

IS IT POSSIBLE TO FOLLOW A DIET ACCORDING TO THE MEDITERRANEAN DIET PATTERNS DESPITE THE INCREASE IN SHOPPING COSTS?

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Abstract: In the last two years the economic cost of weekly shopping has become more expensive due to economic inflation. The Mediterranean Diet (MD) is recognized as healthy, but associated with high costs. The objective of the study is to assess whether the weekly menu of the population attached to our health center is associated with the pattern of DM and its cost. **Material and methods:** Prospective study of 10 family units (UF) selected at random in two medical consultations. They were asked to record the weekly purchase, cost and weekly menu, and the Predimed Questionnaire on adherence to the DM. **Results:** A total of 10 interviews were carried out, one of them belonged to a member of the research team who follows the DM pattern. Average age of people 63.8 years. The UF formed by 1 member (40%), 2 (20%), 3 (30%) and 4 (10%) and 30% of the UFs had good adherence to DM (score = or > 9 in the Predimed questionnaire). When analyzing the weekly menu, only 20% coincided. Average weekly cost/person/day is 7.8275 euros, with a range of 12.27 – 5.11 euros. The cost of the cheapest menu (5.11 euros) corresponded to the unit with the lowest adherence to DM (score of 4), while that of the UF with the highest adherence (score of 11) was 5.6 euros/person/ day. The analysis of the menus demonstrated their monotony both in the use of products and in recipes and culinary techniques. **Conclusions:** Despite the economic crisis, it is possible to follow a varied menu according to the DM pattern without exceeding costs. We believe that it is necessary to carry out activities focused on learning the principles of DM that include gastronomy, culinary techniques, menu planning and knowledge of food sustainability to improve the diet of the population. **Keywords:** Mediterranean diet, food expenditure, adherence to diet, economic cost

INTRODUCTION

Diet is one of the basic pillars for the prevention and treatment of multiple chronic pathologies. In Spain, the prevalence of excess weight is 55.8% according to the ENE-Covid study (1) and the main causes of mortality, according to data from the National Institute of Statistics (INE), in 2023 were neoplasms with 26.6%. of the total followed by cardiovascular diseases with 26.5% (2). To reverse this situation, it is essential to educate the population to follow a healthy lifestyle.

The PREDIMED study in 2013 showed that following a Mediterranean diet (MD) supplemented with olive oil or walnuts reduced the risk of major cardiovascular events (3) and recently, a study conducted in a non-Mediterranean country showed that closely adhering to A Mediterranean lifestyle, which in addition to a Mediterranean diet includes physical activity, adequate rest and socialization, reduces the risk of mortality from all causes by 29%, mortality from cancer by 28% and was associated, independently, with a lower risk of mortality from cardiovascular disease compared to those who did not follow the Mediterranean lifestyle (4). The UCC-SMART cohort study demonstrated that a combined DM and physical activity intervention was cost-saving and highly cost-effective compared to usual care, and these findings strongly advocate for the incorporation of lifestyle interventions as integral components of the care of all patients with cardiovascular disease (5)

Traditional DM is characterized by a high consumption of olive oil, fruits, nuts, vegetables and whole grains; a moderate intake of fish and poultry; a low intake of dairy products, red meat, processed meats, and sweets; and wine in moderation, always consumed with food (3) Fig 1 Pyramid of the Mediterranean diet (6, 7)

According to the 2023 Food Consumption Report of the Ministry of Agriculture, Fisheries and Food, since 2014 the Consumer Price Index (CPI) has maintained a continuous annual growth of 3.1% as of December 2023, but the CPI for food and beverages non-alcoholic beverages was, on that same date, 7.3%. After the return to normality after the COVID-19 pandemic, a 6.3% reduction in the volume of food and beverages purchased for domestic consumption is observed in 2023, compared to 2019, while the economic cost increased by 16.3%. 5%, due to the effect of the increase in the average price of food, which is 24.3% higher in 2023 (8).

