



REVIEW ON IMPACT OF DIET ON CARDIOVASCULAR DISEASES

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Abstract: The main cause of death around the globe is cardiovascular disease. In contrast to whole grains, fruits, vegetables, legumes, seafood, and nuts, poor-quality diets usually contain more refined carbohydrates, excess sugar, salt, and unhealthy fats. They often contain few nourishing goods and freshly made meals, with the majority of them being packaged, ready-to-eat processed cuisine. The risk can be decreased by quitting smoking, eating less salt, increasing your intake of fruits and vegetables, and working out frequently. Consuming saturated fat increases the risk of CVD. The Mediterranean diet, which consists of a diet rich in fruits and vegetables, has been shown in numerous studies to have cardioprotective effects. Additionally, it was found that when consumed, stanols and plant sterols reduce cholesterol. Omega-3 polyunsaturated fatty acids are cardioprotective and can be found in rapeseed and canola oils. Vegetable oils that are rich in mono- and polyunsaturated fatty acids are examples of low-risk foods.

Keywords: Cardiovascular disease, Mediterranean diet.

Introduction

The best diet for maintaining cardiovascular (CV) health is a topic of considerable debate. Over 80% of CVD deaths occur in low- and middle-income countries, despite the fact that the majority of the data on food and cardiovascular diseases (CVDs) originates from high-income countries (HIC). Though new data sources are quickly emerging, there are just a few studies on food and CVD from these nations. Because of changes in lifestyle brought on by rising urbanization, economic development and globalization, non-communicable diseases (NCDs) are predicted to rise significantly in low and middle-income countries (LMIC). The Global Burden of Disease study attributes the growth in hypertension, diabetes, obesity, and other CVD components to nutrition as a major contributing factor.

Worldwide, it is estimated that there are over 500 million obese people and about 2 billion overweight or obese people.

Poor-quality diets tend to be low in whole grains, fruits, vegetables, legumes, fish, and nuts and high in refined grains, added sugars, salt, unhealthy fats, and animal-source foods. They frequently contain a lot of packaged, ready-to-eat processed food and little in the way of whole foods and freshly made meals. Modern food settings contribute to these unhealthy diets, and this issue is only going to get worse as food environments in LMIC start to mimic those in HIC.

Key Facts According To WHO

- The leading cause of death worldwide is cardiovascular disease (CVD).
- According to projections, 17.9 million deaths globally in 2019—or 32% of all fatalities—were caused by CVDs. 85% of these deaths were caused by heart attacks and strokes.
- More than 75% of fatalities in low- and middle-income countries are caused by cardiovascular disease.
- In 2019, 17 million persons aged under 70 died from noncommunicable diseases, with 38% of those deaths being related to CVDs.
- By addressing behavioural risk factors including smoking, poor eating and obesity, inactivity, and excessive alcohol use, the majority of cardiovascular diseases can be avoided.
- Early detection of cardiovascular disease is crucial for the use of counselling and medicine in treating the condition.

Risk Factors for Cardiovascular Diseases (WHO, 2021)

- The most important lifestyle risk factors for heart disease and stroke are a poor diet, a sedentary lifestyle, cigarette smoking and heavy drinking.
- Raised blood pressure, elevated blood glucose, elevated blood lipid levels, as well as being overweight and obese, are all manifestations of behavioural risk factors in people.
- The risk of cardiovascular disease has been found to be decreased by quitting smoking, reducing salt intake, increasing fruit and vegetable consumption, engaging in regular physical activity and abstaining from excessive drinking.

Diet and cardiovascular disease

In his investigation, Kromhout (2001) came to the conclusion that total and HDL cholesterol are significant risk factors for coronary heart disease. Saturated and trans fatty acids have the opposite effect on total and LDL cholesterol from unsaturated fatty acids. N-3 polyunsaturated fatty acids seem to reduce the onset of coronary heart disease independently of cholesterol. Because dietary antioxidants may prevent the oxidation of LDL lipoproteins, which are high in atherogenic cholesterol, they may be extremely important. Carotenoids, vitamin C, and vitamin E do not appear to be particularly effective in preventing coronary heart disease, though. Observational studies suggest that the

polyphenols called flavonols, which are prevalent in plant foods and have strong antioxidant activities may provide protection against coronary heart disease.

Blomhoff et al. (2005) stated that the total antioxidant content of a number of berries, fruits, nuts, seeds, vegetables, beverages, and spices has been determined to be high. The positive effects of dietary plants rich in total antioxidants are supported by preliminary research in people and animals. Through the stimulation of antioxidant and phase 2 enzymes, antioxidants and other plant chemicals may also strengthen the endogenous antioxidant defence. Broccoli, Brussels sprouts, cabbage, kale, cauliflower, carrots, onions, tomatoes, spinach, and garlic are dietary plants high in these chemicals.

