e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
( Peer-Reviewed, Open Access, Fully Refereed International Journal )
Volume:06/Issue:11/November-2024 Impact Factor- 8.187 www.irjmets.com

# NUTRACEUTICALS EXPLORING THEIR ROLE IN HEALTH PROMOTION AND DISEASE PREVENTION

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DOI : https://www.doi.org/10.56726/IRJMETS64169

## ABSTRACT

Nutraceuticals serve as an association and as a bridge between food and pharmaceuticals because they possess a health benefit other than those inherent to normal nutrition. These bioactive compounds derived either from plant, animal, or microbial sources are predominantly used for their anti-pathological/prophylactic purposes against chronic diseases. In this review, we will examine several features of nutraceuticals, such as classification, mechanisms of action, therapeutic applications, regulatory problems, and safety concerns about nutraceutical usage while considering diverse regulatory frameworks across global markets. The paper discusses the advances in research and development on the role of nutraceuticals related to health and wellness and points to the absence of clinical proof. Future directions for nutraceutical research and trends in the industry were taken up to exploit the potential of nutraceuticals completely.

**Keywords:** Emphasis, Cancer, Cardiovascular, Feature Therapeutic Development.

## I. INTRODUCTION

Nutraceutical is a term which is derived from “nutrition” and “pharmaceutics.” This term is applied to those products which are taken from herbal products, dietary nutrients, and processed foods such as soups of different phyto products, and beverages that other than nutrition are also used a medicine for the of the disease in the patients as well as in the healthy peoples.[1]If we talk about the other countries like US, the term “nutraceuticals” products are regulated as drugs, food ingredients and dietary supplements. The term Nutraceuticals is not defined the same in different countries, but it is usually defined as a product which is isolated from the foods that is generally sold in medicinal forms not usually associated with food. A nutraceutical product can be defined as a substance, containing physiological benefit and provides prevention against diseases. Nutraceuticals may be used to improve the health, delay the aging process, prevent chronic diseases, increase life expectancy, or support the structure or function of the body.[2]Nutraceuticals, is related to pharmaceuticals, . Both pharmaceutical and nutraceutical compounds might be used to cure and prevent disorders, but only pharmaceutical compounds have governmental penalties.[3]A dietary supplement are the products which contains one or more than one of the following dietary ingredients: A mineral, a vitamin, an amino acid, a medical herb or other botanical, a dietary substance for use by man to supplement the diet by increasing the total daily intake of these products, concentrate, metabolite, constituent, extract, or combinations of these products. Nutraceuticals are of those nutritional supplements products as used for maintaining health other than nutrition [4]

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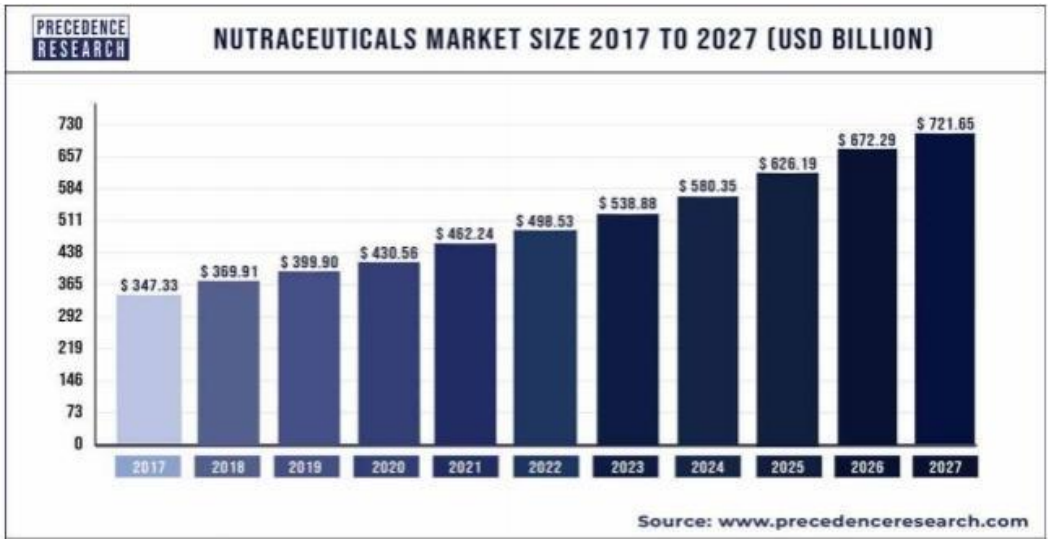


