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Why the Mediterranean diet?

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Abstract

"Mediterranean diet" is a concept that defines a certain range of nutritional behaviors that cannot be faithfully reproduced in current times. The prototype of this diet was created in Crete in the 1960s and spread mainly among poor populations of fishermen and shepherds, leading a lifestyle substantially differed from modern one. The Mediterranean diet is characterized by high consumption of vegetables and fruit, cereal products, legume seeds and olive oil, average consumption of fish, dairy products and alcohol, as well as small consumption of meat, sugar and confectionery products. The products recommended in it contain a number of pro-health properties, among others, thanks to the content of omega-3 fatty acids, monounsaturated fatty acids, fiber, and antioxidants. Therefore, the Mediterranean diet allows to develop good eating habits for life and prevents many civilization diseases.

Key words: Mediterranean diet, omega-3 fatty acids, vegetables and fruit, olive oil, nuts, wine

Main assumptions of the Mediterranean diet

The term "Mediterranean diet" is used to describe the eating habits and lifestyle of the inhabitants of Crete, other areas of Greece and southern Italy from the early 1960s. These areas were inhabited by shepherds and farmers who worked in the open air, and moved mainly by bicycle or on foot. They lived a peaceful life, and the sea climate was an additional positive influence on their well-being. Due to the fact that they were not wealthy people, they ate products from their own farms and crops, so it was mainly simple plant-based foods, always fresh and natural [1]. This idyllic lifestyle fitting in with the currently desired "slow

food" or "slow life" trend, was of great importance in the context of health and longevity of these populations. Therefore, on the basis of the contemporary eating habits, the main principles of healthy nutrition were formed, also known today as the "Mediterranean diet".

According to its rules, cereal products, as the basis of every meal, are eaten in the form of whole-grain pasta, rice, groats and bread, preferably your own baking. These products are combined with a large variety of vegetables, including legumes and a small amount of meat. Bread is not spread with butter but eaten with the addition of olive oil. As a result, products widely regarded as high-calorie are lighter thanks to vegeables, which facilitates their digestion and assimilation of valuable ingredients. The bread can also be used to thicken soups or sauces.

Vegetables are the most diverse and beneficial group of products in the Mediterranean diet. The first place is taken by tomatoes and peppers as the most "responsible" vegetables for minimizing the incidence of most diseases, nevertheless, this group also include aubergines, artichokes, olives and all greens. Vegetables are eaten in raw or briefly stewed in olive oil. Their flavor qualities are also emphasized by herbal additives as well as onion and garlic, instead of large amounts of salt. They are the main ingredients of sauces, appetizers (antipasti, tapas), soups (minestrone, gazpacho), or are themselves served as a main course, eg. stuffed vegetables. They are consumed practically in every meal. Fresh seasonal or dried fruits can be served as a separate meal and as a dessert at the end of the meal.

Dairy products in the Mediterranean diet are mainly natural yoghurt and cheese. The first one can be served as a nutritious dessert or used as a supplement to many dishes, such as soups, salads and sauces. It is also the basis of the popular Mediterranean Greek dish "tzatziki", where it is prepared with chopped garlic and cucumber. In turn, cheeses, especially goat`s cheese and sheep`s cheese, can be served as starters, desserts or as a component of raw salads and other salads (feta, mozzarella, ricotta, mascarpone) [2]. Eggs are recommended in an amount of up to four per week [3]. Meat in a traditional Mediterranean diet is rarely eaten. There are selected lean meat types, that are often only an element of vegetable dishes. Therefore, this cuisine is poor in animal fats. However, on the Mediterranean table there are mainly fish and numerous species of seafood. An addition to them is primarily olive oil, wine, garlic, onion, lemon, numerous herbs and various vegetables. The most commonly consumed fish is salmon, tuna, cod, sole, halibut, sardines, and served sea food includes shrimps, crabs, octopus, squid and mussels. Various cooking techniques are used for their processing, such as

cooking, frying, baking or toasting over charcoal fire. They are served in the form of soups or in the company of vegetable sauces based on olive oil, garlic and herbs.

The most popular substitutes of meat in the Mediterranean diet include legumes, such as pea beans, broad beans, lentils or chickpeas, prepared in the form of goulash, soups, pastes and pâté.

As for fat, the principles of the Mediterranean diet are unambiguous and unchanging. The first place is taken by olive oil, which is added to most dishes. It gives the dishes a taste and aroma typical for the Mediterranean Basin cuisine. It is used in raw salads and other salads (instead of mayonnaise and cream popular in western cuisine), used for short frying and stewing of meat or vegetables and used for dipping bread or soaking croutons before baking. It not only extracts the taste of dishes, but also increases the assimilation of vitamins from other products. Nuts are also a healthy source of fat in the Mediterranean diet, which are eaten mainly as a healthy snack, dessert or as a thickener for soups or sauces.

