

**IMPORTANCE OF NUTRACEUTICALS IN VARIOUS DISEASES AND HUMAN HEALTH – A LITRETURE REVIEW****Dr. Nistha Nema<sup>1</sup>, Dr. Anil Kumar<sup>2</sup>, Dr. M. B. Pillewan<sup>3</sup>, Dr. Praveen Kumar Mishra,<sup>4</sup> Dr. Sonali Biswas<sup>5</sup>**<sup>1</sup>M.D. Scholar Dept. of Samhita Siddhanta Rani Dullaiya Smriti Ayurvedic P.G. Mahavidyalaya Evam Chikitsalaya Bhopal (M.P.).<sup>2</sup>M.S. Scholar Dept. of Shalya Tantra Rani Dullaiya Smriti Ayurvedic P.G. Mahavidyalaya Evam Chikitsalaya Bhopal (M.P.).<sup>3</sup>Professor Dept of Samhita Siddhanta Rani Dullaiya Smriti Ayurvedic P.G. Mahavidyalaya Evam Chikitsalaya Bhopal (M.P.).<sup>4</sup>Reader Dept of Samhita Siddhanta Rani Dullaiya Smriti Ayurvedic P.G. Mahavidyalaya Evam Chikitsalaya Bhopal (M.P.).<sup>5</sup>Lecturer Dept. of Samhita Siddhanta Rani Dullaiya Smriti Ayurvedic P.G. Mahavidyalaya Evam Chikitsalaya Bhopal (M.P.).**\*Corresponding Author: Dr. Nistha Nema**

M.D. Scholar Dept. of Samhita Siddhanta Rani Dullaiya Smriti Ayurvedic P.G. Mahavidyalaya Evam Chikitsalaya Bhopal (M.P.).

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**ABSTRACT**

The term “Nutraceutical” can be explained as the food items as a whole or a part which possesses some nutraceutical value along with the medicinal properties Presently population is gradually suffering from many metabolic and degenerative diseases, which are primarily caused by nutritional deficiency. In recent years a pharmaceutical product “Nutraceuticals” has made a special attention among health professionals and people for their nutritional supplementation. Any substance as a food or its part with normal nutritional value provides health benefits including the prevention of the disease or promotion of health is called Nutraceuticals. It can provide substantial health benefits especially in the prevention and treatment of acute and chronic diseases. The Extensive Researches have revealed the involvement of these agents in the treatment of many disorders Such as cancer, Arthritis, metabolic abnormalities, diabetes and many others. The Presented Review is an attempt to classify all types of nutraceuticals with examples followed by their applications in the treatment of various disorders. Furthermore, the implementation of the designing and development of dosage forms for offering better delivery carrier of the nutraceuticals, the importance and challenges have also been enumerated. Nutraceutical term is quite new for modern world but its roots and concept are already available in Ayurveda. There are much more considerations about diet are described in Ayurveda. The benefits of food for therapeutic purpose and concept of Nutraceuticals for improving quality of life are novel approaches of Ayurveda. This Article brings out the importance of nutraceuticals in Ayurveda and their usage in various diseases and ailments.

**KEYWORDS:** Nutraceuticals, Dietary supplements, Ayurveda, Various diseases.**INTRODUCTION**

Human lifestyles have been drastically changing over last five decades due to urbanization, industrialization, hectic schedule and changing cultures. These factors have changed human habits and force them to fast eating, instant and tasty food, fast food, junk foods. These habits have directly affected our nutritional aspect of food and gradually decreased the quantity and quality of nutrients. Due to these altered dietary habits population have increased the incidence of immune dysfunctions, metabolic disorders and degenerative diseases. In recent years people are getting consciousness about their health and deeply concerned about the management of health. In last two decades, revolution in medicine,

phytomedicine, nutritional science, food industry and health care have promoted extensive attention in health professionals and the public. Major recent advancement has done in nutraceuticals, food products and phytonutrients. It is a great concept designed by pharmaceutical companies for wellness and prevention and treatment of disease. Ayurvedic therapeutic principles directly depend on wholesome Aahar and Vihaar. Aahar has been considered as food as well as primitive medicine. The concept of Rasayana (Rejuvenation therapy) is a broad concept in Ayurveda and more than today’s nutraceuticals.

**Aims and Objectives:** The present study aims to validate the nutraceutical aspect in Ayurveda. It explains

the Ayurvedic perspective of nutraceuticals and provides details about the various diseases and dietary supplements. The study also correlates and discusses nutraceuticals and various diseases.

