

Adherence to Mediterranean Diet Pattern of Grandparents and Grandchildren. Evolution Towards a Less Healthy Diet

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Abstract

Mediterranean diet is a healthy diet pattern based on the consumption of a wide variety of foods that provides the necessary nutrients and bioactive compounds. It represents a model for prevention of chronic diseases. Currently, the Mediterranean diet is undergoing a process of Westernization and strategies to recovery traditional characteristics are a priority for nutritional and educational policies. The objective of this work was to study the changes in eating habits in two recent generations (grandparents and grandchildren) to effectively promote healthy habits and reduce risk factors of chronic diseases. Two generations of people connected familiarly participated in this study, 82 grandchildren and 63 grandparents. Adherence to the Mediterranean dietary pattern was determined using the Mediterranean Diet Adherence Screener (MEDAS). The relation between food intake and emotions was determined in young people by an emotional eating questionnaire. Elderly presented a high adherence to Mediterranean diet. MEDAS was significant lower in young population mainly due to a higher consumption of carbonated/sweetened beverages and processed meat. The emotional state of young people did not affect their feeding behavior. Nutritional education and a healthy lifestyle are good tools to establish a healthy dietary pattern that is important to maintain a good quality of life.

Keywords: *Mediterranean Dietary Pattern; Aging; Emotional Eater; Nutritional Education*

Introduction

Mediterranean diet (MD) was declared by UNESCO as an Intangible Cultural Heritage, offering important benefits for the health, quality of life and well-being of the communities. The MD offers a nutritional model enriched by diverse cultures which over centuries has essentially maintained the same food structure and the same proportions: olive oil, fresh fruits and vegetables, grains and derivatives, fish and to a lesser extent, nuts, dairy products and meat. There is also a moderate consumption of wine, coffee and tea during meals while respecting religious rules and beliefs. MD is not just a diet (mixture of food); MD means a lifestyle because it also implies the way to prepare food and how foods are consumed around the same table. To eat in the Mediterranean Dietary Pattern is a moment of social meeting that complies with several functions: social, cultural and nutritional. The recognition of dietary qualities, and the positive impact on the health of the people who follow this dietary pattern, indicates the model of healthy diet we must try to encourage [1].

The definition of the MD is mainly based on the consumption of a wide variety of foods. The resulting diet is a healthy combination of foods that provides the necessary nutrients and bioactive compounds in adequate amounts to meet defined nutritional goals for a healthy diet. MD represents a model for prevention of chronic diseases [2]. The considerable amount and variety of plant foods in MD, defines some health indicators of this dietary pattern. Plant foods, and in particular fruits and vegetables, have been recognized as important sources for a wide array of non-digestible components and phytochemicals that may contribute synergistically, individually or in combination, to the nutritional and health benefits of these food commodities. Synergy or interactions of bioactive compounds and other

nutrients contained in these foods [3] that may provide desirable health benefits beyond basic nutrition [4]. Decreased oxidative stress is a plausible mechanism linking the Mediterranean diet to reduced chronic diseases risk [5]. Therefore, the role of bioactive compounds or phytochemicals as a key factor in the health effects of the Mediterranean Dietary pattern is an attractive and argued hypothesis [6].

Although inconclusive, evidence has alluded to combine variety of foods may be more protective against chronic diseases than isolated food, and a combination of fruits, and vegetables in the context of a balanced diet and healthy lifestyle, would help to protect against these pathologies [7].

Despite the known health effects of Mediterranean diet pattern, the diet is becoming more Westernized. This implies that the diversity of food is higher but it is a diet rich in red and processed meat, refined cereals, sweetened beverages and poor in fresh foods rich in natural nutrients and bioactive compounds [8]. At present, there is a high concern that the so-called MD is more a theoretical reference pattern based on the diet that existed in the 1960s in some regions on the Mediterranean coast. In the last decades, social and economic changes have led to important modifications in food patterns. Some changes have had a potential impact, such as increasing variety in the diet and improved access to food. However, some changes have moved the diet away from the traditional Mediterranean diet pattern. Some changes have led to a decrease in the nutritional quality of the diet. Nowadays an excessive intake of simple sugars, fats (especially saturated fat), and a deficient intake of low glycemic index carbohydrates was observed [9]. Therefore, strategies that encourage a healthy diet and that allow the recovery of the traditional characteristics of the MD are a priority for nutritional and educational policies.