Recently, nutraceuticals have received significance interest due to potential nutritional, safety purity and therapeutic effects. A market research claim that the worldwide market of Nutraceuticals is going to reach reach US $250 billion by the year 2018 and this number is increasing year by year.[5]

## II. METHODS

Nowadays the papers published on the Nutraceuticals is about of different aspects of nutraceuticals as substitute for pharmaceuticals were searched using scientific sites such as Medline, PubMed and Google Scholar. The used terms included nutraceutical and allergy disease, Alzheimer disorder, cardiovascular disease, cancer, hyperglycemia, eye disorders, immune related disorder, inflammatory or Parkinson. disease Nutraceuticals used in Allergy

Allergy is a disorder in which the immune system get hypersensitive. An allergic reaction is seen in the person's immune system reacts to normally harmless substances. Allergic reactions are unusual reactions because of hyper activation of certain WBCs called mast cells and basophils by a type of antibody called immunoglobulin E. This reaction results in an inflammatory response which can range from uncomfortable to dangerous situation .[6]Quercetin protects the low-density lipoprotein ( also called as bad cholesterols)(LDL-C) from becoming damaged, especially to blood vessels. LDL-C is an underlying cause of heart disease and quercetin acts as an antioxidant and scavenges free radicals. Diabetic patients are at higher risk of blood vessel damage from oxidative stress. Therefore, quercetin is beneficial in these patients, too. [7]

Nutraceuticals used in Alzheimer

disease These are the most common disease . There is no cure for the disease and eventually leads to death. Most often, Alziemer Disease is generally diagnosed in people having age of over 65 years, whereas the less-prevalent early-onset Alzheimer's can occur at much earlier age. According to a serway almost 26.6 million peoples are suffering from this disease in the year2006 and it is predicted to be 85 million till 2050.[8]It is seen that women's are more affected in comparison to men’s, at a ratio of almost 2:1. Several lines of evidence suggested that oxidative stress might be related to a number of neurodegenerative disorders including AD. Nutraceutical antioxidants such as curcumin, lutein, lycopene, turmerin and β-carotene may exert positive effects on specific diseases by combating oxidative stress. The growing trends in nutraceutical usage are due to the belief that these compounds are able to postpone the development of dementias such as AD.[30] There are several recently published papers showing the positive effects of different nutriceutical plants such as Zizyphus jujube, Lavandula officinalis on AD, learning or memory.[23]

Nutraceuticals used in cardiovascular disease

Worldwide, the prevalence of CVD and the researches in this area is increasing at a large number. CVD is a disorder of heart and blood vessels (heart attack), peripheral vascular diseases, cerebrovascular disease (stroke), hypertension, heart failure, and so on. It is claimed that low intake of vegetables and fruits creates high chances of CVD. Majority of the CVD may be prevented. Many survays have reported a protective role for a diet rich in vegetables and fruits against CVD[9].Nutraceuticals in the form of vitamins, minerals, antioxidants,