## MATERIALS AND METHODS

Review of all literature regarding Dietary supplements, Various diseases and nutraceuticals started from classical text to all available scientific publications. All the data have been compiled analyzed and discussed the Ayurvedic approach and nutraceuticals.

## NUTRACEUTICALS

Nutraceutical is any nontoxic food component which has been used for the improvement of health including prevention and treatment of disease. The term "nutraceutical" was coined from "nutrition" and "pharmaceutical" in 1989 by Stephen De Felice. According to him, a nutraceutical is a food or part of food that provides medical or health benefits including the prevention and treatment of diseases. Nutraceuticals may range from isolated nutrients, herbal products, dietary supplements, genetically improved foods, processed food products. Generally nutraceutical contains vitamins, lipids, protein, carbohydrates, minerals and other necessary nutrients. These are marketed in concentrated forms as pills, capsules, powders and extracts in a single compound or in combined form. Hippocrates known as the father of medicine accepted that food is a medicine. Ayurveda has already stated that food is the greatest medicine. Vitamins and minerals supplements contain isolated nutrients or a combination of nutrients. Nutraceutical supplements contain the compounds that are actually extracted from the whole foods. After extraction, they are concentrated and turned into pills or capsules.

Nutraceuticals can be organized in several ways depending upon its easier understanding and application, i.e. for academic instruction, clinical trial design, functional food development or dietary recommendations. Some of the most common ways of classifying nutraceuticals can be based on food sources, mechanism of action, chemical nature etc. The food sources used as nutraceuticals are all natural.

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. Depending on the jurisdiction, products may claim to prevent chronic diseases, improve health, delay the aging process, increase life expectancy, or support the structure or function of the body.

### Classification of Nutraceuticals

**1. Dietary supplement:** A dietary supplement is a product that contains dietary nutrients derived from food products are intended to add further nutritional value to the diet. These are concentrated in liquid, capsule, pills

and tablet form. It covers the following nutraceutical products. Dietary supplements, such as the vitamin B supplement shown above, are typically sold in pill form.

In the United States, the Dietary Supplement Health and Education Act (DSHEA) of 1994 defined the term: "A dietary supplement is a product taken by mouth that contains a "dietary ingredient" intended to supplement the diet. The "dietary ingredients" in these products may include: vitamins, minerals, herbs or other botanicals, amino acids, and substances such as enzymes, organ tissues, glandulars, and metabolites. Dietary supplements can also be extracts or concentrates, and may be found in many forms such as tablets, capsules, softgels, gelscaps, liquids, or powders."<sup>[1]</sup>

Dietary supplements do not have to be approved by the U.S. Food and Drug Administration (FDA) before marketing, but companies must register their manufacturing facilities with the FDA and follow current good manufacturing practices (cGMPs). With a few well-defined exceptions, dietary supplements may only be marketed to support the structure or function of the body, and may not claim to treat a disease or condition, and must include a label that says: "These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease." The exceptions are when the FDA has reviewed and approved a health claim. In those situations the FDA also stipulates the exact wording allowed.

**a) Nutrients:** Substances such as vitamins, minerals, amino acids, fatty acids and antioxidants are dietary ingredients. Vitamins play an important role in metabolism and enzyme systems. Minerals are important for immunity, reproduction and growth. Fatty acids are responsible for healthy cell membranes, skin and hairs and proper functioning of nervous system, immune system and hormones. Antioxidants prevent cellular damage and aging.

**b) Herbals:** Nutraceuticals holds a great promise to improve health and prevent chronic diseases with the help of herbals. Some examples are flax seed oil and powder contains omega-3 fatty acid which is anti-inflammatory, analgesic, antipyretic, astringent and anti-arthritis.

**c) Phytochemicals:** Phytochemicals are secondary metabolites and also act as nutraceuticals. These are non-nutritive plant chemicals that have either defensive or disease protective properties. Chief phytochemicals are polyphenols, isoflavonoids, anthocyanidins, phytoestrogens, terpenoids, carotenoids, limonoids, phytosterols, glucosinolates, and polysaccharides. Dietary intake of phytochemicals may promote health benefits, protecting against chronic degenerative disorders such as cancers, coronary heart disease, diabetes, high blood pressure, inflammation, microbial,

viral and parasitic infections, psychotic diseases, spasmodic conditions, ulcers, osteoporosis and associated disorders. Majority of foods, such as whole grains, beans, fruits, vegetables and herbs contain phytonutrients/ phytochemicals<sup>viii</sup>. For example, Carotenoids (Isoprenoids) found in various fruits, vegetables and egg yolk, are anticarcinogenic, boost immune cells and protect cornea against UV light<sup>ix</sup>.