Therefore, the objective of this work was to study the changes in eating habits in two recent generations to effectively promote healthy habits and reduce risk factors of chronic diseases in the population, especially in the most vulnerable groups.

Methods

Subjects

Two generations of people connected familiarly participated in this study. A group of young adults (mean age: 21 years) and another elderly group (mean age: 82 years). The elders were the grandparents of the young. The young group was formed by 82 people of both sex 63 women and 19 men. The elderly group consisted of 63 individuals, 38 women and 25 men. All were healthy people with normal weight. The old people were free living and they had functional autonomy and free living at home.

Participants gave written informed consent. The study was performed in accordance with the Helsinki Declaration of Human Studies. The protocol was approved by the Department of Nutrition, University Complutense of Madrid, Spain.

Procedure

At baseline, the dietitian completed a general medical questionnaire assessing lifestyle, health conditions, smoking habits, sociodemographic variables, history of illness, medication use, culinary habits, food preferences and aversions, toxic habits, eating habit between meals, habitual serving size, etc. Moreover, other questionnaires related with physical activity pattern and emotional eating were conducted.

The evaluation of adherence to the Mediterranean diet was performed using a questionnaire developed by the PREDIMED study [10]. The 14-item screener of Mediterranean Diet Adherence Screener (MEDAS) includes 12 questions on food consumption frequency and 2 questions on food habits considered characteristics of the Spanish Mediterranean diet. MEDAS is based on a priori assumptions about 14 desirable or undesirable dietary components for health. The 9 desirable components include vegetables, fruit, legumes, olive oil, cereals, nuts, fish, white meat, and moderate wine consumption; the 2 undesirable components are red meat and dairy products. A value of 1 was assigned to a high intake of each desirable component or a low intake of each undesirable food. The value 0 was applied when the condition was not met. For alcohol, a value of 1 was assigned to moderate consumption. MEDAS score was the sum of all values from the 14 components, ranging from 0 to 14; the higher the score, the greater the adherence to the MD. MEDAS score > 9 represented strict accordance with the healthy dietary pattern [10] and a score between 7 and 9 represented a modest accordance [8].

Finally, every young person filled out an emotional eating questionnaire (EEQ). This questionnaire have been developed and validated in order to assess many aspects of the motivation to eat that may be susceptible to impair adequate food intake [11]. This questionnaire classifies individuals as a function of the relation between food intake and emotions. EEQ contains 10 questions each of which have 4 possible replies: Never, sometimes, generally and always. Each reply was given a score of 1 to 4. The value 1 corresponds with the lower score and 4 with the healthier behavior. The subjects were classified in four groups attending to the score obtained: Non-emotional eater, with a score between 0 - 5; low emotional eater, with a score between 5-10; emotional eater, with score between 11 - 20; very emotional eater, with score between 21 - 30.

EEQ gives information about the lack of control in terms of eating, type of food that patients eat more frequently in given situations, and the sense of guilt after eat some foods.

The information contained in the questionnaires was the basis to know the dietary pattern and lifestyle of the participants.

Statistical analysis

A descriptive analysis was conducted on the frequencies, averages and percentages of the population segmented in older adults and young. The results were stratified into categorical variables as the scoring criteria for each determination. The results for the categories were compared using contingency tables. Differences between categorical variables were analysed with the Chi-square test. The average score in each category in terms of sex and age was compared using analysis of variance (ANOVA). P values ≤ 0.05 were considered statistically significant. V22 SPSS statistical software was used for data analysis and processing.

