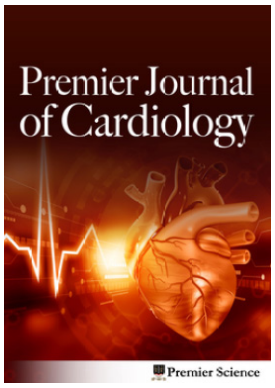

The Effectiveness of Plant-Based Diet on Cardiovascular Health

Jostel Owusu Akua Yeboawaa

ABSTRACT

Cardiovascular disease (CVD) is the most prevalent cause of death globally. Thus, there is a need for extensive research on the various ways to prevent and manage it effectively. This review would establish the effectiveness of a plant-based diet on cardiovascular health based on recent studies such as randomized clinical trials (RCTs), cohort studies, and systematic reviews.

Most recent studies have analyzed the impact of plant-based diets on cardiovascular health. These diets primarily consist of fruits, vegetables, nuts, whole grains, and seeds. Some of the main benefits of plant-based meals on cardiovascular health include an improved lipid profile, better control of blood pressure, and a reduction in systemic inflammation.

The methodology adopted in this review is that of a critical analysis of the peer-reviewed literature published within the last decade. It encompasses literature that directly measures the effects of plant-based diets on various cardiovascular outcomes such as cholesterol levels, blood pressure, arterial stiffness, and inflammatory markers. Plant-based diets are related to lower low-density lipoprotein (LDL) cholesterol and lower blood pressure, with an improvement in endothelial function in subjects. Moreover, plant-based diets exert anti-inflammatory and antioxidant properties and, thereby, lower the rate of oxidative stress, which is one of the major factors in causing or worsening atherosclerosis. The major mechanisms proposed to explain the positive effects of plant-based diets on cardiovascular health include improvements in lipid metabolism, enhancements of vascular function, and reductions in inflammatory responses. These support the fact that, on the whole, plant-based diets contribute to immense positive differences for people experiencing CVD or others who seek avoidance of the disease. However, deficiencies in some nutrients and challenging long-term adherence are the potential adverse effects. Overall, evidence indicates that plant-based diets are a valuable, non-pharmacologic option in reducing CVD risk and improve overall cardiovascular health.

Keywords: Plant-based diet, Cardiovascular health, Lipid profiles, Inflammation reduction, Nutrient deficiencies

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Introduction

CVD is the leading single cause of death worldwide. It accounts for about 17.9 million annual deaths, which roughly equates to one-third of all mortality cases in the world.[1] CVD describes a large group of disorders in the heart and blood vessels, including coronary artery disease, cerebrovascular disease, rheumatic heart disease, and all other disorders related to the cardiovascular system. The risk factors of CVD are complex and may be genetic, related to a sedentary lifestyle, smoking, or diet-related.[2] Of these factors, diet is most especially crucial for a sedentary lifestyle and smoking, and it is modifiable. This can help keep other risks in check, such as obesity, high cholesterol, hypertension, and obesity.[2]

One of the diets that recent research studies have proven to help improve cardiovascular health is plant-based. Plant-based diets also involve variety and come in degrees of restrictiveness. Ranging from vegan, which eliminates animal products, to vegetarian, which excludes meats but allows certain animal products such as dairy and eggs. Lesser restricted approaches to dietary regimen could encompass the Mediterranean diet, which is plant-based but may include small fish and poultry.[3] Each of these diets emphasizes whole, minimally processed foods like fruits, vegetables, legumes, whole grains, nuts, and seeds while reducing animal products, processed foods, and refined sugars.[4] Plants are generally more recommended for good cardiovascular health since they provide less saturated fat and cholesterol and have a high value of fiber, antioxidants, and phytochemicals, which are important in ensuring good cardiovascular health.[5] Although the Mediterranean diet is not plant-based, it is primarily based on plant-derived foods and includes healthy fats from sources such as olive oil, which have been demonstrated to lower LDL cholesterol levels and improve heart health.[6] These two dietary patterns also share key elements that are heavily beneficial toward heart health.[7]

Several mechanisms have been documented on how plant-based diets are related to cardiovascular health. The high content of fiber in plant-based diets contributes to low LDL cholesterol levels due to the tendency to bind with cholesterol molecules and promote the latter's excretion from the body.[8] On the other hand, phytochemicals from plant foods are also rich in flavonoids, carotenoids, and polyphenols, where anti-inflammatory and antioxidant actions have been raised to lower oxidative stress, a major component in the development of atherosclerosis.[9]

