

Nutraceuticals

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ABSTRACT

Nutraceuticals have received considerable interest due to potential nutrition, safety and therapeutic effect. The present article focuses on the need for consuming appropriate diet, health issues surrounding failure to adhere to the known healthy eating models, development of new nutraceuticals/functional food/supplements with novel health benefits. The term nutraceuticals was originally defined by Dr. Stephan L. De Felice, founder and chairman of the foundation of innovation medicine. About 2000 years ago, Hippocrates correctly emphasized "let food be your medicine and medicine be your food." Nutraceuticals are medicinal foods that play an important role in maintaining well-being, enhancing health, modulating immunity. The neurodegenerative disorders include Parkinson's disease (PD), Alzheimer's disease (AD), Huntington's disease (HD), prion disease (PD). It is the most general form of dementia, affecting more than 20 million people worldwide. Posing lifestyle changes are correlated with highly increased risk of the chronic illness and disease. Nutraceutical is the mixture of 'Nutrition' and 'pharmaceutical'. Nutraceuticals in broad are food or part of food playing a significant role in changing and maintaining normal physiological action that maintain healthy human beings. Nutraceutical rich vegetable and fruits are an important component of a healthy diet. The principal reason for the growth of the nutraceutical market worldwide are the current population and the health benefits.

KEYWORDS

Nutraceuticals, food supplements, medicine, antioxidants, health benefits, dietary supplements, therapeutic effects.

I. INTRODUCTION

Industrialization has caused many air and water pollution, soil and food contamination because of substantial use of many chemicals

, heavy metals, electromagnetic waves, and other prospective harmful man-made items. Plants are the most essential resource of human food and medicine. "Nutraceuticals" is a term derived by scientist Stephan De Felice in the year

1979. According to the Stephan De Felice nutraceuticals is "a food or parts of food that provide medical or health benefits; including prevention and treatment of disease. Nutraceuticals are deoxyfying our body, replace diet plan and food habits also. Nutraceuticals are marketed in concentrated forms as a pills, capsules, powders, and suspensions either as a single substance or as a combination preparation. A nutraceutical may be a naturally nutrient-rich food such as spirulina, garlic, soya, or a specific component of a food like omega-3 oil from nutraceuticals are also known as nutritional supplements and food supplement.

WHY NUTRACEUTICALS

For so many of us, it is impossible to get sufficient nutrition from the routine food. Now a days we live in highly toxic environment, filled with pollution and pesticides that throw off our body's ability to regulate it. There are many side effects from the drugs because they are not natural to the body. With good quality supplementation that can be absorbed and utilized by the body can truly power our body and add vitality.

Why nutraceuticals seems attractive

Many diets are rich in phenolic component and are daily consumed by the human beings. Nutraceuticals are easily absorbed in the intestine after ingestion. Do not require an appointment of doctors and are easily available without prescription.

THE REASONS FOR SHIFTING TOWARDS NUTRACEUTICALS

Increasing numbers of consumers, concerned about healthcare costs. Disatisfied with the pharmaceutical agents in upgrating health, are turning to nutraceuticals to improve their health and avoid chronic disease. People believing more in prevention than cure economically challenged patients. With few exceptions, the U.S. Food and Drug Administration (FDA) has not approved nutraceuticals for health benefits or disease prevention; nonetheless, the manufacturers of nutraceuticals have been touting them as health-promoting agents.

CONCEPT OF NUTRACEUTICALS

In the pharmaceutical development process, it is a requirement to have clinical test results for animal tests and studies and further verification of their therapeutic effects. But in case of nutrition, there was no verification method for food in preventing disease in the past.

In the recent years however, as food composition has been scientifically proven to cause lifestyle-related diseases, and has become a social issue.

From the consumers point of view, functional foods and nutraceuticals may offer many benefits. It may increase the health value of our diet. May help us live longer. May help us to avoid particular medical conditions. May have a perceived to be more 'natural' than traditional medicine and less likely to produce unpleasant side-effects. May present food for population with special needs.

CLASSIFICATION OF NUTRACEUTICALS

1) Traditional

- Chemical constituents, nutrients, herbals, phytochemicals
- Probiotic organisms.
- Nutraceutical enzyme.

2) Non Traditional

- Fortified nutraceuticals.
- Recombinant nutraceutical.

3) Substance with established nutritional functions.