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dietary fibers and omega-3 polyunsaturated fatty acids together including physical exercise are suggested for the prevention and treatment of Cardiovascular disease. The molecules like as polyphenols alter cellular metabolism and signaling, which is believed to reduce arterial disorders. Flavonoids are widely distributed in vegetables, grapefruits, apples, cherries, pomegranate, berries, black grapes, and red wine, and are available as flavones, flavanones and flavonols,[46,47,48] which plays a a vital role in the prevention of the Cardiovascular disease. Flavonoids are responsible for the blockage of angiotensin-converting enzyme, blocand the cyclooxygenase enzymes that helps in the break down prostaglandins, and responsible for plateletts aggregation. They also helps in the protection of the vascular system which carries oxygen and nutrients to cells.[49,50] Anthocyanin's, tannins (proanthocyanidins), tetra , stilbenes, dietary indole amines, serotonin and melatonin, in plant foods are hypothesized to impose health benefits.[51] Orange juice which containing pulp in it is considered as a rich in flavonoids. Hesperidin is a flavanone glycoside which is also classified as a citrus bioflavonoid. Citrus saneness and tangelos are the riche in flavanone glycoside which is also classified as a citrus bioflavonoid . citrus saneness and tangelos are the richest dietary source of hesperperiden [10]

Nutraceuticals used in cancer

Cancer has grown as one of the major public health problems in the developing countries as well as the counties which are in the devoloping stage.World Cancer Report claims that the cancer rates are increasing day by day and it is predicted to reach15 million new cases in the year 2020 that is almost 50% rise. Cancer can be prevented by a healthy lifestyle and a healthy diet as well [39] different colors of the foods are generated by carotenoids. They have ability of preventing cancer due to thier antioxidant capabilities . Recent interest in carotenoids has focused on the role of lycopene in human health, especially in cancer disease.[11]The Plants which is rich in daidzein, biochanin, isoflavones, genistein, can also inhibit prostate cancer cell growth.[29] lycopene is considered as a potent antioxidant and a singlet oxygen quencher because of its unsaturated nature. Lycopene concentrates in the prostate, testes, skin and adrenal where it helps in providing protection against cancer.[66,67] The linkage between carotenoids and prevention of cancer and CAD,

heightened the importance of vegetable and fruits in human diet.Lycopene basically containes vegetables and fruits which exert cancer-protective effect by a high decrease in the oxidative stress and damage to DNA. One of the major carotenoids is lycopene which is generally found in guava watermelon and some other fruits β-carotene contains antioxidant activity in it and mainly used in the prevention of disease such as cancer and other diseases, β-carotene has the most antioxidant activity among the all carotines. 50–54% of the antioxidant activity possess by alpha carotene of β-carotene, whereas has 42–50% of the antioxidant activity possessed by epsilon carotene[12.]

Nutraceuticals used in Diabetes

Type 2 diabetes is the most common form of diabetes with 95% prevalence and is associated with obesity. Therefore lot of drugs is used for prevention and treatment of diabetes have been introduced, however, globally the total number of people suffering from diabetes with various causes is increasing. The disease Diabetes mellitus, not only imposes economic burdens on individual patients and their families but also places substantial economic burdens on society as well.[13]Nowadays a very wide range of herbal dietary supplements and herbal medicines have scientifically proven to benefitial in treating type 2 diabetes mellitus in preclinical studies.Isoflavones, are phytoestrogens which have structural/functional similarities to human estrogen. Soy isoflavones have been studied most and their consumption have been associated with lower incidence and mortality rate of type II diabetes, heart disease, osteoporosis and certain cancers.To reduce the glucose tolerance in patients suffering from diabetes Omega-3 fatty acids have been suggested. For the synthesis of a long chain n−3 fatty acids, insulin is required; the heart may thus be particularly susceptible to their depletion in diabetes. Ethyl esters of n−3 fatty acids may be potential beneficial in diabetic patients.For the treatment of diabetic neuropathy lipoic acid is used which is an antioxidant and prooven to be effective as a long-term dietary supplement for protection of diabetics from complications. Dietary fibers from psyllium have been also used widely for pharmacological supplements, food ingredients, in processed food to aid weight reduction, for glucose control in diabetic patients and to reduce lipid levels in hyperlipidemia. A lot of plants extracts such as Toucrium polium, cinnamon and bitter melon have been shown to prevent or treat diabetes. [14] Nutraceuticals used in eye disorder