Plant-based diets are associated with reduced BMI and blood pressure and improved glycemic control, which are key components of improved cardiovascular outcomes.[10]

This review, therefore, embarks on undertaking a comprehensive review regarding how plant-based diets influence cardiovascular health. It puts forth the understanding of the underlying mechanisms through which a plant-based diet exerts its beneficial effects. It will be informed by recent peer-reviewed literature; the article seeks to explain the part played by plant-based dietary patterns in the prevention and management of CVD. Such an exploration is important for individuals

with a pre-existing cardiovascular condition and those who look to avoid non-pharmacological interventions that reduce their risk of developing CVD. Dietary habits are among the most modifiable risk factors; thus, the understanding of the relationship between plant-based diets and cardiovascular health may inform both public health recommendations and individual lifestyle choices.

Methods

Study Design

This review estimated the effect of plant-based diets on cardiovascular health in several studies, including RCTs, cohort studies, cross-sectional studies, and meta-analyses. RCTs will be included since they offer a high level of evidence on causality; cohort and cross-sectional studies offer evidence on the association of plant-based diet with cardiovascular outcomes over some time. The meta-analysis will synthesize data from several studies, thereby enabling a broader review of the literature than what is possible through individual studies.

These studies were included in the review, provided they were peer-reviewed, within the last 10 years, related to the effects of plant-based diets—vegan, vegetarian, or Mediterranean—with a heavy emphasis on plant foods and measuring cardiovascular health outcomes that included changes in blood pressure, lipid profiles, incidence of cardiovascular events, or markers of inflammation. This was deemed appropriate for adult populations aged 18 years and above.

It excluded those studies that did not specify the type of plant-based diet being assessed or whose diet studied had only a very minor focus on plants; lastly, it was mainly for assessing health outcomes other than CVDs. It also was supposed to have no comparator groups and/or not report quantitative outcomes to take into account only high evidence.

The findings of the eligible studies were combined under a qualitative approach where findings were tabulated based on the type of cardiovascular outcome measured to provide an overview of the trends that consistently emanate from the various types of plant-based diets on cardiovascular health. Cochrane Collaboration's tool for selection, performance, and reporting biases in RCTs was applied in the assessment of the risk of bias.

Epidemiological Evidence

Nutrition Components

Plant-based diets are rich in fiber, antioxidants, vitamins, and minerals that make a general contribution and are considered positive for cardiovascular health. Dietary fiber comes from fruits, vegetables, whole grains, and legumes. It has also always been related to an improved cardiovascular outcome through its cholesterol-lowering effects. Soluble fiber binds the cholesterol particles in the intestine, lowering their entrance into the bloodstream and deposition into the body. Various studies have demonstrated that with increased daily intake of fiber, the risk for CVD becomes lower, and the outcomes for cardiovascular health are better.[11]

Antioxidants neutralize free radical molecules accumulating from environmental factors and cellular activities. Free radicals are known to increase oxidative stress, a condition that accelerates the disease course of atherosclerosis, promoting vascular damage. Antioxidants are abundant in plant-based diets, have been associated with a reduction of oxidative stress, and hence offer protection against CVD.[12] Vitamins and minerals with high intakes from plant-based diets include potassium, magnesium, and folate. Potassium and magnesium are well-recognized as key players in blood pressure regulation, while the added benefit of folate is to decrease levels of homocysteine, the amino acid whose elevated level increases the risk for CVD.[13]

Plant-based diets provide important phytochemicals and non-nutritive bioactive compounds, including flavonoids and carotenoids. These have been associated with reduced inflammation and improved vascular function in concert with reduced platelet aggregation, all of which may reduce the rates of cardiovascular events. A meta-analysis by Wang et al. outlined the relationship of increased fruit and vegetable intake with a decreased risk of all-cause mortality, CVD, and cancer.[14]

Impact on Cholesterol and Blood Pressure

There is also a lot of consistent evidence to support the beneficent effect of plant-based diets on cholesterol, in particular, LDL cholesterol, as the leading marker of cardiovascular health. The seminal study by Jenkins et al. defined a "dietary portfolio" of cholesterol-lowering plant-based foods that, in hypercholesterolemic participants, reduced LDL cholesterol to an extent similar to that seen with statin medication.[15]