- Vitamins, minerals, Amino acids, Fatty acid.

4) Herbs (or) Botanical products

5) Reagents derived from other sources

- Pyruvate, Chondroitin sulphate, Steroids, hormones precursors

6) Functional foods.

7) Probiotics and prebiotics

8) Polyunsaturated fatty acids

9) Antioxidant vitamins

10) Spices

1) TRADITIONAL

The traditional nutraceutical category consists of the food which does not undergo any manual changes. Nutraceutical components are natural and having some potential which are actively involved in health benefits; for example, Lycopene is obtained from tomatoes, pink grape fruits, guava, papaya, water melon are its potential benefits and its anti-oxidant activity.

2) NON - TRADITIONAL

The non-traditional category of nutraceuticals is of boosting of nutritional content by addition of nutrients. For example, B-carotene obtained from carrots, orange, tangerines are in its potential benefits. Which are antioxidant activity neutralised free radicals, protect the cornea against the UV lights. They are antioxidants, anticarcinogenic, and anti-cancer.

3) FORTIFIED NUTRACEUTICALS

Fortifications of food components is the process of inclusion of vitamin and minerals to the food for increase the effectiveness and nutritional value. Example includes milk fortified with cholecalciferol in vitamin D deficiency.

3) RECOMBINANT NUTRACEUTICALS

It is the application of biotechnology and genetic engineering in the production of energy providing food. Gold kiwifruit is genetically modified for an effective ascorbic acid, carotenoids, and lutein and Zeaxanthin. E.g. lutein is obtained from corn, avocado, egg yolk, spinach and has potential benefits as anti-cancer activity.

4) SUBSTANCE WITH ESTABLISHED NUTRITIONAL FUNCTIONS

1) Vitamin:-

The role of various vitamins in maintaining normal metabolism and health status is essential. Deficiency of any kind of vitamins can cause distinguishing clinical symptoms. Therefore, most nutraceuticals or nutritional therapy products contain some vitamins, which are of common vitamins like vitamin A, vitamin B, vitamin C, vitamin D, vitamin E.

2) Minerals:-

Ca, I, Zn, Mn, Mg and other alloys are most essential of the human health. Deficiency of the any one minerals may cause serious health

problems. Dietary Ca, Zn, Fe, and other minerals are taken from both flesh and plants foods.

5) HERBS OR BOTANICAL PRODUCTS

Herbs or botanical products are obtained as concentrates and extracts. The herbs are as old as human civilization and they provide a complete store house of remedies to cure acute and chronic disease

APPLICATIONS OF NUTRACEUTICALS IN DISEASE MANAGEMENT

The substantial researches have delighted the participation of nutraceuticals in the treatment of many disease such as insomnia, digestion problems, blood pressure abnormalities, cold and cough, depression, delayed gastrointestinal emptying, and many more conditions which need special care. Nutraceuticals are currently receiving recognition as being beneficial in coronary heart disease, obesity, diabetes, cancer, osteoporosis, and other chronic and degenerative disease such as Parkinson's and Alzheimer's diseases. It appears that these properties play a crucial role in the protection against the pathologies of numerous age-related or chronic diseases.

ROLE OF NUTRACEUTICALS IN NEURODEGENERATIVE DISEASE

Neurodegenerative disorder (NDDs) are heterogeneous groups of many acute debilitating conditions or diseases which affect the peripheral or central nervous system (PNS and CNS). The neurological conjunction includes an extensive array of severe diseases comprising highly complicated etiologies. Also, the NDDs are highly connected to aging, and hence the prevalence rate is higher in older people than younger owing to decline or the altered hormone secretion, the enhanced oxidative stress, and neuro-inflammation. The major NDDs including Parkinson's disease (PD), Alzheimer's disease (AD), Huntington's disease (HD). The motor neuron disease (MND) is mainly caused due to lowered neuronal counts.

ROLE OF NUTRACEUTICALS IN VARIOUS DISEASE

Today's exploration and exploitation of the disease-fighting properties of a multitude of phytochemicals found in both food and non-food plants have created a renaissance in human health and nutrition research. The foods and nutrients play an essential role in the normal functioning of the human body. They are helping in maintaining the

health of the individual and in decreasing the risk of many diseases. At the same time, many opportunities for the development of novel dietary products have been created. It is scientifically proved and supported by many research articles that nutraceuticals are efficacious to treat and prevent various disease conditions. The nutraceuticals are medicinal foods that play an important role in maintaining well-being. They are enhancing health, regulating immunity, and thereby preventing as well as treating specific diseases. Before 2000 years ago, Hippocrates correctly emphasized "let food be your medicine and medicine be your food". In the last five years, the world has witnessed the explosive growth of a multibillion-dollar industry known as nutraceuticals.

