

## Chapter 9

# Phytopharmaceutical Applications of Nutraceutical and Functional Foods

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### ABSTRACT

*Nutraceuticals are actually “Bioactive herbal formulations” that contains selective combinations of specific bioactive constituents of plants and/or their parts that possess health-promotive, disease preventing and medicinal properties. The important phytochemical constituents commonly found in plants are polyphenols, flavonoids, isoflavonoids, anthocyanidins, carotenoids, fibers, limonoids, glucosinolates, phytoestrogens, phytosterols and terpenoids. They play positive pharmacological activities in human health such as antioxidant activity, anti-microbial activity, anti-inflammatory, anti-allergic, anti-spasmodic, chemo-preventive, hepato-protective, neuro-protective, hypolipidemic, hypotensive, anti-aging, diabetes, osteoporosis, repair DNA damage, heart diseases, diuretic, Central Nervous System (CNS) stimulant, immuno-modulator, carminative, Thus the present chapter summarizes the phyto-pharmaceutical applications of nutraceuticals and functional foods and would lay emphasis on its importance for future generations for their well-being.*

### INTRODUCTION

Since the early 1990s, there has been a considerable shift in consumers’ perspective toward nutraceuticals and functional foods. Currently, consumers are much more conscious and aware about health and many share the perception that the onset of many chronic diseases can be prevented with the proper intake of nutritious diet. Food supplements are not only being consumed for just meeting the recommended dietary allowance but also as a mechanism for performance enhancement and disease prevention (FICCI Newsletter; Sharma et al., 2014).

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Consumers are now moving towards food products that are obtained from natural non-GMO (genetically modified organism) extracts. Nutraceuticals are those food derived substances in extracted form, which claim to provide medicinal and health benefits (Prakash & Kumar, 2011).

Globally, nutraceuticals are gaining prominence and becoming a part of the average consumer's daily diet. The key reasons for this have been the increased incidence of lifestyle diseases, increase in life expectancy and inadequate nutrition due to the current lifestyle. In fact, in developing nations, mortality due to nutrition related factors is nearly 40 percent, underscoring the need for nutraceutical products and to balance the nutritional intake of the individual (Prakash, Gupta, & Sharma, 2012).

Vision gain predicts the world market for functional foods and nutraceuticals will reach \$241.25bn in 2015. Market growth has been supported by a significant increase in the world's ageing population as well as growing consciousness of health and wellness across the globe. Increasing usage of internet and social media has also driven the trend towards self-medication using functional foods and nutraceuticals. This has provided an important incentive for the global food industry, which is experiencing an increasing shift towards functional foods and nutraceuticals (Sharma & Prakash, 2013).

## **NUTRACEUTICALS: THEN AND NOW**

Nutraceuticals are products that provide health and medicinal benefits, including the prevention and treatment of diseases in addition to the basic nutritional value found in foodstuff. Nutraceuticals are particularly of interest to the present generation because they have the potential to substantially reduce the expensive, high-tech, disease treatment approaches presently being employed in Western healthcare (Sharma & Prakash, 2013).

This category includes any food that we eat, having a particular health benefit that has been established through molecular and clinical research. In other words, a food can become a nutraceutical simply through the production of new scientific knowledge (Street, 2015).

Chemically the nutraceuticals may be classified as isoprenoid derivatives (terpenoids, carotenoids, saponins, tocotrienols, tocopherols, terpenes), phenolic compounds (couramines, tannins, lignins, anthocyanins, isoflavones, flavonones, flavanoids), carbohydrate derivatives (ascorbic acid, oligosaccharides, non-starch polysaccharides), fatty acid and structural lipids (n-3 PUFA, CLA, MUFA, sphingolipids, lecithins), amino acid derivatives (amino acids, allyl-S compounds, capsaicinoids, isothiocyanates, indoles, folate, choline), microbes (probiotics, prebiotics) and minerals (Ca, Zn, Cu, K, Se) (Prakash, Dhakarey, & Mishra, 2004; Sharma, 2009). They play a crucial role in maintaining optimal immune response, such that deficient or excessive intakes can have negative impact on health. Around the world, the governing bodies have accepted nutraceuticals as possible nutraceutical therapy in main stream of medical education and health (Sharma, 2009).

The major nutraceuticals mainly include vitamins and minerals and bioactive constituents from plant sources (phytochemicals). The vitamins A, B<sub>6</sub>, B<sub>12</sub>, D, E, folate have been reported as anti-cancer, immunoprotective and reducing cancer risk in individuals who used self-medication (Zhang et al., 2008).

Several preclinical and clinical trial studies have shown that the regular consumption of fruits, vegetables and whole grains, reduces the risk of chronic diseases associated with oxidative damage (Cieslik, Greda, & Adamus, 2006). Carotenoids, tocopherols, ascorbates, lipoic acids and polyphenols are strong natural antioxidants with free radical scavenging activity. Besides, there are several endogenous antioxidant enzymes like super oxide dismutase (SOD), catalase, glutathione peroxidase, glutathione reductase,

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