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Nutraceuticals: A New Era of Medicine

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Nutraceuticals are naturally derived bioactive compounds which have nutritional and health promoting, disease preventing and medicinal properties. It includes nutrients, phytochemical or herbals and dietary supplements. Main advantage of using nutraceutical in place of pharmaceutical is, being natural it has no side effects. The main aim of this article is to discuss about types of nutraceutical and their health benefits.

Introduction

Economic development has improved our life style and it has changed our food habit also, which resulted in number of nutritional deficiency diseases. Nutraceuticals can play an important role in controlling such diseases. The term "Nutraceutical" was first coined by Dr. Stephen L. Defelice. He defined term Nutraceuticals in 1989 as a product isolated or purified from foods, and generally sold in medicinal forms that have a physiological benefit or provide protection against chronic disease. Examples are beta-carotene and lycopene. Nutraceuticals is a combination of nutrition and pharmaceuticals. The food products which give good health as well as the prevention and treatment of disease are included in nutraceuticals products.

Classification of Nutraceuticals

There are different types of products that come under the class of nutraceuticals.

a) Nutrients

These are the substances which have established nutritional functions e.g. Vitamins, Minerals, Fatty acids, etc.

Vitamins and Minerals: Vitamins and minerals are essential nutrients, needed in small amounts to work properly, but all are not produced inside body so these nutrients must be obtained from food. Vitamins and minerals have many different roles in general metabolism and their deficiency leads to different types of disease. Vitamins are classified as fat soluble and water soluble. Water soluble vitamins includes vitamin C and vitamin B complex and fat soluble vitamins includes vitamin A, vitamin D, vitamin E and vitamin K. Dietary minerals are the chemical elements required by living organisms, other than the four elements carbon, hydrogen, nitrogen, and oxygen present in common organic molecules. Chemical elements in order of abundance in the human body include the seven major dietary elements calcium, phosphorus, potassium, sulfur, sodium, chlorine,and

magnesium Important "trace" or minor dietary elements, include iron, cobalt, copper, zinc, molybdenum, iodine, bromine, and selenium**.**

Poly unsaturated fatty acids (PUFAs): The two polyunsaturated fatty acids essential for health are omega-3 and omega-6. These are essential because they cannot be manufactured by the body and must come from food. Omega-3 fatty acids are needed for brain and eye development of the growing fetus during pregnancy and for maintain and promoting health throughout the life. Omega -6 fatty acids play an important role in brain and heart function, and in normal growth and development. Common food sources of omega-3 fatty acids include fatty fish such as salmon, white tuna and canola or flax seed oil. Common food sources of omega- fatty acids include vegetable oils like safflower and soy oil etc.

b) Herbals

Herbs or botanical products are used as concentrates and extracts. Some of the common herbal compounds used as Nutraceuticals are;

- Aloe Vera gel obtained from *Aloe vera* L. Burm. and that is used to dilates capillaries, anti-inflammatory, emollient and wound healing properties.
- Chamomile obtained from *Matricaria recutita* L. and used in the treatment as anti-inflammatory, spasmolytic, antimicrobial and wound healing.
- Echinacea obtained from *Echinacea purpurea* L. and act as an immune stimulant and treatment of cold and flu symptoms.
- Garlic a compound of *Allium sativum* L. and is used as Antibacterial, antifungal, antithrombotic, hypotensive, fibrinolytic, antihyperlipidemic and anti-inflammatory.
- Ginger obtained from *Zingiber officinale Rose* and is used as carminative, antiemetic, cholagogue, positive inotropic and treatment of dizziness.
- Ginkgo obtained from *Ginkgo biloba* L. and majorly used as vasodilation, increased peripheral blood flow, treatment of postthrombotic syndrome, chronic cerebral vascular insufficiency, short term memory loss, cognitive disorders secondary to depression, dementia, tinnitus and vertigo.
- Goldenseal obtained from *Hydrastis Canadensis* L. and is used in treatment as Antimicrobial, astringent, antihemorrhagic, treatment of mucosal inflammation dyspepsia and gastritis.
- Licorice obtained from *Glycyrrhiza glabra* L,*G. uralensis* Fisch. and that have therapeutic action as expectorant, secretolytic and in treatment of peptic ulcer.
- Plantago seed obtained from *Plantago arenaria* Waldst., *Plantago arenaria* Kit. *Plantago ovate* used as Cathartic.

c) Dietary supplements

A dietary supplement is a dietary substance that supplements the diet by increasing the total dietary intake. Nutraceutical under this category includes: probiotcs, prebiotics, synbiotics and antioxidants.

