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MEDITERRANEAN DIET AND CANCER PREVENTION

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ABSTRACT

The Mediterranean diet (MedDiet) is one of the most frequently recommended dietary models for the prevention of lifestyle diseases, including cancers. Unlike restrictive diets, it does not require significant dietary restrictions, is safe and does not lead to deficiencies. It is characterized by a high content of vitamins, fiber and anti-inflammatory and antioxidant substances.
Aim and methods: The aim of this study is to analyze the effect of the Mediterranean diet on cancer prevention. Information was collected from scientific publications available in PubMed, Scopus and Google Scholar databases.
Results: Previous research indicates that MedDiet benefits cardiovascular health, reduces the risk of metabolic syndrome and neurodegenerative diseases. A growing body of evidence also points to its role in the prevention of cancers such as breast, lung, liver and colorectal cancers. A high intake of vegetables, fruits, fish, olive oil and nuts is associated with a lower risk of developing these diseases.

KEYWORDS

Mediterranean Diet, Vitamin C, Vitamin E, Omega-3 Fatty Acids, Dietary Fibre, Cancer Prevention, Cancer Statistic

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Introduction

The rising incidence of malignant cancers worldwide has led to increased emphasis on preventive measures, including appropriate dietary choices. Among various dietary models, the Mediterranean diet (MedDiet) holds a special place as one of the healthiest ways of eating. Its foundation consists of plant-based products—vegetables, fruits, legumes, whole grains, olive oil—alongside moderate consumption of fish and dairy, and limited intake of red meat [1,2,3].

The advantages of the MedDiet extend beyond its high nutritional value to its abundance of bioactive compounds with anti-inflammatory and antioxidant properties, such as polyphenols, omega-3 fatty acids, and dietary fibre. Numerous studies suggest that adherence to the Mediterranean diet is associated with a reduced risk of cardiovascular diseases, type 2 diabetes, neurodegenerative disorders, and cancers [4,5,6].

Aim

The aim of this study is to discuss the relationship between the Mediterranean diet and cancer prevention, with particular focus on biological mechanisms and clinical research findings. This work may serve as a starting point for further analyses on the influence of specific components of the Mediterranean diet in reducing the risk of cancers such as colorectal, breast, prostate, and lung cancer.

Methods

Information was gathered through a review of English-language literature available in the PubMed, Scopus, and Google Scholar databases. The keywords used for the search included: the Mediterranean diet, vitamin C, vitamin E, omega-3 fatty acids, dietary fibre, cancer prevention, cancer statistic.

Discussion

1. The Mediterranean Diet – Definition and Composition

The Mediterranean diet is a dietary model originating from the cultures of countries bordering the Mediterranean Sea. Its foundation consists of minimally processed foods, primarily fresh fruits and vegetables, whole grains, and nuts. The main source of healthy fats is extra virgin olive oil (EVOO) and fish, particularly those rich in omega-3 fatty acids. Unlike other diets, it limits the consumption of red meat and dairy products [1,2]. Similar, though not identical, principles are presented by the Dietary Approaches to Stop Hypertension (DASH) diet, which places greater emphasis on reducing table salt intake (to 2300 mg per day) but allows for larger quantities of meat and dairy [3].

Current research unequivocally indicates that the Mediterranean diet significantly reduces the risk of cardiovascular incidents, type 2 diabetes, cancers, dyslipidaemia, and cognitive decline [4,5,6]. The PREDIMED-plus RCT study demonstrated that a 3-year intervention using the MedDiet in middle-aged and elderly individuals with overweight, obesity, or metabolic syndrome, combined with physical activity, can positively influence body composition. This is linked to a reduction in total and visceral fat, as well as slower loss of muscle mass [7]. The Framingham Heart Study, initiated in 1948 and ongoing to this day, although not directly focused on the Mediterranean diet, has provided significant evidence for the health benefits of its adoption. Its cardioprotective potential stems from the substantial contribution of omega-3 fatty acids and the high content of unsaturated fats from olive oil [8].

2. The Challenge of Cancer

Cancer remains one of the most serious challenges in modern medicine and public health. The 'All Cancers fact sheet' published by the Global Cancer Observatory (GCO) provides detailed data on the prevalence, incidence, and mortality of various cancers worldwide. In 2022, nearly 20 million new cancer cases and 9.74 million cancer-related deaths were recorded. Among women, the most common cancers were breast, colorectal, and lung cancer, while among men, lung cancer ranked first, followed by prostate and colorectal cancer [9]. According to GCO projections, cancer incidence will rise by 77% and mortality by 90% by 2050, underscoring the urgent need to intensify efforts in cancer prevention and early diagnosis [10,11].

