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Dietary intakes of essential nutrients among Arab and Berber ethnic groups on rural Tunisian island

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Abstract

Objective: The dietary intake was investigated and food sources were identified among Tunisian ethnic groups from Jerba Island in the south of Tunisia.

Methods: Ninety-four subjects of moderate socioeconomic status (47 Berbers and 47 Arabs) aged 32 to 64 y completed a 1-mo qualitative food-frequency questionnaire and a single 24-h dietary recall, and dietary intakes and demographic status were observed from 2006 to 2007.

Results: The prevalence of overweight and obesity was not significantly associated with Arab men compared with Berber men. Therefore, obesity was significantly associated with Berber women ($P < 0.001$). Height was significantly different between Arab and Berber women ($P < 0.001$). There were no significant differences in energy intake between men and women. Protein intake was not significantly different between ethnic groups. Milk and dairy products in the Berber group were significantly different from the Arab group. Intakes of calcium, zinc, iron, and folate were below recommended nutrient intakes in men and women in the two ethnic groups. Vitamin E intake was greater in Berbers than in Arabs ($P < 0.01$).

Conclusion: Ethnicity was significantly associated with dietary intakes in the two ethnic groups of Jerba Island. © 2010 Published by Elsevier Inc.

Keywords: Ethnicity; Dietary intake; Arabs; Berbers; Jerba Island

Introduction

Ethnicity is a complex construct of biology, culture, language, religion, and distinct health beliefs and behaviors encompassing a range of biological and environmental exposures [1]. The Tunisian population is characterized by its diversity. In Tunisia, there still exists, despite civilizations mixing, areas where ethnic separation remains clear. Among these areas Jerba Island (in the southeast) shelters two different populations in their culture and their lifestyle. The first consists of Berbers, original citizens of the island, whose history extends to the end of the Paleolithic period. The second community consists of Arabs installed in the island at the time of the Islamic conquest during the 7th century. Although the two ethnic groups are Muslim, they differ by their doctrines. Religious and cultural differences have represented an obstacle to their intermixing and marriages usually occur between members from the same extended family in the same ethnic group.

The influence of lifestyle patterns on health status has been evaluated in numerous ecologic and analytic studies. Avoiding cigarette smoking [2], maintaining a normal body mass index (BMI) [3], and adding physical activity to daily activities are well studied [4]. Lifestyle habits are strongly associated with decreased rates of mortality. There is growing awareness that variations in dietary practices among ethnic groups may help to explain interethnic differences in morbidity and mortality. These differences have been identified among many ethnic groups [5–7].

To our knowledge, the assessment of ethnic differences in food intake or physical activity patterns between Berbers and

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Arabs has not yet been performed. The aims of this study were to describe the dietary patterns in two ethnic groups on Jerba Island and to relate these patterns to anthropometric measurements.

Methods

Study population

The data for this study were collected from July 2006 to July 2007 in two Arab villages, Midoun and Houmet Essouk, and two Berber villages, Guellala and Sedwikch. These ethnic groups live far from each other on Jerba Island. The sample for our analyses included 47 Berber and 47 Arab subjects aged 32–64 y. The recruitment of the population was done among the patients who came to medical centers on the island and those who accompanied them. Each participant agreed to take part in our investigation by signing an informed consent before entering the study; the appropriate local ethical committee approved this research and it was performed in accordance with the Declaration of Helsinki.

Each individual was examined by medical personnel and surveyed with a comprehensive questionnaire that they completed at home (including information on their phenotypic measurements about age, smoking habits, medical history and current use of medications, lifestyle, diet, and socioeconomic status).

The inclusion criteria in this study were to be an adult and a life-long full-time resident of the island who never left or lived elsewhere; the spouse had to originate from the island and have the same ethnicity. These criteria seemed important to us to avoid any modification of the food culture.

Because it is recognized that social inequalities play an important role in health and disease outcomes in many regions of the world [8–10], we recruited in the study only subjects of moderate socioeconomic status. Participants were also invited to provide information on their education level (as number of years spent in the education system).

Physical activity assessment

For physical activity assessment, subjects completed a physical activity–recall questionnaire. They were asked to record whether they were sleeping, sitting, standing, or watching television during each hour of the day. Subjects noted the time of day they started each new activity, body position during the activity (reclining, sitting, standing, or walking), and effort (light, moderate, or vigorous). They were asked about leisure and occupational physical activities performed during the previous week. For the previous week, the average number of hours per week of each activity was calculated. The total hours of each activity was multiplied by the estimated metabolic cost of the activity and then the physical activity level (PAL) was computed as the total energy expended over 24 h divided by 24 [11]. Gender, age, height, and body weight are the main determinants of basal metabolic rate (BMR). To estimate the BMR we used predictive equations based on these factors [12]. Multiplying the PAL by the BMR produced the total energy expenditure.

The same investigator instructed the subjects in the use of these physical activity records and inspected the completed forms.

Measurement of diet

Usual dietary intake was assessed with the use of a 168-item semiquantitative food-frequency questionnaire. All questionnaires were administered by trained dieticians. The food-frequency questionnaire consisted of a list of foods with a standard serving size. Participants were asked to report their frequency of consumption of each food item during the previous month on a daily (e.g., bread) or weekly (e.g., rice or meat or fish) basis. Portion sizes of consumed foods were converted from household measurements to grams. Each food and beverage was then coded according to the prescribed protocol and analyzed for content of energy and other nutrients using Bilnut software (SCDA Nutrisoft, Cerelles, France), which was designed for Tunisian foods. We used a 24-h dietary recall to obtain detailed information about foods including brand names, preparation methods, and ingredients used in the preparation. Three-dimensional food models, measurement aids, and food-specific units were used to estimate amounts consumed. We determined total calories, total and percentage of calories from protein, carbohydrate and fat, and the nutrients cholesterol, fiber, folates, vitamin C, vitamin E, calcium, zinc, iron, and magnesium.

We calculated the nutrient density (amount of nutrient per 100 kcal) for fiber, sucrose, and iron.

An appropriate intake of energy with energy distributions of carbohydrate, protein, and fat was determined within the recommended nutrient intakes (RNIs) established by the U.S. National Academy of Sciences. No subject had lactose intolerance during his/her lifetime.

Anthropometric determination

Measurements of height by using a stadiometer and weight on a digital scale while wearing lightweight clothing without shoes was used to calculate BMI; BMI was defined as weight in kilograms divided by height squared in meters. Non-obese subjects had a BMI $<25\ kg/m^2$, overweight subjects had a BMI 25–30 kg/m^2, and obese subjects had a BMI $>30\ kg/m^2$. Obesity was defined as a BMI $\geq 30\ kg/m^2$ according to recommendations of the World Health Organization [13].Waist and hip circumferences were measured at the level of the umbilicus and the widest area around the buttocks, respectively, and the waist-to-hip ratio was also calculated [14].

To avoid the influence of height, the ratio of waist circumference (WC) to body height (BH) was computed. The WC/BH ratio has been reported to have closer values between men and women than BMI or WC; therefore, the same