



Review Article

A REVIEW ON FOOD SUPPLEMENT-NUTRACEUTICALS

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ABSTRACT-

Nutraceutical-rich vegetables and fruits are an important module of a healthy diet. It has been shown that people consuming healthy diets, living active lifestyles, not smoking and not indulging in excessive alcohol consumption tend to have a reduced risk of CVD. There has been an detonation of consumer interest in the health enhancing role of physiologically-active specific nutraceuticals. Such products include food supplements, dietary supplements, value-added processed foods as well as non-food supplements such as tablets, soft gels, capsules etc. The explosive growth, research developments, lack of standards, marketing zeal, quality assurance and regulation will play a vital role in its success or failure.

Keyword: Nutraceutical, Probiotics, Explosive Growth

INTRODUCTION-

The term 'nutraceuticals' was coined from 'nutrition' and 'pharmaceutical' in 1989 by Derelict and was originally defined as 'a food (or part of the food) that provides medical or health benefits, including the prevention and/or treatment of a disease' [3]. A nutraceuticals may be a naturally nutrient-rich food such as spiralling, garlic, soya or a specific component of a food like omega-3 oil from salmon. They are also known dietary supplements [22].

Nutraceuticals are medicinal foods that boost health, modulate immunity and thereby prevent and cure specific diseases. They may range from natural diets, herbal products to genetically engineered foods and processed products such as cereals, soups and beverages [23].

Bio fortified crops have been considered as a complementary strategy for delivering nutrition to malnourished populations [7]. Dairy products that contain Probiotics organisms such as Lactobacillus and Bifid bacterium species represent a new research area which improves gut health by modulating gut microbial composition [7]. The ability of Nutraceuticals to influence chronic diseases like diabetes, different types of cancers, etc. should be recognized as an enormous opportunity in their treatment [14]. They will play important role in future therapeutic developments [4].

CLASSIFICATION-

Nutraceuticals are categorized on the basis of foods available in the market [25].

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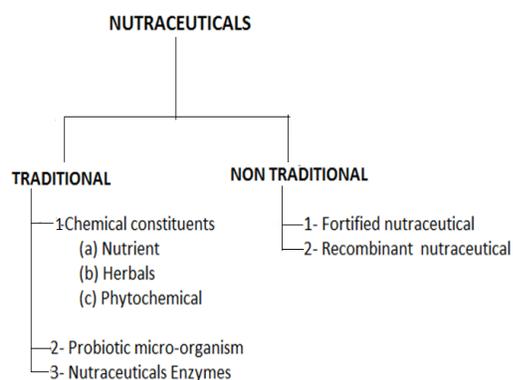
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TRADITIONAL NUTRACEUTICALS

Simply natural with no changes to the food. Food contains several natural components that deliver benefits beyond basic nutrition, such as lycopene in tomatoes, omega-3 fatty acids in salmon or saponins in soy. Applications of traditional nutraceuticals in chronic disease control are discussed in^[23]. They are grouped on the basis of

Chemical Constituents

Nutrients

Substances such as vitamins, minerals, amino acids and fatty acids with established nutritional functions^[1,5,6]. Most vegetables, wholegrain cereals, dairy products, fruits and animal products such as meat, poultry, contain vitamins and are helpful in curing heart diseases, stroke, cataracts, osteoporosis, diabetes and cancer^[7]. Minerals found in plant, animal and dairy products are useful in osteoporosis, anaemia and build strong bones, teeth, muscles, improve nerve impulses and heart rhythm and are potent controllers of the inflammatory processes, maintenance of brain function and reduce cholesterol deposition^[9].

Herbals

Nutraceuticals holds a great promise to advance health and prevent chronic diseases with the help of herbals. Some examples are willow bark (*Salix nigra*), having active component as salicin, which is anti-inflammatory, analgesic, antipyretic, astringent and antiarthritic^[12]. Parsley (*Petroselinum crispum*) contains flavonoids (apiol, psoralen) and is diuretic,

carminative and anti-pyretic^[14]. Peppermint (*Mentha piperita*) contains menthol as an active component and cures cold and flu. Lavender (*Lavandula angustifolia*) contains tannin which is helpful in curing depression, hypertension, stress, cold, cough and asthma^[9,11]. Cranberries (*Vaccinium erythocarpum*) contain proanthocyanadin and are found to be useful in cancer, ulcers and urinary tract infections^[16].