An important element of the Mediterranean dishes is a glass of dry red wine, consumerd in moderate quantities after a meal, as well as large quantities of water [2].

The above-mentioned, approximate model of the Mediterranean diet, as already stated, is similar to the diet of the inhabitants in the greater part of Greece and southern Italy from the 1960s. Summarizing the assumptions of the analyzed diet, one can distinguish several of its characteristics,i.e.

- high consumption of olive oil and low consumption of fats of animal origin
- high consumption of vegetables and fruit
- high consumption of cereal products (mainly bread)
- high consumption of legume seeds
- average fish consumption
- average consumption of dairy products
- average consumption of alcohol (mainly wine)
- small consumption of meat and meat products
- small consumption of sugar and confectionery products.

Apart from observing a healthy diet, the inhabitants of the Mediterranean basin lived a healthy lifestyle due to high regular physical activity, which was undoubtedly influenced by the type of performer work [4]. In addition, their lifespan was one of the highest in the world, and the incidence of cardiovascular disease, some cancers and other chronic conditions was the lowest

despite limited access to health care. This was attributed to the low intake of saturated fatty acids (7-8% of energy), with their total content in the diet ranging from less than 25% to more than 35%, and it should be noted that in Crete, the most exemplary place in the use of the Mediterranean diet, consumption amounted to as much as 40% [4].

Pro-health properties of particular components of the Mediterranean diet

Cereal products

In the Mediterranean diet cereal products are consumed practically in every meal. The best choices are whole-grain products, such as wholemeal bread, groats, brown rice, whole-grain pastas or whole-grain cereals. Studies have shown that the consumption of these products can significantly contribute to the reduction of cardiovascular disease, cancer, diabetes or obesity, as well as the fact that their regular consumption may prolong senior`s lives.

Whole-grain products owe their health-improving effects to ingredients such as fiber, polyphenols, phytoestrogens and phytic acid. Fiber regulates the functioning of bowels, which helps to prevent, among others, bowel cancer, binds heavy metals in the body, is responsible for a long-lasting feeling of satiety and reduces the level of cholesterol and glucose in the blood. In addition, fiber fractions, β-glucans, help to strengthen the body's immune system and cause a decrease in LDL cholesterol by about 4-5%. Antioxidants contained in cereals – polyphenols, ferulic acid, vanillic acid, p-coumaric acid and caffeic acid, prevent oxidative stress, the development of atherosclerosis and cancer. Phytoestrogens, in turn, have antineoplastic, antibacterial and antioxidant effects, and influence lowering the level of cholesterol in blood.

The phytic acid contained in the outer layer of cereal grains reduces the absorption of, among others, iron and zinc, however, is increasingly appreciated as a compound that inhibits the development of cancer, including mammary gland and large bowel [5].

Vegetables and fruit

Vegetables and fruit are one of the main food sources in the Mediterranean diet. Their most characteristic pro-health features are antioxidant properties which block free radicals.

In fruit, the activity of antioxidant phenolic compounds depends on the degree of their maturity and shelf life. Black chokeberry and huckleberry, also known as blue berry, are

distinguished by the high content of polyphenols, mainly anthocyanins, and the highest antioxidant activity. It has been proven that the juice of chokeberry fruit has pharmacological activity, and thanks to its chelating properties it helps to remove heavy metals from the body. In addition, substances in chokeberry help to strengthen the walls of blood vessels, reduce the risk of developing atherosclerosis and heart disease, and regulate blood pressure. Blue berries are used as an anti-diarrheal and anti-inflammatory agent, and improve the night vision thanks to the carotenoids and anthocyanins contained in them. The fruits rich in antioxidant phenolic compounds also include: cranberry, helping to prevent inflammation of the urinary tract, peptic ulcer disease and periodontal diseases; blackberry which is a diaphoretic and expectorant agent; rosehip fruits, containing high amounts of vitamin C, E and carotenoids; redcurrant fruits, strawberries and raspberry fruits. The content of phenolic compounds in grapes depends on the type of vine. In principle, there are more phenolic compounds in red grapes than in white grapes, and they are found primarily in seeds and peel [6].

Although vegetables have a lower antioxidant capacity than fruit, their ability to bind free radicals is very high. Vegetables with a strong antioxidant effect include kale, spinach, brussels sprouts, broccoli, beetroots, red onions and shallots. In garlic, these properties are exhibited by sulphide and diallyl disulphide, allicin, S-allyl cysteine. However, the one deserving special attention and one of the most important vegetables of the Mediterranean cuisine is a tomato, more precisely, the lycopene which is highly concentrated in it and in processed tomato products. The influence of lycopene consumption on reducing the risk of heart disease as well as prostate cancer in men and cervical cancer in women was demonstrated. Interestingly, the assimilability of this compound from processed products (ketchup or tomato concentrate) is greater than from fresh products. It also increases when a tomato dish is prepared with the addition of olive oil, which is of course the characteristic of the Mediterranean cuisine [6].

