

Review Article

Care for your Core: Prevention of Cardiovascular Disease by Nutrition

Daniello-Santiago D, Santiago JJ, Ramjiawan M and Tappia PS*

Asper Clinical Research Institute, Office of Clinical Research, St. Boniface Hospital, Winnipeg, Canada

*Corresponding author: Paramjit S Tappia, Asper Clinical Research Institute, St. Boniface Hospital, CR3129 - 369 Tache Avenue, Winnipeg, Manitoba R2H 2A6, Canada

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Abstract

A wealth of information linking diet to heart health is available in the literature. While poor nutritional practices and improper diets exert an adverse effect on the heart, specific foods and dietary interventions are cardioprotective and maintain a healthy heart. The public has become much more aware and knowledgeable on the benefits of nutrition for health, and thus it is important that such available information is backed by credible science. In this brief article, we provide a dietitian and nutritionist perspective on the importance of food and nutrition in the prevention of cardiovascular disease as well as associated risk factors such as obesity and diabetes. Furthermore, we discuss how to best utilize foods to gain health benefits, specifically for heart health as part of an overall healthy lifestyle regimen.

Keywords: Cardiovascular health; Human nutrition; Foods; Lifestyle

Introduction

It is well established that there is a correlation between diet and Cardiovascular Diseases (CVDs). Indeed, nutritional factors may be responsible for approximately 40% of all CVDs. In addition, it is understood that poor and inadequate dietary practices negatively influence cardiovascular health. It has been reported that poor dietary habits contributed to almost half of more than 700,000 deaths attributed to heart disease, stroke and type 2 diabetes [1]. In this regard, the excessive intake of sodium/salt has been a major concern as it can lead to hypertension. The U.S. Food and Drug Administration has estimated that the daily average intake of sodium is about 3.4g. The federal Dietary Guidelines for Americans 2020-2025 (www.dietaryguidelines.gov) recommends limiting sodium intake to less than 2.3g per day. Furthermore, the association between the intake of sugary beverages and processed foods, particularly meat, as well as foods high in saturated fats with heart disease has resulted in the recommendation that these food types be limited. On the other hand, the intervention with specific nutrients is considered as part of an effective approach for the prevention of CVDs. In fact, there is a growing public interest in the role of nutrition in the prevention and management of CVDs. As a consequence, scientific investigation into establishing dietary approaches for the prevention of heart disease has increased exponentially over the last decade. We have recently highlighted new insights into the mechanisms of action of foods/nutrients with respect to cardiovascular health [2].

Heart disease is a major global concern and approximately 18 million deaths have been attributed to CVDs, representing about 30% of all deaths worldwide [3]. Furthermore, it has been estimated by the World Health Organization that at least 75% of global deaths attributed to CVDs occur in low- and middle-income countries [3,4]. Such a statistic may be due to inadequate or lack of primary health care services available for early detection/diagnosis and treatment. As a consequence, detection is often late in disease stage and death due to CVDs occurs at an earlier age as compared to in developed nations.

Almost one third of all deaths in Canada are from major cardiovascular events [5], while one in every four deaths, about 655,000, occur from heart disease in the USA [6]. In both China and India, CVDs account for approximately 40% of total deaths [4,7]. Taken together, it has been proposed that ethnicity and culture may be critical determinants of risk factors for CVDs as well as of the effectiveness of dietary and lifestyle interventions designed for prevention of CVDs [7].

How many times have you said “it will never happen to me”? The problem is that many of us ignore or avoid listening to critical information concerning our health simply because we do not think we need to know. This way of thinking however, is flawed and when it comes to our own individual health, ignorance is not bliss. Therefore, a proactive stance needs to be undertaken for our cardiovascular and overall health. The heart can be taken as the core, and to enable normal physiology it is important that the health of the core is maintained. Thus, nutritional and lifestyle approaches have significant influence on cellular health and function. Accordingly, in this article we highlight strategies that can be incorporated for the prevention of heart disease and improve heart health from a dietitian’s viewpoint. In addition, we describe other risk factors such as obesity and diabetes that increase the risk for CVDs. Although we define simplistic steps that can be undertaken for heart health, they do, however, require a major behavioral change and commitment. The benefits of such an approach are not only cost-effective, but such measures will also reduce the economic burden of heart disease on health care systems as well as reduce human toll.

Prevention

There are three types of prevention strategies, and while they have similar elements, differences exist in their initiation and implementation as well as in their effects [8].

Primordial prevention

The word “primordial” means existing from the beginning. This approach in prevention refers to avoiding the development of risk

factors before they occur [9]. Since atherosclerosis begins in youth and is related to dyslipidemia, smoking, and higher blood pressure, blood glucose levels and body mass index, then it is conceivable that primordial prevention must start early in life [8]. Thus, early implementation in the practice of primordial prevention, i.e. from childhood onwards, the more likely the increased likelihood of improved heart health and cardioprotection against heart disease.