Phytochemicals

According to Best phytochemicals is one class of nutraceuticals^[19]. They are classified on the basis of chemical name given according to their phytochemical properties^[1]. For example, Carotenoids (Isoprenoids) found in various fruits, vegetables and egg yolk, are anti-carcinogenic, boost natural killer immune cells and protect cornea against UV light^[17,18]. Legumes (chickpeas and soybeans), grains, palm oil contain non-carotenoids, which remove cholesterol and are anti-carcinogenic^[19]. Flavonoid polyphenolics are found in berries, fruits, vegetables, and legumes, which are potent antioxidants, phytoestrogens, prevent breast cancer, prostate cancer and control diabetes^[3]. Non-flavonoid polyphenolics are present in dark grapes, raisins, berries, peanuts, turmeric roots are strong anti-inflammatory, anti-oxidants, and effective anti-clotting agents and reduce cholesterol^[9]. Phenolic acids, found in blueberries, tomatoes and bell peppers having antioxidant activity, reduce mutagenicity of polycyclic aromatic hydrocarbons^[8]. Seeds of *Barbarea verna*, broccoli contain isothiocyanates (glucosinolates) and have antitumorogenesis activity^[10].

Probiotic Microorganisms

The scientific interest in probiotics boosted from the work of Metchinkoff to transform the toxic flora of the large intestine into a host-friendly colony of *Bacillus bulgaricus* was found by Hord. 'Probiotics' mean 'for life' and are defined as live microorganisms, which when consumed in adequate amounts, confer a health effect on the host^[20]. They are friendly bacteria

that promote healthy digestion and absorption of some nutrients^[21]. They act to crowd out pathogens, such as yeasts, other bacteria and viruses that may otherwise cause disease and develop a mutually advantageous symbiosis with the human gastrointestinal tract^[21]. They have an antimicrobial effect through modifying the microflora, preventing adhesion of pathogens to the intestinal epithelium, competing for nutrients necessary for pathogen survival, producing an antitoxin effect and reversing some of the consequences of infection on the intestinal epithelium, such as secretory changes and neutrophil migration^[5]. Probiotics can cure lactose intolerance by the production of the specific enzyme (β -galactosidase) that can hydrolyze the offending lactose into its component sugars^[20].

Nutraceutical Enzymes

Enzymes are an essential part of life, without which our bodies would cease to function^[15]. Those people who are suffering from medical conditions such as hypoglycemia, blood sugar disorders, digestive problems and obesity, eliminate the symptoms by enzyme supplements to their diet^[14]. These enzymes are derived from microbial, plant and animal sources.

NON-TRADITIONAL NUTRACEUTICALS

Artificial foods prepared with the help of biotechnology. Food samples contain bioactive components which are engineered to produce products for human-wellness^[6]. They are arranged into

Fortified Nutraceuticals

It constitutes fortified food from agricultural breeding or added nutrients and/or ingredients^[2] e.g. orange juice fortified with calcium, cereals with added vitamins or minerals and flour with added folic acid. Some examples are milk fortified with cholecalciferol used in vitamin D deficiency^[5]. Prebiotic and probiotic fortified milk with Bifid bacterium lactis HN019 used in diarrhea, respiratory infections and severe illnesses, in children. Banana fortified using

soybean ferritin gene in iron deficiency was discovered by Kumar^[20].

Recombinant Nutraceuticals

Energy-providing foods, such as bread, alcohol, fermented starch, yogurt, cheese, vinegar, and others are produced with the help of biotechnology^[13]. The production of probiotics and the extraction of bioactive components by enzyme/fermentation technologies as well as genetic engineering technology are achieved through biotechnology^[22].