**d) Probiotics:** These are live microbial feed supplement for improving its intestinal microbial balance<sup>x</sup>. Specific probiotics are used to treat lactose intolerance, acute diarrhea and antibiotic-associated gastrointestinal side effects. They help the production of the specific enzyme ( $\beta$ -galactosidase) that hydrolyze the offending lactose into its component sugars<sup>xi</sup>. Lactobacillus bacteria and bifidobacteria are most important and probiotics.

**e) Prebiotics:** Prebiotics are nutraceuticals which promote the flourishing of Probiotics. These are the dietary ingredients that affect the host by selectively altering the composition or metabolism of gut flora. These are short-chain fructo-oligosaccharides that have unique chemical structures that are not digested by humans. The prebiotics consumption generally promotes the lactobacillus and bacterial growth in the gut which helps in metabolism. It is beneficial in improving lactose tolerance, detoxification, and dyslipidemia, relief from constipation and in certain tumors<sup>xii</sup>. Inulin is prebiotic that has been widely used in processed foods<sup>xiii</sup>. Prebiotics are commercially extracted and concentrated from fruits and vegetables through the hydrolysis of polysaccharides from dietary fibers or starch, or through enzymatic generation. Some sources of prebiotics are chicory roots, onion, garlic, banana, tomato, alliums, and beans<sup>xiv</sup>.

**e) Nutraceutical Enzymes:** Enzymes are an essential part of the body which is responsible for many biological functions. Enzyme supplements to diet eliminate many symptoms of hypoglycemia, hyperglycemia, digestive problems and obesity<sup>xv</sup>.

**f) Dietary Fibers:** Dietary fibers are the edible plant material that is not hydrolyzed by enzymes of digestive tract but digested by the microflora of gut. Dietary fiber includes non-starchy polysaccharides such as cellulose, hemicelluloses, gum and pectin, lignin and resistant dextrins. The soluble components of dietary fibers have bulking and viscosity producing capabilities which retard the gastric emptying of the stomach. This affects the rate of digestion and uptake of nutrients and feeling of satiety. It lowers the LDL and improves glucose tolerance<sup>xvi</sup>.

Dietary fibre is the food material, more precisely the plant material that is not hydrolyzed by enzymes secreted by the digestive tract, but digested by microflora in the gut. Dietary fibres mostly include non-starch polysaccharides (NSP) such as celluloses,

hemicelluloses, gums and pectins, lignin, resistant dextrins and resistant starches. Foods rich in soluble fibre include fruits, oats, barley and beans. The level of dietary fibre in certain foods has been illustrated in Table 1.

Chemically dietary fibre means carbohydrate polymers with a degree of polymerization not lower than 3, which are neither digested nor absorbed in the small intestine. Based on their water solubility, dietary fibres may be divided into two forms:

1. Insoluble dietary fibre (IDF), which includes celluloses, some hemicelluloses and lignins which is fermented to a limited extent in the colon.
2. Soluble dietary fibre (SDF), which includes  $\beta$ -glucans, pectins, gums, mucilages and hemicelluloses that are fermented in the colon. Nutraceutical is a broad term. There are multiple different types of products that fall under the category of nutraceuticals<sup>iv</sup>.

**2. Functional food/Fortified nutraceutical:** Functional food is ordinary food in which components or ingredients added to give it for a specific medical or physiological benefit, other than purely nutritional effect<sup>xvii-xviii</sup>. The concept of functional food first-ever introduced by Japan in 1991. When functional food aid in prevention or treatment of disease but disorders other than anemia is called as nutraceuticals<sup>xix</sup>. It constitutes fortified food from added nutrients or ingredients. For examples- Milk enriched with Vit. D, Orange juice fortified with calcium, Cereals flour added with fiber and folic acid<sup>xx</sup>. Functional foods are fortified or enriched during processing and then marketed as providing some benefit to consumers. Sometimes, additional complementary nutrients are added, such as vitamin D to milk.

Health Canada defines functional foods as "ordinary food that has components or ingredients added to give it a specific medical or physiological benefit, other than a purely nutritional effect. all functional foods must meet three established requirements: foods should be (1) present in their naturally occurring form, rather than a capsule, tablet, or powder; (2) consumed in the diet as often as daily; and (3) should regulate a biological process in hopes of preventing or controlling disease.