Plant-based diets could be positively associated with blood pressure apart from lipid management. Most of the plant-based diets are rich in potassium and magnesium, mainly from vegetables, fruits, whole grains, nuts, and seeds, which are important in the regulation of blood pressure. Potassium helps the body get rid of sodium, thus lowering blood pressure, while magnesium helps the blood vessels relax. Indeed, several studies have shown that vegetarian and vegan diets are associated with lower blood pressure compared to omnivorous diets. This may be attributed to the fact that plant-based diets are usually low in sodium but high in potassium and magnesium, which are important minerals involved in blood pressure regulation.[16]

The other aspect of the influence with respect to blood pressure regulation concerns the effects of plant-based diets on endothelial function. Plant foods high in nitrates, such as leafy greens, increase the bioavailability of the small molecule nitric oxide (NO), which is known to cause dilation of the blood vessels and, therefore, reduce blood pressure. Plant-based diets enhance levels of NO and thereby assure better vascular health and blood pressure, which are highly relevant for cardiovascular health.[17]

Reduction of Inflammation

Another critical factor in developing CVD is systemic inflammation due to endothelial dysfunction and

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also plaque formation, which leads to atherosclerosis. Plant-based diets have been shown to be related to reduced inflammation markers, such as C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α). Plant-based diets have shown anti-inflammatory actions because of the high levels of anti-inflammatory compounds, which include polyphenols, fiber, and plant-based omega-3 fatty acids from flaxseeds and walnuts.[18]

Barnard et al. reported the results of a low-fat, plant-based dietary intervention that included reductions in CRP and other inflammatory markers and suggested an anti-inflammatory diet that favored cardiovascular health.[19] Plant-based diets are also very low in saturated fats and devoid of dietary cholesterol, considered pro-inflammatory dietary elements leading to poor cardiovascular health. Plant-based diets have anti-inflammatory effects through a reduction of dietary intake of saturated fat and by increasing anti-inflammatory compounds that may be associated with an improvement in cardiovascular health.[20] Dietary fiber in a plant-based diet positively modulates gut microbiota and reduces general inflammation in the body. Gut bacteria ferment dietary fiber into short-chain fatty acids, including butyrate, which has anti-inflammatory properties. A diversified gut microbiome prevents intestinal permeability and ascertains a low risk of endotoxemia with chronic inflammation and CVD. This, in turn, furthers the promise of plant-based diets in alleviating inflammation and allows cardiovascular health to stand on firmer ground through beneficial modulation of gut health.[21]

Central Cohort Investigations Overview

Epidemiological investigations provide sound evidence to understand how the consumption of plant-based diets comes in relation to the betterment of cardiovascular health. Examples of such broad work from this perspective include the Adventist Health Study, which followed cohorts of Seventh-day Adventists—most of whom had put themselves on plant-based diets in relation to dietary patterns concerning health outcomes. In fact, the Adventist Health Study 2 has indeed reported a follow-up with over 96,000 subjects and maintained that the vegetarians had significantly reduced major CVD risk factors such as hypertension, hyperlipidemia, diabetes, and obesity compared to the omnivorous group. The results also showed that vegan and lacto-ovo vegetarian diets were associated with a lower incidence of ischemic heart disease and total mortality, confirming the protective effect of a diet low in or free from animal products regarding CVDs.[22] EPIC-Oxford was part of the cardiovascular events conducted among vegetarians and non-vegetarians in the United Kingdom by EPIC-European Prospective Investigation into Cancer and Nutrition. In the EPIC-Oxford study of over 44,000 participants, vegetarians had a 32% lower risk of hospitalization or death from ischemic heart disease than meat-eaters. The results also showed that vegetarians maintained much lower levels of cholesterol and blood pressure, reinforcing the view that plant-based diets are indeed effective in reducing cardiovascular risk factors.[23]

Other powerful cohort studies that influence knowledge on dietary patterns and cardiovascular health include the Nurses' Health Study. Although this study did not specifically address health, one of the meta-analyses, Yokoyama et al., studied vegetarian diets and blood pressure, and the findings presented came from 39 studies containing more than 21,000 participants. It indicated that vegetarian diets have lower blood pressure as compared to omnivorous ones, with large differences in both systolic and diastolic blood pressure. Vegetarian diets tend to be very high in intake of potassium and magnesium, coupled with low intakes of saturated fats, hence lower blood pressure. These two elements are one of the major variables for CVDs.[24]