CATEGORIES OF NUTRACEUTICALS

Nutraceuticals are non-specific biological therapies used to promote wellness, prevent malignant processes and control symptoms. 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. They are categorized as follows^[1].

Based on chemical constituents

Nutrients

Nutrients are substances with established nutritional functions, such as vitamins, minerals, amino acids and fatty acid^[15].

Dietary Supplement

Dietary supplements are products administered through mouth that contain a dietary ingredient intended to add something to the foods you eat. Examples of dietary supplements are black cohosh for menopausal symptoms, ginkgo biloba for memory loss, and glucosamine/chondroitin for arthritis^[5]. They also provide definite functions such as sports nutrition, weight-loss supplements and meal replacements. Supplement ingredients may contain vitamins, minerals, herbs or other botanicals, amino acids, enzymes, organ tissues, gland extracts, or other dietary substances^[1]. They are available in different dosage forms, including tablets, capsules, liquids, powders, extracts, and concentrates^[11,12].

Table No 1 List of vitamins, minerals and their benefits-

<i>Nutrients</i>	<i>Health benefits</i>
Vitamin A	Antioxidant, essential, for growth and development in treatment of certain skin disorder.
Vitamin E	Antioxidant, helps from blood cells, muscles, lung and nerve tissue boosts the immune system.
Vitamin K	Essential for blood clotting.
Vitamin C	Antioxidant, for healthy bones, gums, teeth and skin, in wound healing, prevent common cold and attenuate its symptoms
Vitamin B1	Helps to convert food in to energy, essential in neurologic function.
Vitamin B2	Helps in energy production and other chemical processes in the body, helps sustain healthy eyes, skin and skin and nerve function.
Vitamin B3	Helps to convert food in to energy and maintain proper brain function.
Vitamin B6	Produce the genetic material of cells, formation of RBCs, maintenance of central nervous system and synthesize amino acids and metabolism of fats, protein and carbohydrates.
Folic acid	Produce the genetic material of cells, in pregnancy for preventing birth defects, RBCs formation, protect against heart disease.
Calcium	Bone and teeth and maintaining bone strength important in nerve, muscle and glandular functions.
Iron	Energy production, carry and transfer oxygen to tissues.
Magnesium	Healthy nerve and muscle function and bone formation, may help prevent premenstrual syndrome (PMS).
Phosphorous	Strong bone and teeth helps in formation of genetic material, energy production and storage
Chromium	With insulin helps to convert carbohydrates and fats into energy.
Cobalt	Essential component vitamin B12 but ingested cobalt is metabolized in vivo to form the B12 coenzymes.
Copper	Essential for haemoglobin and collagen production, healthy functioning the heart, energy production, and absorption of iron from digestive tract.
Iodine	For proper functioning of the thyroid

Herbals

Herbs or botanical products are use as concentrates and extracts ^[3, 5].

Table 2 Herbal used and their therapeutic relevance.

<i>Herbals(botanical source)</i>	<i>Therapeutic relevance</i>
Aloevera gel (Aloevera L.N.L Burm)	Dilates capillaries anti-inflammatory, emollient healing properties
Chamomile (Matricaria recutita L)	Anti-inflammatory, spasmolytic, antimicrobial, wound healing,
Echinacea (Echinacea purpurea L)	Immunostimulant, treatment of cold and flu symptoms
Ephedra (ephedre sinica stapf.)	Bronchodilator, vasoconstrictor, reduce bronchial Edema.
Evening (Oenothera bienns L.)	Dietary supplement of linoleic acid, treatment of atropic eczema.
Garlic (allium sativm L)	Antibacterial, antifungal, antithrombotic, hypotensive anti-inflammatory
Ginger (Zingiber officinale rosc)	Carminative, antiemetic, cholagogue, positive inotropic
Ginseng (Panex ginseng)	Adaptogen.
Ginkgo(Ginkgo biloba L)	Vasodilation, increased peripheral blood flow, treatment of post thrombotic syndrome.