Olive oil

Olive oil is another important component of the Mediterranean diet, whose beneficial effects have been proven in numerous scientific studies, and which is rich in both monounsaturated fatty acids and antioxidants. Epidemiological research has shown a significant relationship between its consumption and low incidence of lifestyle diseases, mainly due to the high content of oleic acid (55-83%) and antioxidants, such as phenols,

sterols, carotenoids, squalene and tocopherol, which are responsible for protecting the body against the effects of free radicals, causing heart disease, cancer, aging of cells or damage to their genetic material. Thanks to the content of antioxidants in olive oil, the LDL cholesterol fraction is protected against oxidation, which inhibits the development of atherosclerosis. Moreover, consumption of olive oil lowers the concentration of total cholesterol, increases HDL cholesterol, lowers blood pressure and reduces insulin resistance, which has an effect on inhibiting the development of diabetes, and has anti-inflammatory and anticoagulant effects. Epidemiological studies also prove that people using the Mediterranean diet with a large amount of olive oil are less likely to suffer from bowel cancer. The high content of fatty acids and antioxidants in olive oil also has a positive effect on the nervous system, inhibiting degenerative processes and preventing cognitive disorders (Alzheimer's disease, Parkinson's disease). In addition, it has a protective effect on the mucous membrane of the stomach and bowels, improves the functioning of the liver, gall bladder and alleviates digestive disorders [7]. In 2004, despite the limited and incomplete evidence for the beneficial effects of olive oil on various health parameters, the U.S. Food and Drug Administration issued a document recommending the consumption of 2 tablespoons of olive oil per day as a substitute for the same amount of saturated fatty acids. Thanks to monounsaturated fatty acids contained in olive oil, it may reduce the risk of developing ischemic heart disease [8]. These recommendations seem to confirm the positive results of the later PREDIMED study, where in the study group consuming approximately one liter of oil per week (at least 50 ml / day) there was a 30% decrease in the risk of myocardial infarction, stroke or cardiovascular death.

Nuts

An important element of the Mediterranean diet are also nuts, which are characterized by a broad range of pro-health properties, especially in relation to cholesterol. The essential unsaturated fatty acids contained in them and a high content of fiber reduce the level of its LDL fraction in the blood by up to 20%. Antioxidative vitamin E contained in nuts prevents the oxidation of LDL cholesterol, which reduces its atherogenic properties and inhibits the development of cancer, while plant sterols counteract the absorption of cholesterol from the gastrointestinal tract [2].

The compounds contained in nuts also affect other health parameters of the body. In particular, alpha-linolenic acid (ALA), present in large quantities in walnuts, lowers blood

pressure, regulates triglyceride levels, prevents arrhythmias and has anticoagulant effect. The amino acid L-arginine present in the nuts, due to nitrogen transformations, causes artery dilation and increases blood flow, which in turn affects better blood supply to the myocardium. Potassium and magnesium present in the nuts are also beneficial for this organ, as well as folic acid, which inhibits the development of atherosclerosis by protecting against the high concentration of homocysteine in the blood [2].

Currently, it is recommended to eat about 30 g of a mixture of various nuts (walnuts, hazelnuts, peanuts, almonds, pistachios) daily. This portion contains approx. 180 kcal and covers 70% of the daily requirement for essential unsaturated fatty acids, 50% for vitamin E, 13% for fiber and 18% for both copper and magnesium [2].

Fish and seafood

Fish and seafood owe their pro-health effect to the omega-3 fatty acids contained in them, mainly docosahexaenoic acid (DHA) and eicosapentanoic acid (EPA), whose beneficial effects on prevention and supporting the treatment of cardiovascular diseases and cancer have been scientifically proven. As proved by numerous studies, the consumption of omega-3 fatty acids significantly reduces the risk of ventricular fibrillation and restores normal sodium-calcium exchange in damaged or ischemic cells, thus acting anti-arrhythmically. In addition, these acids have a positive effect on coagulation factors and prevent the development of atherosclerosis by inhibiting platelet aggregation. They also reduce blood pressure and have a beneficial effect on the lipid metabolism of the body, reducing total cholesterol and triglycerides. As a result of the inhibition of the production of free radicals in granulocytes, they also reduce the inflammatory reaction in the body [9].

Epidemiological studies have also shown that while omega-6 fatty acids (linoleic acid (LA) and arachidonic acid (AA)) can stimulate cancer in the body, omega-3 fatty acids can contribute to reducing the risk of cancer, among others cancer of breast, large bowel, pancreas, prostate, lungs and stomach. The protective mechanisms of these acids can work at every stage of the tumor process, thanks to the ability to inhibit the multiplication of cancer cells and induce their death, as well as anti-inflammatory effects. Consumption of omega-3 fatty acids can also affect the inhibition of the transformation of proinflammatory arachidonic acid in the body, strengthening the immune system response and the regulation of androgen activity in the body [10].

