Nutraceuticals– As a Functional Foods for Heath

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***Abstract*-Nutraceuticals are products, which other than nutrition are also used as medicine. A nutraceutical product may be defined as a substance, which has physiological benefit or provides protection against chronic disease. Nutraceuticals may be used to improve health, delay the aging process, prevent chronic diseases, increase life expectancy, or support the structure or function of the body, Traditional use of medicines is recognized as a way to learn about potential future medicines. The World Health Organization estimates that 80 percent of the world's population presently uses herbal medicine for some aspect of primary health care. The concept of nutraceutical has been accepted internationally. The terms "functional foods" and "nutraceuticals" are emerging out of benefits from foods that go beyond those attributable to essential nutrients. In recent years there is a growing interest in nutraceuticals which provide health benefits and are alternative to modern medicine. Nutrients, herbals and dietary supplements are major constituents of nutraceuticals which make them instrumental in maintaining health, act against various disease conditions and thus promote the quality of life. The recently published papers about different aspects of nutraceuticals as alternative for pharmaceuticals were searched using scientific sites such as Medline, PubMed, and Google Scholar. The used terms included nutraceutical and allergy, Alzheimer, cardiovascular, cancer, diabetes, eye, immune, inflammatory or Parkinson.**

***Key words*: Nutraceutical, functional foods, dietary supplements, herbal, quality of life**

INTRODUCTION

Nutraceutical is a term derived from "nutrition" and "pharmaceutics." The term is applied to products that are isolated from herbal products, dietary supplements (nutrients), specific diets, and processed foods such as cereals, soups, and beverages that other than nutrition are also used as medicine.

Nutraceuticals or bioactive foods may be defined as dietary supplements or food ingredients which are beneficial in various health issues, apart from their nutritional value and also find effective in various cancer and heart related diseases.

Nutraceuticals, in contrast to pharmaceuticals, are substances, which usually have not patent protection. Both pharmaceutical and nutraceutical compounds might be used to cure or prevent diseases, but only pharmaceutical compounds have governmental sanction.

Vitamins, minerals and nutraceuticals rich nutrients, dietary supplements or foodprovides health or disease preventive benefits with higher nutrition values. An appreciable attention has been given to the nutraceuticals as they retain outstanding safety and potent biological activity apart from their nutritive value. Some popular nutraceuticals include ginseng, *Echinacea*, green tea, glucosamine, omega-3, lutein, folic acid, and cod liver oil. Majority of the nutraceuticals possess multiple therapeutic properties. Nowadays, nutraceuticals have received considerable interest due to potential nutritional, safety and therapeutic effects. Market research recently proposed that the worldwide nutraceuticals market is expanding and would reach US $250 billion by 2018.

Nutraceuticals are in high demand as they provide highhealth value, longer cell life healthy living and also reduces the risk of side effects from modern medicines.Nutraceuticals own innumerable biological benefits like anti-diabetic, natural antioxidant, anti-obesity, immune enhancement and also in heart diseases also, they also helpto maintain better quality of health. Both food industries and pharmaceutical industries have roped up to use bioactive food, pharmaceutical and nutrition products, from drinkable yogurt to mainstream designer bone, heart, and digestive health foods to calcium chews, from sports nutrition bar makers to soy burger manufacturers bioactive foods are poised to undergo very rapid

growth in the coming years. Functional foods are defined as products that resemble traditional foods but possess demonstrated physiological benefits. There are many functional foods and nutraceuticalsthat are becoming increasingly available in the marketplace.

Nutraceuticals may be used to improve health, delay the aging process, prevent chronic diseases, increase life expectancy, or support the structure or function of the body.

In order to reduce or minimize disease risk factor and promote health dietary supplements and nutraceuticals food ingredients are very important.

A number of knownbioactive foods show beneficial effects by different mechanisms like as antioxidant phenolic compounds are widely used

Nutraceuticals belonging to antioxidant category especially phenolic/polyphenolic compounds like omega 3 or probiotics are now days in great demand as they are very useful in several chronic diseases like cancer and cardiovascular**.**

PRESENT MARKET SCENERIO IN INDIA AND ABROAD

Global market of nutraceutical is very huge. Nutraceuticals are hugely popular among consumers in the U.S. and other parts of the world. In Japan, England and other countries, nutraceuticals already have become part of the dietary landscape. Indian nutraceutical market is in infant stage but growing at very fast rate. Indian society has always been open to new concepts and quick to adapt. Due to increased physician acceptance of the medical benefits of nutritional products increased market demand of nutraceuticals. Consumers dissatisfied with drug costs and conventional healthcare are turning to unproven and untested natural products for treatment and prevention.