The importance of nutrition in lowering the risk of a number of chronic diseases, including cardiovascular disease and total mortality, is supported by both epidemiological research and intervention trials (Esposito et al., 2006).

Frank (2007) stated that the original diet-heart hypothesis, which linked total and saturated fat to CHD, is misrepresented, and that sound nutritional guideline must take into account various types of fats, carbohydrates, and other dietary factors, some of which are more easily changed than dietary fat intake. Due to the fact that numerous lines of evidence link high GL to detrimental metabolic consequences that raise the risk of diabetes and CVD.

Cook (2007) revealed blood pressure is lowered and hypertension may be prevented by consuming less sodium. There are little and conflicting data regarding how dietary salt intake affects future morbidity and mortality. Numerous ecological research supports a direct link between increased sodium intake or sodium excretion in the urine and stroke mortality.

In the study, 100 patients were randomly assigned to one of two diets: one that was high in carbohydrates (65% of energy consisted of carbohydrates, 13% of energy consisted of protein, and 22% of energy consisted of fat, 17% of which was unsaturated); or one that was low in carbohydrates and high in monounsaturated fat (48% of energy consisted of carbohydrates, 19% of energy consisted of protein, and 33% of energy consisted of unsaturated fat). The high-carb diet was also associated with a considerable drop in LDL cholesterol levels. There were no differences in the rates of metabolic syndrome resolution across the groups, but the low-carb diet was associated with a greater drop in the prevalence of hypertension and hyper triacylglycerolemia than the high-fat diet (P 0.05 and P 0.001, respectively) (Muzio, 2007).

Lasker (2008) in his findings concluded that in comparison to a high carbohydrate, low protein diet, a weight loss diet with moderate carbs and moderate protein leads to more favourable changes in body composition, dyslipidemia, and post-prandial INS response, suggesting an additional benefit beyond weight management to include augmented risk reduction for metabolic disease.

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Hooper et al. (2011) result point to a slight but possibly significant decrease in cardiovascular risk associated with dietary fat modification but not a total fat reduction in longer studies. All persons at risk of cardiovascular disease, as well as lower-risk population groups, should continue to receive lifestyle recommendations that permanently reduce their intake of saturated fat and partially replace it with unsaturated fat.

A Mediterranean diet regimen was linked to a 38% relative decrease in the risk of CVD clinical events revealed by Gonzalez (2014).

Pan (2018) concluded that there should be more focus on increasing overall diet quality and food sources of macronutrients, like dietary fats and carbs, in order to lower the worldwide burden of cardiovascular disease.

Morbidity and mortality from cardiovascular disease (CVD) are rising, which is a significant global public health concern. It is generally recognised that lifestyle factors, such as a poor diet, smoking, and inactivity, have a significant impact on CVD risk. One of the finest eating regimens studied in relation to CVD risk and other health outcomes is MedDiet (Salvado, 2018).

Badimon (2019) implied that because of its high concentration of bioactive compounds like unsaturated fatty acids, polyphenols, fibre, phytosterols, vitamins, and minerals that exert antioxidant, anti-inflammatory, and antithrombotic effects and help to delay the onset and progression of CVD, the Mediterranean diet, which is high in fruits and vegetables, is considered to be the most cardioprotective.

Hemler (2019) concluded that as long as they are properly planned and include high-quality foods, a variety of plant-based diets can be nutritionally sufficient and have positive effects on the heart. Contrary to common misconception, plant-based eating plans don't have to be vegetarian or vegan. The vast majority of people find it unrealistic and unnecessary to completely abstain from meat or other animal products in order to maintain cardiovascular health. Not all foods derived from plants have positive effects on the cardiovascular system, thus it's crucial to take into account the quality of the individual diet components. With widespread acceptance, a healthy plant-based diet can be tailored to a person's interests and culture while simultaneously reducing risks to the environment's health and the health of humans.

The rate of adherence to the Atlantic diet and exercise guidelines demonstrates that greater adherence is associated with lower cardiovascular risk, lower total cholesterol and triglycerides, lower rates of obesity, and lower values for pulse wave velocity (Martin et al., 2019).

Cholesterol is reduced when plant sterols or stanols are added. Omega-3 fatty acid supplementation, on the other hand, significantly lowers triglycerides and may help patients with familial hypercholesterolemia lower their cholesterol (Barkas, 2020).

