Chapter 41
Roles of Nutraceuticals and Functional Food in Prevention of Cardiovascular Disease: Sustaining Health

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ABSTRACT

The chapter provides an overview of cardiovascular disease, a major cause of mortality worldwide. It relates economic and social impacts to the disease, especially in developing countries. One of the approaches to addressing this challenge is increasing awareness within society, through implementation of education programs. It is important for society to understand the types and roles of the risk factors leading to cardiovascular disease. Emphasis is on the role of functional food and nutraceuticals as dietary sources that could prevent development of cardiovascular disease. The chapter highlights roles of nutraceuticals and functional food sources from medical plants, seeds, berries, and tropical fruits in lowering risk factors. Key findings from trials conducted in Asia, China, Europe, and America provide supporting evidence for the importance of functional food to health, and its potential for modifying the level of risk factors related to cardiovascular diseases.

INTRODUCTION

Noncommunicable disease is on the public health agenda of the World Health Organization (WHO). The healthcare burden has been rising due to various diseases primarily related to lifestyle and dietary habits. According to the World Health Organization, cardiovascular disease is the major cause of disability and premature throughout the world (WHO, 2007). Addressing behavioral risk factors, such as

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tobacco use, unhealthy diet and obesity, physical inactivity, and harmful use of alcohol, can prevent most cardiovascular diseases, using population-wide strategies (Mendis, Puska, & Norrving, 2011). The percentage of premature death from cardiovascular diseases (CVDs) range from 4% in high income countries and 42% in low-income countries, indicating differences between countries and populations. Halting premature deaths from CVDs and other noncommunicable diseases will require global solidarity and broad alliances that go beyond national, cultural and ethnic boundaries (Mendis, Shanthi, Puska, Pekka, & Norrving, 2011). As a preventive measure against contracting the disease later in life, individuals must understand the root causes of cardiovascular disease. Increased knowledge sharing and dissemination programs on the importance of nutraceuticals in treating and preventing disease should be in place in schools and communities. In the long term, this would assist in reducing the economic burden due to increasing healthcare costs of noncommunicable diseases. Over the last 35 years, a trend toward use of natural products has increased worldwide (Newman & Cragg, 2007). Discovery of the various health benefits of natural compounds has led to their use in clinical applications, supported by emerging reports on the medicinal benefits of plant-derived products (Alves-Silva, Monica, Carla, Ligia, & Henrique, 2016; Guo, Gan, Haist, Rajapurohitam, Zeidan, Faruq, & Karmazyn, 2011; Hu, Koon, Chan, Lau, & Fung, 2012). They indicate the need for greater emphasis on exploring the healing qualities of nutraceutical and functional food products deemed safe for consumption, and with minimal adverse effects (Alam, Subhan, Rahman, Uddin, Reza, & Sarker, 2014; Alam, Kauter, & Brown, 2013; Ashraful, Kathleen & Lindsay, 2013; Kristen, Lehrke, Buss, Mereles, Steen, Ehlermann, . . . Katus, 2012; Sobenin, Pryanishnikov, Kunnova, Rabinovich, Martirosyan, & Orekhov, 2010). Increase in society's awareness could prevent diseases due to modifiable risk factors. Priority must be given to fostering healthy dietary practices in younger generations. Prevention occurs by inculcating knowledge and developing daily practices that focus on healthy food selection. This could lead to modification of lifestyle, long-term outcomes of which lead to achieving the goal of sustainable health.

In addition, this chapter gives an overview of cardiovascular disease prevalence, discussing multiple risk factors to provide a better understanding of how they cause cardiovascular diseases. The risks include lifestyle, dietary habits, genetics, and environmental factors reportedly related to coronary artery disease. The chapter introduces metabolic diseases (hypertension, obesity, diabetes mellitus) related to lipid abnormalities (i.e., dyslipidaemia, hypercholesterolemia). Similar to dyslipidaemic nondiabetic subjects, Type 2 diabetes mellitus (DM) patients show marked increased risk of CAD complications. The American Heart Association has designated DM as a "CHD risk equivalent." Furthermore, the International Diabetic Foundation (IDF) predicts that by the year 2025, the Southeast Asia Region will have the highest prevalence of diabetes.

We emphasize lipids, one of the potential risk factors for developing cardiovascular diseases according to data available from meta-analysis and clinical research findings. The chapter also includes the pathophysiology of atherosclerosis and its relation to the development of coronary artery diseases. This leads to a description of the role of lipids as a dietary source, their structure and functions, abnormalities in blood lipid levels, causes of dyslipidaemia, monitoring technologies, and highlighting the importance of self-monitoring. The National Education Program (NCEP ATP III) and other related guidelines are cited as references for the healthy population, diabetic patients, and cardiovascular disease patients.

The literature on disease prevention through the molecular mechanisms of functional food and nutraceuticals is described. Findings from cytotoxicity, antilipidemic, and other studies from the literature with regard to nutraceuticals and functional food are cited, as they relate to existing knowledge on the roles of nutraceuticals in the prevention of atherosclerosis.