During this period, olive oil, the DM's main food, has increased its price by 42%. As a consequence, the purchase of olive oil has decreased by 14.9% to the benefit of the increase in the purchase of sunflower oil (24.6%). Within the different types of olive oil, pomace oil, although it still remains in a minority share in the olive sector with 2.7% of the total market, has increased its demand by 105.9% compared to 2022 due to its lower cost (9)

Our health center is located in Barcelona, specifically in the La Marina del Prat Vermell neighborhood. Its family income index, according to the Urban Heart Barcelona 2021 report, is 40.0, the second lowest in the city, as is the registered unemployment rate in adults between 16 and 64 years old, which is 13.4 (10).

Given that various studies have shown that greater adherence to DM is associated with higher economic costs (11, 12), our objective is to analyze whether the weekly menu of the population adhered to our health center is associated with the pattern of DM; if it is possible to follow a DM with a cost that is acceptable to the majority of the population.

MATERIAL AND METHODS

A prospective study was carried out including 10 family units, selected at random, among people who attended two primary care consultations for adults at the health center on a given day. A member of the research team, who usually follows an intake that meets the MD pattern, was included in order to be able to compare with the rest of the participants.

Each family unit was asked to complete two records over the course of a week, one with the cost of the food purchased and another with the menu made that week. We asked the person in charge of making the purchase and the weekly menu to complete the Predimed questionnaire (13).

To calculate the weekly cost of the purchase, the participants were asked to write down the different foods purchased, their quantity and the cost of the product, as well as their invoice. In order to obtain the cost per person and day, we simply divide the weekly cost by the members of the family unit and by 7 days of the week.

To record the menu, a weekly questionnaire was provided where they had to write down the menu of the different meals made each day of the week (breakfast, mid-morning, lunch, snack and dinner).

Affiliation data (sex, age, level of education and members of the family unit) were collected, as well as 2 questions about shopping habits and places only from the person who filled out the questionnaires and a statistical treatment of means and range of values was carried out.

RESULTS

The average age of the people who carried out the records was 63.8 years, with 80% being women. Regarding the level of education, 40% had primary education, 50% had secondary education, and 10% had university education (corresponding to the member of the research team). 20% were retired and 80% were active workers. The family units were composed of 1 member in 40%, 2 in 20%, 3 in 30% and 4 in 10% (corresponded to the member of the research team).

When analyzing the 14-question Predimed questionnaire, only 30% obtained a score equal to or greater than 9 points, considering this good adherence. When analyzing the different menus we assessed whether the different questions of the questionnaire were met and only 20% of the family units obtained this score. When analyzing these discrepancies, most of them referred to the consumption of daily fruits and vegetables, weekly fish and legumes, with the actual consumption, assessed by the registered menu, being lower than the consumption referred to in the questionnaire (Table 1).

The average weekly cost per person and day was 7.8275 euros, with a range of 12.27 – 5.11 euros. The cost of the cheapest menu (5.11 euros) corresponded to the unit with the lowest adherence to the Mediterranean diet (score of 4), while that of the family unit with the highest adherence (score of 11) was 5.6 euros per person and day. The highest costs, 12.27 euros; 10.45 and 10.39 euros corresponded to a real Predimed questionnaire result of 5,7 and 6 points, which meant they had low adherence to the DM. (Table 2)

When analyzing the dishes from the different weekly menus, it stood out that they were very monotonous both in the type of dishes or recipes, fruit or sandwich for dinner, no variation in the type of breakfast, use of the same type of vegetables (green beans)

as use of culinary techniques, most of them used boiling or grilling techniques as the most common and the use of salads as raw vegetables.

Regarding purchasing habits, only 20% of participating family units have modified the type of business where they do their weekly shopping, which varies from the local market, the neighborhood store, and medium and large supermarkets, but; 100% admit to looking for the best offers. Regarding the purchase of food, 60% report having modified the purchase of food, mainly olive oil and fish, in smaller quantities, and fruits and vegetables, in larger quantities.

