

## Chapter 24

# Food and Cardiac Health: Protective Effects of Food on Cardiovascular System

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### ABSTRACT

*Emerging influence of Cardiovascular Diseases (CVDs) and its impact on the society has raised much awareness for its prevention. Healthy food habits and physical exercise has drawn a lot of attention of the people from scientific as well as common world. The role of food-based bioactive compounds in reducing risk of CVDs has been established with various health benefits apart from the basic nutrition have been reported. The present chapter provides an overview of the role of different foods on cardiovascular health of humans. Biological effects of plant derived food products and their bioactive compounds in the context of relevance to cardiovascular health promotion are discussed in detail. The chapter also covers the effects of the consumption of functional food on the intermediate clinical markers of CVDs including cholesterolemia, hypertension, endothelial function and inflammation. The chapter will enable the better understanding of the current knowledge on the potential health benefits of different functional foods and bioactive compounds on cardiovascular health.*

### INTRODUCTION

Cardiovascular Diseases (CVDs) have a substantial influence on public health from past several decades and it still remain the major cause of mortality and morbidity throughout the globe. CVDs comprise group of different cardiac and vascular complications including hypertension, coronary heart, atherosclerosis, cerebrovascular disease (stroke), peripheral artery disease, rheumatic heart disease, heart failure etc. Major lifestyle causes of CVDs include tobacco intake, physical inactivity and unhealthy diet (World health organization, 2009). Major CVD events arise due to atherosclerosis, a pathophysi-

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ological complication of innermost layer of arterial wall and such events can be prevented by nutritional supplementation (O'Toole et al. 2008). Different parameters have been studied in this regard and life-style changes have been suggested as the most helpful practices including physical activity and healthy food habits. Healthy diet and food habits show an inverse relationship with onset of vascular diseases as well as affect the longevity. Food provides both the essential nutrients required for basic life processes as well as bioactive compounds that help in disease prevention and health enhancement. Balanced diet including fruits, vegetables, whole grains and other plant foods helps in acquiring the required amounts of nutrients, antioxidants, bioactive compounds and phytochemicals thereby prevents various health related complications. Potential health promoting benefits of the natural bioactive compounds have been studied over time. There is keen interest in assessing the role of food-based bioactive compounds in reducing risk of chronic diseases including Cancer, CVD and diabetes mellitus.

For the reduction of coronary heart diseases, much emphasis is given on reducing the saturated fat, trans fat and cholesterol to lower the low-density lipoprotein-cholesterol (LDL-C) levels. Other pathways involved in the protective effects mediated by different food products with respect to CVDs onset has also been studied extensively. Oxidative stress results in cellular damage by affecting proteins, DNA and lipids, thereby increasing the risk CVDs. Oxidized LDL-C are a major factor that contributes to the cardiac diseases. Antioxidant potential of fruits and vegetables accounts for the most of the health promoting benefits and CVD prevention (Pandey & Rizvi, 2009). Major oxidative stress mediated events that lead to various cardiovascular complications are summarized in the Figure 1. Other factors include preventing vascular inflammation, reducing platelet hyper activity, vasodilation, cardiac hypertrophy etc. Inflammation is a critical factor in CVDs and its systemic marker, C-reactive protein, plays an important role in disease progression. Inflammation promotes atherosclerosis initiation and progression resulting in severe thrombotic complications of atherosclerosis (Shrivastava et al, 2015). Platelet activation and aggregation play a key role in the pathogenesis of myocardial infarction and ischaemic cardiac complications. Cardiac hypertrophy is a compensatory pathophysiological response of the heart to chronic pressure, and is a critical risk factor for ischemic heart disease, arrhythmia and sudden death. Dietary supplementation can promote the proper platelet function by reducing the hyper-reactivity of platelets and maintain cardiovascular health.

Based on the extensive studies done in the previous decades, a throughout general observation has been made to support the hypothesis that the precise intake of foods and beverages with high amount of flavonoids and polyphenols play an important role in reducing CVD risk by improving vascular function and modulating inflammation (Habauzit & Morand, 2012). There are ample epidemiologic evidences from numerous studies that suggest a strong relationship between the consumption of diets high in fruits and vegetables, legumes, whole grains, fish and cardiovascular disease protection. Phenolic compounds including flavonoids, tannins etc. are present in almost all the plants and vegetables. These compounds have been studied in detail for their protective and beneficial roles in human health.

## **NATURAL FOODS WITH CARDIOPROTECTIVE BENEFITS**

There are increasing facts suggesting the uptake of natural food products as they are enriched in micro-nutrients including minerals, vitamins and essential fatty acids that are required to sustain the cellular antioxidant levels and other stress response mechanisms (Visioli & Hagen, 2007). It has also been demonstrated in various studies that intake of a healthy balanced diet including whole food is evidently

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