Another meta-analysis was conducted aimed at assessing the association between vegetarian diets and atherosclerosis. These results showed that plant-based diets were associated with lower total cholesterol, LDL cholesterol, and triglyceride factors considered major risk factors for CVD. The mean reduction in LDL cholesterol was highly significant since high levels of LDL are among the major causative factors in atherosclerosis and other CVDs. This meta-analysis suggests a supportive role of plant-based diets in reducing lipid and, ultimately, protection from initiation of CVDs.[25]

Few systematic reviews have shown the positive effect of a plant-based diet on total mortality and cardiovascular mortality. For instance, in the systematic review of prospective cohort studies, it was observed that greater adherence to plant-based dietary patterns reduces the risk of all-cause mortality and cardiovascular mortality. Diets high in fruits, vegetables, legumes, and whole grains but low in animal products had a greatly lower cardiovascular mortality rate, a review summed up. These findings support the view that plant-based diets confer not only cardiovascular health benefits but also longevity.[26]

Collectively metabolically, the findings from meta-analysis and systematic reviews confirm what was documented in individual cohort studies on the cardiovascular benefits of plant-based diets. The protective role in cardiovascular health with plant-based diets may be mediated through a reduction in blood pressure, an improvement in the lipid profile, and a reduction in levels of markers of inflammation associated with reduced incidence of cardiovascular events.

Lipid-Lowering Mechanisms

Fruits, vegetables, legumes, and whole grains with high levels of fiber and phytonutrients are highly extolled to give plant-based diets its lipid-lowering effect. Most plant foods are made up of soluble fiber; oats, beans, and some fruits have been said to play a role in reducing LDL cholesterol.[27] In the intestines, this soluble fiber becomes a gel-like substance as it is being digested and binds bile acids, preventing them from being reabsorbed back into the blood. To replace the bile acids excreted into the intestines, more bile acids are made by the liver by using cholesterol it pulls from

the blood, hence lowering the total amount of cholesterol circulating in the blood, including LDLs.

Phytonutrients, including plant sterols and stanols, have added lipid-lowering characteristics. They contain structural features that resemble cholesterol; hence, they are absorbed similarly from the small intestines and, therefore, compete for their absorption. Foods from plants rich in unsaturated fat contribute additively to reducing LDL and elevate HDL cholesterol. Plant-based diets can prevent atherosclerosis and, consequently, CVD by reducing LDL cholesterol and improving lipid metabolism.[28]

Improvement in Vascular Function

Improvement in vascular function, including enhancement of endothelial function and arterial elasticity, is among the key plant-based diet benefits reported in numerous studies.[29] The endothelial cells form part of the inner layer lining the blood vessels. They play a role in the maintenance of orchestration of blood flow, blood pressure, and vascular tone. Yet, it should be noted that plant-based nutrition, in terms of antioxidants, fiber, and nitrates, improves endothelial functions by increasing levels of NO, which has been recognized to be very necessary for dilation purposes within vessels, thereby increasing blood flow.

Nitrate content varies, and green leafy vegetables are mostly of enormous and great usefulness for vascular health. It follows that nitrates in the human body are then reduced to NO; in return, NO relaxes the blood vessels and, as a result thereof, lowers blood pressure, hence improving arterial elasticity. The Mediterranean diet includes fruits, vegetables, whole grains, and healthy fats and has been associated with improvements in endothelial function and arterial stiffness in clinical studies, as reflected in lower blood pressure and improved blood flow. This, in turn, would reduce cardiac workload and also lower the chance of developing hypertensive diseases or cardiovascular-related diseases.

Anti-inflammatory Pathways

Inflammation is still one of the major risk factors for CVDs, and plant-based diets are rich in antioxidants and phytochemicals that fight against oxidative stress and inflammation. This is brought about by the imbalance between free radicals and antioxidants, which work toward the degradation of cellular components. Berries, leafy greens, nuts, and seeds are rich in antioxidant sources: vitamins C and E, polyphenols, and flavonoids neutralize the free radicals and protect against this oxidative damage.

The phytochemicals of plant-based diets include flavonoids, carotenoids, and polyphenols, which represent potent anti-inflammatory activity.[30] Such phytochemicals inhibit the production of pro-inflammatory cytokines, including IL-6 and TNF-α, and increase anti-inflammatory cytokines. For instance, the Mediterranean diet has been associated with a reduction in the levels of the inflammatory biomarker CRP, associated with CVD.[31] Diets based completely on plants prevent inflammation, hence minimizing the risk for endothelial dysfunction and damage to arteries that lead to plaque accumulation, factors considered hallmarks for the development of CVD.[32]

In other words, taken together, overall cardiovascular protection due to plant-based diets results in a summation of mechanisms related to lipid-lowering and vascular function enhancement with anti-inflammatory properties. There is a reduction not only in the traditional risk factors levels of cholesterol and hypertension but also in some of the very important underlying processes that drive CVD, such as oxidative stress and inflammation.