Results and Discussion

The MD is a palatable food pattern necessary in all collectives of population, young and older-adults, because it is considered for the experts as a healthy food pattern [12]. This dietary pattern is rich in nutrients and antioxidant bioactive compounds that are associated with a long and healthy life. Decreased oxidative stress is a plausible mechanism linking the MD to reduced risk of metabolic syndrome and its components. The association between the Mediterranean diet and plasma oxidative stress is robust and is not confounded by genetic or shared environmental factors [13].

However, adherence to the Mediterranean diet pattern has declined in the last years. The Mediterranean region is undergoing a “nutrition transition” away from their old diet, long considered a model of healthy living and sustainable food systems that preserve the environment and empower local producers. Moreover, because it is based largely on plant foods, this dietary pattern has relatively little impact on the environment, requiring fewer natural resources than production. But with products coming increasingly from outside the region and the variety of local landscapes being transformed by monoculture, traditional food systems are affected by a changing dietary habits [14].

There is an increasing evidence that Mediterranean populations are abandoning their traditional eating habits. Changes over time in the diet of populations towards an increase in the intake of processed foods and saturated fat and a decrease in the intake of plant foods and monounsaturated fatty acids. Findings are alarming, particularly in relation to younger generations. Spanish diet certainly has been object of these changes. Food consumption pattern and energy and nutrient intakes have changed markedly in Spain in the last 40 years [9,15].

The consumption of fresh fruits, fruit juices, nuts and transformed vegetables have increased. However, the consumption of other plant foods (legumes; cereals; nuts, etc.) has decreased on the last ten years [15].

In 60s, the nutritional indicators of Spanish diet were in line with recommendations for a healthy diet but the decline in the consumption of cereals and derivatives, legumes and pulses, nuts, and fresh vegetables have changed the nutritional value of diet.

Is noteworthy, the elderly participants in this study were young adults in the 60s and their diet fit perfectly to the Mediterranean dietary pattern [9]. Currently nutritional analysis of the diet has changed. The percentage contribution of carbohydrates has steadily decreased. In contrast, the percentage of lipids (41%) markedly exceeded the dietary guidelines for Spanish people [16]. A positive aspect that should be maintained was the high proportion of monounsaturated fatty acid because of the common occurrence of olive oil in the Spanish diet. In this evolution have been others changes that have negatively affected the quality of the diet, such as the elevated consumption of beverages, and processed meat products that are more typical Western foods [8,9]. All these changes also have been observed in the group of young participants (Table 3) but not in elderly (Table 2).

Several studies point to the abandonment of the Mediterranean diet by a substantial proportion of the Spanish population, especially the younger people [8]. Obviously, dietary habits are not strongly established in younger people and also the feeding behavior of this group is more affected by emotions and lifestyle. The Mediterranean diet has been partly replaced by an unhealthy Westernized dietary pattern, which clusters with other unhealthy lifestyles and may lead to synergistic undesirable health effects [8]. However, elderly appear to have greater adherence to the Mediterranean dietary pattern, mainly due to maintaining their eating habits acquired from childhood and endured over time. While the Westernized pattern was more frequent among the younger.

In summary, current Spanish diet follows a Mediterranean dietary pattern, but diet is increasingly separates diet 60s. At present MEDAS score for the Spanish population stands at around 6.3 [8]. This value is very low in comparison with the target of MEDAS > 9 established for the strict adherence to the Mediterranean diet. However, recommended values for MEDAS could have a wider margin. León-Muñoz, et al. [8] considered that the MEDAS score using cutoffs > 9 defines a strict adherence to the Mediterranean diet, while the use of cutoffs between 7 and 9 denotes a modest adherence. Even considering this greater margin of recommended values, the current average diet of the Spanish population is not adjusted to Mediterranean dietary pattern. In this study the degree of adherence to the MD was different depending on the age (Table 1). MEDAS score for grandchildren (young group) and grandparents (elderly group) were significantly different. The Mediterranean diet accordance was higher among older than younger people.

