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Review Article

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Nutraceuticals and their Health Benefits

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ABSTRACT

Nutraceuticals are products derived from food sources that are purported to provide extra health benefits, in addition to the basic nutritional value found in foods. Nutraceutical are a food or part of food that provides health benefits including the intervention and treatment of a disease. Nutraceuticals improve the health status of individuals by modulating the body functions. Different types of those nutraceuticals are available in general viz., proteins, vitamins, minerals, and other pure food compounds like., dietary supplement, herbals, nutrients, medical foods, functional foods. Nutraceuticals have attracted considerable interest due to their potential nutritional, safety and therapeutic effects.

Key words: *Nutraceutical, Health, Food, Disease, Nutrition.*

INTRODUCTION

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]. Restated and clarified in a press release in 1994, its definition was "any substance that may be considered a food or part of a food and provides medical or health benefits, including the prevention and treatment of disease[5&6]. About 2000 years ago, Hippocrates emphasized 'let food be your medicine and medicine be your food's[7]. The actual use of Nutraceuticals is to attain desirable therapeutic outcomes with reduced side effects. Such products may range from isolated nutrients, dietary, supplements and diets to genetically engineered 'designer' foods, herbal products and processed foods such as cereals, soups, and beverages[4,8&9].

HISTORY OF NUTRACEUTICALS

The concept of Nutraceuticals went back three thousand years ago. Hippocrates (460-377 B.C) stated 'let food be thy medicine and medicine be the food' to predict the relationship between appropriate foods for health and their therapeutic benefits [10]. In the early 1900s, in united states food manufacturers start adding small quantity of iodine to salt to prevent Goiter. In Japan, England and other countries, Nutraceuticals are already becoming part of dietary landscape, nowadays Nutraceuticals are most rapidly growing segments of the industry & the global nutraceutical market is estimated as USD 117 billion[11& 12].

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TRADITIONAL AND NON-TRADITIONAL NUTRACEUTICALS

Wide variety of nutraceutical foods are available in the market which falls in the category of traditional foods and non-traditional foods.

(a) Traditional Nutraceuticals

Under the category of traditional Nutraceuticals comes food in which no change to the food are made; It is simply natural, whole foods with new information about their potential health qualities. There has been no change to the actual foods, other than the way the consumer perceives them. Many fruits, vegetables, grains, fish, dairy and meat products contain several natural components that deliver benefits beyond basic nutrition, such as lycopene in tomatoes, omega-3 fatty acids in salmon or saponins in soy. Even tea and chocolate have been noted in some studies to contain health-benefiting attributes[12&13].

(b) Nontraditional Nutraceuticals

They are the outcome from agricultural breeding or added nutrients and/or ingredients such as orange juice fortified with calcium, cereals with added vitamins or minerals and flour with added folic acid are nontraditional nutraceutical. Agricultural scientists successfully have come up with the techniques to boost the nutritional content of certain crops. Research currently is being conducted to improve the nutritional quality of many other crops[13, 14&15].

NUTRACUTICALS ARE CATEGORIZED BASED ON THEIR CHEMICAL CONSTITUENTS AS BELOW

(a) Nutrients

As defined by AAFCO (1996), "a feed constituent in a form and at a level that will help support the life of an animal." The chief classes of feed nutrients are proteins, fats, carbohydrates, minerals and vitamins[16&17].

(b) Herbals

Herbs or botanical products as concentrates and extracts. Herbals are as old as human civilization and they provide a complete storehouse of remedies to cure acute and chronic diseases. India has the oldest written tradition for the nature's remedies called 'Auyrveda' which possess many effective means of ensuring health care. Numerous nutraceuticals are present in medicinal herbs of key components[18&19].

(c) Dietary Supplements

Dietary supplements are products administered through mouth that contain a dietary ingredient intended to add something to the foods you eat. A dietary supplement is a product that is intended to supplement the diet that bears or contains one or more ingredients like, vitamin, mineral, a herb, an amino acid or a concentrate, metabolite, constituent, extract, or combinations of these [17]. Examples of dietary supplements are black cohosh for menopausal symptoms, ginkgo biloba for memory loss and glucosamine/chondroitin for arthritis. Supplement ingredients may contain vitamins, minerals, herbs or other botanicals, amino acids, enzymes, organ tissues, gland extracts or other dietary substances [20].

