Applied nutritional investigation

Adherence to Mediterranean diet in a sample of Tuscan adolescents

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ABSTRACT

Objective: The aim of this study was to estimate the level of adherence to the Mediterranean diet in a group of Italian high school students, in relation to their lifestyles and social and family contexts, and to compare the nutrition habits of the sample with other similar groups.
Methods: The KIDMED index and an ad hoc questionnaire were administered to 1127 students (mean age 16.8 ± 1.6 y) in the province of Florence. Any significant associations between the level of adherence to the Mediterranean diet and the aforementioned variables were assessed by the χ^2 test and by logistic regression analysis.
Results: The adherence to the Mediterranean diet was good in 16.5%, average in 60.5%, and poor in 23% of the students. The students attending technical high schools, those who played sports less than "almost every day", those who spent >3 h/d in sedentary activities, those who defined their school performance as worse than "more than sufficient," and those who referred to use of a car/ moped as the most frequent mode of transportation, had significantly higher odds of poor rather than average or good adherence to Mediterranean diet. Moreover, being normal weight or over-weight/obese, and referring to health workers as source of information on diet, seem to be pro-tective factors against poor adherence to Mediterranean diet.
Conclusions: Our sample presents a departure from the Mediterranean dietary pattern. It is certainly necessary to implement public health policies targeting teenagers to promote healthier lifestyle choices; the nutritional patterns of the Mediterranean diet should be among these choices.
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Introduction

The Mediterranean diet, which is considered a model of a healthy diet, ensures a sufficient intake of calories and nutrients in proper proportions. This dietary pattern helps prevent cardiovascular diseases [1], hypertension [2], cancer [3], and diabetes [4], and is generally related to a longer life expectancy.

The Mediterranean diet is characterized by a high consumption of vegetables, grains, nuts, olive oil, and legumes; a moderate consumption of poultry, fish, eggs, and dairy products; and a low consumption of red meat and animal fat. It also includes a good intake of antioxidant vitamins (vitamins E and C), carotenoids, and micronutrients [5].

In recent decades, a shift away from this nutritional pattern toward a high-energy diet pattern that is rich in saturated fats and low in micronutrients has been seen in Mediterranean countries. This diet has often replaced traditional foods, especially in younger generations [6–8].

This gradual transition has led to an alarming increase in obesity, especially among children in both Mediterranean and other industrialized countries [9]. Many factors may have contributed to this increased prevalence of obesity (e.g., genetic, neurologic, endocrine, and environmental). However, although it is unlikely that changes in the genetic structure could represent the main factor, it is conceivable that the root of the problem can be found among environmental factors [10].

In fact, the rapid development of the food industry, together with the sociologic changes and technological developments that have emerged alongside it, has modified eating habits and lifestyles. A combination of these factors has spurred many individuals toward choosing a diet rich in "industrialized" foodstuffs and, at the same time, adopting an increasingly sedentary lifestyle [1]; together, these two factors have been determining the phenomenon of the so-called *globesity* [11]. The alarming obesity epidemic has pushed many scientists and public health professionals to develop health promotion interventions, especially those addressed to children and teenagers [12].

Food choices are directly related to an individual's level of nutritional knowledge [13]. The family, school environment, peers, coaches of extracurricular sporting activities, and health professionals can provide this type of knowledge [13]. In the scientific literature, a great deal of evidence exists that the family environment is particularly important in determining food choices and lifestyle. In particular, membership in a higher social class and the possession of higher familiar cultural capital are associated with a higher-quality diet and, generally, with healthier lifestyles [14].

Many scientific studies have utilized the KIDMED tool to evaluate adherence to the Mediterranean diet (as a prototypical healthy diet) in people between the ages of 2 and 24 y [15,16]. KIDMED was initially used in Spain and was then applied to studies carried out in other Mediterranean countries [13,17]; it is the first index aimed at specifically evaluating the adherence to the Mediterranean diet in children and young people [15].

The aim of this study was to estimate the level of adherence to the Mediterranean diet in a group of Italian high school students, in relation to their lifestyles and social and family contexts, and to compare nutritional habits of the sample with other similar surveys.

Materials and methods

The survey has been conducted according to the Helsinki Declaration on human subjects testing. Written consent of students' parents has been collected.

The survey was carried out in a state high school located in the province of Florence and that includes different fields of education: *Liceo Classico*, which features Latin, Ancient Greek, Italian, history, and philosophy as its most important subjects; *Liceo Scientifico*, which is more oriented toward mathematics, physics, chemistry, biology, Earth science; and *Istituto Tecnico*, which is more oriented toward practical subjects such as jurisdiction, tourism, metal working, electronics, chemical industry, biotechnology, visual communication, and fashion. The sample was selected on convenience criteria: The school was chosen due to the different fields of education, the number of students that could be included in the study, and the collaboration of the headmaster and teachers. Among the students (N = 1380), 40% and 28%, respectively, resided in the municipalities of Scandicci and Florence, whereas the other students lived in 20 different municipalities of the provinces of Florence and Prato. The final sample consisted of 1127 students, representing 100% of the students at school on the day of the survey and approximately 82% of the registered students.