This raises considerable interest in the role that schools play in the development and maintenance of primordial prevention. In a multi-site, randomized Child and Adolescent Trial for Cardiovascular Health (CATCH), researchers examined the outcomes of health behavior interventions that focused on elementary school environments, curricula and home programs involved in the prevention of cardiovascular disease. A total of 56 schools participated in a school-based intervention consisting of an enhanced physical education program and reductions in fat content of school-offered lunches. Students involved in the interventional cohort showed increased intensity of physical activity, within and outside of school compared to those in the control group [10]. Not only does school-based primordial prevention cause short-term gains in physical activity, but also demonstrates persisting effects as well. Three years later, students from the interventional CATCH cohort were reassessed and found that without further intervention, behavioral changes initiated during the initial trial persisted to early adolescence for dietary and physical activity behaviors [11].

Primary prevention

Primary prevention targets those individuals that have already developed cardiovascular risk factors, such as high blood pressure or high cholesterol. The focus involves controlling these risk factors by adopting healthy lifestyle changes and, if needed, taking pharmacological medications. At this point, concerning cardiovascular risk factors means that inflammation and atherosclerosis are already at work and, in many cases may not be reversible.

Secondary prevention

This strategy is initiated following a cardiovascular event, undergoing angioplasty or bypass surgery, or developing some other form of heart disease. It typically involves taking pharmacological medications, quitting smoking and losing weight, if necessary, increasing exercising or beginning a physical activity regimen, and following a healthy diet. If followed, these steps can help prevent a second heart attack or stroke, cease the progression of heart disease and prevent early death.

Four Key Steps to Heart Health

The prevention of heart disease can be facilitated with four key steps as follows:

Quit smoking and avoid or limit alcohol intake

Tobacco use through cigarette smoking, is the leading cause of preventable disease and death in the US. It is well established that smoking increases the risk of cardiovascular disease [12]. According to the US Department of Health and Human Services report in 2004 [13], following smoking cessation for 1 year, the risk for Coronary Heart Disease (CHD) is about half that of a smoker; while quitting smoking for 5 years, the risk for stroke risk is reduced to that of a non-smoker

(5 to 15 years after smoking cessation) and the risk for CHD is also reduced to that of a non-smoker (15 years after smoking cessation). The effects of alcohol on the cardiovascular system are complex. The association between drinking and CVDs such as hypertension, CHD, stroke, peripheral arterial disease, and cardiomyopathy has been very elegantly reviewed [14]. Public interest in the potential health-related effects of moderate alcohol consumption is high. While the harmful effect of excessive alcohol intake is well established, the association of low-to-moderate alcohol consumption with health-related benefits is still controversial; mostly due to the fact that many studies are not homogeneous and definitive conclusions cannot be made. Despite this, one standard unit would be considered as a low-risk intake of alcohol [15].

Maintaining a healthy weight

Excess weight can put added stress on the heart. The healthy eating tips below can assist in the management of weight and promote weight loss. It should be mentioned that seeking guidance from a health professional, such as a dietitian and/or personal trainer can be helpful and worthwhile in keeping on track with a defined regimen.

Physical activity

The benefits of being physically active and living an active lifestyle cannot be underestimated, but yet this is an area where many people struggle with, perhaps due to several limitations/restrictive factors including not knowing what to do to be physically active, getting bored easily, lack of motivation, commitment or available time. It is generally believed that physical activity and having an active lifestyle can lower blood pressure, improve blood flow, lower LDL-cholesterol, reduce stress and anxiety, decrease risks of heart disease, stroke and diabetes, and promote other heart-healthy habits; the list of benefits goes well-beyond these aspects. It is important to overcome any barriers that are a hindrance or are inhibitory to physical activity. In addition, having a social support system can be very encouraging and beneficial in the development and maintenance of an active lifestyle.

Heart-healthy eating

A heart-healthy diet sounds great, but what does that really mean? It is important to identify which foods actually make your heart healthy. The World Health Organization (WHO) [16] and other groups [17] have validated that diets rich in red meats, fatty, salty, and sweet foods are linked with an increased risk for heart disease. In contrast, diets that are high in fruits, vegetables, whole grains, legumes, nuts, seeds, fish, and poultry may offer cardioprotection. However, knowing this information and applying it are two different things.