**3. Farmaceuticals/Recombinant nutraceuticals:** Farmaceuticals is made of two words Farm and Pharmaceuticals. The term Farmaceuticals is more frequently associated in agricultural circles, with medical applications of genetically engineered crops or animals. Energy-providing foods, such as bread, alcohol, fermented starch, yogurt, cheese, vinegar and others are produced with the help of biotechnology. The production of probiotics and the extraction of bioactive components by enzyme/fermentation technologies as well as genetic engineering technology are achieved through biotechnology<sup>xxi</sup>.

**4. Medical food:** The medical foods are formulated to be consumed or administered internally under the supervision of a physician, and which is intended for the specific dietary management of a specific disease or conditions for which distinctive nutritional requirements, on the basis of recognized scientific principle, are established by the medical evaluation. Medical foods are regulated by the FDA and will be prescribed or monitored by medical supervision. For example-supplement for a patient with inborn errors in amino acid metabolism, hyperhomocysteinemia, pancreatic exocrine insufficiency, cachexia in cancerxxii-xxiii. In the next part of the review, a brief description of the health and medical benefits of some such nutraceuticals are done.

More broadly, nutraceuticals can be classified in two groups:

1. Potential nutraceuticals
2. Established nutraceuticals

A potential nutraceutical could become an established one only after efficient clinical data of its health and medical benefits are obtained. It is to be noted that much of the nutraceutical products are still lays in the 'potential' category.

#### **Nutraceuticals Approach in Ayurveda**

The prime aims and objectives of the Ayurveda is the establishment of the healthy condition and removes disease condition. In Ayurvedic dietetics importance given to food in prevention and treatment of disease as well as herbs and herbal formulations are the part of daily food supplements. According to Acharya Charak, a diet which besides providing the basic nutrition to the body, help to maintain the healthy state of the body and prevents the occurrence of diseases should be consumedxxiv. An interesting verse by Acharya Lolimbaraja regarding the importance of food is, if wholesome diet is given in a planned way, then there is no need to administer medicines and if wholesome diet is not being used then too there is no need to give medicine as this is not going to cure the disease in the absence of wholesome dietxxv. The concept of Aahar is a holistic approach and far beyond the modern view. An indication of Pathya-apathy, Hita-ahita and Satmya-asatmya are based on individualistic approach. Ayurveda has a great emphasis on the quality of nutritious food as Rasayana (preventing degenerative changes), Balya (Post illness nutrition), Brihan (Provides deficient nutrient), Jeevaniya (maintaining longevity), Vyadhikshmatva (enhancing the immunity) and Vajikaran (maintaining vitality and vigor) xxvi. The science of food and nutrition in Ayurveda was much developed. Acharya Charak has categorized all food items into twelve classes, Acharya Sushrut in ten and thirteen. There is another classification based on consistency of food products as Ashita (Semi-solids, advised for aged people), Khadita (solid food, advisable for young people with good digestion), Peeta (liquid in consistency, advisable for the newborns, children and diseased people and advocated in summer) and Leeda

(Paste form that can be licked, advisable for children, convalescing and old people.

The nutraceutical products are recognized not only for their health benefits to reduce the risk of cancer, heart diseases and other related ailments, but also to prevent or treat hypertension, high cholesterol, excessive weight, osteoporosis, diabetes, arthritis, macular Poor diet No exercise Hectic lifestyle Inoculations.

#### **Progressive Immune Dysfunction**

High blood pressure, Heart attack, Diabetes, Cancer, Arthritis, Asthma, Stress, Acute recurrent infection, Allergies, Chronic infections, Negative emotions, Stress, headaches, Colds, High fever, Candida Environmental toxicity, Onset of fatigue, Urinary tract infection, Food and chemical allergy, Viral and bacterial infections, Strokes, Vaginitis, Prostatitis, degeneration, cataracts, menopausal symptoms, insomnia, diminished memory and concentration, digestive upsets and constipation. Nutraceuticals have also found considerable.

Trust in treating headaches and migraines resulting from stress. Other related neutraceutical products are touted as cures for thinning hair, lack of confidence, poor complexion, varicose veins, alcoholism, depression, and lethargy. Vegetables, fruits, whole grains, herbs, nuts and seeds contain an abundance of phenolic compounds, terpenoids, sulfur compounds, pigments, and other natural antioxidants which act as compounds for the treatment of the above mentioned conditions. Food derived from herbs like garlic, soybean, cabbage, ginger, licorice root and the Umbelliferous vegetables are used commonly for the treatment of cancer. Citrus fruits provide plenty of vitamin C, folic acid, potassium and soluble fiber and are also believed to prevent cancers. Garlic powder preparation has some clinical use in reducing mild hypertension.

