

Review Article

Nutraceuticals in Health Care: A Review

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ABSTRACT

When a functional food aids in the prevention and/or treatment of disease(s) and/or disorder(s) (except anemia), it is called a nutraceutical. The term "nutraceutical" was coined from "nutrition" and "pharmaceutical" in 1989 by Stephen DeFelice. It is a term coined to describe substances which are not traditionally recognized nutrients but which have positive physiological effects on the human body. They do not easily fall into the legal category of food and drug and often inhabit a grey area between the two. Nutraceuticals are either functional foods or dietary supplements with health benefits besides their basic nutritional value. Several nutraceuticals may exert lipid-lowering, anti-atherosclerotic, anti-inflammatory and anti-oxidative properties. The nutraceutical revolution will lead us into a new era of medicine and health, in which the food industry will become a research-oriented one similar to the pharmaceutical industry.

Keywords: Nutraceuticals, Medicine, Functional foods



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INTRODUCTION

The quality of life in terms of income, spending and lifestyle has improved with economic development. However, it has also thrown up a major challenge in the form of 'lifestyle diseases'. The first victim of this lifestyle change has been food habits. Consumption of junk food has increased manifold, which has led to a number of diseases related to nutritional deficiencies. Nutraceuticals can play an important role in controlling them. No wonder more and more people are turning to nutraceuticals.

The term nutraceutical was coined from nutrition and pharmaceutical in 1989 by Stephen Defelice, founder and chairman of foundation for innovation in medicine, an American organization which encourages medical health^{1, 2, 3, 4}.

According to him "a nutraceutical is any substance that is a food or a part of food and provides medical or health benefits, including the

prevention and treatment of disease". Such products may range from isolated nutrients, dietary supplements and specific diets to genetically engineered designer foods and herbal products^{1,5}. The concept of nutraceutical was started from the survey in U.K., Germany and France and it concluded that diet is rated more highly by consumer than exercise or hereditary factors to achieving a good health. In the U.S⁶. "nutraceutical" was commonly used, but no regulatory definition existed. Its meaning was modified by health ministry of Canada which defines nutraceutical as "a product isolated or purified from the food, generally sold in medicinal form not associated with food and demonstrated to have a physiological benefit .It also provides benefit against chronic disease"⁶.

In Britain, the Ministry of Agriculture, Fisheries and Food has developed a definition of a functional food as "a food that has a component incorporated into it to give it a specific medical

or physiological benefit, other than purely nutritional benefit⁸. There is a slight difference between the functional foods and Nutraceuticals. When food is being cooked or prepared using "scientific intelligence" with or without knowledge of how or why it is being used, the food is called "functional food". Thus, functional food provides the body with the required amount of vitamins, fats, proteins, carbohydrates, etc. needed for its healthy survival. When functional food aids in the prevention and/or treatment of disease(s) and/or disorder(s) other than anemia, it is called a nutraceutical. Examples of nutraceuticals include fortified dairy products (e.g. milk) and citrus fruits (e.g. orange juice)⁹.

CLASSIFICATION

Nutraceuticals or functional foods can be classified on the basis of their natural sources, pharmacological conditions or as per chemical constitution of the products. On the basis of natural source it can be classified as the products obtained from plants, animals, minerals or microbial sources.

The classification of nutraceuticals based upon its therapeutic utility for the treatment or prevention of specific condition may produce a big list. Some of the important conditions in which the nutraceuticals are specially directed for its treatment, prevention or support are given in Table 1.

Conditions	Nutraceuticals
Allergy relief	Ginkgo biloba
Arthritis support	Glucosamine
Cancer prevention	Flax seeds, green tea
Cardiac diseases	Garlic
Cholesterol lowering	Garlic
Digestive support	Digestive enzymes
Diabetic support	Garlic, momordica
Female hormone support	Black conosh, false unicorn
Immunomodulators	Ginseng
Prostate support	Tomoto lycopenes

Table 1: Nutraceuticals used in various disease conditions

A systematic classification on the basis of therapeutically important compounds of the nutraceuticals products responsible for the

specific health benefit can be done as given in Table:2.

Sl. no.	Class	Example
1	Inorganic mineral supplements	Minerals
2.	Vitamin supplements	Vitamins
3.	Digestive enzymes	Enzymes
4.	Probiotics	Lactobacillus acidophilus
5.	Prebiotics	Digestive enzymes
6.	Dietary fibres	Fibres
7.	Cereals and grains	Fibres
8.	Health drinks	Fibre
9.	Antioxidants	Natural antioxidants
10.	Phytochemicals Polysaccharides Isoprenoids Flavonoids Phenolics Fatty acids Lipids proteins	Arabinogalactans Carotenoids Bioflavonoids Tea polyphenols Omega-3-fatty acids Spingolipids Soya proteins
11	Herbs as a functional foods	Soya proteins

