The Link Between Cardiovascular Disease and Diet and Its Progress in Treatment

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Abstract: CVD is one of the leading causes of death in the world today, so it is important to prevent and reduce the risk of CVD. The pathogenesis of CVD is mainly caused by atherosclerosis, which leads to cardiovascular impairment, and eventually leads to hypertension, coronary heart disease and other diseases. The research mainly focuses on the pathogenesis, the development of targeted drugs, or the use of AI technology to make targeted diagnosis and combine with models to treat patients. These methods are relatively costly and not universal, and some studies have shown that diet can prevent and improve the risk of CVD to a certain extent, but the complete dietary structure and related efficacy are not explained. This article analyzes the pathogenesis, symptoms, main risk factors, and the influence of trace elements on CVD and the regulation of CVD by Mediterranean diet (MD), and obtains the results of the impact of diet on human health and the regulation of CVD by the correct dietary structure. The purpose of this study is to focus on diet, a low-cost and universal method for the prevention and treatment of CVDs, and to make further progress in dietary structure and promotion. It provides a reference for future research on healthy dietary structure, and on the issue that the MD is not prevalent on a global scale, future research can focus more on adjusting the dietary structure to make it universal.

Keywords: CVD, MD, Trace element

1.   Introduction

For human beings, the prevention and treatment of cardiovascular diseases (CVDs) are important medical issues. With the development of society and the improvement of medical conditions, CVD is still the disease with the highest morbidity and mortality in the world, and is one of the main causes of death in the world. According to the most recent epidemiological study of CVD, the influence of CVD risk factors on residents' health has grown significantly over the last two decades, and the incidence of CVD has continued to rise.

As for the pathogenesis of CVDs, it mainly involves atherosclerosis, vasospasm, myocardial ischemia, etc., which lead to damage to the function of blood vessels and force the arteries to block, and the oxygenated blood cannot be exported from the heart, resulting in the illness and death of patients [1]. Through the analysis of its pathogenesis, a variety of studies have been carried out to explore the association between premature mortality caused by CVD and various factors. Among them, previous studies have proven that smoking, alcoholism, unhealthy diet, obesity, etc. are all risk factors for CVD [2]. There has been a lot of attention to CVD around the world in recent years, and although the situation has improved compared to before, the incidence is still high, which is related

to the behavior of the public itself. One of the main reasons for the public's failure to develop healthy eating habits is that most people are less likely to maintain healthy eating habits because they do not correctly anticipate the serious consequences of an unhealthy diet [2]. Or the public does not know much about the causal relationship between diet and CVDs, and there is a lack of understanding of the associated diseases caused by certain food intake [3]. The results of some studies have shown that unhealthy eating habits can increase the risk of CVD, and on the contrary, healthy eating habits will ensure the normal operation of cardiovascular function [3]. At the same time, compared with some high-income countries that train health professionals and use specific drugs to regulate CVDs, the method of actively regulating dietary habits and implementing an effective diet is more practical and cost-effective, and does not make people feel that the prevention of such diseases is out of reach [4].

The main objective of this study is to explore the association between diet and CVD, and whether it can be used in the treatment process of CVD. Specifically, the purpose of this review is to make progress in the study of macro- and micro-elements through the regulation of dietary patterns and dietary structure. Diet is closer to people's daily life, but also a major inducing factor leading to CVD, the study of dietary structure can better help people prevent and adjuvant treatment, healthy diet can improve metabolic status and avoid some risk factors for the disease, to a certain extent can reduce its morbidity and mortality.