Goldenseal(<i>Hydrastis canadensis</i> L)	Antimicrobial, astringent, antihemorrhagic treatment of mucosal inflammation dyspepsia, gastritis
Horehound (<i>Marrubium vulgare</i> L)	Expectorant, antitussive choleric
Licorice (<i>Glycyrrhiza glabra</i> L)	Expectorant, secretolytic treatment of peptic ulcer
Melissa (<i>Melissa</i>)	Topical antibacterial and antiviral
Plantago seed (<i>plantago arenaria waldst</i>)	Cathartic.
St.john's wort (<i>Hypericum perforatum</i> L)	Anxiolytic, anti-inflammatory, antidepressant, monoamine oxidase inhibitor.
Valerin (<i>valeriana officinalis</i> L)	Spasmolytic, mild sedative, sleep aid.
Willow bark (<i>salix alba</i> L)	Anti-inflammatory, analgesic, antipyretic, astringent, treatment of rheumatic and arthritic
Feverfew (<i>Tanacetum athenaeum</i> L.)	Treatment of headache, fever and menstrual problem, severity and duration of migraine headache

Table 3 various categories of Dietary Supplements ^[25]

Dietary supplements	Significance
Ketogenic diets	Comprised of foods with high fat and low protein and carbohydrates content have been reported to improve seizure control However, these diets are widely acknowledged to be unpalatable
Minimally refined grains	Cereals and grains fortified with calcium may reduce the incidence of diabetes and prevent gastrointestinal cancers
Phytoestrogens	Found on soya flour and linseeds and have been documented to enhance oestrogens levels when hormonal level is low. This action may prevent against both hot flushes and breast cancer
Several species of edible mushrooms	Tonnage, <i>Lentinus</i> , <i>Pleurotus</i> , <i>Auricularia</i> , <i>Flammulina</i> , <i>Tremella</i> , <i>Hericium</i> and <i>Grifola</i> have varying degrees of lowering and antitumor without any significant toxicity.
Glucosamine sulfate and chondroitin sulphate	They are effective and safer to alleviate symptoms of osteoarthritis.
Peptides/Hydrolysates	Found in casein and whey protein and have ACE. Inhibitor activity. Buckwheat proteins used as flour reduce cholesterol, hypertension; improve constipation and obesity by acting similar to dietary fibre and Interrupting the in-vivo metabolism.
Dairy foods	Containing friendly or probiotic bacteria claimed to promote gut health. Bio yoghurts containing <i>Lactobacillus acidophilus</i> and <i>Bifi do bacteria</i> lead the sector[

Table 4 Product of Nutraceuticals In Market [24]

Drug Name	View by Generic
Alpha-Lipoic-Acid-	alpha-lipoic acid
Aminomine	tryptophan
Animi-3	omega-3 polyunsaturated fatty acids
Animi-3 with Vitamin	omega-3 polyunsaturated fatty acids
Carnitor	levocarnitine
Carnitor SF	levocarnitine
Cidaflex	chondroitin/glucosamine
Coenzyme Q10	ubiquinone
CoQ10	ubiquinone
Cosamin DSgeneric	chondroitin/g lucosamine
Cystadane	betaine
Divista	omega-3 polyunsaturated fatty acids
Dry Eye Omega Benefits	omega-3 polyunsaturated fatty acids
elppa CoQ10	ubiquinone

CONCLUSION

The nutraceutical industry is growing at a rate far exceeding expansion in the food and pharmaceutical industries. In tomorrow's market, the most successful Nutraceuticals players are likely to be those companies in which functional product are just a part of a broad line of goods satisfying both conventional and health value point. Future demand of nutraceuticals depends on consumer perception of the relationship between diet and disease. Although Nutraceuticals have significant promise in the promotion of human health and disease prevention ,health professional, nutritionists and regulatory toxicologist should strategically work together to plan appropriate regulation to provide the ultimate health and therapeutic benefit to mankind. Long-term clinical studies are required to scientifically validate the Nutraceuticals in various medical

conditions. The interaction of nutraceuticals with food and drugs is another area, which should be taken into consideration. The effect of different processing methods on the biological availability and effectiveness of nutraceuticals remains to be determined. As like drugs, there should be strict regulatory controls for nutraceuticals.

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