ROLE OF NUTRACEUTICALS IN NEUROLOGICAL DISORDERS

A nutrient-deficient diet may lead to disturbances in the central nervous system (CNS) or peripheral nervous system (PNS). According to the health survey globally, more than 10 million people suffer from neurological disorders annually, and this is expected to rise in the future. According to a survey about 3.1% of the populations in western countries aged between 70-79 years are considered prone to neurodegenerative disease while the incidence of disease in the individuals of similar age groups in India is about 0.7%. The difference is mainly due to varying lifestyle and food habits and its dependence upon the consumption of different ingredients. The Indian history including the Unani, Ayurveda (including Sushruta Samhita and Charaka), Ashtavaidya, and Siddha systems of medicines, is the possession of the art of healing procedures. There is an abundance of unexplored food products and nutrients that possess valuable biological activities. In the process of pharmaceutical development, clinical testing on animals and humans is a must, and the results obtained verify the therapeutic effects of the drug. Apart from its helpful effects in medical conditions, it also assists in providing psychological benefits; hence, they are most popular in preventing neurological disease conditions. The aim and scope of the manuscript is to raise the awareness of the readers about the use of nutraceuticals in the management of neurodegenerative and psychotic disorders through the use of ingredients that are easily available and tend to show a proved neuroprotective effect.

II. METHODOLOGY

Before commencing the review article, a deep literature survey on nutraceuticals in neurological disorders was performed. Research and review articles from various search engines and scientific databases, such as pubmed, medline, science direct, google, scopus, Cochrane library, etc. were assessed and thoroughly read for a deep understanding of the topic and to evaluate the currently employed psychoactive and neuroprotective nutraceuticals. After the literature survey, the article writing was initiated. The total time span for the completion of the review article was approximately 2 months.

NUTRACEUTICALS IN ALZHEIMERS DISEASE

Alzheimer's disease (AD), also known as senile dementia of the Alzheimer type (SDAT) or the primary degenerative dementia of the Alzheimer type (PDDAT), is the most common form of memory loss. The pronounced nutraceuticals are helping in management of AD include the super essential oxidants, which can be used in the treatment of all chronic disease due to oxidative stress. Various studies reported an association between the intake of higher amount of dietary antioxidants and diminished risk in patients with AD, which is highly imperative as disease prevention is considerably easier than treating it. Some of the compounds are beneficial in the AD which is described in below;

FLAVONOIDS

Flavonoids are mainly used in the neurodegenerative disorders, mainly Alzheimers include catechin, epicatechin, epigallocatechin, and epigallocatechin gallate. These are commonly found group of poly phenolic compounds which is extracted from the human diets. The main source of the flavonoids include fruits, vegetables, and drinks, such as wine, tea, and cocoa. Flavonoids and their metabolic products possess neurological modulating actions and have been studied to interact with the neuronal signaling pathways, which is mainly involved in the survival and functioning of neurons.

CAROTENOIDS

About 700 diverse members of the carotenoids family have been identified to date, 40 of which are found in human and blood. Major carotenoids present in human include lutein, zeaxanthin, lycopene. The antioxidant activity

of the carotene is mainly identified on the basis of their chemical structure setting. Carotenoids are the fat-soluble pigments and they are extracted from the fruits and vegetables that are orange, or deep-yellow, and red in colour. Patients with the severe or moderate AD lack major carotenoids, such as lutein and beta carotene, compared with patients with mild AD.

CROCIN

Crocetin is the chief phytoconstituent obtained from saffron (*Crocus sativus*). It is used for the ages for its antispasmodic, neuronal, sedative, gingival sedative, expectorant, stimulants, and carminative disorders. Saffron has been proven to act in the prevention of epilepsy, depression, and inflammatory disorders. Crocetin is also known to improve learning and enhance memory based on its long-term potential being blocked by ethanol, hence it is used in neurodegenerative disorders, such as AD. Through various studies it has been concluded that it can significantly alter the level of oxidative markers in the region of the hippocampus and deleterious effects on learning and memory due to chronic stress.