2. Types and onset of CVD

For a best viewing experience the used font must be Times New Roman, on a Macintosh use the font named times, except on special occasions, such as program code.According to recent studies on CVDs, they can be divided into several main types, which have different symptoms but very similar pathogenesis. CVDs mainly include coronary heart disease (CHD), coronary artery disease (CAD), acute coronary syndromes. etc [5]. CHD includes acute coronary syndrome (ACS), and relevant studies and investigations have shown that the main symptoms of ACS include chest pain, shortness of breath, sweating, dizziness, and nausea. Some individuals also experience symptoms such as loss of appetite, fatigue, etc [6]. The main symptom of heart failure is dyspnea, accompanied by symptoms such as insomnia, pain, fatigue, etc. In addition to these physiological reactions, there may also be psychological disorders, such as depression and anxiety [7]. Cerebrovascular disease, also known as stroke. Patients who have suffered a stroke usually have sudden headaches, paralysis, confusion and other conditions. After a stroke, there is pain and fatigue physically, and anxiety and depression psychologically. The main symptom of arrhythmia is palpitations, which are accompanied by fatigue, difficulty breathing, dizziness. Patients with peripheral artery disease experience tiredness, weakness and pain when walking. Valvular heart disease manifests as angina, dyspnea, syncope, and in severe cases, cardiogenic shock [7]. Cardiac infarction is characterized by severe chest pain, shortness of breath, and dizziness [8]. According to the main CVDs and their symptoms listed above, it can be seen that CVDs are accompanied by physical symptoms such as fatigue, pain, shortness of breath, and psychological symptoms of depression and anxiety. These symptoms are obvious and can affect the daily life of the affected person, and even lead to shock and death. The main cause of these symptoms is the unique pathogenesis of CVD, the main pathogenesis of which is atherosclerosis. Atherosclerosis is a chronic inflammatory disease in which substances such as fat, cholesterol, and other substances accumulate in the walls of the arteries to form plaque. Its development begins with endothelial damage, which leads to lipid deposition, immune cell infiltration, and smooth muscle cell proliferation. Lipid-rich atherosclerotic plaques are responsible for narrowing of the lumen of blood vessels, which gradually harden, narrowing the arteries and restricting blood flow. Unstable plaques can rupture, leading to thrombosis, narrowing of coronary and cerebral arteries, and eventually myocardial infarction or stroke [9].

3.   The effect of nutrients on CVD

The main risk factors for CVD include obesity, hypertension, diabetes mellitus, and dyslipidemia, while the rest of the risk factors will vary from individual to individual, depending on the individual's age, gender, social status, ingestion status, etc. Even though there are differences between individuals, these risk factors are largely due to unhealthy diets [10]. Studies have shown that dietary risk is the top five contributors to the burden of CVD, and that unhealthy dietary factors can increase the burden of CVD, and for nearly three decades, dietary risk has been present in both male and female risk factors for CVD in both men and women, and is a major risk factor for young to middle-aged people (25-64) [11]. The reason why dietary risk can be a major risk factor for CVD is because dietary intake of some trace elements is closely related to CVD. For vitamins, vitamin D is the main element that affects CVD. Vitamin D is involved in the regulation of renin and inhibits the renin-angiotensin-aldosterone system (RAAS), vitamin D improves CV risk status in hypertensive patients, and once the patient's vitamin D is deficient, the RAAS system is overactivated, thereby increasing circulating parathyroid hormone, leading to pro-inflammatory diseases and promoting the progression of atherosclerosis [12]. Vitamin D also has an effect on glucose metabolism and parathyroid hormone, and the absence of vitamin D will induce myocardial insulin resistance leading to cardiac insufficiency, myocardial energy metabolism and other consequences, resulting in myocardial hypertrophy [13]. Essential trace elements (ETEs) such as calcium (Ca), cobalt (Co), and selenium (Se), etc. are all important components of most enzymes and proteins, and have antioxidant and anti-inflammatory activities. Because ETEs are produced in small quantities or cannot be produced at the root level, they can only be consumed through diet [14]. Se is lower than normal in serum samples from patients with CVD because selenium deficiency affects the aortic wall and wall thrombosis, resulting in the formation of aneurysms. At the same time, selenium also has the ability to improve heart function and improve histological lesions affected by cadmium. Studies have shown that serum zinc concentrations are strongly associated with CVD. The loss of zinc can lead to a decrease in lymphocytes and impaired immune response, which is more likely to lead to inflammation and eventually atherosclerosis. Deficiency of elements can lead to CVD, excess elements can also have bad effects, excess iron can cause damage to the kidneys and liver, and during periods of iron overload, calcium deposition in the aorta can be induced, leading to the adverse effects of vascular calcification [15]. For trace elements, too much or too little will affect human health and increase the morbidity and mortality of CVDs. Due to the special properties of trace elements, they can only be supplemented by diet, as well as by intaking water. It is necessary for people to pay more attention to the intake of trace elements to a certain extent, and supplement more relevant vitamins in the diet, such as intaking more fruits and vegetables in the daily diet to supplement vitamin C, vitamin D, Fe, Zn, Se, etc. It can effectively enhance immunity, promote growth and development, and protect cardiovascular function [16].

