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Marjan Ramezan,[1] Golaleh Asghari,[2] Parvin Mirmiran,[2] Zhale Tahmasebinejad[2] and Fereidoun Azizi[3]

[1]Department of Clinical Nutrition and Dietetics, Faculty of Nutrition Sciences and Food Technology, National Nutrition and Food Technology Research Institute, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran. [2]Nutrition and Endocrine Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran ; [3]

Endocrine Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran (Correspondence to: Parvin Mirmiran: mirmiran@endocrine.ac.ir).

Abstract

Background: More than 1% of urban Iranians aged >20 years develop type 2 diabetes annually. A major contributing factor is overweight due to energy imbalance and poor quality diet. Even though there are reports on the beneficial effects of some isolated foods on glucose metabolism, researchers are increasingly focusing on dietary patterns versus single foods.

Aims: The aim of this study was to evaluate the association between adherence to a Mediterranean diet and risk of type 2 diabetes.

Methods: The current study was a case–control study nested in the cohort of the Tehran Glucose and Lipid Study. Among participants who met the study criteria, 187 incident cases of diabetes were identified and matched with 374 healthy controls according to sex, age, date of data collection, and previous history of lifestyle intervention.

Results: In the highest Mediterranean Diet Scale (MDS) category there were higher intakes of energy, fibre, glycaemic load, carbohydrate, total fat, and olive oil. However saturated fatty acid and monounsaturated fatty acid intakes decreased in higher MDS categories. The multiple adjusted odds ratios (ORs) for type 2 diabetes among individuals with medium (score 3–4) and high (score 5–8) adherence to MDS were 0.79 (95% CI:0.38–1.65) and 0.93 (95% CI:0.44–1.96), respectively, compared to individuals with low adherence (score 0–3).

Conclusion: Adherence to the Mediterranean dietary pattern was not associated with type 2 diabetes. Increased rates of type 2 diabetes in the Islamic Republic of Iran might be accounted for by the cultural and traditional differences between the Iranian and the Mediterranean dietary patterns.

Keywords: Mediterranean diet, diabetes, diet quality, Mediterranean Diet Score

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Introduction

Type 2 diabetes is a highly prevalent noncommunicable disease at a global level (1). Its prevalence is increasing across the globe, including in the Islamic Republic of Iran (2). The worldwide incidence is projected to rise from 171 million in 2000 to 366 million in 2030, imposing exorbitant costs on health care systems. This diabetes epidemic will continue even if obesity levels remain constant (1). In the Islamic Republic of Iran, more than 1% of the urban population aged over 20 years develops type 2 diabetes annually (2). Hyperglycaemia caused by diabetes can lead to dysfunction and failure of various organs, specifically nerves, kidneys, eyes, heart and blood vessels (3). The major cause of type 2 diabetes is overweight due to energy imbalance; poor diet quality also plays a role (4). Even though there are reports on the beneficial effects of some isolated foods or food groups on glucose metabolism, currently researchers are increasingly focusing on dietary patterns versus single foods, since there are some interactions between single foods and nutrients that can confound the association between nutrition and the disease (5).

The Mediterranean diet is native to the Mediterranean region, an area with low incidence of chronic diseases and high life expectancy, which has made this dietary pattern important for public health (6).There is evidence that a Mediterranean dietary pattern protects against coronary heart disease (7), and based on the analogy between coronary heart disease and diabetes, this diet has also been postulated as being effective for the prevention and treatment of type 2 diabetes (8). Its protective role could be due to its ability to prevent weight gain and also to it being a source of beneficial components such as polyphenols and monounsaturated fatty acids (MUFAs) (9,10).

Trichopoulou et al. invented a scale for measuring adherence to the Mediterranean diet and named it the Mediterranean Diet Scale (MDS) (11); the diet entails a high consumption of vegetables, fruits and nuts, cereals, legumes and fish. It has a high ratio of MUFAs and saturated fatty acids (SFAs), moderate alcohol use, moderate dairy consumption and low consumption of meat and meat products.

Several studies have investigated the role of adherence to a Mediterranean diet on type 2 diabetes risk through a priori dietary scores (4,10,12–19). A recent systematic review of randomized controlled trial and cohort studies showed that greater adherence to a Mediterranean diet measured by a priori scores is associated with a significant reduction in the risk of type 2 diabetes (20). However not all studies assessed Mediterranean diet compliance using a uniform scale, and most were conducted in the United States of America and European countries (20). With respect to cultural variations in dietary habits and possible biological differences in metabolism among different ethnic groups, associations between diet and disease may differ across geographical populations and ethnic groups (19).

To the best of our knowledge, no study has yet carried out research on the associations between a priori-defined dietary quality indices and risk of type 2 diabetes in the Middle East and North Africa (MENA) region. Therefore, our main aim was to evaluate the association between the MDS and risk of type 2 diabetes in a nested case–control design study among a healthy adult population in the Islamic Republic of Iran.

Methods

Design and study population

This study was run within the framework of the Tehran Lipid and Glucose Study (TLGS), an ongoing urban population-based cohort study aimed at evaluating the risk factors of noncommunicable diseases and their prevention through healthy lifestyles (21). Study participants were 15 005 residents (aged 3–75 years) of district No. 13 in Tehran, selected from 3 different health care centres between March 1999 and December 2001. Demographic, clinical, lifestyle and dietary data is collected for the TLGS over 3-year periods. First, a cross-sectional study was conducted from 1999 to 2001, then prospective follow-up surveys, 2 (2002–2005), 3 (2006–2008) and 4 (2009–2011), were performed.

Our study was a nested case–control study in the third and fourth surveys of the TLGS. Our participants were male and female adults > 20 years for whom we had complete sociodemographic, clinical, lifestyle and dietary data. Cases were participants who were newly diagnosed with diabetes in the third (2006–2008) and fourth (2009–2011) surveys who had been free of diabetes in previous surveys. American Diabetes Association criteria for case determination were: fasting plasma glucose ≥ 126 mg/dL, 2 hours plasma glucose (2 h-PG) after conducting an oral glucose tolerance test (OGTT) ≥ 200 mg/dL, or current therapy for a definite diagnosis of diabetes (3). In total, 641 cases of incident diabetes were identified, of whom we had complete dietary data for 221. Those who were pregnant or lactating (n = 1), had over- or under-reported energy intake (n = 17), or had a history of cancer or cardiovascular diseases (n = 16) were excluded. In all, 187 new cases of diabetes remained for analysis. For each case, 2 controls of the same age, sex and date of data collection (± 6 months gap for data collection), were selected from

among the healthy population (n = 374) with the individual matching method. Criteria for control selection were: fasting plasma glucose