CYANIDIN

The vital compounds comprise cyanidin (anthocyanidins), which is mostly acquired from cranberries, strawberries, etc., exert potent anti-inflammatory and neuroprotective activity by suppressing the activation of proinflammatory cytokines and ultimately brain damage. The main role can be attributed to the inhibition of phospholipase A2, which is chiefly involved in the signaling of proinflammatory cytokines and oxidative stress parameters.

LUTEOLIN-

The apigenin and luteolin are flavones, which possess remarkable neuroprotective activity. The principal source of these flavone-containing compounds comprises rosemary, parsley, and celery. The phytoconstituents possess remarkable pharmacological benefits, mainly the capacity to protect DNA against hydrogen peroxide-mediated toxicity, further avoiding inflammation and cell damage in Alzheimers.

NUTRACEUTICALS :A PARADIGM OF PROACTIVE MEDICINE

1)NUTRACEUTICALS AND PROACTIVE MEDICINE

The millennium challenge is nowadays more and more focusing on the prevention more

than on diseases cure and therapy. Among the main reason for the world wide growth of attention to dietary supplements and nutraceuticals, there is in fact an enhancing desire of a healthy status, well-being and nice-being prevention, and last but not least, the health trends. The traditional way of handling a disease with an appropriate treatment has been for the countries centered on a static approach: The patients often unaware of a potential health risk, waited till the clear sign of the disease onset appeared. The pharmaceutical approach is the only realistic way to face an illness since the symptoms usually appear when the organ damage is already ongoing. This is the case of hypercholesterolemia, hypertension, and hyperglycemia, hypertriglyceridemia, etc. On the other hand, the proactive medicine approach to health, well-being and nice-being, is the best tool to prevent the illness onset. "Proactive medicine" or "inactive medicine" is a dynamic approach which consists in taking preventive action before the onset of a disease instead of waiting for the disease to become evident.

HYPERTENSION

The well-known effects on blood pressure of dietary approaches. Now a days lifestyle changes and the beneficial effect of adopting the Mediterranean diet, a large number of studies investigated the possible blood pressure lowering effects of different nutraceuticals. Some of them occurred when berberine combined with oral hypotensives was compared to the same hypotensives. No serious adverse reaction was reported indicating that berberine can be considered safe in use also effective on hypertension. Garlic (*Allium sativum*) is a type of the onion genus native to central Asia, and it is rich of phytonutrients with therapeutic effects on cardiovascular disease, mainly in hypertension, making its extracts a useful tool for prevention and control of hypertension. A recent study using aged garlic extract examined this effect allowing to determine a lowering blood pressure by about 10 mm Hg and 8 mm Hg, systolic and diastolic, respectively, similar to the standard medication. The beneficial nutraceutical potential has also been connected to the presence in garlic extracts of organoselenium compounds, steroids, saponins and saponinins.

HYPERCHOLESTEROLEMIA

Among the health threat connected with metabolic syndrome, dyslipidemia is between the most applicable ones. This pathological condition

regulates an abnormal amount of lipids in the blood. The most dyslipidemia cases detected in developed countries are often due to both wrong diet and lifestyle. Within the extensively marketed nutraceuticals with clinically metabolic syndrome, omega-3 fatty acid, psyllium, soluble fibers, red yeast rice, berberine, and apple phytocomplex are among the most studied.

III. CONCLUSION

The Nutraceuticals provide all the essential substances that should be present in a healthy diet for the human. From the above study it can be concluded that various chemical constituents from natural sources can be obtained and prepared into various optimized, safe, stable formulations for the treatment and diagnosis of diseases. Nutraceuticals are widely used in the food and pharmaceutical industries. Most of the nutraceuticals are from either mineral origin, animal origin, or vegetable origin, like gamma-terpinenes, beta-carotene, curcumin, limonene, eugenol, pinene, safranal, geraniol, allicin, caryophyllene, lycopene and silymarin. These constituents are prepared into dosage forms as topical, oral, etc. Ex. Creams, lotions, ointments, emulsions, unani formulations, aromatic oils, microemulsions, beads, tablets, herbal formulations, etc. Used in various categories as antidiabetic, antibiotic, antimicrobial, anti-inflammatory, anti-cancer, protective, etc.

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