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Diet containing foods rich in antioxidants, such as n−3 fatty acids, lutein and zeaxanthin with a healthy lifestyle appears as beneficial for age-related macular degeneration (AMD).Antioxidant activity is possessed by high content of polyphenolic flavonoids in nutraceuticals . Herbs or herbal extracts, such as green tea, Allium spp., Vitamins C and E, polyphenols, carotenoids (mainly lycopene and β-carotene), and coenzyme Q10 possess antioxidant properties and effective in AMD.In the marine world such as sea bream, salmon, trout, and shrimps Astaxanthin is an important naturally occurring carotenoid. A number of essential biological functions such as protecting against oxidation process, protecting against ultra violet light effects, immune and pigmentation, in aquatic animals is possessed by Astaxanthin. It is also used as a very potent antioxidant. Astaxanthin also helps in the protection of the eyes and prevents problems such as macular degeneration and many more. protection of heart from oxidative damage, and protection of the nervous system from degenerative diseases like AD is possessed by Astaxanthin and also helps in the boosting immune system function.[15]A carotenoid called Lutein which is mainly found in many vegetables and fruits including sweet potatoes, carrots, squash, tomatoes, mangoes, corn, and leafy greens such as kale andcollards.Visual disorders is also treated byLutein and Zeaxanthin .The food sources of zeaxanthin, include egg yolks, corn, green vegetables and fruits, such as brussel sprouts, cabbage, kale, broccoli, green beans, green peas, lettuce, kiwi, collard greens, spinach, and honeydew lutein and zeaxanthin also occur in plants in the form of mono- and diesters of fatty acids. A new source of these carotenoids is marigold flower (Tagetes erecta) that contains approximately 86% by weight of the carotenoids zeaxanthin and lutein.

Nutraceuticals used in Obesity

is growing as a global public health problem nowadays with almost 315 million people involved in it . Obesity is prooven as a risk factor for causing many disorders such as hypertension, congestive heart failure, heart related disease, hyperlipidemia, respiratory disorders, osteoarthritis, cancer, renal vein thrombosis and reduced fertility.Increased availability of high-fats and cholesterol is one of the major causes of obesity is , energy-dense foods. Obesity is spreading day by day globally and hence nutrition and exercise play a key role in its prevention and treatment. Nutraceutical interventions are currently being investigated on a large-scale basis as potential treatments for obesity and weight management. Nutraceuticals such as capsaicin conjugated linoleic acid, Momordica charantia and Psyllium fiber possess potential antiobese properties.[16]Nowadays excessive consumption of energy-rich foods such as snacks, processed foods and drinks causes weight gain, whereas, caloric restriction and increased physical activity has been shown to be only moderately successful in managing obesity. Therefore, all the 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. However, their use is controversial due to their ability to cause side-effects. Green tea extract and 5-hydroxytryptophan may promote weight loss, while the former increases the energy expenditure, the latter decreases appetite. [17]

Nutraceuticals used in Inflammation

Inflammation included swelling, pain, redness and heat, inflammation is the response of body tissue to the injury . Nutraceuticals that play benifitial role in managing obesity are ginger, soybean, unsaponifiable, glucosamine, chondroitin, S-adenosylmethionine. They are safe and well tolerated, therefore, 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 antiinflammatory 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 antiinflammatory effects.[18]The omega-3 and omega-6 are those components which have a significant role on diseases by generating potent modulatory molecules for inflammatory responses, including some of the components like prostaglandins, leukotrienes, and interleukins. Gamma linolenic acid (GLA) is one of the major components of the body that is produced in the body from linoleic acid, which work as an essential fatty acid of omega-6 series in the body . GLA is a nutraceutical which is mainly used in the treatment against problems with inflammation and autoimmune diseases. Preformed GLA is present in trace amounts in nuts, green leafy vegetables, vegetable