DISCUSSION

The DM is a healthy dietary pattern, rich in nutrients such as vitamins, minerals, antioxidants, fiber, omega 3 fatty acids (mainly from fish) and monounsaturated fatty acids (from olive oil) and has demonstrated multiple beneficial effects on health (7)

Different studies have shown a progressive abandonment of the most classic DM habits in Mediterranean countries (7,14,15,16), relating socioeconomic factors as the greatest determinant of adherence to DM (16, 17). Bonaccio estimated that 20% of the Italian population recognized negative changes in their diet due to the economic recession and that their adherence to the DM was lower (18). Gregorio, in Portugal, related that food insecurity, defined as the socioeconomic situation that limits access to the food necessary to maintain a healthy and active life, is associated with low adherence to DM, a higher prevalence of chronic diseases, a worse quality of life and a higher consumption of health resources (19)

With the situation of economic crisis that appeared in our country after the COVID-19 pandemic, with an increase in the price of the shopping basket (8) that can negatively

condition eating habits, and the progressive abandonment of the DM suffered by the Mediterranean countries; We were interested in knowing the situation of the population assigned to our health center located in one of the most depressed areas of Barcelona: if users' adherence to the DM had worsened and if it was possible to create a weekly menu adapted to the DM that was affordable, all with the aim of adapting the community activity of our center to improve the habits and lifestyle of the population.

In studies that have shown the progressive abandonment of DM, the consumption of olive oil, vegetables, fruits, nuts and fish decreases (7, 13, 15). According to data from the 2023 Food Consumption Report, the consumption of fruits, vegetables, olive oil, bread and fish decreases while that of potatoes, eggs and meat increases. The consumption of legumes increases compared to 2022 but they are only consumed 1.6 times per week instead of a minimum of 3 servings recommended in the DM (8). In our study, the trend of progressive abandonment of the DM eating pattern is confirmed. Less olive oil and fish are purchased; But instead, it means buying more fruit and vegetables even though their weekly consumption is lower than recommended according to the Predimed questionnaire. Mendes, in Portugal, reports that people with greater adherence to the DM show greater spending on fruits, vegetables, in addition to fish and nuts (12). Possibly the fact that fruit and vegetables continue to be foods with a low cost compared to others, favors the increase in the shopping basket reported by the families in our center, although their consumption is lower than recommended. In future studies it would be important to assess not only the cost of the product but also the purchased Kg of that product and, above all, whether they are consumed according to the DM recommendations in order to assess

adherence to DM and its real cost.

Another aspect to highlight is the low weekly intake of legumes compared to what is recommended. Legumes are a typical DM food with great health benefits, a source of cheap vegetable protein, which when eaten together with cereals constitutes a complete protein, with a low amount of fat and a high amount of micronutrients and fiber (20) and with an affordable price.

Recently, studies, both in Portugal and Spain, showed that diets with high adherence to the MD had a higher cost than diets with low adherence (12, 21, 22). Alves, in Portugal, found that diets with high adherence to the MD were 0.59 euros more expensive (2.79 versus 3.29 euros, a 21.2% increase in total daily cost (12).

In Spain, Rubini et al., in a study carried out in Extremadura, found that the average monthly cost of food was 203.63 euros, being 229.38 euros for diets with greater adherence to the MD, 49.37% more expensive compared to diets with low adherence (21). Bouzas et al, also in Spain, found that diets with greater adherence to the MD were 1.42 euros/day more expensive (22).

Our study did not follow that line; The family unit with the worst adherence to the DM presented the lowest cost of the menu (5.11 euros/person/day), but other units with low adherence presented high costs (12.27, 10.45 and 10.39 euros /person/day). The family unit with the greatest adherence to the DM has the second cheapest cost, being 5.6 euros/day, which represents a monthly cost of 168 euros per person and day in a city like Barcelona. To find out the reason for these differences, we assessed the purchasing habits of that family unit: they made most of their purchases of fresh products (fruit, vegetables and fish) in neighborhood or weekly markets. I bought meat products in neighborhood stores taking advantage of offers and the rest

of the products (pasta, rice, legumes, etc.). in average supermarkets and always taking advantage of offers. There were practically no prepared products in their shopping basket and, at home, they invested time in cleaning, preserving and preparing fresh products.