Compounds like diallyl sulfides, diallyl disulfides and quercetin which are active components of garlic, have known to have anti-inflammatory, anti-mutagenic activities. Similarly, the active components such as kaempferol and chlorogenic acid in tomato are also understood to have anti-mutagenic activities. Lycopene, which is another substance present in tomatoes, is believed to be the most active oxygen quencher with potential chemo-preventive activities. These observations also suggest that tomato and garlic suspensions have a protective effect on colon carcinogenesis. Honey has proven antimicrobial activity. Green tea enhances humoral and cell-mediated immunity while decreasing the risk of certain cancers and the risk of cardiovascular disease. Ginseng enhances production of macrophages, B and T cells, natural killer cells and colony-forming activity of the bone marrow.<sup>[19]</sup> Panax ginseng is reported to prevent irradiation-induced programmed cell death in hair follicles. The dietary plants like soybean, garlic, ginger and green tea reduce the incidence of cancer believed to be through inducing programmed cell death.



Soybean extract, in addition, has been shown to prevent development of disease like polycystic kidneys. The vast number of nutraceuticals, including vitamins, minerals, phytochemicals, and other ingredients, are like an alphabet soup ranging from A to Z. At the head of the list are anthocyanins, which are flavonoids that make up the intense blue pigments and are usually found in wild blueberry fruits. Antioxidants are important because they neutralize free radicals, which can damage DNA molecules and thereby lead to cancer and other dangerous diseases. Antioxidants also retard the effects of aging. At the end of the alphabet, Z stands for zinc. This mineral is essential for normal growth, appetite, and immune function. Zinc is an essential component for the normal function of more than 100 enzymes involved in digestion, metabolism, and wound healing. Dietary sources of zinc include liver, beef, and the dark meat of poultry. In the middle of the alphabet, one finds the popular three 'Gs' namely, ginkgo, ginseng, and guarana. The former is purported to increase mental activity. Both ginseng and guarana are said to provide energy.

#### **Nutraceuticals as Therapeutic Agents**

The majority of the nutraceuticals do possess multiple therapeutic benefits and have been claimed to have physiological benefits or provide protection against various diseases as the following products:

- Cardiovascular agents
- Anti-obese agents
- Anti-diabetic agents
- Anti-cancer agents
- Immune boosters
- Substances that manage chronic inflammatory disorders and
- Formulations to cure degenerative diseases.

#### **Flavonoids As Nutraceutical Ingredients**

The major active nutraceutical ingredients in plants are flavonoids. As is typical for phenolic compounds, they have antioxidant, antimicrobial, antibacterial, antiviral and antifungal, anti ulcer, hepatoprotective, anti-inflammatory, anti-diabetic, vasorelaxant, anti-atherosclerotic, anti-thrombogenic, cardioprotective and anti-neoplastic activities in addition to their profound effects on the central nervous system.

#### ***Nutraceuticals and Medicinal Importance Available From***

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. Tomatoes and salmon are two types of food that researchers have found to contain benefits beyond basic nutrition - in this case, lycopene and omega-3 fatty acids, respectively.

- b) **Non traditional 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 non traditional 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.

#### **Nutraceuticals and Various Diseases**

- 1) Nutraceuticals against Alzheimer's disease (AD) Alzheimer's disease (AD), also called senile dementia of the Alzheimer type (SDAT), primary degenerative dementia of the Alzheimer's type (PDDAT), or simply Alzheimer's, is the most common form of dementia. The various nutraceuticals which are used to cure Alzheimer's disease is as follow:- Antioxidants Antioxidants are very essential in the treatment of almost all diseases because most chronic diseases carry with them a great pact of oxidative stress. Oxidative stress plays a chief job in neurodegenerative diseases such as Alzheimer's disease (AD).
- 2) Parkinson's disease (PD), and Huntington's disease (HD). Oxidative stress is accelerated by the ageing process along with lack of dietary antioxidants. A huge number of studies have found an association between high dietary antioxidant intake and a decreased risk of AD which is very imperative because preventing a disease is significantly easier than treating it. So prevention is key and researches suggest that preventing AD is actually not that complex. Treatment with antioxidants is a hopeful loom for slowing disease progression. There is an ongoing study with vitamin E to see if it really slows AD progression. An assessment was done by isolating the patients into two groups one is treated with 1000 IU of vitamin E and at least 5 mg of donepezil (Aricept) and the other who did not take any vitamin E. Consequences showed that those taking the permutation therapy declined at a drastically lower rate. Food utilization studies have had similar outcomes. There are plentiful antioxidants in food, you get a surplus of them – everything from flavonoids to well known antioxidants like vitamin E and vitamin C. Parkinson's disease Parkinson's disease is a brain disorder that results from nerve damage in certain regions of the brain causing muscle rigidity,