Carbohydrate Association With CVD

- Increasing consumption of carbohydrates will help cut down on saturated fat, and many fruits and vegetables are also loaded with antioxidants.
- A number of prospective studies have demonstrated the protective effects of cereal diets high in non-starch polysaccharides against coronary heart disease.
- The main dietary recommendation for lowering the risk of coronary heart disease is to consume fewer fats and more carbohydrate-rich meals, especially cereals, vegetables, and fruits high in non-starch polysaccharides.
- Reducing total fat intake and promoting the consumption of the best carbohydrate-containing foods are especially crucial for those who are overweight or obese.
- When taken in naturally occurring foods, foods that have been enhanced by purified forms, or even when supplied as dietary supplements, several non-starch polysaccharides, such as β -glucans, have been proven to significantly lower serum cholesterol. These polysaccharides can be utilised to treat patients who already have hypercholesterolemia.

Fats And Oils Association With CVD

- Sources of n-3 polyunsaturated fat alpha-linolenic acid (ALA), such as rapeseed or canola oil, are cardioprotective. Vegetable oils with a high concentration of mono- and polyunsaturated fatty acids, such as olive oil, appear to lower the risk of CHD.
- Low-density lipoprotein cholesterol is decreased and HDL is preserved when saturated fat is substituted with monounsaturated or polyunsaturated fat.
- According to the 2013 American Heart Association, this suggested switch from saturated to unsaturated fats should take place concurrently in a generally healthy dietary pattern like DASH (Dietary Approaches to Stop Hypertension) or the Mediterranean diet.
- Trans fatty acids (TFA) are generated either by biohydrogenation in the stomach of ruminant animals or by hydrogenation of unsaturated oils. TFA is present in significant amounts in vanaspati ghee and margarine.
- Numerous studies have linked ingesting TFA to a higher risk of cardiovascular disease (CVD). TFA raises the risk by elevating the LDL to HDL cholesterol ratio. According to the World Health Organization and the Food and Agriculture Organization of the United Nations, TFA shouldn't make up more than 4% of people's dietary fat.

Lycopene and CVD

- Unsaturated lipophilic carotenoid lycopene is found in a variety of red fruits and vegetables, including tomatoes, papayas, and watermelons.
- Lycopene may lessen the chance of developing atherosclerosis, especially in the early stages of the disease, by reducing endothelial dysfunction (low bioavailability and blood flow) and LDL oxidation.
- Improved metabolic profile (by reducing cholesterol synthesis) and blood pressure, decreased arterial stiffness, and regulated expression of pro-inflammatory markers and platelet aggregation are other methods by which lycopene may exert effects.
- Additionally, dietary lycopene promotes cardiovascular health and significantly lowers CV mortality and major CV events in postmenopausal women who are free of cancer or CVD.

Conclusion

The leading fatality in the world is cardiovascular disease. Heart attack and stroke are thought to be the two main causes. Most fatalities occur in low- and middle-income countries. The main contributors to cardiovascular disease are smoking, bad eating practices, being overweight or obese, not moving around much, drinking too much alcohol, and using tobacco products. The risk can be decreased by quitting smoking, eating less salt, increasing your intake of fruits and vegetables, and exercising frequently. Saturated fat consumption raises the possibility of CVD. Strong antioxidants that can lower the risk of heart disease include polyphenols and flavanols. High Glycaemic Index food consumption raises the risk of diabetes and cardiovascular disease. Lower risk is associated with decreased salt consumption. Heart attacks and strokes are usually associated with higher LDL levels. Consuming protein and carbohydrates in moderation aids in weight management and lowers the expenses related to being overweight or obese. Numerous studies have demonstrated the cardioprotective effects of the Mediterranean diet, which comprises a diet high in fruits and vegetables. Additionally, it was discovered that stanols and plant sterols lower cholesterol when ingested. Omega-3 polyunsaturated fatty acids, which are found in rapeseed and canola oils, offer cardioprotective qualities. Low-risk foods include vegetable oils that are high in mono- and polyunsaturated fatty acids. Therefore, the only things that reduce the risk of CVD are the inclusion of a diet high in carbohydrates, a reduction in the consumption of saturated fats, and a diet high in fruits and vegetables with a lot more antioxidants.

References

1. Badimon, Lina, Chagas, Patricia, Chiva-Blanch and Gemma. 2019. Diet and Cardiovascular Disease: Effects of Foods and Nutrients in Classical and Emerging Cardiovascular Risk Factors. *Current Medicinal Chemistry*. **26** (13): 3639-3651.

2. Barkas, F., Nomikos, T., Liberopoulos, E and Panagiotakos, D. 2020. Diet and Cardiovascular Disease Risk Among Individuals with Familial Hypercholesterolemia: Systematic Review and Meta-Analysis. *MDPI*. **12** (8): 2436.

3. Blomhoff and Rune. 2005. Dietary antioxidants and cardiovascular disease. *Nutrition and Metabolism*. **16** (1): 47-54.