(d) Medical foods

Medical foods are a specific category of therapeutic agents that are intended for the nutritional management of a specific disease. Medical foods are formulations intended to manage patients with inborn errors in amino acid metabolism. Newer medical foods are designed to manage hyperhomocysteinemia, pancreatic exocrine insufficiency, inflammatory conditions, cancer cachexia, and other diseases. An example of health bars with added medications, transgenic cows and lacto-ferrin for immune enhancement, transgenic plants for oral vaccination against infectious diseases[21&22].

(e) Functional Foods

When food is being cooked or prepared using "scientific intelligence" with or without the knowledge of how or why it is being used, then the food is called as "functional food." Thus, functional food provides the body with the required amount of vitamins, fats, proteins, carbohydrates necessary for healthy survival[4]. A food product that is part of usual diet but has beneficial effects that go beyond the traditional nutritional effects. When functional food aids in the prevention and/or treatment of disease(s)/disorder (s) other than deficiency

conditions like anemia it is called a nutraceutical[4]. Thus, a functional food for one consumer can act as a nutraceutical for another. Examples of nutraceuticals include fortified dairy products (milk as such is a nutrient and its product casein is a pharmaceutical) and citrus fruits (orange juice is nutrient and its constituent ascorbic acid is a pharmaceutical)[7&12]

HEALTH BENEFITS OF NUTRACUTICALS

Cardiovascular diseases: The nutraceuticals used are antioxidants, dietary fibres, omega-3 fatty acids, vitamins, minerals for prevention and treatment of CVD[23]. Polyphenol (in grape) prevent and control arterial diseases[24]. Flavonoids (in onion, vegetables, grapes, red wine, apples and cherries) block the ACE and strengthen the tiny capillaries that carry oxygen and essential nutrients to all cells[25].

Diabetes: Lipoic acid, an antioxidant is used for treatment of diabetic neuropathy[26] dietary fibres from psyllium have been used for glucose control in diabetic patients and to reduce lipid level in hyperlipidemia[27]. Ethyl esters of n-3 fatty acids may be beneficial in diabetic patients[28]. Docosahexaenoic acid modulates insulin resistance and is also vital for neurovisual development[29]

Obesity: Herbal stimulants, such as ephedrine. Caffeine, ma huang-guarana, chitosan and green tea help in body weight loss[30]. Buckwheat seed proteins acting similar to fibers present in food[31]. 5-hydroxytryptophan and green tea extract may promote weight loss, while the former decreases appetite, the later increases the energy expenditure [32]. A mixture of glucomannan, chitosan, fenugreek and vitamin C in dietary supplement significantly reduced body weight[33].

Cancer: Flavonoids which block the enzymes that produce estrogen reduce of estrogen-induced cancers[34] . Phytoestrogens is recommended to prevent prostate/breast cancer[35]. Soy foods are source of Iso-flavones, curcumin from curry and soya isoflavones possess cancer chemo preventive properties[36]. Lycopene concentrates in the skin, testes, adrenal and prostate protects against cancer[37]. **S**aponins contains antitumor and antimutagenic activities[38]. Curcumin (diferuloylmethane) which is a polyphenol of turmeric possesses anti-carcinogenic, anti-oxidative and anti-inflammatory properties[39]. Beet roots, cucumber fruits, spinach leaves, and turmeric rhizomes were reported to possess anti-tumor activity[40] .

Anti-inflammatory activities: Cucurmin which is a polyphenol of turmeric have anti-carcinogenic, anti-oxidative and anti-inflammatory properties [23.] Linoleic acid (found in green leafy vegetables, nuts, vegetable oils i.e., evening primrose oil, blackcurrant seed oil, hemp seed oil, cyanobacteria and from spirulina) are used for treating problems with inflammation and auto-immune diseases[41]. Glucosamine and chondroitin sulfate are used against osteoarthritis and regulate gene expression and synthesis of NO and PGE2[42].

Vision improving agents: Lutein (found in mangoes, corn, sweet potatoes, 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[23]. Zeaxanthin (found in corn, egg yolks and green 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[43].

Osteoarthritis: Glucosamine (GLN) and chondroitin sulphate (CS) is used for treatment of osteoarthritis[44].

Alzheimer's disease: β-carotene, curcumin, lutein, lycopene, turmerin etc may exert positive effects on specific diseases by neutralizing the negative effects oxidative stress mitochondrial dysfunction and various forms of neural degeneration[45].

SUMMARY AND CONCLUSION

The nutraceutical industry is growing at a rate far exceeding expansion in the food and pharmaceutical industries. Most of the nutraceutical food or food components that help in treatment and prevention of diseases

are made from herbal/botanical raw material. The use of nutraceuticals is important to obtain therapeutic outcomes with reduced side effects. But their success depends on maintaining on their quality, purity, safety and efficacy.

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