Although the way of calculating the average cost of the menu is different in our study, we start from the real cost per family instead of estimating costs from the different supermarkets or from official data like the rest of the studies (12, 21, 22). and, having been carried out with few participants, we think that future research is necessary calculating the cost of the menu based on family spending, with a larger number of participants and introducing other concepts such as purchasing sites to know which aspects need to be improved and avoid worsening the quality of our DM. Buying in local markets, looking for offers and buying fresh, unpackaged products help reduce the cost of the shopping basket.

When analyzing the menus of the family units, the monotony of both the menus and the culinary techniques used stood out. The breakfasts were very similar every day; The dinners were fruit and yogurt or sandwiches.

The vegetables were boiled and with little variety and the cooking techniques used were mainly grilled, boiled and fresh preparations (salads). This trend correlates with what is reflected in the 2023 Food Consumption Report of the Ministry of Agriculture, Fisheries and Food: the most used cooking techniques in Spain in 2023 were grilling with a percentage of 34.2%, raw with 30%, and boiling or steaming with 27.2%, while typical DM techniques such as stewing (19%) and baking (10.2%) are decreasing in use, as are healthy and fast like the microwave (3.4%) and the use of air fryers appears in 3% (8). It would be important to analyze these trends and the reason for the progressive less use of healthy and traditional DM techniques,

such as stew and oven, which, although they require more cooking time, allow for cooking a greater amount of food to be able to make a batch. weekly cooking.

The greater use of traditional and healthy cooking techniques such as the use of the microwave (23) or low-temperature and vacuum cooking (24,25,26) would favor richer menus both nutritionally and gastronomically that could prevent abandonment. of diets.

If we analyze the menu of the family unit with greater adherence and more economical, it presents a great variety of dishes and cooking techniques (Figure 2) that makes it easier to enjoy the food while making it healthier, but also favors coexistence. of the different members of the family, another aspect of the Mediterranean lifestyle. One problem that this menu may have is that it requires a greater investment of time in its preparation. With good planning of both the purchase and the menu, organization in the preparation and use of healthy, fast cooking techniques or that allow cooking more quantities that can later be frozen or kept vacuum (oven, stew, low temperature cooking). In addition to the involvement of the entire family, they could facilitate adherence to DM at a lower cost

Despite the limitations of our study, small number of participants, requesting more precise records of the purchase sites of each of the products, has shown us that we can carry out a diet following the canons of the DM at an affordable cost for a large number of people. part of the population.

The DM being the dietary pattern par excellence of our country; Having demonstrated its multiple health benefits (7), the reduction in global health economic costs (27, 28) and its sustainability (29, 30), strategies must be created to promote healthy lifestyles, not only from health organizations. and policies (31) but from primary care itself with community activities aimed at

improving lifestyle. We cannot modify the socioeconomic factors of the users of our center, but we can help them make healthier and more economical choices when purchasing food, teaching menu planning, purchasing techniques, food preservation and cooking techniques. that would favor adherence to the DM (32, 33).

As conclusions of our study, we think that despite the economic crisis it is possible to

follow a varied menu according to the DM pattern without exceeding costs. We believe that, in primary care, it is necessary to carry out community or group activities focused on learning about the principles of the Mediterranean diet that include gastronomy, culinary techniques, menu planning and knowledge of food sustainability to improve the population's diet.

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Mediterranean diet pyramid: a current lifestyle

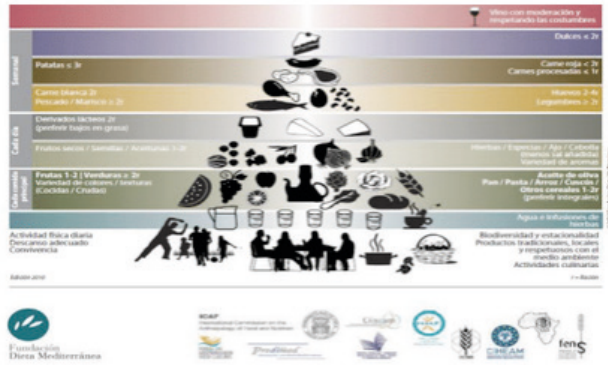


Figure 1: Mediterranean diet pyramid https://dietamediterranea.com/piramidedm/piramide_CASTELLANO.pdf

