

## Chapter 8

# The Protective Role of Nutraceuticals and Functional Food in Hyperlipidemia

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### ABSTRACT

*Diets rich in fats and cholesterol are mainly responsible for the production of free radicals which contribute to the incidence of hyperlipidemia and hypercholesterolemia. Both of these are the major factors responsible for CVDs. Hyperlipidemia is characterized by elevated level of total cholesterol (TC), low-density lipoprotein (LDL) and very low-density lipoprotein (VLDL), and reduced level of high-density lipoprotein (HDL) in serum. The main role of diet is to provide ample amount of nutrients to meet the nutritional requirements of an individual. However, there are increasing scientific approaches helping the hypothesis that some food ingredients have beneficial effects over and above the provision of the basic nutrients. So in this chapter, the main focus is food categorized under nutraceutical and functional food and their various protective roles in the case of hyperlipidemia.*

### INTRODUCTION

Hyperlipidemia is characterized by elevated levels of total cholesterol (TC), low-density lipoprotein (LDL), very-low-density lipoprotein (VLDL), and reduced level of high-density lipoprotein (HDL) in serum (Sissayb. Mecbib, Thierry, Regnier, & Korsten, 2006). Hyperlipidemia is a major contributing factor for the development

DOI: 10.4018/978-1-5225-3267-5.ch008

of atherosclerosis leading to chronic heart disease (CHD) (Defronzoet, 1992). According to current projections, it is estimated that by 2030 about 23.6 million people will die from cardiovascular disease (World Health Organization, 2009). On the other hand, cholesterol-induced oxidative stress is one of the factors that link hypercholesterolemia with atherogenesis and is known to produce vascular atherosclerotic lesion. Recent data show that people from the Indian subcontinent have a genetic predisposition towards hyperlipidemia leading to CVD (Harrison & Griendling, 2003). Diets rich in fats and cholesterol are mainly responsible for the production of free radicals. Among the mechanisms responsible for the development of atherosclerosis, the role of oxidative stress has also been established.

As per World Health Organization (WHO) estimates, approximately 1.5 billion adults are overweight among which, 200 million men and 300 million women are obese. Excess intake of food than required and consequent obesity are some important factors in developing cardiovascular disease, diabetes, atherosclerosis, fatty liver disease various neurodegenerative disease and cancer (Magrone, Perez de Heredia, Jirillo, Morabito, Marcos, & Serafini, 2013). In developing countries, the rate of increase of CVD is almost double in comparison with developed countries (Gaziano, 2005). Cardiovascular disease (CVD) is the main cause of death in India (Mukherjee, 1995) and its contribution to total mortality is increasing.; Deaths due to CVDs are to approximately double between 1985-2015(WHO, 2016). Apart from this, the published data suggest that the death rate in Asian population due to cardiovascular disease is likely to increase 103% in men and 90% in women by 2030 (Mozaffarian, Benjamin, Go, Arnett, Blaha, Cushman, ... Turner, 2016). In 2015 CHD has been predicted to rank first among the causes of death in Indian population by (Nag & Ghosh, 2015). A total of nearly 64 million cases of CVD is likely in the year 2015 among them nearly 61 million would be CHD cases (the remaining would include stroke, rheumatic heart disease, and congenital heart diseases). The demise of this group of diseases is likely to amount to be a staggering 3.4 million (Global Burden of Disease Cancer Collaboration, 2017). Cardiovascular diseases in India have been generally occurring in urban areas but many vascular deaths also occur in rural regions and this is still where the majority of the population lives. While there is some limited information regarding the causes and management of cardiovascular disease in urban regions, corresponding data for rural regions is negligible (Gupta & Gupta, 1996). It seems reasonable to argue that people with changing lifestyles due to growing urbanization are associated with adverse CVD risk factors irrespective of their habitat (rural vs. urban) (Das, Pal, & Ghosh, 2011).

There are various important factors which are generally responsible for the increasing level of lipids in body and development of cardiovascular disease. Sometimes some people are born with conditions that predispose them to heart disease but most people who are suffering from this disease a combination of

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