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Role of Nutraceuticals in Health and Disease Prevention

Jeeshan Alam Kajmi[1], Richa Singh[2], Dr. Tarkeshwar P. Shukla[3]
[1, 2, 3] *SCPM College of Pharmacy Lucknow Road Haripur Gonda*

Abstract: ***Nutraceuticals are the pharmaceutically blended products that possess both nutritional as well as the medicinal value. Such aproduct is designed to improve the physicalhealth, fight against day-to-day challenges such as stress, increase longevity, etc. The food products used as nutraceuticals can be categorized as dietary fiber, prebiotics, probiotics, polyunsaturated Fatty acids, antioxidants and other different types of herbal natural foods. These nutraceuticals used in various diseases such as Obesity, cardiovascular diseases, cancer, osteoporosis, arthritis, diabetes, cholesterol etc.. In recent years there Is a growing interest in nutraceuticals which provide health benefits and are alternative to Modern medicine. By using nutraceuticals, it may be possible to reduce or eliminate the need for conventional medications, reducing the chances of any adverse effect. The Nutraceuticals are the best way to boost immunity. The nutraceuticals also plays an important role in economic growth of some developing countries including India.***

Keywords: Disease, Nutrition, Adverse effect, Health, Medicine

I. INTRODUCTION

Nutraceutical defined as a "food, or parts of a food, that provide medical or health benefits, including the prevention and of disease'' .The term "nutraceutical" combines the word "nutrient" (a nourishing food or food component) with "pharmaceutical" (a medical drug).The term nutraceutical was coined from nutrition and pharmaceutical in 1989 by Stephen De felice, founder and chairman of foundation for innovation in medicine, an American organization which encourages medical health. Nutraceuticals contain a lot of vitamins, minerals, and nutritional supplements, which makes them Unique. Crucial in sustaining health, acting as an antidote to a variety of diseases, and so promoting Most of the drug molecules Available in the formulations were anciently used in crude form. 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. Some popular nutraceuticals include ginseng, Echinacea, green tea, glucosamine, omega-3, lutein, folic acid, and cod liver oil. Majority of the nutraceuticals possess multiple therapeutic properties.

Nutraceuticals mainly consists of...

1) *Nutrients:* Substances which have established Nutritional functions e.g. Vitamins, Minerals, Amino Acids, Fatty acids, etc.
2) *Herbals/ Phytochemicals:* Herbs or Botanical products.
3) *Dietary Supplements:* Probiotics, Prebiotics, Antioxidants, Enzymes, etc [1].

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II. NUTRACEUTICALS AND DISEASES

Nutraceuticals have been claimed to have a physiological benefit or provide protection against the following diseases such as: Cardiovascular, Diabetes, Obesity, Parkinson's Alzheimer's, Cancer, Allergy, Osteoarthritis, Eye disorders, Immune system and Inflammations

A. Cardiovascular Disease

Cardiovascular diseases (CVD) is a chronic disease by means of disorders of the heart and blood vessels which generally include hypertension (high blood pressure), coronary heart disease (heart attack), cerebro-vascular disease (stroke), heart failure, peripheral vascular disease, etc. In cardiac heart disease, atherosclerotic plaques form on the inner surface of arteries, which narrow the lumen and reduced the blood flow. Further it would be the leading cause of death in developing countries. Majority of these diseases would be preventable and controllable. Nutraceuticals used in cardiovascular diseases are Anti-oxidants, Dietary fibers, Omega-3 poly unsaturated fatty acids, Vitamins, minerals for prevention and treatment of CVD. Milk and eggs having gamma linolenic acid (GLA) which has many benefits, including prevention and management of cardiovascular diseases. Polyphenols (in grape) prevent and control arterial diseases. Flavonoids (in onion, vegetables, grapes, red wine, apples, and cherries) Block the ACE and strengthen the tiny capillaries that carry oxygen and Essential nutrients to all cells [2-9].

B. Diabetes

Diabetes mellitus is characterized by abnormally high levels of blood glucose, either Due to insufficient insulin production, or due to its ineffectiveness. The most common forms of Diabetes are type 1diabetes (5%), an Autoimmune disorder, and type 2 diabetes (95%), which is associated with obesity. Gestational diabetes occurs in pregnancy. Globally the total number of people with Diabetes is projected to raise from 171 million In 2000 to 366 million in2003.Docosahexaenoic acid modulates insulin Resistance and is also vital for neurovascular Development. This is especially important in Women with gestational diabetes mellitus which foster the recommendation for essential Fatty acids during pregnancy. Lipoic acid is a universal antioxidant, now used in Germany for the treatment of diabetic Neuropathy. It is possible that lipoic acid may be more effective as a long-term dietary Supplement aimed at the prophylactic Protection of diabetics from complications. Dietary fibers from psyllium have been used Extensively both as pharmacological Supplements, food ingredients, in processed Food to aid weight reduction, for glucose Control in diabetic patients and to reduce lipid Levels in hyperlipidemia.Good magnesium status reduces diabetes risk And improves insulin sensitivity; chromium. Picolinate, calcium and vitamin D appear to Promote insulin sensitivity and improve Glycemic control in some diabetics; extracts of Bitter melon and of cinnamon have the Potential to treat and possibly prevent Diabetes. However it has been suggested thatNutraceuticals with meaningful doses of Combinations may substantially prevent and presumably could be marketed legally [10-15].

