar village was chosen for this study because it represented a prototypical Palestinian village [6,11]. The population of this village is representative of many of the villages surrounding Ramallah city and probably other villages close to urban areas in the West Bank.

Of the factors identified by logistic regression analysis age, triglycerides, family history of diabetes and WHR were significantly associated with Type 2 diabetes mellitus

WHR is a modifiable risk factor and an indicator of central adiposity that seems to be a better predictor of diabetes than BMI or relative weight [4]. According to Bjorntorp [12], increased WHR with obesity (abdominal obesity) seems to be associated with a cluster of metabolic risk factors, as well as hypertension. In this study increased WHR may be associated also with urbanization of rural areas and social and economic changes that come with it.

The prevalence rates of both Type 2 diabetes mellitus and IGT are high, but comparable to other countries in the region. In a resource-constrained region such as the Palestinian territories, diabetes is expected to be among the major public heath problems.

In Palestinian territories, like in other developing countries, an epidemiological transition exists. This means that the country has to deal with communicable and non-communicable diseases simultaneously. Demographic, socio-economic and nutritional trends that are associated with Type 2 diabetes and cardiovascular diseases are apparent, including increased life expectancy, urbanization and food availability and increased prevalence of obesity [3,13].

The expected increase in life expectancy in Palestinian territories and the significant association between diabetes and age indicates that the prevalence of diabetes is expected to increase.

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