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NUTRACEUTICALS: AS AN ALTERNATIVE TO PHARMACEUTICALS

***Amisha Mohan Hedau, Prachiti Kadao, Priya Damahe, Dimple Lute, Adesh Meshram (M. Pharm.)**

Dr. Arun Motghare College of Pharmacy, Kosra- Kondha (MH)-441908.

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***Corresponding Author**
Amisha Mohan Hedau

Dr. Arun Motghare College of Pharmacy, Kosra- Kondha (MH)-441908.

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ABSTRACT

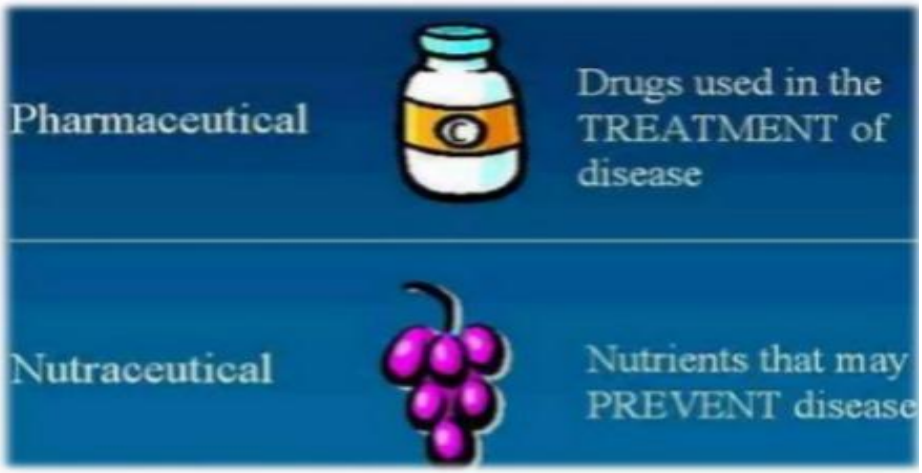
The study is aimed to highlights the different aspects of nutraceuticals including market trends, difficulties, and the processing methods used to harness natural resources. A very broad "nutraceutical" rise has been caused by the nutraceuticals' reach for healthcare management of chronic disorders. The majority of settings had a negligible impact on inadequate eating and lifestyle choices. Research on nutraceuticals is very important and reasonably priced. The healthcare and pharmaceutical industries are facing difficulties as a result of its financial system. It has been found that nutraceuticals contribute to the prevention of infection and cancer and have a positive effect on immune system and cardiovascular health. Based on their composition and mode of action, nutraceuticals are categorized into classes. The many kinds of nutraceuticals and their potential therapeutic effects in illness, such as their anti-inflammatory, anticancer, antioxidant, and anti-lipid properties, will be discussed in this review. Additionally Over the last fifty years, lifestyles have been significantly impacted by urbanization, the rate of industrialization, and rapid change. which resulted in the formation of a junk food eating habit. The ability to eat healthily is impacted by these practices, which gradually reduce the quantity and quality of nutrients consumed. Dementia, starvation, and degenerative diseases are becoming more common as a result of the population's changed eating habits. In recent years, people's worries about their health and ability to receive healthcare have grown. Nutraceuticals are essential for boosting immunity without compromising the body's natural defenses.

Nutraceuticals are present in active foods, designer meals, medical diets, dietary supplements, and other diet regimens that offer additional health benefits. Nutrient-rich foods help with a number of bodily functions, including the prevention and treatment of diseases. The medicinal plant offers a range of phytochemical qualities to address different medical issues.

KEYWORDS: Nutraceuticals; FSSAI; Health supplements; Dietary Supplement; Conventional.