shaking, and difficult walking usually occurring in mid to late adult life. Canadian researchers indicated that vitamin E in food may be protective against Parkinson's disease. Creatine appeared to modify Parkinson's disease features as measured by a decline in the clinical signs. Researchers have also studied glutathione to determine its effect on nerve and its power as an antioxidant. The appropriate long-term dosing, side-effects and the most effective method of administration are not yet clear. Nutritional supplements have shown some promising results in preliminary studies, it is important to remember that there is not sufficient scientific data to recommend them for Parkinson's disease at present. The patients should be cautioned that over-the-counter medications do have side effects and interactions with other drugs and are also expensive.

- 3) **Obesity:** Obesity is a complex condition, with serious social and psychological dimensions, affecting virtually all ages and socioeconomic groups. The worldwide existence of obesity nearly doubled between 1980 and 2008. According to country estimates for 2008, over 50% of both men and women in the WHO European Region were overweight, and roughly 23% of women and 20% of men were obese. Given the worldwide increase in obesity and its health consequences, efficient strategies for its prevention and treatment are important. It has been recommended that weight reduction programs focus on achieving a modest weight loss of 7–10% of the initial weight. Obesity arises from an energy imbalance whereby energy intake exceeds energy expenditure. Dealing with obesity — by either prevention or treatment — requires modification of one or both components of energy balance. Approaches to weight management (including a functional food approach) therefore can target multiple aspects of the energy balance systems: food intake, energy expenditure, and energy storage. All of these approaches are currently being taken by pharmaceutical companies; however, developing functional foods designed for weight management may be a more attractive approach for dealing with the 61% of the population that is currently overweight or obese.
- 4) **Osteoarthritis:** Osteoarthritis (OA), a debilitating joint disorder, is the most common form of arthritis in the United States, where it affects an estimated 21 million people. In 2004, the direct and indirect health care costs associated with all forms of arthritis were approximately 86 billion dollars. Joint discomfort from OA and other joint disorders may reduce physical activity in individuals experiencing this condition, resulting in energy imbalance and weight gain. Increased weight can exacerbate existing problems, through additional stress on joints. Glucosamine (GLN) and chondroitin sulfate (CS) are widely used to alleviate symptoms of OA. These nutraceuticals have both nutrient and

pharmaceutical properties and seem to regulate gene expression and synthesis of NO and PGE<sub>2</sub>, providing a plausible explanation for their antiinflammatory activities.

Many diseases start from Nutritional deficiency.

### Recent Trends in Nutraceuticals

In recent years, rising awareness among consumers towards the health benefits of foods and their nutritional benefits for disease prevention and health enhancement. Gradually increased understanding about the potential mechanism of biologically active components in food, which could improve health and probably reduce the risk of disease and enhance overall well being. Emerging field in nutraceuticals are Nanoneutraceuticals, Nutrigenomics, Nutrigenetics, Molecular nutrition and safety and efficacy of nutraceuticals. Huge demands of herbal products project the pharmaceutical industries to produce herbals nutritional supplements.

### CONCLUSION

The probable mode of action of Rasayana is the direct enrichment of the nutritional quality of Rasa Dhatu, promotes digestion, metabolism and nutrition through improving Agni and promotes the competence of Srotas (microcirculation). In classics, Rasayana has been indicated not only for maintenance of health but also for the treatment of the disease. In today's medical practice it has a vital role to serve mankind through improvement in the body-mind-spirit system. Rasayana therapy is used to achieve the physical, mental and social well being. Many Ayurvedic formulations have tremendous nutritional benefits. There are many preparations in classics which have not been used in therapeutics are also challenges for pharmaceuticals. There are also need for further research and development of these preparations for nutritional supplements. Response of nutraceuticals varies from person to person. Individual's susceptibility to any particular disease depends on the genetic predisposition, environmental factors and lifestyle. But the role of nutraceuticals in prevention, restriction and cure of various diseases is beyond doubt.

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