Elderly people showed MEDAS score over 9 (Table 1). These values correspond to a strict adherence to the MD. The major part of elderly individuals (69.8%) attained a MEDAS score of over 9, while 30.4% had a MEDAS score of 7 to 8, representing a modest adherence to the MD. Any elderly person showed values of low adherence to the Mediterranean diet pattern.

	Older adults n = 63	Young n = 82
Age (years)	82.2 ± 4.4	21.09 ± 1.5
Gender		
Women	38	63
Men	25	19
Body Mass Index (kg/m ²)	26.42 ± 4.10	21.13 ± 1.51
Mediterranean Diet Adherence Screener	9.44 ± 1.61	7.30 ± 1.41
High adherence (≥ 9)	44	29
Medium adherence (7 - 8)	19	39
Low adherence (≤ 6)	0	15
Emotional Eater Questionnaire	-	8.81 ± 4.80
Non-emotional (≤ 5)	-	22
Low emotional eater (6 - 10)	-	34
Emotional eater (11 - 20)	-	24
Very emotional eater (21 - 30)	-	2

Table 1: Characteristics of study population^a.

^a Data were presented as mean ± standard deviation and number of subjects.

However, young people presented a mean values of MEDAS of 7,3 (modest adherence to the MD). 35,4 and 47,6% attained high and medium adherence respectively and 18,3% of young individuals consumes a diet with a low degree of adherence to the MD (MEDAS \leq 6).

In spite of these results, MEDAS of young people were higher than the average values reported for the Spanish population [8]. These positive results could be due to the group of young people were students of Nutrition and were aware of the importance of diet on health.

The MD is an eating pattern that is culturally rooted and transmitted by eating habits learned from previous generations. The older population has followed these customs throughout their lives and it is less influenced by the Westernization of their diet. This may be an important reason to explain the high MEDAS found in this elderly population.

Most elderly people still adhere to the main features of the Mediterranean diet pattern, such as high consumption of olive oil as the main source of fat, a high consumption of fish, fruits and vegetables, a moderate wine intake, and low consumption of red meat and foods with added sugars, (Table 2). In contrast, adherence to the Mediterranean diet pattern has declined in young population because was observed a high consumption of carbonated/sweetened beverages, and a low consumption of olive oil, fresh vegetables, fruit and legumes (Table 3).

Questions	Target	Achievement of MEDAS target		
		Women (%)	Men (%)	Total
1. Do you use olive oil as main culinary fat?	Yes	100	100	100
2. How much olive oil do you consume in a given day? (including frying, salads, etc)	\geq 4 tablespoon/d (1 tablespoon: 13.5g)	83.3	80	82.6
3. How many vegetable servings do you consume per day? (consider side dishes as a half a serving)	\geq 2 servings/d (1 serving: 200g)	66.7	100	73.9
4. How many fruit units do you consume per day? (including natural fruit juices)	\geq 3	66.7	80	69.6
5. How many servings of red meat, hamburger or meat products do you consume per day?	< 1	83.3	60	78.3
6. How many servings of butter, margarine, or cream do you consume per day?	< 1	88.9	80	86.9
7. How many sweetened and/or carbonated beverages do you drink per day?	< 1	83.3	80	82.6
8. How many wine do you drink per week?	\geq 7 glasses	16.7	40	21.7
9. How many servings of legumes do you consume per week? (1 serving 150 g)	\geq 3	50	60	52.2
10. How many servings of fish or shellfish do you consume per week? (1 serving 100 - 150g of fish or 4 - 5 units or 200g of shellfish)	\geq 3	72.2	80	73.9
11. How many times per week do you consume commercial sweets or pastries	< 3	50	60	52.2
12. How many servings of nuts do you consume per week? (1 servings 30 g)	\geq 1	16.7	20	17.4
13. Do you preferentially consume chicken, turkey or rabbit meat instead of veal, pork, hamburgers or sausage?	Yes	72.2	80	73.9
14. How many times per week do you consume vegetables, pasta, rice or other dish seasoned with sauce of tomato, onion, garlic, or leek with olive oil?	\geq 2	77.8	60	73.9