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oils, such as seed oil, borage oil, Oenothera biennis oil, blackcurrant and hemp seed oil. GLA is metabolized to dihomogamma linlenic acid which undergoes oxidative metabolism by lipoxygenase and cyclooxygenase enzymes to produce antiinflammatory eicosanoids.[20]Nutraceuticals used in Miscellaneous complications Angiogenesis is an enzymatic process that is generally down-regulated in healthy individuals. Antiangiogenic compounds are selective against newly formed blood vessels While spring existing ones may not lead to Side effects even after prolonged exposure. Antiangiogenic compounds may prevent diseases involving degenerative process such as multiple sclerosis, arthritis, osteoporosis, diabetes, cancer, AD and Parkinson's diseases. Some bioactive compounds such as curcumin, flavins, isoflavones and catechins, resveratrol, proanthocyanidins, flavonoids, Saponins, terpenes, Chitin, chitosan, Vitamins B3 and D3, Fatty acids, peptides and amino acids are potentially effective angiogenic compounds[21]Moringa oleifera Lam has an impressive range of medicinal uses and is a good source various amino acids and phenolics, protein, vitamins, β-sitosterol, caffeoylquinic acid, kaempferol and β-carotene with high nutritional and therapeutic values. Various parts of this plant like leaves, seed, bark, fruit, roots, flowers and immature pods act as cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, antiinflammatory, diuretic, antihypertensive, antidiabetic, cholesterol lowering, antiulcer, antispasmodic, antioxidant, hepatoprotective, antibacterial, and antifungal activities.[22]

## III. DISCUSSION

Due to their potential nutritional nowadays, nutraceuticals have received high interests and safety profile, other than therapeutic capability. Pharmaceutical and nutritional companies are aware of the changing trends which are due to the advantages of these compounds. Most of the nutraceuticals possess multiple therapeutic benefits.[1] In the present study focused towards a better understanding of the nutraceuticals based on their pharmaceutical and therapeutic indications.It is seen that there might be a lot of confusion related to the terminologies of nutraceuticals such as phytochemicals, pharmafoods, medical foods, functional foods, dietary supplements, designer foods, etc., There is thin dividing line in their interchangeable usage by different people on different occasions. Pharmaceuticals are mostly considered as medications which are used mainly to treat diseases, however nutraceuticals are the substances which are mostly considered to prevent diseases. his distinction between pharmaceuticals and nutraceuticals is very erroneous and superficial. Pharmaceuticals and nutraceuticals both can cure and prevent disease(s) however, only pharmaceuticals have governmental sanction. Pharmaceuticals are compounds which usually possess patent protection due to expensive testing. However, nutraceuticals do not need these testing documents.Medical foods or medicinal foods are a specific category of therapeutic agents that are considered for the nutritional management of a specific disease. For example, medicinal foods are designed to manage inflammatory conditions, cancer, 7, pancreatic exocrine insufficiency and other diseases.[125,126] They also play a substantial protection against numerous age-related or chronic diseases. Herbal medicines that are used as a nutrient are considered in this category.Nutraceuticals found in many fruits and vegetables are responsible for health benefits. Dueb to these health benefits of nutraceuticals, they might regularly be taken to cure or reduce the risk factors such as high cholesterol, high blood pressure and diabetes. Some of the most popular nutraceutical products marketed today are botanicals such as ginseng, ginkgo biloba, St. John's wort and Echinacea.The list of nutraceuticals being studied is changing continually and reflects ongoing market developments, research, and consumer interest. With rapidly increasing interest in the nutraceutical consumption, substantial researches are absolutely necessary to warrant the nutraceuticals usage safe and effective.The mechanistic actions of nutraceuticals are not fully clear. However, they might be involved a wide variety of biological processes, including activation of signal transduction pathways, antioxidant defenses, gene expression, cell proliferation, differentiation and preservation of mitochondrial integrity.

## IV. CONCLUSION

Nutraceuticals might be defined as substances that have physiological benefits or provide protection against chronic diseases. 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. Nowadays, nutraceuticals have received considerable interest due to potential nutritional, safety and therapeutic effects. Recent studies have shown promising results for these compounds in various complications. In the present review much effort has been devoted to provide their diseases modifying indications related to oxidative stress including allergy,

Alzheimer, cardiovascular, cancer, diabetes, eye, immune, inflammatory and Parkinson's diseases as well as obesity.

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