4. Casas R, Castro-Barquero S, Estruch R, Sacanella E. 2018. Nutrition and Cardiovascular Health. *International Journal of Molecular Sciences*, **19** (12): 3988

5. Cook, NR., Cutler, JF., Obarzanek, E, Buring, JE., Rexrode, KM., Kumanyika, SK., Appel, LJ and Whelton, PK. 2007. Long term effects of dietary sodium reduction on cardiovascular disease outcomes: observational follow-up of the trials of hypertension prevention (TOHP). *British Medical Journal*. 334-885.

6. Esposito, K and Giugliano, D. 2005. Diet and inflammation: a link to metabolic and cardiovascular diseases. *European Heart Journal*. **27** (1): 15-20.

7. Frank M. Sacks, Alice H. Lichtenstein, Jason H. Y. Wu, Lawrence J. Appel, Mark A. Creager, Pency M. Kris-Etherton, Michael Miller, Eric B. Rim, Lawrence I. Rudel, Jennifer G Robinson, Neil J. Stone and Linda V. Van Horn. 2017. Dietary Fats and Cardiovascular Disease: A Presidential Advisory from the American Heart Association. *AHA Journals*, **136** (3): 1-23

8. Frank, B. 2007. Diet and Cardiovascular Disease Prevention: The Need for a Paradigm Shift. *Journal of the American College of Cardiology*. **50** (1): 22-24.

9. Gonzalez, M., Angel, M., Bes-Rastrollo and Maira. 2014. Dietary patterns, Mediterranean diet, and cardiovascular disease. *Current Opinion in Lipidology*. **25** (1): 20-26.

10. Hemler, EC and Frank, B. 2019. Plant-Based Diets for Cardiovascular Disease Prevention: All Plant Foods Are Not Created Equal. *Current Atherosclerosis Reports*. **18**.

11. Hooper, L., Summerbell, CD., Thompson, R., Sills, D., Roberts, FG., Moore, H and Smith, GD. 2011. Reduced or modified dietary fat for preventing cardiovascular disease. *Cochrane Library*. **7**: 1465-1858.

12. Iqbal, MP. 2014. Trans Fatty Acids- A Risk Factor for Cardiovascular Disease. *Pakistan Journal of Medical Sciences*, **30** (1): 194-197
13. Kromhout, D. 2001. Diet and Cardiovascular Diseases. *The Journal of Nutrition, Health & Aging*. **5** (3): 144-149.
14. Lasker, DA., Evans, EM and Layman, DK. 2008. Moderate carbohydrate, moderate protein weight loss diet reduces cardiovascular disease risk compared to high carbohydrate, low protein diet in obese adults: A randomized clinical trial. *Nutrition and Metabolism*. **30**.
15. Martin, CR., Ortis, LG., Sanchez, ER., Cantera, CM., Cano, AS., Arietaleanizbeaskoa, MS., Belio, JF., Saurez, MM., Fernandez, JA., Sanchez, CL., Marcos, MA and Rodriguez, JI. 2019. The Relationship of the Atlantic Diet with Cardiovascular Risk Factors and Markers of Arterial Stiffness in Adults without Cardiovascular Disease. *MDPI*. **11** (4): 742.
16. Muzio, F., Mondazzi, L., Harris, WS., Sommariva, D and Branchi, A. 2007. Effects of moderate variations in the macronutrient content of the diet on cardiovascular disease risk factors in obese patients with the metabolic syndrome. *The American Journal of Clinical Nutrition*. **86** (4): 946-951.
17. Pan, A., Lin, X., Hemler, E., Hu, FB. 2018. Diet and Cardiovascular Disease: Advances and Challenges in Population-Based Studies. *Cell Metabolism*. **27** (3): 489-496
18. Salvado, JS., Tomas, NB., Gavilan, JF., Bullo, M and Barrubés, L. 2018. Mediterranean Diet and Cardiovascular Disease Prevention: What Do We Know? *Progress in Cardiovascular Diseases*. **61** (1): 62-67.
19. Samantha Berger, Gowri Raman, Rohini Vishwanathan, Paul F Jacques, Elizabeth J Johnson. Dietary cholesterol and cardiovascular disease: a systematic review and meta-analysis. 2015. *The American Journal of Clinical Nutrition*. **102** (2): 276–294.
20. Siddiqi, Hasan K.; Kiss, Daniel; Rader, Daniel. HDL-cholesterol and cardiovascular disease: Rethinking our approach. *Current Opinion in Cardiology*, **30** (5): 536-542.
21. World Health Organization 2021. Cardiovascular Diseases. Retrieved from https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1 on 2/12/2022.