Table 2: Older adults who achieve each target of the MEDAS^a score

^aMEDAS, Mediterranean Diet Adherence Screener [10]

Questions	Target	Achievement of MEDAS target		
		Women (%)	Men (%)	Total (%)
1. Do you use olive oil as main culinary fat?	Yes	87.3	47.4	78
2. How much olive oil do you consume in a given day? (including frying, salads, etc)	≥ 4 tablespoon/d (1 tablespoon: 13.5g)	66.7	26.3	57.3
3. How many vegetable servings do you consume per day? (consider side dishes as a half a serving)	≥ 2 servings/d (1 serving: 200g)	53.9	21.1	46.3
4. How many fruit units do you consume per day? (including natural fruit juices)	≥ 3	26.9	15.8	24.4
5. How many servings of red meat, hamburger or meat products do you consume per day?	< 1	69.8	42.1	78.8
6. How many servings of butter, margarine, or cream do you consume per day?	< 1	76.2	21.1	78.8
7. How many sweetened and/or carbonated beverages do you drink per day?	< 1	61.9	31.6	68.2
8. How many wine do you drink per week?	≥ 7 glasses	0	0	0
9. How many servings of legumes do you consume per week? (1 serving 150 g)	≥ 3	28.6	36.8	37.9
10. How many servings of fish or shellfish do you consume per week? (1 serving 100-150 g of fish or 4-5 units or 200 g of shellfish)	≥ 3	58.7	36.8	66.7
11. How many times per week do you consume commercial sweets or pastries	< 3	60.4	21.1	63.6
12. How many servings of nuts do you consume per week? (1 servings 30 g)	≥ 1	28.6	15.7	31.8
13. Do you preferentially consume chicken, turkey or rabbit meat instead of veal, pork, hamburgers or sausage?	Yes	65.1	36.8	72.7
14. How many times per week do you consume vegetables, pasta, rice or other dished seasoned with sauce of tomato, onion, garlic, or leek with olive oil?	≥ 2	74.6	31.6	80.3

Table 3: Young participants who achieve each target of the MEDAS^a score.

^a MEDAS, Mediterranean Diet Adherence Screener [10].

It is interesting to note that some results observed in the answers to the 14 MEDAS questions in the elderly people may not reflect the real situation during the life (Table 2). For example, only 52.2% of older people met the goal of consuming legumes at least three times a week. However, the more detailed answers on food consumption indicated that most of the population frequently consumed legumes (twice a week). A similar situation occurred with the results for wine consumption. Most participants considered wine consumption to be beneficial for the health and had routinely consumed wine throughout their adult lives. However, they had abandoned or reduced their intake in recent years due to the greater prevalence of disease and the increased necessity of consuming medicines, some of which interacted with alcohol. In both examples it can be said that the consumption of legumes and wine were two eating habits that were deeply-rooted in this population.

It is clear that young people have worst eating habits than the elderly people. In addition, non-healthy eating habits could be affected by emotional factors and the eating behavior may be modified by the emotional status during adolescence. Obviously, the character of young people is more affected by the emotional status than seniors.

Attending to the results of EEQ, the majority young participants (47,5%) were classified as low emotional eater, because they reached mean values around 9. The distribution of young according to the emotional response to food was indicated in table 1.

A detailed analysis of the answers to the EEQ questionnaire showed that more than 20% of young participants feel guilty after eat snacks or sweets; sometimes they preferred to eat only some few favorite foods; a tendency to a monotonous diet was observed; and a 76,8% showed problems to control the serving size (Table 4).