INTRODUCTION

Customers' increasing demand for nutraceutical products has resulted in a global nutraceutical exploitation. This is a result of the escalating health care costs linked to conventional medicines, the frequent side effects of pharmaceutical products, and the widespread belief that compounds that resemble food are safe in comparison to conventional medications. Stephen Defelice, MD, is the founder and chairman of the Foundation for Innovation in Medicine (FIM) since 1989. He is credited with coining the term "nutraceutical," which he defined as any substance that can be consumed or used as a food ingredient that has therapeutic or health benefits, including the potential to prevent or treat illness Nutraceuticals are becoming more and more popular as a result of their use in healthcare to treat chronic illnesses Because of their seeming safety and possible health and nutritional advantages, nutraceuticals and functional foods attracted a lot of attention. Given consumer interest in these goods, the functional food and nutraceutical industries are well-positioned to benefit Many diseases, including allergies, Alzheimer's disease, cardiovascular and ocular disorders, cancer, obesity, diabetes, and Parkinson's disease, as well as the control of immune system function and inflammation, may be prevented or treated with nutraceuticals, according to recent studies Worldwide, the use of nutraceuticals is growing rapidly and is constantly being developed These include components, such as B vitamins and low-calorie sweets, that have been demonstrated to be beneficial to human health. The future nutraceutical program will focus on specific diagnostic models, human clinical research, and comprehension in order to better understand the precise mechanism of action that is beneficial in the prevention and treatment of diseases. Nutraceuticals have been demonstrated to support health and strengthen immunity when taken as prescribed.



Types of Nutraceuticals

1) Potential Nutraceuticals :- These have a promising approach for health or medicinal benefits.

2) Established Nutraceuticals:- These are potential nutraceuticals that have become established with sufficient clinical use.

Nutraceutical mainly consist of

Nutraceuticals are substances that health benefits and can be used to prevent and treat diseases.

- They are broadly classified into three categories.

1) Nutrients:- Substance which have established Nutritional function.

eg:- vitamins, minerals, Fatty acid and amino acids etc.

2) Herbals/Phytochemicals:- Herbs or Botanical Product.

3) Dietary Supplements:- dietary supplements include probiotics, prebiotics, Enzymes and antioxidants.

Scope Of Nutraceuticals

Disease	Nutraceuticals	Source
1. Joint health	Glucosamine, Chondroitin	Found in ligaments,cartilages ,tissue, tendonsProteoglycans of articular cartilage
2. Cardiovascular health	Melatonin, DHA, Reseveratrol, Caretonoids, Catechin	Bone marrow, Fish ,Grapes, red wine,Carrot,sweet potato, Tea extracts
3. Eye health	DHA, Caretonoids	Linseed (flax oil), fish oil, Barley, Spinach, Carrot, sweet potatoes
4. Cancer prevention	DHA, Reseveratro	Flax seed, linseed, fish oil. Redwine,grapesTomatoes,grape fruit, Tea extracts (ellagic acid), Strawberry, Raspberry

Clasification of nutraceuticals

Classification Based On The Chemical Group

Sr. NO	Class	Examples
1	Inorganic Mineral Supplement	Minerals
2	Probiotics	Helpful Bacteria
3	Prebiotics	Digestive Enzyme
4	Dietary Fibre	Fibre
5	Antioxidant	Natural Antioxidants
6	Phytochemicals Eg :- Protein	Soyaprotein
	Fatty Acid	Omega 3 Fatty Acid

Fig no: 1.

Classification Based On Source

Plant	Tomato, Garlic, Momordica
Animal	Shark Liver Oil, Cod liver Oil
Minerals	Calcium, Magnesium, Phosphorus
Microorganism	Bifidobacterium, Lactobacilli

Fig no: 2.

METHODS

Alzheimer's disease and nutraceuticals :- Alzheimer's disease (AD) is the most common form of dementia. There is no cure for the disease and eventually leads to death. Most often, AD is diagnosed in people over 65 years of age, although the less-prevalent early-onset Alzheimer's can occur much earlier.

Women are more affected in comparison to men, at a ratio of almost 2:1. Several lines of evidence suggest 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. 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.

Cancer and nutraceuticals:- cancer has emerged as a major public health problem in developing countries. According to the World Cancer Report the cancer rates are increasing and it would be 15 million new cases in the year 2020 that is, a rise in 50%. A healthy lifestyle and diet can help in prevention of cancer. Carotenoids are a group of phytochemicals

responsible for different colors of the foods. They have antioxidant activities and effective on cancer prevention. Recent interest in carotenoids has focused on the role of lycopene in human health, especially in cancer disease.