Probiotics, prebiotics and synbiotics: The human gut is populated by a wide array of microorganism which have important role in metabolism and immune functions which in turn affects human health. Probiotics, according to a consensus definition, are 'living micro-organisms, which upon ingestion in certain numbers exert health benefits beyond inherent basic nutrition. Common microorganism used as probiotics includes *Lactobacillus rhamnosus* GG, *Lactobacillus reuteri*, bifidobacteria and certain strains of *Lactobacillus casei*, the *Lactobacillus acidophilus*-group,

Escherichia coli strain Nissle 1917, certain enterococci, especially *Enterococcus faecium* SF68, and the probiotic yeast *Saccharomyces boulardii* ,they are usually *used* in fermented milk products. Probiotics have been shown to have applications in alleviating symptoms of allergies, respiratory and urinary tract infections. Furthermore, various findings suggest that probiotics have beneficial effects in alleviating symptoms associated with aging, fatigue, autism, and in reducing the risks of osteoporosis, obesity and possibly type 2 diabetes. Advantages of probiotics for health can only be realized if proper probiotic strain or product selection, and dose guidelines of commercial production, are followed in human food or medicine. While probiotics are gaining significant interest as alternatives for antibiotics or anti-inflammatory drugs, their mode of action is poorly understood. Probiotics may act by modulating the host's immune system, affecting other microorganisms directly or acting on microbial products, host products or food components .The effectiveness of a probiotic depends on its metabolic properties, the set of molecules presented at its surface, the components it secretes, and the integral parts of the microorganism such as its DNA or peptidoglycan. A prebiotic is "a selectively fermented ingredient that allows specific changes, both in the composition and/or activity in the gastrointestinal microflora that confers benefits upon host well being and health", whereas synergistic combinations of pro- and prebiotics are called synbiotics. Today, only bifidogenic, non-digestible oligosaccharides (particularly inulin, its hydrolysis product oligofructose, and (trans)galactooligosaccharides), fulfill all the criteria for prebiotic classification. They are dietary fibers with a well-established positive impact on the intestinal microflora. Other health effects of prebiotics (prevention of diarrhoea or obstipation, modulation of the metabolism of the intestinal flora, cancer prevention, positive effects on lipid metabolism, stimulation of mineral adsorption and immunomodulatory properties) are indirect, i.e. mediated by the intestinal microflora, and therefore less-well proven.

Antioxidants: Many metabolic processes in human body uses oxygen and by product of such metabolic processes can lead to development of molecular agents that react with body tissues in a process called oxidation and creates oxidative stress in cell, which plays an essential role in heart diseases, neurodegenerative diseases, cancer, and in the aging process. Since antioxidants are capable of preventing oxidative damage, the use of dietary antioxidants helps in reducing such diseases. An antioxidant is any substance that when present at low concentration compared to those of an oxidizable substrate significantly delays or prevents oxidation of that substrate and protects from the damaging effects of free radicals. Dietary source of antioxidants includes polyphenols, vitamins like vit.C, vit. E and carotenoids etc. Natural polyphenols exert their beneficial health effects by their antioxidant activity, these compounds are capable of removing free radicals, chelate metal catalysts, activate antioxidant enzymes, reduce tocopherol radicals and inhibit oxidases. Carotenoids are powerful antiaging antioxidants, protecting the cells of the body from damage caused by free radicals. They work in combination with each other including vitamin C, vitamin E, lipoic acid, and the antioxidant enzymes produced in our body: superoxide dismutase, catalase and glutathione peroxidase. Vitamin E functions as a chain-breaking antioxidant that prevents the propagation of free radical reactions during lipid peroxidation. Vitamin C acts as an electron donor for different enzyme.

Table1. List of Some Marketable Nutraceuticals

S. No.	Product name	Content	Manufacturer
1	Coral calcium	Calcium and trace minerals	Nature's answer, NY, USA
2	Weight smart ^{TM}	Vitamins and trace elements	Bayer corporation, NL, USA
3	Omega women	Antioxidant, vitamins and phytochemicals	Wassen, UK
4	Rox^{R} Glucon-D	Taurine,caffeine and glucuronolactone glucose	Rox America, USA
5	Mushroom otimizer^{TM}	Mushroom polysaccharides and Folic acid	Jarrow formulas, CA, USA
6	Chaser^{TM}	Activated calcium carbonate	Living essential, USA

Conclusion

As Nutraceuticals have proven its health benefits, it is gaining important position in growing health market of India as well in world. Since the market for nutraceuticals is booming, many product are available that have not been tested for their safety or efficacy. So, much more research & developments are needed in this field, as well as more precise regulatory approach is required to maintain the purity and safety issues.