Emotional Eater Questionnaire [11]				
Questions	Answers ^a			
	Never	Sometimes	Generally	Always
1. Do the weight scales have a great power over you? Can they change your mood?	33 (40,2)	33 (40,2)	13 (15,9)	3 (3,7)
2. Do you crave specific foods?	4 (4,9)	51 (62,2)	24 (29,3)	3 (3,7)
3. Is it difficult for you to stop eating sweet thing?	31 (38,2)	33 (40)	12 (14,5)	6 (7,3)
4. Do you have problems controlling the amount of certain types of food you eat?	19 (23,2)	49 (59,8)	12 (14,6)	2 (2,4)
5. Do eat when you are stressed, angry o bored?	13 (15,9)	33 (40,2)	22 (26,8)	13 (15,9)
6. Do you eat more of your favourite food and with less control when you are alone?	28 (34,1)	24 (29,3)	25 (30,5)	5 (6,1)
7. Do you feel guilty when eat "forbidden" foods, like sweets or snacks?	24 (29,3)	31 (37,8)	25 (30,5)	2 (2,4)
8. Do you feel less control over your diet when you are tired after work at night?	48 (58,5)	23 (28,0)	6 (7,3)	0
9. When you over eat while on a diet, do you give up and start eating without control, particularly food that you think is fattening?	69 (84,1)	9 (11,0)	3 (3,7)	1 (1,2)
10. How often do you feel that food controls you, rather than you controlling food?	48 (58,5)	28 (34,1)	6 (7,3)	0

Table 4: Distribution of young population according the answers of the Emotional Eater Questionnaire

^aNumber of subjects. Percentages with respect to the total number of individuals are indicated in brackets.

The relation between emotional status with the three categories of degree of adherence to the Mediterranean diet (low, moderate and strict degree of adherence) can be observed in table 5. Our results showed that the emotional status no affected the degree of adherence to the Mediterranean dietary pattern in the young population. Significant differences were not found but when the degree of adherence to Mediterranean diet increased, the percentage of emotional eater individuals was lower.

It is certain that dietary habits in adult life are influenced by the habits acquired while growing up [17-19] and the dietary patterns, like any other habits, are learned at an early age and the grandchildren have learned from grandparents. It is possible that the elderly simply maintain traditional dietary habits acquired in infancy. Moreover, it is easier for older people to cook and eat at home, because they do not suffer from work-related time constraints.

However, according to the results, learning has not been as effective as we might want because young are subjected to the strong influence of environmental factors that affects their feeding behavior and make it difficult the educational process.

	MEDAS score ^a			p-value ^b
	Low n (%)	Medium n (%)	High n (%)	
Emotional Eater Questionnaire				0.416
Non-emotional (≤ 5)	8 (9.8)	6 (7.3)	8 (9.8)	
Low emotional eater (6 - 10)	4 (4.9)	16 (19.5)	14 (17.1)	
Emotional eater (11 - 20)	4 (4.9)	11 (13.4)	9 (10.9)	
Very emotional eater (21 - 30)	1(1.2)	1(1.2)	0	

Table 5: Distribution of emotional status according to the Mediterranean Diet Adherence Screener (MEDAS).

^a MEDAS score: low (≤ 6), Medium (7 - 8), High (≥ 9)

^b $p \leq 0.05$ were considered to be statistically significant

Conclusion

The adherence to the Mediterranean dietary pattern of the grandparents (elderly people) was significantly higher than in grandchildren (young people). The main detected problem in the young diet was the lower consumption of plant foods such as fruits, vegetables and legumes, and a high consumption of soft drinks and processed foods. Consequently, the intake of carbohydrates with low glycemic index, dietary fiber, and antioxidant bioactive compounds, were very low. However, intake of fat, saturated fatty acids and sugars was very high. Emotional status was not the cause because it did not affect the eating behavior of young people.

Nutritional education and maintaining a healthy lifestyle are good tools to establish a healthy dietary pattern that is important to maintain a good quality of life.

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