Wine

Wine is a known and valued product in the Mediterranean tradition, however, pro-health properties are attributed mainly to its red and dry variety, rich in polyphenols. Their cardioprotective effect is based, among others, on prevention of oxidation of LDL cholesterol, which inhibits the development of atherosclerosis and cardiovascular diseases, and primarily, coronary heart disease [11].

It was shown that the extract of polyphenols from red wine influences the increase of nitric oxide (NO) secretion by endothelial cells of blood vessels, which in turn leads to the dilation of arteries, inhibition of platelet aggregation, and also positively affects myocardial immunity to ischemia. The wines that have the highest health effects are young red wines whose fermentation occurs in the presence of skins and grape seeds [11].

The cardioprotective factors of consumption of red wine also include its inhibitory effect on platelet activity, preventing their adhesion and aggregation, which may result in blocking blood flow in the artery [11].

Although red wine is not yet included in the official nutrition guidelines of cardiological societies, it undoubtedly can be considered an important pro-health component of the Mediterranean diet. "Counted on the antioxidant activity associated with the polyphenol content, 1 glass of red wine (about 150 ml) corresponds to 12 glasses of white wine, 2 cups of tea, 5 apples, 5 portions (about 100 g) of onions, 3.5 glasses of black currant juice, 0,5 liter of beer, 7 glasses of orange juice or 20 glasses of apple juice."[11]

Summary

"Mediterranean diet" is a concept that defines a certain range of nutritional behaviors that cannot be faithfully reproduced in current times. The prototype of this diet was created in Crete in the 1960s and spread mainly among poor populations of fishermen and shepherds, leading a lifestyle substantially differed from modern one. However, despite the obvious changes in civilization, affecting also the quality of food, it is worth to implement the main principles of this diet. Regardless of the country and the continent, the use of appropriate food ingredients of the Mediterranean diet in a daily menu can positively affect our health. This is confirmed by numerous scientific studies, starting from one of the first Lyon Diet Heart Study from the 1990s, in which it was stated that the use of the Mediterranean diet for over 2 years in patients after an acute coronary incident reduced the number of deaths due to this desease

by 76% [12]. Mention should also be made of the PREDIMED study (Prevención con Dietta Mediterránea), which showed that the use of the Mediterranean diet with a large share of olive oil and nuts, without energy limitations, reduced the risk of cardiovascular events among people from a high-risk group by about 30% [13]. The EPIC study (European Prospective Investigation into Cancer and Nutrition) confirmed the effectiveness of the Mediterranean diet in the prevention and even in the supporting of cancer treatment. According to his results, among people who more strictly adhered to the principles of the Mediterranean diet, there was a reduction in the risk of stomach cancer by 33% [14]. Similar positive results of the diet were also obtained in relation to the reduction of the incidence of bowel cancer [15], breast cancer [16] and the overall incidence of this disease [17]. The protective mechanisms of the Mediterranean diet were seen in the antioxidant and anti-inflammatory effects of its ingredients, primarily vegetables and fruit, rich in vitamins and polyphenols, olive oil, and oily sea fish [16].

There are several types of the Mediterranean diet, adapted to specific diseases. The first of these is the DASH diet (Dietary Approaches to Stop Hypertension) in hypertensive disease, with the aim to reduce the consumption of sodium and high-processed food containing it, such as cold meats and smoked products. Studies have shown an inverse relationship between adherence to the DASH diet and the occurrence of stroke [18] and a significant decrease in blood pressure in people using the diet, both healthy and those with diagnosed metabolic syndrome [19]. The second type is the MIND diet (Mediterranean-DASH Intervention for Neurodegenerative Delay), which is a combination of the Mediterranean diet and the DASH diet. It is characterized by a large supply of nutrients stimulating the brain, contained, among others, in green leafy vegetables, legumes or fruits rich in polyphenols. Observations have shown that observing it even to a moderate degree, significantly reduces the risk of developing Alzheimer's disease [20] and slows down the decline in cognitive abilities with age [21]. The Mediterranean diet assumes a moderate consumption of meat and milk products, so it can be a good base to create a varied vegetarian diet, and through a low content of sugar and processed products, also to a diet with a low glycemic index [22-25]. Although the arrangement of a menu in a specific disease entity requires an individual case study, and the selection of ingredients must often include allergies and food intolerances, the Mediterranean diet may be an ideal starting point to write a healthy nutrition plan that will not

only influence our health in a multifaceted way, but also will allow us to develop new, healthy habits for life.

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