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Review article

Mediterranean diet adherence in children and adolescents in southern European countries

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ABSTRACT

Background: Over the last decades, a progressive shifting away from traditional healthy dietary patterns, such as the Mediterranean diet, has been observed. The aim of this review was to evaluate evidence on extent and determinants of adherence to the Mediterranean diet among children and adolescents living in southern European countries.
Methods: A review of scientific articles published over the last 15 years conducted on dietary habits and determinants of adherence to the Mediterranean diet in the target population was performed. Cross-sectional surveys conducted in Spain, Greece, and Italy were selected.
Results: Irrespectively of the tool used, adherence to the Mediterranean diet was mainly poor in roughly half of the populations investigated. Major determinants of adherence were social and demographic factors. Among the former, high socioeconomic and cultural status of participants' parents (especially mothers) were associated with higher adherence. In most of countries, also living in rural areas was a determinant of high adherence. There was no consistent association with metabolic status, as most of the associations with health-related outcomes were mediated by other key variables, such as sedentary behaviors and engagement in physical activities.
Conclusions: There is a need for nutrition education programs to establish healthy eating habits at a young age. Targets for such intervention should not be limited to children and adolescents but also include parents, teachers, and physicians.

Contents

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1. Introduction

Modern strategies in research on nutrition not just focus on the role of individual nutrients or foods but also aim to measure the relationship between whole diets and health [1–3]. Over the last 20 years, a large body of literature explored and demonstrated the beneficial effects of the Mediterranean dietary pattern over a number of health outcomes [4]. This dietary pattern refers to the traditional eating habits adopted by individuals living in the regions of the Mediterranean basin during the 1960s [5]. Despite with differences across countries, the key features of the Mediterranean diet were the following: (i) high consumption of fruits, vegetables, legumes, and cereals, as main source of fiber and antioxidant compounds; (ii) moderate consumption of fish, nuts, and olive oil as main sources of fats (primarily monounsaturated and polyunsaturated fatty acids [MUFA and PUFA]); (iii) low consumption of red meat and sweets, as sources of trans- and saturated fatty acids; (iv) moderate consumption of wine (mainly red), which contain moderate amount of alcohol and rich in polyphenols. The Mediterranean diet has demonstrated mainly benefits against cardiovascular disease (CVD) [6], which may depend on the benefits toward metabolic diseases [7,8]. Besides a decreased risk of cardiovascular risk factors, several components of the diet may exert direct effects also on cancer prevention [9,10]. The overall result of current research on this topic is that higher adherence to Mediterranean diet may affect chronic disease morbidity and increase life expectancy [11].

It is surprising that individuals living in countries supposed to adopt a traditional Mediterranean dietary pattern are those mostly affected by high prevalence of overweight and obesity. Globalization and urbanization have been considered, at least in part, responsible for the phenomenon of nutrition transition [12]. This process, which is generally referred as "Westernization" of the diet, is particularly evident among the younger generations. Modernization of the society implies a number of unhealthy lifestyle habits, not just limited to modification of food preferences toward "junk" foods, but also relative to sedentary activities (computer and television use), leading to an overall imbalance between energy intake and expenditure [13]. The aim of this narrative review is (i) to examine existing evidence reporting the level of adherence to the Mediterranean diet among children and adolescents living in southern European countries, (ii) to explore potential determinants of adherence, and (iii) to evaluate whether an association with metabolic-related health outcomes exist.

2. Search methods

A review of scientific articles published over the last 15 years conducted on dietary habits and determinant of adherence to the Mediterranean diet in children and adolescents living in southern European countries was performed. Key terms, such as "Mediterranean diet," "adolescents," "children," "Spain," "Greece," "Italy," and "Europe," were used to identify representative cross-sectional surveys conducted in the main countries of interest. Studies were reviewed only whether they reported a measure of level of adherence to the Mediterranean diet (irrespectively of the tool used). Potential determinants and association with body mass index (BMI) status or any other metabolic-related outcomes were also discussed, whether reported.

3. Mediterranean diet in Spain

3.1. Level of adherence to the Mediterranean diet

Several surveys have been conducted in Spain over the last 15 years, involving the whole country as well as localized specific areas. Among the most important, the EnKid study was the first [14]. Conducted in the 2000, authors developed and tested the Mediterranean Diet Quality Index for children and adolescents (KIDMED), a tool to evaluate the level of adherence to the Mediterranean diet in young populations [15]. The rationale behind the KIDMED index relied on the principles characterizing the Mediterranean dietary pattern. The index ranged from 0 to 12 points based on a 16-question test. Questions indicating food components not in line with the Mediterranean diet (fastfood, skip breakfast, sweets, baked goods) were assigned a value of −1, those indicating foods that characterize this dietary pattern (fruit and vegetable, fish, pulses, pasta, cereals, nuts, olive oil, and dairy products) were assigned +1. The sums of the values obtained were classified into three levels: (1) >7, optimal Mediterranean diet; (2) 4–7, improvement needed to adjust intake to Mediterranean patterns; and (3) <4, very low diet quality. The findings derived from EnKid study showed for the first time the changes in dietary habits and nutritional status that have occurred in Spain over the last decades, especially among children and adolescents. Very low KIDMED score was found for 4.2% of the sample, 49.4% demonstrated intermediate adherence, and 46.4% had high index results. Among other dietary information, energy consumption was more than 2000 kcal in males and roughly 1700 kcal in females, total fat as a percentage of total energy intakes was 39.8% and 13.4% for saturated fat [14]. The KIDMED score demonstrated to capture the high nutritional quality of the Mediterranean Diet, including an enhanced nutritional adequacy for calcium, iron, magnesium, vitamin B6, vitamin C, and A [16]. Pastries and sausages represented the strongest contributors to the dietary energy density while fruits and vegetables were the lowest.

In two surveys conducted on 8- to 16-year-old population living in Granada (southern Spain) from 2002 to 2005 [17] and from 2005 to 2006 [18], the authors found that the mean energy intake of the study population was higher than the mean theoretical energy expenditure calculated using equations proposed for these ages by the FAO/WHO, with protein, and lipid intake more than double than expected while mineral salts intake was inadequate [17]. The mean KIDMED index score of this population was classified as average-good by the authors. Compared with the EnKid study population, children, and adolescents of Granada consumed similar amount of pasta, rice, breakfast milk products, yoghurt, and cheeses, but higher of fruit, cereals, cereal products, and vegetables, while the percentage consuming adequate amounts of fish was almost half. However, a majority of individuals was consuming olive oil, consistent with other findings in southern Spain, where it is strongly embedded in sociocultural traditions [17].

Another group of studies have been conducted in 1231 adolescents living in the Balearic Islands, western Mediterranean Sea. [19]. Less than 25% of participants met the 2010 nutritional objectives for the Spanish population for dietary fiber, folate, iodine, total fat, SFA, PUFA, total carbohydrates, and fruits and vegetables. However, females showed better compliance with the recommendations for PUFA, cholesterol, and vegetables than did males, but the former also showed lower