C. Cancer

Cancer has emerged as a major public health problem in developing countries. A high risk of cancer is associated with chronic inflammation risk. Chronic inflammation is also linked with immune suppression, which is a risk factor for Cancer. At the molecular level, free radicals and aldehydes, produced during chronic inflammation, can induce deleterious gene mutation and posttranslational Modifications of key cancer-related proteins. In year 2000, malignant tumors were responsible for 12 per cent of the Nearly 56 million deaths worldwide from all causes. According to the World Cancer Report the cancer rates there would be 15 million new cases in the year 2020 i.e. a Rise in 50%. Nutraceuticals used in cancer are lycopene concentrates in the skin, testes, adrenal and prostate where It protects against cancer. Lycopene is one of the majorCarotenoids in western diets and is found almost exclusively In tomatoes, water melon, guava, pink grapefruit and Papaya. Phytochemicals derived from herbs and spices also have potential ant carcinogenic and anti-mutagenic Activities, A broad range of "phytoestrogens" with a claimed Hormonal activity, is recommended for prevention of Prostate/breast cancer. Flavonoids found in citrus fruit Appear to protect against cancer by acting as antioxidants Soy foods source of isoflavones, curcumin from curry and Soya isoflavones possess cancer chemo preventive Properties. Ellagic acid is a proven anti-carcinogen present In strawberries, cranberries and walnuts. Top of form Beet Roots, cucumber fruits, spinach leaves, and turmericRhizomes, were reported to possess anti-tumour activity Tannins present in blackberries, blueberries, cranberries, Grapes, lentils, tea and wine with advantage to detoxify Carcinogens and scavenge harmful free radicals. Curcumin (diferuloylmethane) which is a polyphenol of turmeric Possesses anticarcinogenic, antioxidative and antiinflammatory properties. Pectin (apples) prevents prostate Cancer by inhibiting cancer cells from adhering to other body cells [16-22].

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D. Arthritis

Osteoarthritis is degenerative damage and loss of the articular cartilage of the joint due to loss of protein Substance between the bones of joints. 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. Joint disorders may reduce physical Activity in individuals resulting in energy imbalance and weight gain. Nutraceuticals used in osteoarthritis are Glucosamine (GLN) and chondroitin sulphate (CS) are widely used to improve symptoms of osteoarthritis. Methyl Sulfonyl Methane (MSM) used in combination with Glucosamine and chondroitin for helping to treat or prevent Osteoarthritis or joint disorder [23].

E. Obesity

Obesity is now a global public health problem, defined as an Unhealthy amount of body fat, which is responsible for Many disorders like angina pectoris, congestive heart Failure, hypertension, hyperlipidaemia, respiratory Disorders, renal vein thrombosis, osteoarthritis, cancer, Reduced fertility etc. The principal causes this rapid rise in Obesity rates is the increased accessibility of high-fat, Energy dense foods such as energy-rich foods (snacks, Drinks, burger, pizzas etc) can encourage weight gain, which Calls for a limit in the consumption of saturated and trans Fats apart from sugars and salt in the diet about 315 million People are estimated to fall into the WHO-defined obesity Categories. Nutraceutical interventions are currently being investigated on a large-scale basis as potential treatments for obesity and weight management. Nutraceuticals used in Obesities are Buckwheat is a crop has special biological Activities of cholesterol lowering effect, anti-hypertension Effects and improving the constipation and obesity condition by acting similar as to dietary fiber present in Food. 5-hydroxytryptophan and green tea extract may promote weight loss, while the former decreases appetite, the later increases the energy expenditure. Herbal stimulants, such as ephedrine, caffeine, ma huang-guarana, and green tea help in body weight loss. A blend of glucomannan, chitosan, fenugreek, G Silvestre, and vitamin C in the dietary supplement significantly reduced body weight. Conjugated linoleic acid (CLA), capsaicin, Momordica Charantia (MC) possesses potential anti obese properties [24-26].

F. Constipation

A fibre rich diet can relieve constipation. Herbal medicines and certain phytochemicals are very useful to treat constipation. Botanical laxatives such as senna, frangula, aloe, rhubarb and cascara are used in the treatment of constipation. Some natural fibers present in skin of vegetables and fruits, leafy vegetables, buckwheat seed proteins have beneficial role in constipation [27].