4.   Dietary patterns for the regulation of CVD

In recent years, new advances have been made in the treatment of CVDs, and the mainstream treatment is targeted drugs developed according to the pathogenesis of CVDs. In high-economy countries, the focus is on individualized treatment, through the integration of organoid modeling of patients, so as to accurately replicate the patient's condition and carry out targeted treatment. In addition, there is a new type of cell transplantation that adds value to the new cells [17]. In addition to medication and individualized treatment, the cost of dietary modification and prevention is relatively low and more universal. A large number of data show that CVD is largely caused by unhealthy diets, high salt, high fat, high alcohol and low vegetables often lead to obesity, further damaging the endothelium of blood vessels, cause arteriosclerosis, and finally lead to CVDs such as

hypertension [13]. In recent years, research has focused more on regulating this phenomenon through dietary structure. Among the many dietary structures, the MD stands out for its unique nutritional benefits and is considered a cornerstone of preventive medicine, combining a variety of foods with antioxidant and anti-inflammatory effects, especially for diseases associated with imbalances in oxidative levels [18]. There has been increasing interest in the potential benefits of the MD for CVD prevention and improvement. Countries in the Mediterranean region generally consider MD to be a healthy dietary pattern. It emphasizes the intake of virgin and extra virgin olive oil, as well as the intake of fruits, vegetables, nuts, legumes and grains to replenish fat. Additionally, it recommends moderate intake of dairy, fish, poultry, and alcohol while limiting consumption of red and processed meats. This dietary pattern is characterized by a low intake of saturated fats while providing essential trace elements through the intake of fruits, vegetables, and olive oil. [19]. The MD can be effective in consuming some trace elements that have beneficial effects on heart health. For example, olive oil, which is the main source of fat, is rich in monounsaturated fatty acids that play a key role in cardiovascular protection, omega-3 fat contained in fish can reduce inflammation and reduce the risk of atherosclerosis, and citrus fruits can better maintain the microbial environment of the stomach and intestines [20]. To protect people's cardiovascular system through the MD, extra virgin olive oil should be chosen as the main source of fat and mixed with fresh vegetables, especially leafy greens, whole grains and nuts in moderation. This method includes therapeutic amounts of garlic, rosemary, and saffron for use as a modest supplement, as well as moderate amounts of fish, legumes, and dairy products. On this basis, limit the intake of red meat and processed meat to reduce the risk of high blood pressure [21].

5.   Conclusion

This study analyzed the main types of CVDs and their associated symptoms and pathogenesis, and concluded that CVDs are affected by dietary habits, and unhealthy diet is the main risk factor for CVDs. From the perspective of diet, by starting with the trace elements required by the human body, we will explore their impact on CVDs, and the amount of some trace elements, too much and too little will induce the onset of CVDs. In recent years, most of the treatments for CVDs are costly and not universal. From the perspective of diet, the study started from the well-known MD, and analyzed the mechanism of dietary structure for the prevention and treatment of CVDs. For a healthy diet, it can effectively intake the energy and trace elements required by the human body, so as to protect and maintain cardiovascular function, and reduce the risk of CVD to a certain extent. Diet is closely related to people's daily life, and adjusting the diet structure does not consume a lot of costs, and it is universally applicable on a global scale. This article only provides an in-depth analysis of the MD, which has a clear role in the Mediterranean region, but is quite different from the diet in Asia and other regions, and it is uncertain whether the diet structure is universal in these regions. It is hoped that future studies can compare and summarize various dietary structures and find out the optimal dietary solutions for the prevention and treatment of CVDs.

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