Plants rich in daidzein, biochanin, isoflavones and genistein, also inhibit prostate cancer cell growth. Because of the unsaturated nature of lycopene it is considered to be a potent antioxidant and a singlet oxygen quencher. Lycopene concentrates in the prostate, testes, skin and adrenal where it protects against cancer. The linkage between carotenoids and prevention of cancer and CAD, heightened the importance of vegetable and fruits in human diet. Chronic inflammation is associated with a high cancer risk. Chronic inflammation is also associated with immune-suppression, which is a risk factor for cancer. Ginseng is an example of an anti inflammatory molecule.

Citrus fruit flavonoids are able to protect against cancer by acting as antioxidants. Soyfoods are a unique dietary source of isoflavones, the polyphenolic phytochemicals exemplified by epigallocatechin gallate from tea, curcumin from curry and soya isoflavones possess cancer chemo preventive properties. Soybean seems to offer protection against breast, uterine, lung, colorectal, and prostate cancers. β-carotene found in yellow, orange, and green leafy vegetables and fruits such as tomatoes, lettuce, oranges, sweet potatoes, broccoli, cantaloupe, carrots, spinach, and winter squash has anticancer activity.

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.

One of the primary causes of obesity is the increased availability of high-fat, energy-dense foods. There is a very high prevalence of obesity 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.

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.[] 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.

Increase metabolism: Compounds like those in green tea extract ((EGCG)) may help increase metabolic rate and fat oxidation.

Reduce inflammation: Obesity is linked to chronic inflammation, and nutraceuticals like omega-3 fatty acids and compounds in ginger ((6)-gingerol and (6)-shogaol) have anti-inflammatory properties that may help.

Improve insulin sensitivity: Many nutraceuticals can help improve how the body uses insulin, a key factor in metabolic health.

Increase satiety: Some fibers, like psyllium, can help you feel fuller for longer, which may help with weight management.

Nutraceuticals in Management of Diabetes

Diabetes is a common metabolic disease and is one of the top ten mortality cause as per World Health Organization. Most of the cases it is related with the obesity. More than 50 % of the global population are suffering in diabetes mainly type 2 (noninsulin-dependent diabetes mellitus) due to lifestyle changes. Available anti-diabetic medicines suffer from diverse adverse effects so there is huge demand for alternatives in this area. In recent years in some scientific reports has shown that some herbal medicine and herbal dietary supplements are in preclinical trial level in the management of diabetes. Isoflavones is a phytoestrogen using in type 2 diabetes treatment producing a steep decline in the mortality rate. Omega-3 fatty acid and Ethyl esters of n-3 fatty acid are also used in diabetes management. Lipoic acid and some dietary fibers like psyllium is incorporated in nutraceuticals to mitigate diabetic neuropathy, hyperlipidemia and control of blood sugar level. Other than this diverse medicinal plants are reported to be active in type 2 diabetes control.

Nutraceuticals in Alzheimer's Disease

Alzheimer is a neurodegenerative disease which affects more than 26 million people all over the world. It starts with dementia and turns to Alzheimer's and lastly death. Most of the cases it happens in older age that is more than 60 and till date it is non curable. As per scientific reports woman are more affected by this disease than the men may be linked to exposure to the stress conditions. Some of the neutraceutical products like β carotene, lycopene, curcumin, lutein are useful in the management of Alzheimer. There are some research reports which claim that some extracts of plants like Lavandula officinalis, Zizyphus jujube are useful in treatment of Alzheimer's as they contribute in memory enhancemets.

Nutraceuticals in Cardiovascular Disease

Cardiovascular problems top the list of global mortality causes according to World Health Organization. This disease presents itself in different forms like cardiac failure, vesicular blockage, hypertension, stroke etc. and any of them may result in death or warrant immediate surgical intervention like angioplasty and bypass surgery. But at least 50% cardio vascular disease can be prevented with timely precautions. Vitamins, antioxidants, omega 3 fatty acids, dietary fibers and minerals are the formulated as neutraceuticals supported by physical exercise is recommended for cardiovascular disease management. Flavonoid compounds abundantly found in vegetables/ fruits are often designed as nutraceuticals for cardiovascular problems. These plant bioactives block the angiotensin-converting enzyme and also prevent the platelet aggregation by blocking the cyclooxygenase enzyme. Other substances like melatonin, serotonin, dietary indoleamines, tannis etc are explored as nutraceuticals for minimizing cardiovascular risk. Omega 3 fatty acids found in fish lower the lipid and bad cholesterol levels so are used as nutraceuticals for treatment of cardiac arrhythmia. Consumer acceptance for nutraceuticals in heart diseases is related to the belief that these products do not associate any residual effect.