Comparison of Each Plant-Based Diet on Cardiovascular Health

The overall effect of each plant-based diet on cardiovascular health can be quite variable. Vegan diets exclude all animal-derived products and are extremely effective in reducing cardiovascular health due to the exclusion of saturated fats and cholesterol, as well as an emphasis on fiber, antioxidants, and plant-based proteins. In general, the works have reported that vegans tend to present lower LDL cholesterol, blood pressure levels, and an incidence of ischemic heart disease. However, this benefit may be modulated under the presence of nutrient deficiencies, such as deficiencies of vitamin B12 or omega-3 fatty acid deficiencies, when proper supplementation or food fortification is not used.

Vegetarian diets, which may include eggs and dairy products, have most of the same advantages as vegan, with perhaps slightly less benefit in CVD markers if high-fat or processed dairy products are not minimized.[33] Indeed, lacto-ovo vegetarians, who eat eggs and dairy products, had significant decreases in blood pressure and LDL cholesterol compared to omnivores, though the reductions varied depending on the quality and quantity of the dairy products consumed.

The Mediterranean-style plant-based diet is actually a very particular combination of plant-based and lean animal-derived foods, including fish heavy in omega-3 fatty acids, making them especially heart-healthy. This dietary pattern contains fruits, vegetables, nuts, whole grains, extra virgin olive oil, and, therefore, very high intakes of polyphenols, monounsaturated fats, and anti-inflammatory compounds. Indeed, the Mediterranean diet has coherently shown to be associated with a low rate of coronary artery disease, low blood pressure, and improved endothelial function when compared to more rigid diets, such as vegan or vegetarian ones, concerning global cardioprotection.

Plant-based diets vary, although the emphasis on whole, nutrient-dense foods while reducing amounts of processed foods and unsaturated fats lowers CVD risk factors. Again, it is vital to address how diet quality can make a difference in the diet. A “junk food” vegan who is on a diet highly composed of processed plant-based foods will negate health benefits. In this regard, for a diet to really ensure maximum cardioprotective effects of plant-based eating patterns, an approach with awareness and balance is imperative.

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Potential Limitations and Considerations

Nutritional Deficiencies

Admittedly, while there are numerous cardiovascular benefits to plant-based diets, there also exist some key nutrient deficiencies, primarily among those that are not well-planned. Nutrients that may be of concern in a strictly plant-based diet include, but are not limited to, vitamin B12, iron, and omega-3 fatty acids. Vitamin B12 is essential for the production and maintenance of nerve tissue and healthy red blood cells, predominantly obtained from animal products. A deficiency in B12 causes anemia and neurological problems, and low levels are linked to the CVD risk factor homocysteine. Vegetarians need to supplement their diet with vitamin B12 or eat foods fortified with vitamin B12.

Iron is another nutrient that is often inadequately supplied by the vegetarian diet. Plant-based sources contain non-heme iron that is not as bioavailable as the heme iron found in animal products. Non-heme iron is most easily absorbed when consumed with foods containing vitamin C and also with iron-containing plants. The best sources of non-heme iron are leafy greens and legumes. Dark, leafy greens can enhance the absorption of non-heme iron. Omega-3 fatty acids are highly concentrated in fish and help lower triglycerides, reduce inflammation, and improve blood pressure. Flaxseeds, chia seeds, and walnuts contain alpha-linolenic acid (ALA), which is a precursor to eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). However, only limited ALA is converted to EPA and DHA, and thus, plant-based individuals may supplement with algae-derived DHA dietary supplements to obtain adequate status of these nutrients.[34]

Additionally, studies show that individuals on plant-based diets may have lower choline intake, thereby impacting the metabolism of very-low-density lipoprotein and increasing the accumulation of fat within the liver, thereby leading to NAFLD.[35] Eggs and fish provide the richest sources of choline, but in plant-based sources like soybeans and quinoa, the amount is very low.