Food choices have a significant impact on heart health, even in the presence of other cardiovascular risk factors. There are non-modifiable factors, such as age, sex and family history that dictate the risk for heart disease. Keeping the focus on food rather than nutrients may be far more effective as people eat food, not nutrients. According to a study conducted at Harvard T.H. Chan School of Public Health, greater adherence to a variety of healthy eating patterns was associated with a lower risk of CVD [18]. There is no "one-size-fits-all" diet that is best for everyone. Foods can be combined in a variety of ways to achieve a healthy eating pattern according to an individuals' health needs, food preferences and cultural traditions. While macronutrients

are under discussion, micronutrients which are essential for nutritional diets may also play a role in CVD prevention. It is evident that there is high use of vitamin supplements in the general public domain. However, there is no supportive evidence for the routine supplementation of vitamins and multi-minerals for the prevention or treatment of CVD including myocardial infarction. Indeed, there is no conclusive evidence available in the literature for the benefit of supplements under conditions of different dietary backgrounds, when the nutrient intake is sufficient [19]. However, folic acid (vitamin B9) alone and B vitamins with folic acid, B6 and B12, reduce the risk for stroke [19,20]. Presently, there are no specific guidelines or recommendations for the use of vitamins and minerals for the primary purpose of CVD prevention [19-21]. In addition, there is also no current methodology that can accurately measure individuals' vitamin and mineral concentrations with meaningful results that are both cost-effective and less invasive. It should be mentioned that data on the potential benefits for prevention or treatment of CVDs with oral supplementation with coenzyme Q, calcium, and selenium are also inconsistent and thus these minerals cannot be recommended either at this time [20].

The following are some helpful and healthful eating tips that a registered dietitian would recommend as a starting point:

- Eat plenty of whole foods that can be recognized as food and avoid complicated labels with a long list of ingredients.
- Emphasize plant-based foods such as vegetables, fruit, whole grains, nuts, seeds and legumes. If there is a desire to consume animal foods, this selection should be of those that are minimally processed with lower levels of sodium and sugar.
- Fish intake at least once or twice a week.
- Limit ultra-processed foods that have very high levels of sugar, such as pop and candy; packaged snack foods and convenience meals also contain high levels of sodium.

However, the issue remains of how to undertake and maintain such diets. It may seem overwhelming, but the key is to start off with small goals, be realistic, keep it simple and just start by adding one fruit and one vegetable per day to the diet, and if this is already being done then perhaps add one more.

Risk Factors for Cardiovascular Disease

Other risk factors for CVDs should be mentioned from a dietetic perspective. Obesity is a major risk factor for CVDs. In this regard, several books have been edited on obesity induced cardiac dysfunction [22-24]. The major cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. It really is easier said than done to control, especially when we live in a society that offers easy to access, low cost, refined, highly processed, super-sized foods, and overall unhealthy eating habits, it definitely makes it more of an obstacle for many. Not to mention the increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, increasing development, along with enhanced technology and significantly increased screen time starting at a young age. Obesity exerts strain on the heart and along with excessive pressure on the joints, pulmonary concerns and insulin resistance represent a few of the obesity-

induced complications [22]. It is important to remember that obesity is not always what we see with the naked eye, the significant impact of visceral fat that encompasses the abdominal organs is not always visible. Visceral fat is the type of fat that is more likely to increase the risk for serious medical issues.

Diabetes, hypertension and stress alone are all closely integrated ailments that pave the path towards CVD, and therefore are important risk factors that contribute towards reducing the efficacy of the cardiovascular system [25]. Fortunately, following the 4 key steps identified above will all assist in decreasing these risk factors and therefore reducing the risk for CVD. With respect to blood glucose control, hypertension, and stress, it is important to understand that both diet and physical activity will have the most influential impact on these ailments as well as cardiovascular health. Dietary and a sedentary lifestyle are important behavioral components influencing world-wide health. Individual pathology, comorbidities along with various risk factors contributes to the different individual responses to a diet regimen [25]. It is important to remember and understand that a one-size-fits-all approach in nutritional intervention may be limiting for those with CVD, a personalized and tailored intervention may achieve greater benefits. To extend it even further, seeking guidance from a health professional to aid in working on various risk factors can provide a significant benefit and may reduce the risk for a cardiovascular episode.

Concluding Remarks

Nutrition plays an important part throughout the life cycle, starting from before birth (maternal nutrition) and continuing through entire life. Thus, diet selection is an integral component of overall health and well-being at all life stages. From the aforementioned, it is evident that healthy changes in the type and pattern of food intake, physical activity, and other daily habits greatly influence cardiovascular health. Indeed, a healthy lifestyle can sustain heart health. Health depends on the quality of whole diet, not just a specific type of fat or the amount of sodium or cholesterol in a food. Any eating plan should include more vegetables, fruit, and wholesome foods with simple ingredients on the label. Consultation with a registered dietitian is an important and serious undertaking for not only the education and maintenance of lifestyle changes, but to provide the motivation and guidance for what is, and should be, a lifelong commitment. Whatever age, sex or current state of health, it is never too late to take steps to protect the heart. In addition, it is never too early to engage in nutritional practices and lifestyle changes to protect and keep a healthy heart. It is hoped that this commentary will prompt interest and stimulate research in the field of nutrition and human health as well as underscore the importance of seeking dietary/nutritional advice for disease management and prevention. Without education in cardiovascular sciences and its interconnection with nutrition, people seeking help will not be supported unless the health sectors take an active stance in conveying accurate and crucial messages at every step of the way.

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