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Plant-Based Diet to Prevent Coronary Artery Disease

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Abstract

Plant-based diet is associated with a reduced risk of cardiovascular disease. Only plant-based diet showed a reversal effect on coronary artery disease. Recommended plant-based diet is low in calories and high in fiber, vitamins, minerals, and phytonutrients. Plant-based diets can reduce the risk of coronary artery disease through several mechanisms.

Introduction

Plant-based diet is a dietary pattern that prioritizes the high consumption of plant products and avoids consuming various types of animal products. Plant-based diet as a sustainable diet has a low environmental impact, maintains health and well-being, and preserves resources for future generations [1]. Vegetarian is a form of a plant-based diet that focuses on reducing the consumption of various animal products (meat, fish, and poultry) and has been shown to reduce the risk of various diseases, such as ischemic heart disease, type II diabetes mellitus, hypertension, some types of cancer, and obesity [2]. Each attempt to improve energy balance and dietary changes towards predominantly plant-based diets that are in line with evidence on healthy eating is a suitable approach for sustainable diet [3]. Diets high in plants and low in animal contents are associated with a reduced risk of cardiovascular disease morbidity and mortality. Cardiovascular disease is one of the leading causes of death globally, accounting for about 46% of deaths from non-communicable diseases in the world [4]. A healthy lifestyle can reduce the risk of myocardial infarction by up to 80%, with nutrition playing an important role. A vegetarian diet can reduce CVD and the risk of coronary heart disease by up to 40%. Only plant-based diet showed a reversal effect on CHD [5].

Plant-based diet improves the cardiovascular system

The vegetarian diet is consistently associated with promising effects on the cardiovascular system, such as lowering systolic and diastolic blood pressure, lowering blood cholesterol and LDL-C, and lowering the risk of Type II diabetes mellitus. A high-vegetable diet generally consumes lots of whole grains, nuts, fruits, and vegetables, generally suitable for cardiovascular health. This plant-based diet is low in calories and high in fiber, vitamins, minerals, and phytonutrients [6]. Consumption of these plant-based products positively affects body weight, blood fat, glycemic index, blood pressure, and inflammatory outcomes [7]. On the other hand, consumption of fruit juices, refined grains (including breakfast cereals), beverages, and high-sugar foods is an unhealthy plant-based diet. The vegetarian diet consists of consuming low saturated fat and high-unsaturated fat, phytochemicals, vegetable protein as a substitute for animal protein, and foods with a low glycemic index. All of the above components benefit the risk of cardio metabolic disease [8]. Consumption of red and processed meat has been shown to increase the risk of death from cardiovascular disease in both obese and non-obese patients. In patients without obesity, those with high consumption of red meat had a higher risk of death from cardiovascular disease than those who rarely consumed red and processed meat. Red meat has been shown to increase the risk of ischemic heart disease in the non-obese population [9]. In addition to avoiding animal products, most vegetarians have a healthier lifestyle than non-vegetarians, including not smoking, drinking alcohol, and doing regular physical activity. The plant-based diet has a relationship with cardiovascular disease improvement with intermediate-risk factors. A community-based program campaigning for a plant-based diet has been shown to impact cardiovascular disease with intermediate-risk factors significantly. Vegetarian diets have been shown to have a protective effect on the incidence and mortality associated with ischemic heart disease. It has been shown to reduce body mass index, total cholesterol, LDL-cholesterol, glucose levels [10]. There is a significant relationship between a vegetarian diet and a decrease in the Framingham Heart Study risk assessment points. Even at a young age, maintaining a healthy diet and lifestyle plays a fundamental role in reducing cardiovascular risk. A vegetarian diet has been shown to improve the degree of stenosis in CHD patients, and reduce the risk of atherosclerosis [11]. Vegetarian diets have higher antioxidants related to lower blood pressure and cardiovascular risk. Vegetarian diet pattern also improves vasodilation and endothelial cells, increases insulin sensitivity, modification of the renin-angiotensin system, sympathetic nervous system, and modification of digestive system microorganisms [12]. Vegetarian diets have been shown to reduce the risk of mortality from ischemic heart disease by 30% compared to non-vegetarians. These results are supported by several other studies, which say there is a reduction in mortality from ischemic heart disease in the vegetarian group. The cause of the reduced mortality from ischemic heart disease is due to decreased risk factors for ischemic heart disease in the vegetarian population compared to the non-vegetarian population. From a metabolizing point of view, the benefits of a vegetarian diet are due to the health-promoting substances of a plant-based diet. Moreover, it also reduce the consumption of harmful substances in meat products, such as saturated fat and heme iron [13]. Hypertension is one of the main risk factors for stroke and ischemic heart disease. Physical stress caused by hypertension can worsen and accelerate atherosclerosis, especially in the coronary arteries and the brain [14]. Significant complications of hypertension can also cause the rupture of atherosclerotic plaques in the heart and brain. A decrease in blood pressure of 1 mmHg can reduce the risk of coronary heart disease by 13.5 events and two mmHg by 27 events per 100,000 population each year [15]. A strict vegetarian diet with no meat is linked to lower blood pressure. Compared with the omnivore diet, there was a significant decrease in blood pressure in the population with a vegetarian diet. In comparing the two groups between vegans (not consuming eggs and dairy) and lacto-ovo-vegetarians (still consuming eggs and milk), there was a significant decrease in systolic blood pressure, which was more remarkable in the vegan than in the lacto-ovo-vegetarian group. A significant reduction in blood pressure in a vegetarian diet can provide an essential protective effect for preventing hypertension [16].