Taurine is an amino acid found almost exclusively in animal products and plays critical roles in the conjugation of bile salts, the maintenance of osmotic balance in cardiac tissue, and calcium homeostasis in cardiac muscle. Its deficiency has been associated with enhanced oxidative stress and endothelial dysfunction, especially among elderly individuals adhering to vegan diets.[36] Although L-carnitine is highly concentrated in red meat, it is an important cofactor for the oxidation of fatty acids in mitochondria. Several reports indicate that muscle carnitine stores are low in long-term vegetarians and vegans, which could reduce cardiac energy metabolism and perhaps exercise performance.[37]

Lastly, vitamin K2 and Arterial Calcification Plant-based diets will naturally be abundant in the source of K1, phylloquinone, but contain very small quantities of menaquinones. Fermentation or animal origin supplies vitamin K2. Vitamin K2 is necessary for carboxylation to stop arterial calcification. Vitamin K-dependent activation of the inhibitor of calcification by the matrix Gla-protein (MGP) suppresses this process. These data confirm that low intake of K2, which is common in plant-based diets, is associated with increased calcification of coronary arteries, becoming a considerable risk factor in cardiovascular events.[38]

Challenges to Adherence

It is not easy to maintain and adhere to a plant-based diet for one who is accustomed to a more animal-product-heavy diet. Long-term adherence to a plant-based diet depends on social, cultural, and environmental influences. A plant-based diet, unless well planned, is also not nutritionally complete, which is a source of deficiency in nutritional intake and resultant health outcomes.

It must be adequate in order to ensure a variety of nutrient-dense foods to meet needs each day for long-term adherence. Other ways the diet might be implemented and maintained include meal planning, education, and counseling from registered dietitians or health care providers. The preparation of palatable yet nutritionally adequate meals can help to enhance adherence and reduce the potential to return to less healthful ways of eating.

Confounding Factors

A number of plant-based diets related to CVD have been performed, and generally relatively consistent findings in favorable changes in LDL cholesterol, blood pressure, and endothelial function were found. Making an overall assessment, besides possible dietary confounding factors, should be considered in order not to overestimate general health benefits that might be attributable to diet.

Lifestyle Behaviors

It is not a limitation of most such studies that the benefits of plant-based diets cannot be differentiated from other lifestyle issues. The same people who choose to follow plant-based diets because of certain values also lead healthier lifestyles, including regular exercise. On the one hand, regular physical activity has a strong correlation with improved cardiovascular outcomes. Exercise in and of itself has been shown to lower blood pressure, improve vascular function, and decrease systemic inflammation—many of the same protective effects ascribed to plant-based diets. Plant-based eaters are more likely to be nonsmokers and to drink less alcohol, independently contributing to better heart health. Apart from the fact that smoking cessation decreases the risk of atherosclerosis, there is also an association of moderate to no alcohol consumption with improved blood pressure and lipid profiles. Without considering the practices mentioned above, it is not clear what the exact contribution of diet has to cardiovascular improvement.

Socioeconomic Disparities

This only adds another layer of complexity—socioeconomic status—where; in fact, the classes that enjoy higher statuses are more inclined toward adopting a plant-based diet because they more frequently have

access to nutrient-dense foods like fruits, vegetables, nuts, and seeds. They may, too, enjoy better financial leeway for access to health education and care services that perhaps result in even better health profiles in this particular population. On the other hand, plant-based diets in low-income classes tend to be less varied and less nutrient-dense and, therefore, tend to reduce the amount of cardiovascular protection found in low-income statuses. Yet another socioeconomic disparity highlights the need to consider external factors in interpreting results and broadening generalizations.

Psychological and Environmental Influences

Psychological well-being and environmental influences are other rather important yet undercover areas. Plant-based diets are more often chosen in a larger mindfulness-oriented lifestyle that tries to reduce stress and promote holistic health. This would be a consequence of the direct effects on cardiovascular health emanating from reduced levels of stress through cortisol, blood pressure, and inflammation. Furthermore, those with healthier lifestyles may be the ones residing in communities with more green spaces, exercise facilities, and lower levels of pollution, which are quite apart from their diet. These are factors to be taken into consideration so as not to overestimate the causal role of plant-based diets.

Conclusion

Evidence overwhelmingly supports the effectiveness of plant-based diets in promoting cardiovascular health. Indeed, many studies have indicated that high consumption of fruits, vegetables, whole grains, legumes, nuts, and seeds has been associated with significant improvements in lipid profiles, blood pressure, and markers of inflammation—critical determinants in reducing the risk of CVD. Plant-based diets provide the active ingredients of fiber, antioxidants, and phytochemicals, which act synergistically in protecting the heart and vascular system while reducing oxidative stress and inflammation.