Nutraceuticals in Allergic Disorders

Allergy is a common disorder due to the hypersensitivity in human immune system. The clinical management is complex as most of the allergy causes are either unknown or difficult to trace. Allergy produces several effects in the body ranging from irritation to some fatal ones like acute respiratory distress. Allergic condition is associated with hematological changes like enhancement of white blood cell and basophil count. Quercetin is a plant bioactive often used in neutraceutical for management of allergy due to its effect on low

density lipoprotein. Eucalyptus essential oil is another plant derivative mostly used in neutraceuticals for management of allergy.

Benefits of Nutraceuticals

Nutraceuticals can be broadly categorized by their source, chemical composition, or application. Common types include dietary supplements (vitamins, minerals, amino acids), functional foods (fortified cereals, yogurt), herbal/phytochemicals (turmeric, garlic, green tea extract), probiotics and prebiotics, and polyunsaturated fatty acids (like omega-3s).

By application

- **Dietary Supplements**

Products intended to supplement the diet, such as vitamins, minerals, amino acids, and herbal extracts.

- **Functional Foods**

Foods that have been fortified with added health benefits, like probiotic yogurt or cereals with added fiber.

- **Medicinal Foods**

Formulated foods designed for specific medical conditions, such as protein shakes for diabetics or electrolyte-rich drinks.

- **Herbal/Natural Products**

Products derived from plants, including herbs, spices, and extracts like ginseng, garlic, and curcumin.

By chemical composition or source

- **Vitamins and Minerals**

Essential nutrients that support health, like vitamin C, vitamin D, and calcium.

- **Polyunsaturated Fatty Acids (PUFAs)**

Fatty acids the body cannot produce, such as omega-3 and omega-6, often found in fish oil and flaxseed.

- **Probiotics and Prebiotics**

Live microorganisms that provide health benefits (probiotics) and indigestible fibers that feed beneficial bacteria (prebiotics).

- **Antioxidants**

Compounds that protect cells from damage, including antioxidant vitamins (like C and E) and phytochemicals (like lycopene and resveratrol).

- **Carbohydrates**

Including dietary fibers found in beans, apples, and other plants.

Marketed Nutraceuticals

Currently neutraceuticals are gaining importance in global market. Nearly 85 % of the neutraceuticals are devoted to vitamins and minerals product while 10% are anti-oxidants and the rest around 5 % belong to botanical products.[78] Though China and India also present a huge market for nutraceuticals, U.S.A heads the list of global sales as US dollars are miles ahead than Indian/ Chinese currency. Globally the demand of neutraceuticals is increased about 5.8% more than $ 15.5 billion from 2010- 2019.[80] Which definitely would have positive impact on neutraceuticals manufactured company. At present neutraceuticals products are the largest category products as per the reports. Globally the demand of vitamin products increases around 5%. Along with vitamins there are carotenoids, anti oxidants, calcium supplements, immune supplements, energy drinks, neurotonic, and nutritional supplements which dominate the global nutraceutical market. Currently global nutraceutical market is estimated at 117 billion USD 2019-2020.

Future prospect of nutraceuticals

Nutraceuticals market, its growth drivers, key ingredients, and the market potential in India.

- The global desire for better health is a major factor driving the nutraceuticals market.
- The market is expected to see high growth in areas such as soy protein, lutein, lycopene, omega-3 fatty acids, probiotics, and herbal extracts like garlic and green tea. India is projected to be a strong market for nutraceutical products, with the industry comprising a mix of large multinational companies.

CONCLUSION

Nutraceutical industry and the factors influencing its future. It highlights that successful companies in this field offer functional products as part of a broader range of goods. The text also emphasizes the importance of consumer perception regarding the link between diet and disease, and the need for health professionals to collaborate on regulations to ensure the health benefits of nutraceuticals.

- The nutraceutical industry is growing rapidly.
- Future demand for nutraceuticals is dependent on consumer perception of the relationship between diet and disease.
- Successful nutraceutical companies offer functional products alongside conventional goods.
- Health professionals and regulators should work together to plan appropriate regulations for the industry.

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