The KIDMED and an *ad hoc* questionnaire were administered to the students who agreed to join the study. The administration took place over a single day in February 2012. The questionnaire and the KIDMED test were self-compiled during the school day after the research team gave a short explanation. The questionnaires were immediately compiled. The KIDMED is a tool widely used in the literature [15]. It produces a score measuring the degree of adherence to the Mediterranean diet (poor, average, or good) in children and adolescents. The KIDMED was developed to combine in a single index recommendations on the Mediterranean diet for adults with others for a child's diet (such as regularly making breakfast). The scale consists of 16 questions with yes/no answers. A value of −1 was assigned to the responses reflecting a lack of adherence to the Mediterranean diet, whereas those responses indicating compliance were assigned a value of +1. The final scores ranged from −4 to +12 and were then classified into three levels: ≥8 was considered a good level of adherence; 4 to 7, an average level of adherence; and <4, a poor level of adherence to Mediterranean diet.

The questionnaire included questions regarding the following items:

- Individual and family characteristics, such as nationality, job, level of education, and marital status of the parents;
- Anthropometric data (self-reported height and weight);
- Self-perception regarding one's own body weight ("Do you think you are underweight, normal weight, or overweight/obese?");
- Source of information on proper nutrition (family, teachers, coach, friends, health workers, TV/internet, no source);
- Sport (type and h/wk), daily hours of sedentary activity, mode of travel during the day; and
- Potential elements of distress, including quality of relationships with peers, family, and school performance.

Body mass index (BMI) was calculated using self-reported weights and heights; underweight, normal weight, and overweight/obesity were defined using the threshold values for BMI previously derived and as recommended by the International Obesity Task Force (IOTF) [18,19].

For each student, the jobs and the level of education of the parents were used to establish the social class and cultural capital attributed to the single parent and to the family, based on a previously described model [20]. Erikson's criterion of dominance [21] was used to combine the parents' jobs in the variable "familiar social class" considering the higher level of profession between the two parents. Similarly, "familiar cultural capital" was determined based on parental achievement of the higher level of education. The collected data were entered into an ad hoc access database and analyzed using the statistical software SPSS 19 (IBM SPSS, Version 19.0. Armonk, NY, USA).

To evaluate significant associations between the level of adherence to the Mediterranean diet and the variables just cited, a descriptive analysis with χ^2 test and a logistic regression analysis were conducted. In particular, the logistic regression analysis was performed to assess the degree of association, as measured by odds ratio, between all the variables and the level of adherence to Mediterranean diet. Because the main objective was to understand the predictive factors of poor adherence, in the logistic analysis we have considered, as dichotomous outcome variable, *poor* or *average plus good* adherence.

At first, univariate logistic analysis was performed. The variables statistically associated with the level of adherence to Mediterranean diet (poor versus average/good) were entered into a multivariate logistic regression model, conducted using the backward stepwise method. The final model includes only the variables with a statistically significant association with the outcome variable in the multivariate analysis.

For each analysis, an α level of 0.05 has been considered as significant.

Results

The sample consisted of 1127 students (55.1% boys and 44.9% girls), between ages 14 and 20 (mean age 16.8 ± 1.6 y). All the collected questionnaires were, almost partially, completed, and considered for the statistical analyses. The percentage of missing values was, for each item, <12%. In the descriptive analysis, the percentage of each modality of answer was calculated without considering missing values.

Of these, 8.4% of the students were born abroad, most frequently in Albania (2.6%) or Romania (2.4%), and 12.8% and 9.4% of the sample had a mother or father born abroad, respectively.

Considering self-reported anthropometric data, 9.3% were underweight, whereas the prevalence of overweight/obesity was 10%.

The sample primarily consisted of students belonging to families with medium-high or high familial cultural capital (54.2% and 29.2%, respectively), and the familial social classes were medium-high (47%) or high (25.4%) in most of the sample. Fewer than 20% of the mothers and fathers graduated high school only, whereas 2.2% of mothers and 3.1% of fathers had only a primary school education. Among the sample, 26.9% of respondents said they played sports almost every day; 45.2% played one to three times a week; 17.3% played occasionally; and 10.5% never played. Regarding their usual modes of transportation, 31.7% of the students responded that they traveled mainly by foot and by bicycle.