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Ethnicity is an independent risk indicator when estimating diabetes risk with FINDRISC scores: A cross sectional study comparing immigrants from the Middle East and native Swedes

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ABSTRACT

Aims: This study sought to compare type 2 diabetes (T2D) risk indicators in Iraqi immigrants with those in ethnic Swedes living in southern Sweden.
Methods: Population-based, cross-sectional cohort study of men and women, aged 30–75 years, born in Iraq or Sweden conducted in 2010–2012 in Malmö, Sweden. A 75 g oral glucose tolerance test was performed and sociodemographic and lifestyle data were collected. T2D risk was assessed by the Finnish Diabetes Risk Score (FINDRISC).
Results: In Iraqi versus Swedish participants, T2D was twice as prevalent (11.6 vs. 5.8%, $p < 0.001$). A large proportion of the excess T2D risk was attributable to larger waist circumference and first-degree family history of diabetes. However, Iraqi ethnicity was a risk factor for T2D independently of other FINDRISC factors (odds ratio (OR) 2.5, 95% CI 1.6–3.9).

The FINDRISC algorithm predicted that more Iraqis than Swedes (16.2 vs. 12.3%, $p < 0.001$) will develop T2D within the next decade. The total annual costs for excess T2D risk in Iraqis are estimated to exceed 2.3 million euros in 2005, not accounting for worse quality of life.
Conclusions: Our study suggests that Middle Eastern ethnicity should be considered an independent risk indicator for diabetes. Accordingly, the implementation of culturally tailored prevention programs may be warranted.

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1. Background

Type 2 diabetes (T2D) is one of the strongest risk factors for cardiovascular disease and premature death [1]. The prevalence of T2D is continuously increasing worldwide, and it is estimated that by 2025 that 15% of the global population will be affected by T2D, impaired fasting glucose (IFG) or impaired glucose tolerance (IGT) [2].

Of the five countries with the highest diabetes prevalence, four are located in the Middle East, where overall prevalence rates vary between 7 and 20% [3,4]. Migration and urbanization are known risk factors for T2D [5] and epidemiological studies have shown that immigrants from the Middle East have a high prevalence of T2D, which is partly thought to be a consequence of obesity (body mass index, BMI $\geq$30 kg/m^2), which is highly prevalent in non-European immigrants [6]. Considering the risk of reduced quality of life [7] and of diabetic complications and early death, determining the metabolic, lifestyle and heritable risk factors that underlie the high diabetes prevalence in immigrant populations from the Middle East is of high priority.

The total annual diabetes-related costs for healthcare, productivity loss, lost life-years and lost productivity years (as a result of mortality or permanent disability) was roughly 920 million euros (mEUR) in 2005, more than twice the expenditure in 1987 (439 mEUR), owing largely to a sharp increase in the disease's prevalence [8]. Thus, there are substantial health incentives as well as economic incentives to detect and prevent from the development of diabetes, especially in high-risk populations. Moreover, as highlighted in a recent systematic review [9], there is a relative dearth of such studies, particularly in immigrant communities.

The purpose of the current study was to determine and compare the prevalence of T2D and the frequency of intermediate risk factors for T2D in Middle Eastern immigrants to Sweden and ethnic Swedes living within the same region of southern Sweden. This study also sought to estimate and compare the future burden and incidence of diabetes in these populations using the Finnish Diabetes Risk Score, FINDRISC [10], which was developed as a population screening tool for Nordic populations [10].

2. Methods and procedures

In the MEDIM study (the impact of Migration and Ethnicity on Diabetes In Malmö) citizens of Malmö born in Iraq or Sweden 30–75 years of age were randomly selected from the census register and invited by mail and phone to participate in this population-based survey. We aimed to recruit Iraqi and Swedish groups matched for sex and 10-year age distributions (2:1 matching). People with type 1 diabetes, severe physical or mental illness or disabilities were not included in the study. Participants included second-generation immigrants born in Sweden. All participants fulfilling the inclusion criteria were enrolled consecutively in the survey as they accepted to participate and no individuals were excluded due to inconsistent matching with age group.

To minimize cohort effects and assessment biases, examinations were conducted within a relatively short timeframe (February 1, 2010 through December 31, 2012). Fig. 1 shows a flow chart describing the recruitment of MEDIM participants.

2.1. Power and sample size calculation

Power calculation was based on estimations on differences in T2D in an adult Swedish and Iraqi population. We estimated that the T2D prevalence would be 7% in a Middle Eastern population and 4% in native Swedes [5]. With alpha = 0.05 (two-sided test) and a power of 80% we would detect a significant difference in T2D prevalence with a sample size of 1400 participants born in Iraq and 1400 born in Sweden. However, the study was stopped in advance since T2D prevalence was higher than estimated amongst Iraqis; with these differences in prevalence, the sample size yielded an estimated power of 99% to determine that this difference was statistically significant.

2.2. Ethical considerations

All participants provided written informed consent and the Ethics Committee at Lund University approved the study (No. 2009/36 & 2010/561). This investigation conforms to the principles outlined in the Declaration of Helsinki [11].

2.3. Physical examination

Trained Swedish and Arabic speaking research nurses conducted standard physical examinations. Assessment of standard physical examinations and clinical variables such as blood pressure, height, weight, body mass index (BMI) and waist circumference was performed as described previously [12].

2.3.1. Blood samples and oral glucose tolerance test (OGTT)

Participants were instructed not to eat or drink nothing but water or consume tobacco later than 10 pm the day before the OGTT and to bring a record of their current medications. The following morning a 75 g oral glucose tolerance test (OGTT) was performed. Blood samples were collected prior to the glucose load and at 30, 60, 90 and 120 min; glucose was analyzed continuously on fresh plasma from venous whole blood immediately after sampling using a photometer (HemoCue AB, Ängelholm, Sweden) as described previously [12]. New cases of diabetes were confirmed by fasting plasma glucose level of $\geq$7.0 mmol/L and/or by a 2-h plasma glucose level of $\geq$11.1 mmol/L. Two pathological values were needed for diagnosis [13] and if only one glucose value was indicative of diabetes, the OGTT was repeated another day with the same fasting procedures. Participants stating they had existing diabetes were considered as previously diagnosed diabetes cases if they were on medication with oral hypoglycaemic agents and/or insulin or if they had fasting glucose >7.0 mmol/l. Participants with previously known diabetes did not undergo an OGTT.

Impaired fasting glucose (IFG) was defined as a fasting plasma glucose level of $\geq$6.1 mmol/L and <7.0 mmol/L and a