3. Diet and Cancer

Nutrition plays a key role in modulating oncological risk, as confirmed by numerous epidemiological studies. Guidelines published by the American Cancer Society highlight a healthy diet, alongside weight control, regular physical activity, and abstaining from alcohol, as a fundamental pillar of cancer prevention [12]. Dietary habits can either support the body's natural defence mechanisms or disrupt them. An appropriate diet may improve the body's overall response to anti-cancer treatment and reduce its side effects [13,14]. The European Code Against Cancer, developed by experts from the European Oncology Union, outlines behaviours that reduce cancer risk. These include avoiding harmful substances, daily physical activity, maintaining a healthy weight, and a balanced diet [15].

4. Mechanisms of the Mediterranean Diet in Cancer Prevention

The anti-cancer properties of the MedDiet stem from the antioxidant and anti-inflammatory properties of its components, which prevent damage to the genetic material of healthy cells and inhibit the proliferation of cancer cells [16]. Polyphenols in EVOO contribute to its anti-inflammatory, antioxidant, neuroprotective, cardioprotective, anti-cancer, anti-obesity, anti-diabetic, antimicrobial, and anti-steatotic properties [2,4]. Hydroxytyrosol, another component of EVOO, has been shown to induce apoptosis and inhibit cell proliferation through its ability to auto-oxidise and accumulate hydrogen peroxide. In androgen-dependent prostate cancer, it reduces the expression of the androgen receptor and lowers prostate-specific antigen (PSA) levels. In hepatocellular carcinoma, hydroxytyrosol arrests the cell cycle of cancer cells in the G2/M phase, initiating apoptosis [4]. Omega-3 fatty acids in fatty fish inhibit angiogenesis and, consequently, tumour growth. Dietary fibre also plays an important role, as its fermentation in the gut exhibits anti-inflammatory properties and reduces intestinal permeability, protecting against potential inflammatory processes [17]. Vitamins found in fruits and vegetables modulate immunity and protect cellular DNA. Vitamin C activates NK cells and inhibits the migration of cancer cells, preventing metastases. Vitamin E is a potent antioxidant that enhances T-cell activity and inhibits COX-2, stimulating anti-cancer immunity [18].

5. Impact of the Mediterranean Diet on Different Types of Cancer

Research has demonstrated that adherence to the Mediterranean diet significantly reduces cancer incidence [4]. The EPIC study provided valuable insights into the protective role of the MedDiet in cancer prevention. High fruit consumption offers protective effects against prostate cancer, while increased vegetable intake further guards against colorectal, breast, and lung cancer. Greater fish consumption combined with limited red and processed meat intake contributes to the prevention of colorectal cancer [11,19,20,21]. The Mediterranean diet is particularly significant in preventing breast cancer, especially in postmenopausal women [22]. It has also been shown to lower the risk of bladder cancer and head and neck cancers. By slowing the progression of high-risk HPV infections, it further reduces the risk of cervical cancer [16]. Due to its rich content of vitamins E and C, as well as polyphenols, this diet may protect against stomach cancer by modulating the expression of tumour suppressor genes and inhibiting tumour promoter genes [17].

6. Practical Recommendations

The foundation of the Mediterranean diet consists of fresh fruits and vegetables, which provide vitamins, minerals, and antioxidants. Another key pillar is whole grains, which supply fibre and complex carbohydrates. Healthy fats come from EVOO and fatty fish, while nuts, seeds, and dates serve as tasty and nutritious snacks rich in unsaturated fats and micronutrients. It is advisable to avoid highly processed foods and red meat, as they increase cardiovascular risk and the likelihood of developing cancer. Instead, lean poultry, legumes, or the aforementioned fish are better protein sources. The MedDiet is not just about specific dietary guidelines but a holistic lifestyle. Meals are eaten slowly, enjoyed in the company of loved ones, and daily routines include moderate physical activity [1,4,5,6,7,16,20].

Conclusions

Healthy eating habits are a modifiable risk factor for chronic diseases, including cancer. Research shows that the Mediterranean diet, alongside avoiding harmful substances, regular physical activity, and maintaining a healthy weight, is one of the most important pillars of cancer prevention. Regular adherence to its principles can significantly reduce the risk of cancer, cardiovascular incidents, and cognitive decline. Its health benefits stem from its antioxidant and anti-inflammatory properties. It positively influences gut microbiota and, due to its high fibre content, accelerates intestinal transit, preventing stool retention. Promoting this dietary model among the public offers an opportunity for overall health improvement.

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