The expanding nutraceutical market indicates that end users are seeking minimallyprocessed food with extra nutritional benefits and organoleptic value. This development, in turn, is propelling expansion in the nutraceutical markets globally. Future demand of nutraceutical depends on consumer perception of the relationship between diet and disease.

Dietary supplement

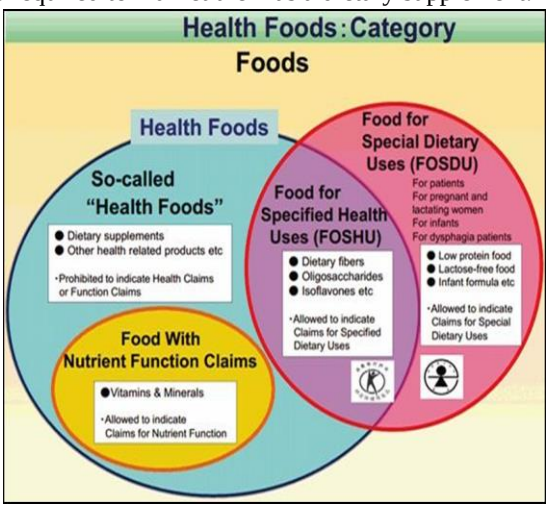
The Dietary Supplement Health and Education Act (DSHEA) of 1994 formally defined "dietary supplement" using several criteria. A dietary supplement:

May be formulated in following dosage form like tablet, pill, capsule and liquid forms.

These dietary supplements cannot be consumed as traditional meal or food.

They must be tagged as dietary supplement.

Certified antibiotics approved new drugs or licensed biologic are included in dietary supplements and are tri orlicense or approval from an authorized committee is required to market them as a dietary supplement.



Rationale for use of Nutraceuticals

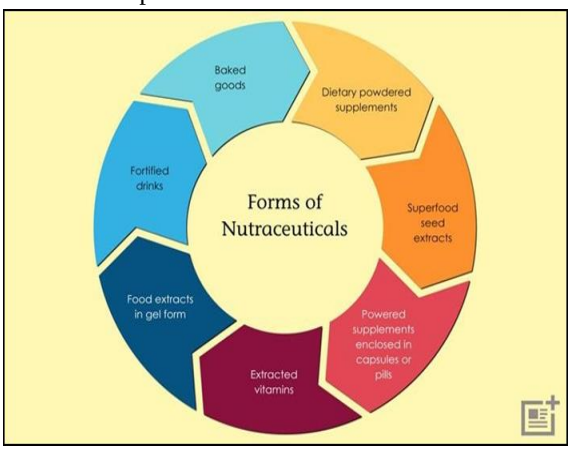
Some dietary components mean a lot in unanticipated chronic disease emergence, disease evolution, morbidity and mortality. According to study modern diet and food intake attribute to evolution of various diseases like about 35-50% part in cancers, 20% part in osteoporosis and 40-50% part inheart disease. For the prevention and therapy of different disorders utilizing food as medicine is not a current advancement. The table salt with iodine and wheat flour combined with folic acid and iron is used for the inhibition of iodine deficiency goiter and anemia. In order to reduce vitamin A deficiency, vitamin A is combined with food as a supplement available at reasonable and cost-effective price [10].

effective in the therapy of obesity, diabetes, cancer, cardiovascular disease, vitamin deficiency and other chronic decant diseases such as Parkinson's and Alzheimer diseases. The Scientific study shows that the mechanical behavior of nutraceuticals which includes a large variety of biological processes such

as activation of antioxidants protections, signal transduction pathway, cell survival related gene expression, cell reproduction and distinction and conservation of mitochondrial integrality. It acts that these features mean a lot for the safety upon the dysfunctions of several age allied or chronic diseases. Fruits and vegetables naturally available are which in nutrients which are an essential for health andit is scientifically proved. For e.g. zeaxanthin and lutein

Nutraceuticals and diseases

In recent time the nutraceuticals are very inhibit cataract and macular devolution; lycopene and beta – carotene protects the skin from ultraviolet radiation damage;lycopene and lutein are useful in cardiovascular health and lycopene is also used in treatment of prostate cancer.