	Breakfast	Extra Snack	Food	Snack	Dinner
Monday	Glass of 200 ml milk supplemented with calcium with coffee; whole wheat toast 30 grams; 2 spoons	1 pear	White bean stew with vegetables and sausages; cucumber and tomato salad; strawberries with vinegar	Tea	Broth; Turkey Sirloin Wellington; lamb's lettuce salad; arugula and tomatoes
Tuesday	Glass of 200 ml milk supplemented with calcium with coffee; whole wheat toast 30 grams; avocado	1 kiwi and 5 almonds	Russian salad with breadcrumbs and anchovies; turkey fillet; tangerine	Tea	Broth, tortilla with calcots, yogurt
Wednesday	Glass of 200 ml milk supplemented with calcium with coffee; whole wheat toast 30 grams; tomato with burrata and basil	1 apple	Pasta with octopus and peas ragout; white asparagus with tomato and orange vinaigrette; pineapple	Tea and 5 almonds	1 cup of vichisoise; grilled fresh cheese with seasoned tomato and olives; orange
Thursday	Glass of 200 ml milk supplemented with calcium with coffee; whole wheat toast 30 grams; tuna fish	1 piece of pineapple	Lentils with vegetables; grilled sole with baked potato with pepper and oil; banana	Tea and 5 almonds	Sautéed cauliflower with garlic and bacon; garlic chicken breast; yogurt
Friday	Glass of 200 ml milk supplemented with calcium with coffee; whole wheat toast 30 grams; sweet ham	1 apple	Eggplant parmigiana; Roman-style squid; pineapple	Tea	Peas with ham and walnuts; poached egg, bread; yogurt
Saturday	Glass of 200 thousand milk supplemented with calcium with coffee; whole wheat toast 30 grams; Sweet ham 2 slices	1 pear	Orecchiette (50 grams) with broccoli, anchovies AND breadcrumbs; pickled horse mackerel; tangerine	Tea and 5 almonds	Grilled zucchini, steamed mussels, yogurt
Sunday	Glass of 200 ml calcium-supplemented milk with coffee; whole wheat toast 30 grams; salted ham of 2 slices	5 almonds plus half a glass of vermouth	Chicken and vegetable paella; arugula and lamb's lettuce salad and tomato sherry flan	Tea	Steamed artichoke, sardinas; yogurt

Figure 2: Weekly menu for the Family Unit with greater adherence to DM and with a cost per person per day of 5.6 euros

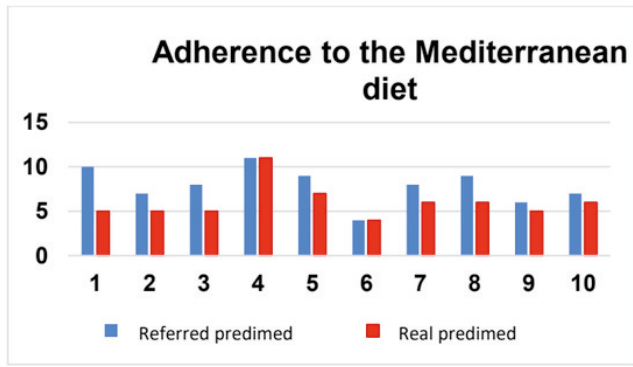


Table 1:

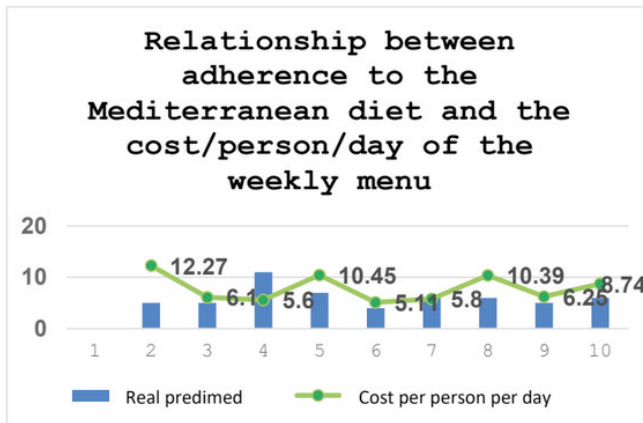


Table 2: