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Effects of a culturally adapted lifestyle intervention on cardio-metabolic outcomes: a randomized controlled trial in Iraqi immigrants to Sweden at high risk for Type 2 diabetes[☆]

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ARTICLE INFO

Article history:

Received 5 April 2016

Accepted 2 October 2016

Keywords:

Body weight

Immigrants

Insulin sensitivity

Lifestyle

Randomized controlled trial

ABSTRACT

Background and Aims. Middle-Eastern immigrants constitute a growing proportion of the Swedish population and are at high risk for Type 2 diabetes. This calls for a more proactive preventive approach for dealing with diabetes risk in this target group. The aim was to test the effect of a culturally adapted lifestyle intervention programme on changes in lifestyle habits and cardio-metabolic outcomes comparing an intervention group with a control group receiving usual care.

Methods. Citizens of Malmö, Sweden born in Iraq and at high risk for Type 2 diabetes ($n = 636$) were invited. Participation rate was 15.1%. In all, 96 participants were randomized to the intervention group ($n = 50$) or to the control group ($n = 46$). The intervention group was offered seven group sessions addressing healthy diet and physical activity including one cooking class. Changes in body weight, physical activity levels and cardio-metabolic outcomes were evaluated using linear mixed-effects models.

Results. The mean follow-up time was 3.9 and 3.5 months in the intervention and control groups, respectively. The drop-out rate from baseline to the last visit was 30.0% in the intervention group ($n = 15$) and 30.4% in the control group ($n = 14$).

The mean insulin sensitivity index increased significantly at follow-up in the intervention group compared to the control group (10.9% per month, $p = 0.005$). The intervention group also reached a significant reduction in body weight (0.4% per month, $p = 0.004$), body mass index (0.4% per month, $p = 0.004$) and LDL-cholesterol (2.1% per month, $p = 0.036$) compared to the control group. In total, 14.3% in the intervention group reached the goal to lose $\geq 5\%$ of body weight versus none in the control group.

Conclusions. This culturally adapted lifestyle intervention programme shows a beneficial effect on insulin action, body weight reduction, as well as LDL-cholesterol reduction, in

Abbreviations: BMI, body mass index; DI, disposition index; DBP, diastolic blood pressure; FPG, fasting plasma glucose; ISI, insulin sensitivity index; IPAQ, international physical activity questionnaire; MEDIM, impact of migration and ethnicity on diabetes in Malmö; MET, metabolic equivalent of task; OGTT, oral glucose tolerance test; PA, physical activity; PHC, primary health care; RCT, randomized control trial; SBP, systolic blood pressure; US, United States.

[☆] Trial registration number: NCT01420198

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<http://dx.doi.org/10.1016/j.metabol.2016.10.001>

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Middle-Eastern immigrants. The programme adapted to resources in primary health care provides tools for improved primary prevention and reduced cardio-metabolic risk in this high-risk group for Type 2 diabetes.

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1. Introduction

Middle-Eastern immigrants constitute a growing proportion of the Swedish population, with Iraqi immigrants representing the largest non-European group [1]. Malmö, the third largest city in Sweden, has a growing immigrant population with at present approximately 11,000 Iraqi immigrants [1]. The MEDIM study (“impact of Migration and Ethnicity on Diabetes In Malmö”), conducted 2010 to 2012 among Iraqi immigrants, has shown that their prevalence of Type 2 diabetes is twice as high as compared to the native Swedish population (11.6% vs. 5.8%, $p < 0.001$), matched for age and sex [2].

Large randomized clinical trials based on lifestyle intervention such as the Diabetes Prevention Program in the United States (US) and the Finnish Diabetes Prevention Study have shown the efficacy of dietary modification and physical activity (PA) in delaying or preventing the onset of Type 2 diabetes [3,4]. However it is unlikely that these interventions will yield equivalent results in populations of different cultures in terms of dietary and PA habits, perception and experience of barriers, behavioral change and supporting factors [5–7]. Earlier studies have indicated that in order to be effective, lifestyle interventions in non-Western groups should focus on behavioral change through increased self-efficacy and self-empowerment [8]. In addition, a gender-specific approach should be applied and differences in PA preferences should be considered [8,9].

The high prevalence of diabetes and its risk factors in Middle-Eastern immigrants [10], calls for an even more proactive approach for dealing with diabetes risk in this high-risk group, than is currently the case in Swedish primary health care (PHC) or the community at large. However there is a scarcity of information on culturally adapted lifestyle interventions, particularly from randomized control trials (RCT) addressing non-western immigrants in the developed world [7,11].

The aim of this project, based on a RCT design, was to test the efficacy of a culturally adapted lifestyle intervention programme developed to address healthy diet and PA habits in Iraqi immigrants living in Sweden. Specific aims were to examine changes in body weight and PA levels as well as cardio-metabolic outcomes in the intervention group participating in the programme, and to compare these with changes in the control group receiving usual care.

2. Material and Methods

2.1. Study Population

Citizens of Malmö born in Iraq, aged 30–75 years and at high-risk of Type 2 diabetes were invited by post between October

and December 2014 followed by a telephone contact, to participate in the MEDIM intervention study. The eligible study population was identified from the MEDIM population-based study, a cross-sectional study conducted between 2010 and 2012 including 1398 Iraqi-born and 757 Swedish born residents of Malmö matched for age and sex and residing in the same neighborhood [2]. ‘At high-risk’ was defined as having a body mass index (BMI) ≥ 28 kg/m² and/or waist circumference (≥ 80 cm in women and ≥ 94 cm in men) [12] and/or pre-diabetes i.e. impaired fasting plasma glucose (IFPG): 6.1–6.9 mmol/l and 2-h glucose < 7.8 mmol/l, impaired glucose tolerance regulation (IFPG: 6.1–6.9 mmol/l and 2-h glucose: 7.8–11 mmol/l) [10], individuals with overt diabetes (IFPG: ≥ 7 mmol/l or 2-h glucose: ≥ 11.1 mmol/l), mental incapacity to engage in the study, physical impairments limiting PA, or those who were pregnant were not eligible for participation in the intervention study. Of 636 individuals invited, 104 accepted to participate and attended the first visit and of these, 96 were eligible for participation in the study (corresponding to a participation rate of 15.1%). Fig. 1 shows a flow chart of study participants.

2.2. Data Collection

The study took place between mid-January and mid-June 2015 and was designed to include three health examinations. Each health examination comprised a physical examination, collection of fasting blood samples and oral glucose tolerance tests (OGTT; 75 g glucose) by trained study nurses speaking the participants’ native language [10]. The study was conducted at a facility located close to the PHC centre and easily accessible to the participants.

Body weight was measured using an electronic scale while participants were requested to remove shoes and wear light clothing. A wall-mounted stadiometer was used to measure height. Blood pressure was calculated as a mean of two readings taken 1 minute apart with the participant lying in supine position. The participants rested for 5 minutes before the readings were taken [10]. Radioimmunoassay (Access@ Ultrasensitive Insulin, Beckman Coulter, USA) and high pressure liquid chromatography (Bio-Rad) were used to estimate serum insulin levels and HbA_{1c} respectively [13]. A HemoCue photometer (HemoCue AB, Ängelholm, Sweden) was used to measure plasma glucose levels [10,13]. Enzymatic methods were used to estimate plasma HDL-cholesterol (Boehringer Mannheim GmbH, Germany) and triglyceride levels (Bayer Diagnostics) [14] whereas Friedewald’s equation was used to estimate plasma LDL-cholesterol levels [15].

The participants were also requested to fill in a four-day food diary in connection with the three health examinations. In the food diaries, participants indicated the type, frequency and quantity as well as cooking method and preparation of

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