Classification of Nutraceuticals

Nutraceuticals can be classified as follows:

On the basis of natural source

Products can be obtained from-

1. Plants- e.g. Indole-3-carbinol(cabbage), lycopene(tomatoes)
2. Animals- e.g., EPA and DHA (fish oil)
3. Minerals- e.g., selenium, iodine
4 Microbes- e.g., Phycocyanobilin (Spirulina), lactobacillus (yogurt)

On the basis of chemical constituents or therapeutic action of the nutraceutical

Nutraceuticals on basis of below properties:

1. Potential Nutraceuticals (plant-foods polyphenols fordiabetes)
2. Established Nutraceuticals (polyvitamins, omega-3fatty acids)

APPLICATION OF VARIOUS COMPOUND AS A NUTRACEUTICALS

Phenolics and polyphenolics as antioxidants

Phenolic and polyphenolic compounds are mainly obtained from plant foods. As plant foods are abundant source of these phenolic compounds among which the skin and seeds of fruit contain maximum quantity of phenols and polyphenols as compared to its leaves. An example for thisis blueberry leaves that are excellent sources of antioxidants.The expression of hepatitis C virus RNA is being suppressed by blueberry leaves. Although the term antioxidant is frequently used by the public to describe the health benefits of phenolic and polyphenolic compounds, the mechanism by which these effects are rendered are not limited to their antioxidant potential which may be described as their efficacy in scavenging free radicals, chelating pro-oxidant metal ions or acting as reducing agents [5-7].

Most widely used food sources as Nutraceuticals are ofnatural sources and can be categorized as follows:

1. Dietary fibre- e.g. beans, fruits
2. Probiotics- e.g. yogurt, dark chocolate
3. Prebiotics- e.g. Asparagus, almonds, apples
4. Polyunsaturated fatty acids- e.g. olive oil, walnuts
5. Antioxidants vitamins- e.g. vitamin C, vitamin E
6. Polyphenols- e.g. tea, coffee, spinach

Omega-3 oils and their health benefits

Edible marine algae, sometimes referred to as seaweeds, are of interest as good sources of nutrients including protein, long-chain polyunsaturated fatty acids (PUFA), dietary fibers, vitamins and minerals. More recently, many researchers have focused on marine algae and their constituents as nutraceuticals and functional foods for their potential health-promotion mostly attributed to their o m g a 3 fatty acids, antioxidants, and other bioactive. Although the majority of marine algae have low lipid contents, ranging from 0.3% in *U. lactuca* to 7.2% in *Caulerpa lentillifera*. The proportions of EPA and DHA in oils from *Skeletonema costatum* and *Crypthecodinium cohnii* were 41 and 37%, respectively [8-9]. The omega-3 oils, although originating from phytoplankton or algae, are transferred to marine fish and mammals through the food web. Lipids from the bodyof fatty

fish such as mackerel and herring, the liver of white lean fish such as cod and halibut, and the blubber of marine mammals such as seals and whales are rich in long-chain fatty acids.

Nutraceuticals in cancer treatment

Now days the chief cause of death among adult is cancer in adults. In generally the therapy of cancer includes the expensive and traumatic use of drug, surgery and irradiation. By change in lifestyle, reduction in the rates of cancer has been observed in recent times. Nutrition andfoods are concerned up to 30% of cancers. In animal study it is scientifically proved that the deficiency of 40 nutrients which is important in our life can result in a risk of cancer.In human cancer scientific study has showed a large subset of organ specific subtypes. In the therapy of human cancers while testing the therapeutic activity of nutraceuticals, the lack of authenticated therapeutic target is the biggest challenge. In cancer or tumors DNA damaging factor and DNA transcription is controlled and regulated with the help nutraceuticals. Nutraceuticals have plentiful biological benefits like cardiovascular, immunity enhancement, anti- obesity, natural antioxidant, anti-diabetic and anti-inflammatory effects.

Nutraceuticals as anti-inflammatory

Inflammation is characterized by swelling, pain, redness and heat, and is the response of body tissues to irritation or injury. Nutraceuticals that their influence on osteoarthritis has been tested are ginger, soybean, unsaponifiable, glucosamine, chondroitin, S-adenosylmethionine. Although they are safe and well tolerated, however, the results are hampered by heterogeneity of the studies and inconsistent results. Vitamins C and D are micronutrients for which evidence of benefit exists. Cat's claw is a potent anti-inflammatory agent. Scientists have attributed the efficacy of cat's claw to compounds called oxindole alkaloids; however, water-soluble cat's claw extracts that do not contain significant amounts of alkaloids do not possess strong antioxidant and anti-inflammatory effects.

Nutraceuticals own anti-inflammatory activity also whichis widely used for the treatment of rheumatoid arthritis. Rheumatoid arthritis is a chronic inflammatory disease where in oxidative stress and inflammatory biomarkers are elevated.