Plant-based diet and lipid profile

The vegetarian diet is rich in fiber and omega-6 and is low in cholesterol, total fat, and saturated fatty acids, which will cause a decrease in total cholesterol, HDL cholesterol, LDL cholesterol, and non-HDL cholesterol. This reduction in cholesterol will make blood pressure better regulated [17]. Lipid profile and foam cell formation have long been recognized as mechanisms of atherosclerotic plaque formation in patients with coronary heart disease. Improving the lipid profile is one of the advantages offered by a vegetarian diet. This decrease in lipid profile varies depending on the baseline lipid, BMI, and the type of vegetarian food eaten. An observational study found a decrease in LDL-C of up to 22.9 mg/dl in clinical trials. The vegetarian diet, in general, has lower saturated fat and cholesterol content than the omnivore diet. Lowering the lipid profile can also be maximized by choosing specific foods. A vegan diet has a more significant lipid profile lowering effect than a vegetarian diet with egg and dairy consumption [18].

Plant-based diet and thrombosis

A plant-based diet can affect thrombotic factors depending on the food we consume. People on plant-based diets have lower fibrinogen levels than omnivores. Consumption of red meat and low-fiber foods is associated with high levels of fibrinogen. High iron and sugar intake and high body mass index are also associated with high plasma fibrinogen. Dark chocolate, garlic, ginger, onion, berries, grape have been shown to reduce platelet aggregation. Vegetarian diet pattern also affects factor VII and fibrinolysis [19]. Consumption of red meat in the long term will increase the blood's Trimethylamine N-Oxide (TMAO) levels. TMAO can accumulate in the heart, kidney, and other tissues and is involved in various biological processes, such as platelet aggregation and foam cell formation, inducing an inflammatory response and reducing reverse cholesterol transport that will contribute to atherosclerosis [20]. Consumption of red meat, eggs, fish, and dairy products contains abundant TMA precursors such as choline, betaine, L-carnitine, crotonobetaine, trimethylglycine-butyrobetaine, phosphatidylcholine, glycerophosphocholine, and trimethylamine-N-oxide. This precursor will be converted into TMA through enzymes produced by specific microbes in the digestive tract. This TMA will later enter the blood circulation, then be converted into TMAO by FMO3 in the liver. When we consume red meat, eggs, and other products, the level of TMAO in the blood will increase, and the risk of atherosclerosis and heart disease also increases [21].

Conclusion

A healthy lifestyle that include plant-based diet can reduce the risk of coronary artery disease. Plant-based diets can reduce the risk of several chronic mechanisms such as hypertension, dyslipidemia, and thrombosis that contributing to reduce coronary artery disease in long term. Plant-based diet should be promoted to make sustainable diet more popular.

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