Another perfect approach to the prevention of CVDs through actions on modifiable lifestyle factors could be the adoption of a plant-based diet. However, it has to be put into consideration that though promising, the use of plant-based diets is not devoid of pitfalls.

Nutritional deficiencies, particularly vitamin B12, iron, and omega-3 fatty acids, are worth considering and have to be properly planned or included in the diet as supplements.

While the concept of plant-based diets is growing, much needs to be learned about its long-term effects and how best to achieve those. How certain plant-based diets influence cardiovascular health and how to maximize those benefits may be better realized in clinical trials and longitudinal studies. Individuals interested in transitioning to a plant-based diet should consult healthcare professionals or registered dietitians to tailor dietary plans to their unique health needs and ensure balanced nutrient intake for sustained cardiovascular well-being.

References

1 Virani SS, Alonso A, Aparicio HJ, Benjamin EJ, Bittencourt MS, Callaway CW, et al. Heart disease and stroke statistics—2021 update: A report from the American Heart Association. Circulation. 2021;143(8):e254–743.
2 Lichtenstein AH, Appel LJ, Brands M, Carnethon M, Daniels S, Franch HA, et al. Diet and lifestyle recommendations revision 2006: A scientific statement from the American Heart Association Nutrition Committee. Circulation. 2006;114(1):82–96.
3 Tuso PJ, Ismail MH, Ha BP, Bartolotto C. Nutritional update for physicians: Plant-based diets. Perm J. 2013;17(2):61–6.
4 Ornish D, Brown SE, Billings JH, Scherwitz LW, Armstrong WT, Ports TA, et al. Can lifestyle changes reverse coronary heart disease? The lifestyle heart trial. Lancet. 1990;336(8708):129–33.
5 Medawar E, Huhn S, Villringer A, Witte AV. The effects of plant-based diets on the body and the brain: A systematic review. Transl Psychiatry. 2019;9(1):226.
6 Esselstyn CB, Gendy G, Doyle J, Golubic M, Roizen MF. A way to reverse CAD? J Fam Pract. 2014;63(7):356–64.
7 Menotti A, Kromhout D, Blackburn H, Jacobs D Jr, Lanti M. Forty-year mortality from cardiovascular diseases and all causes of death in middle-aged men of the Seven Countries Study. Eur J Epidemiol. 2004;19(9):803–12.
8 Anderson JW, Baird P, Davis RH Jr, Ferreri S, Knudtson M, Koraym A, et al. Health benefits of dietary fiber. Nutr Rev. 2009;67(4):188–205.
9 Fraser GE. Vegetarian diets: What do we know of their effects on common chronic diseases? Am J Clin Nutr. 2009;89(5):1607S–12S.
10 World Health Organization. Cardiovascular diseases (CVDs) [Internet]. 2021. Available from: https://www.who.int/health-topics/cardiovascular-diseases
11 Estruch R, Ros E, Salas-Salvadó J, Covas MI, Corella D, Arós F, et al. Primary prevention of cardiovascular disease with a Mediterranean diet. N Engl J Med. 2013;368(14):1279–90.
12 Yokoyama Y, Levin SM, Barnard ND. Association between plant-based diets and plasma lipids: A systematic review and meta-analysis. Nutr Rev. 2017;75(9):683–98.
13 Li D. Effect of the vegetarian diet on non-communicable diseases. J Sci Food Agric. 2014;94(2):169–73.
14 Wang X, Ouyang Y, Liu J, Zhu M, Zhao G, Bao W, et al. Fruit and vegetable consumption and mortality from all causes, cardiovascular disease, and cancer: Systematic review and dose-response meta-analysis of prospective cohort studies. BMJ. 2014;349:g4490.
15 Jenkins DJ, Kendall CW, Marchie A, Faulkner DA, Wong JM, de Souza R, et al. Direct comparison of a dietary portfolio of cholesterol-lowering foods with a statin in hypercholesterolemic participants. Am J Clin Nutr. 2005;81(2):380–7.
16 Higgins JP, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomized trials. BMJ. 2011;343:d5928.
17 Key TJ, Appleby PN, Spencer EA, Travis RC, Roddam AW, Allen NE. Cancer incidence in vegetarians: Results from the European Prospective Investigation into Cancer and Nutrition (EPIC-Oxford). Am J Clin Nutr. 2009;89(5):1620S–6S.
18 Yokoyama Y, Nishimura K, Barnard ND, Takegami M, Watanabe M, Sekikawa A, et al. Vegetarian diets and blood pressure: A meta-analysis. JAMA Intern Med. 2014;174(4):577–87.
19 Barnard ND, Scialli AR, Turner-McGrievy G, Lanou AJ, Glass J. The effects of a low-fat, plant-based dietary intervention on body weight, metabolism, and insulin sensitivity. Am J Med. 2009;122(6):491–7.
20 Esselstyn CB Jr, Ellis SG, Medendorp SV, Crowe TD. A strategy to arrest and reverse coronary artery disease: A 5-year longitudinal study of a single physician's practice. J Fam Pract. 1995;41(6):560–8.
21 Esposito K, Giugliano D. Mediterranean diet and cardiovascular disease. BMJ. 2014;349.
22 Adventist Health Study 2. Arch Intern Med. 2013;173(13):1242–9. https://doi.org/10.1001/jamainternmed.2013.2017
23 Craig WJ. Health effects of vegan diets. Am J Clin Nutr. 2009;89(5):1627S–33S.
24 Yokoyama Y, Nishimura K, Barnard ND, Takegami M, Watanabe M, Sekikawa A, et al. Vegetarian diets and blood pressure: A