Synthetic drugs suggested for its therapy has acute reaction or various side effects due to which new and securer methods are being utilized for its treatment. There are many rich sources of food containing anti-inflammatory activity such as phenolic compound, phytosterols, tocopherols and polyunsaturated fatty acids. The example of foods including those components are tomato, carrot, green tea, fish oil, fenugreek, coriander, coconut etc. as anti-inflammatory agent nutraceuticals act following mechanism such as inhibiting the activation of NK-kappa B, Enzymes like COX-2, down regulation of over expression of CAMs and Phospholipase A2 etc. Nutraceuticals also have the ability to remove reactive oxygen species and block the expression of pro-inflammatory cytokines such as IL-1, IL-6. A common mechanism of action or molecular target is followed by non-steroidal anti-inflammatory drugs and compounds acting as anti-inflammatory nutraceuticals. Nutraceuticals have capacity to prevent the metastatic processes which cause to inflammation by the activation of NK-kappa B, induction and up regulation of pro- inflammatory cytokines, production of ROS. Herbal nutraceuticals with anti-inflammatory activity are also available. Gentianine, present in Gentian root, is an effective anti-inflammatory agent. Bromolain, a proteolytic enzyme found in extracts of stinging nettle, turmeric, pineapple, teas and extracts of turmeric or curcumin has anti-inflammatory activity.

Nutraceuticals as antioxidants

Nutraceuticals work as an antioxidant which act on free radicals or their actions. This is scientifically proved that themajor consumption of foods/ mixtures having an antioxidants activities lower the different human fatalities. Some of the compositions of food that have antioxidant activities are garlic, onion, turmeric, rosemary etc. Nutraceuticals having antioxidants activity is useful in treatment of neurodegenerative diseases like Alzheimer’s,

Obesity and nutraceuticals

Obesity is, nowadays, a global public health problem with about 315 million people involved. Obesity is a risk factor for many disorders such as hypertension, congestive heart failure, angina pectoris, hyperlipidemia, respiratory disorders, osteoarthritis, cancer, renal vein thrombosis and reduced fertility.

Although excessive consumption of energy-rich foods such as snacks, processed foods and drinks causes weight gain, however, caloric restriction and increased physical activity has been shown to be only moderately successful in managing obesity. Therefore, researchers and obese individuals are seeking the help of nutraceuticals and pharmaceuticals to prevent or treat obesity. An effective nutraceutical that can increase energy expenditure and/or decrease caloric intake is desirable for body weight reduction. Herbal stimulants, such as caffeine, ephedrine, chitosan, ma huang-guarana, and green tea are effective in facilitating body weight loss.

Nutraceuticals as anti-aging

In modern society people are more conscious about their skin and age-related degenerative diseases. So scientific research has evolved out that utilization of good dietary supplements especially containing antioxidant and also considering suitable cosmetics for skin may be helpful in skin and age-related treatment. As studies has show that excessive release of free radicals in body are mainly responsible for skin damage and even to the DNA also so we need to focus on use of antioxidants. They also affect theprocesses that stimulates the production of reactive species ROS, RON, etc. Right selection of nutrients plays a vital role in the treatment of various disease which can be achieved by proper diet containing intake of food supplements rich in vitamin E, folic acid, vitamin B12, iron, etc. and they are mainly present in plenty of food sources like green vegetables, nuts, egg yolk, etc. curcumin, green tea, and black gram are most widely used as nutraceutical in obesity. They secrete leptin and other cytokines like IL-1, IL-6 that are critically involved in obesity and chronic inflammation. They also help in reducing LDL and total cholesterol. Some act by limiting overall food daily intake.

Parkinson's disease and nutraceuticals

Parkinson's disease is a degenerative disorder of the central nervous system, which its motor symptoms result from the destruction of dopamine-generating cells in the substantia nigra, with unknown causes. The most obvious symptoms are movement-related including rigidity, slowness of movement, shaking and difficulty with walking and gait. The symptoms in advanced stages of the disease include thinking and behavioural problems. Depression is the most common psychiatric symptom and symptoms include sensory, emotional and sleep problems. Parkinson's disease is more common in older people, with most cases occurring after the age of fifty.

Nutraceuticals as anti-diabetic

Diabetes is a metabolic syndrome where a person suffers from high blood glucose. It is caused due to lack of insulin production or the body cells do not respond properly to insulin or both. Some nutraceuticals used to treat and prevent diabetes are *Emblica officinalis*, fenugreek, green tea, etc. It also includes antioxidant vitamins like vitamin Cand E and minerals like magnesium and chromium. They generally act by affecting insulin sensitivity and also prevent insulin resistance. Some act by increasing hepatic glycogen concentration and decreasing the concentration of glycogen phosphorylase and gluconeogenic enzymes.

CONCLUSION

Nutraceuticals have been emerged as an alternative to modern medicines and have proven health benefits. Nutraceuticals has disease prevention capability with good nutritional value and food ingredients with additional health benefits. They are widely accepted by all age groups due to their higher quality, purity, safety and efficacy, promoting health and help to cure diseases. Nutraceuticals, such asglucosamine and chondroitin sulfate, offer possible chondroprotective effects against joint injury. The latest trend is moved towards nutragenomics and nutraceuticals has led to new era of medicine and health.

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