Table 2: classification on the basis of therapeutically important compounds of the nutraceuticals

Role of nutraceuticals in cardiovascular diseases^{10,11,12}:

Various nutraceuticals used in cardiovascular diseases like carnitine, N-acetylcysteine, creatine, glutathione, selenium, resveratrol, beta-sitosterol and flavonoids. Carnitine is an amino acid derivative that is found in all cells of the body, especially in striated muscles. Two analogs of arnitine, acetyl-L-carnitine and propionylL-carnitine, have been used clinically. It plays an important role in the transport of free fatty acids across the inner mitochondrial membranes for energy production. It is a cofactor in carbohydrate metabolism and has noted to reduce the buildup of toxic metabolites in an ischemic condition. It is widely utilized by patients with a variety of cardiovascular conditions. L-carnitine has reported to have beneficial effect on cardiac function and it has postulated to be cardioprotective due to its antioxidant effects⁶. Studies have suggested that it will lower, to a variable extent, plasma triglycerides and elevate high-density lipoprotein cholesterol levels.

Role of nutraceuticals in obesity¹²:

Buckwheat is a crop has special biological activities of cholesterol lowering effect, anti hypertension effects and improving the constipation and obesity condition by acting similar as to dietary fiber present in food. 5-hydroxytryptophan and green tea extract may promote weight loss, while the former decreases appetite, the later increases the energy expenditure. Herbal stimulants, such as

ephedrine, caffeine, ma huang-guarana, chitosen and green tea help in body weight loss. A blend of glucomannan, chitosan, fenugreek, G sylvestre, and vitamin C in the dietary supplement significantly reduced body weight.

Nutraceuticals used in Alzheimer's diseases¹²:

β -Carotene, curcumin, lutein, lycopene, turmeric etc may exert positive effects on specific diseases by neutralizing the negative effects of oxidative stress, mitochondrial dysfunction, and various forms of neural degeneration.

Nutraceuticals used in osteoarthritis¹²:

Glucosamine (GLN) and chondroitin sulfate (CS) are widely used to improve symptoms of osteoarthritis. Methylsulfonyl Methane (MSM) used in combination with glucosamine and chondroitin for helping to treat or prevent osteoarthritis or joint disorder.

Nutraceuticals used in vision¹²:

Lutein (found in mangoes, corn, sweetpotatoes, carrots, squash, tomatoes and dark, leafy greens such as kale, collards and bokchoy) also known as helenien is used for the treatment of visual disorders.

Zeaxanthin (found in corn, egg yolks and gree vegetables and fruits, such as Broccoli, green beans, green peas, brussel sprouts, cabbage, kale, collard greens, Spinach, lettuce, kiwi and honeydew) used in traditional Chinese Medicine mainly for the treatment of Visual Disorders.

Nutraceuticals used in cancer¹²:

Lycopene concentrates in the skin, testes, adrenal and prostate where it protects against cancer. Lycopene is one of the major carotenoids in western diets and is found almost exclusively in tomatoes, water melon, guava, pink grapefruit and papaya.

Phytochemicals derived from herbs and spices also have potential ant carcinogenic and anti mutagenic activities, A broad range of "phyto-estrogens" with a claimed hormonal activity, is recommended for prevention of prostate/breast cancer.

Flavonoids found in citrus fruit appear to protect against cancer by acting as antioxidants.

Soy foods source of isoflavones, curcumin from curry and soya isoflavones possess cancer chemo preventive properties.

Ellagic acid is a proven anti-carcinogen present in strawberries, cranberries and walnuts.

Top of form Beet roots, cucumber fruits, spinach leaves, and turmeric rhizomes, were reported to possess anti tumor activity.

Tannins present in blackberries, blueberries, cranberries, grapes, lentils, tea and wine with advantage to detoxify carcinogens and scavenge

harmful free radicals.

Curcumin (diferuloylmethane) which is a polyphenol of turmeric possesses anticarcinogenic, antioxidative and anti-inflammatory properties.

Pectin (apples) prevents prostate cancer by inhibiting cancer cells from adhering to other body cells.

Nutraceuticals used in allergy¹²:

Quercetin (QR) belongs to a group of polyphenolic substances known as flavonoids. Quercetin found in onions, red wine and green tea work as natural antihistamine and opposes the actions of the histamine in the body.

CONCLUSION

Nutraceuticals offer an advantage over the synthetic drugs under development by the pharmaceuticals industry. It is novel pharmacological activity that are become interesting in their possible clinical use and thus helping in prevention and therapeutic in several diseases, as nutraceuticals are beneficial in coronary heart disease, obesity, diabetes, cancer, osteoporosis and other chronic and degenerative diseases such as Parkinson's and Alzheimer's diseases. It appears that these properties play a crucial role in the protection against the pathologies of numerous age-related or chronic diseases.

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