meta-analysis. JAMA Intern Med. 2014;174(4):577–87. https://doi.org/10.1001/jamainternmed.2013.15160
25 Melina V, Craig W, Levin S. Position of the academy of nutrition and dietetics: Vegetarian diets. J Acad Nutr Diet. 2016;116(12):1970–80.
26 Liu Y, et al. Vegetarian diet and serum lipid levels: A systematic review and meta- analysis. Nutr Rev. 2013;71(12):837–44. https://doi.org/10.1111/nure.12050
27 Hever J, Cronise RJ. Plant-based nutrition for healthcare professionals: Implementing diet as a primary modality in the prevention and treatment of chronic disease. J Geriatr Cardiol. 2017;14(5):355–68. https://doi.org/10.11909/j.issn.1671-5411.2017.05.012
28 Trautwein EA, McKay S. The role of specific components of a plant-based diet in management of dyslipidemia and the impact on cardiovascular risk. Nutrients. 2020;12(9):2671. https://doi.org/10.3390/nu12092671
29 Peña-Jorquera H, Cid-Jofré V, Landaeta-Díaz L, Petermann-Rocha F, Martorell M, Zbinden-Foncea H, et al. Plant-based nutrition: Exploring health benefits for atherosclerosis, chronic diseases, and metabolic syndrome—A comprehensive review. Nutrients. 2023;15(14):3244. https://doi.org/10.3390/nu15143244
30 Kumar APN, Kumar M, Jose A, Tomer V, Oz E, Proestos C, et al. Major phytochemicals: Recent advances in health benefits and extraction method. Molecules (Basel, Switzerland). 2023;28(2):887. https://doi.org/10.3390/molecules28020887
31 Wu GD, Compher C, Chen EZ, Smith SA, Shah RD, Bittinger K, et al. Comparative metabolomics in vegans and omnivores reveal constraints on diet-dependent gut microbiota metabolite production. Gut. 2016;65(1):63–72.
32 Samtiya M, Aluko RE, Dhewa T. Plant food anti-nutritional factors and their reduction strategies: An overview. Food Prod Process Nutr. 2020;2(1):6.
33 Zinöcker MK, Lindseth IA. The Western diet–microbiome-host interaction and its role in metabolic disease. Nutrients. 2018;10(3):365.
34 López de Las Hazas MC, Piñol C, Macià A, et al. Differential epigenetic modulation in vascular-related genes after supplementation with plant-based diets: A randomized clinical trial. Clin Epigenetics. 2022;14(1):41.
35 Wallace TC, Fulgoni VL. Usual choline intakes are associated with egg and protein food consumption in the United States. Nutrients. 2017;9(8):839.
36 Schaffer SW, Jong CJ, Ito T, Azuma J. Role of taurine in the pathogenesis of cardiovascular diseases. Hypertens Res. 2021;44(7):856–64.
37 Rebouche CJ. Carnitine function and requirements during the life cycle. FASEB J. 1992;6(15):3379–86.
38 Brandenburg VM, Reinartz S, Kaesler N, et al. Vitamin K2 supplements can mitigate arterial stiffness and reduce vascular calcification progression: A randomized controlled trial. Thromb Haemost. 2017;117(10):1937–46.