G. Diarrhoea

The discomfort caused from diarrhea is due to excessive fluid loss followed by dehydration. Affected individuals are advised to take herbal drinks like peppermint tea, rosemary, lemon, orange, and catnip to get relief. They can be beneficial in stopping diarrhea due to the presence of tannin which plays an important role in contracting the human tissue which results in fluid retention in the body [28].

H. Gastritis

Certain flavonoids show anti-ulcer activity and help in prevention of gastric mucosal lesions. The bioactive component of aloe vera is reported to help in prevention of stress-induced gastric ulceration in the rats [108]. Similarly, curcumin has proven to be effective in improving endoscopic healing of pepticulcers. [29].

I. Nutraceutical Scenario in India

There is growing acceptance of the potential role of nutraceuticals and functional foods to minimize health risks, lifestyle diseases and improve health quality among the Indian population. People are becoming more aware of their nutritional needs and taking progressive steps to prevent chronic lifestyle diseases for well-being. The youngsters are now actively pursuing fitness practices to prevent obesity, cardiovascular diseases, diabetes and other secondary complications derived from that. The Indian nutraceuticals industry is rapidly growing despite the economic down turn and rising inflation rates. Literature suggests that there is a huge scope of growth of nutraceuticals market in India and is concentrated in the southern part followed by the eastern part of the country. This market is majorly dominated by some pharmaceutical companies like Dabur, Himalaya Drugs etc. Previously, production of functional foods or nutraceuticals was limited to food companies only, but pharmaceutical companies are now diversifying their product line due to earn revenue on this. Simultaneously, extensive research is going onto utilize the large pool of natural resources having minimal side effects and to move into less expensive drugs.

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The dietary supplements, such as vitamins, antioxidants, purified extracts and spot medicines have been captured by pharmaceutical giants and nutraceuticals along with beverage are now majorly produced by Fast Moving Consumer Goods (FMCG) companies like Amway, Sami Labs, Zandu Pharmaceuticals etc. It is predicted by extensive market research by www.bccresearch.com that global nutraceutical market should touch $336.1 billion by 2023 from $230.9 billion in 2018 at a Compound Annual Growth Rate (CAGR) of 7.8%, from 2018 to 2023. According to the Assocham Report, the nutraceuticals market in India is estimated at around $ 4 billion in 2017 and is expected to grow at a significant 21% CAGR to $ 10 billion in 2022. For accelerated growth, production companies along with researchers and scientists must educate common people for their better understanding and to adopt effective communication strategies without harming the interest of chemists and druggists for the target consumers [30 -34].

III. CONCLUSION

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 terpenes, beta carotene, curcumins, limonene, Eugenol, pinene, safranal, geraniol, aloine, caryophyllene, Lycopene and silymarin. These constituents are prepared into dosage forms as topical, oral, etc. viz. creams, lotions, Ointments, emulsions, unani formulations, aromatic oils, Microemulsions, SMEDDS, beads, tablets, emulgels, herbal Formulations etc. used in various categories as antidiabetic, Antibiotic, antimicrobial, anti-inflammatory, anti-cancer, Protective, etc. Nutraceuticals are quickly replacing Pharmaceuticals in prevention and management of acute And chronic health problems. Nutraceuticals show an ample Scope to flourish in future as therapeutic agents with Preventive and curative properties. Althoughnutraceuticals Show a promising approach for the promotion of health and Prevention of various diseases, yet health professionals, Nutritionists, toxicologists should strategically work in Collaboration to explore them for their full potential. A ray of cure preference in the mind of common patients revolves Around nutraceuticals because of their false perception “All Natural medicines are good”. Also, a high cost of Prescription pharmaceuticals and reluctance of some Insurance companies to cover the cost of drugs help the Nutraceuticals to solidify their presence in the global market of therapies and therapeutic agents. Use of nutraceuticals As an attempt to explore their therapeutic potential with Minimum side effects as compared to conventional Pharmaceuticals has observed a great success and met with Huge monetary benefits. The preference for exploration and production of nutraceuticals over pharmaceuticals is evident in various pharmaceutical and biotechnology Companies. Nutraceuticals still need extensive scientific Research to prove their preference over pharmaceuticals. It can be achieved by enactment of FIM Proposed Nutraceutical Research and Education Act (NREA). It includes creation of a Nutraceutical Commission (NUCOM) Specifically for the review and approval of nutraceuticals as Well as clinical research. As per FIM, NREA should look into Exclusive rights over the research and development. Cost Wise of nutraceuticals should be kept within the Accessibility of common man. There is an imperative need to focus on the establishments of new horizons in Nutraceutical development.

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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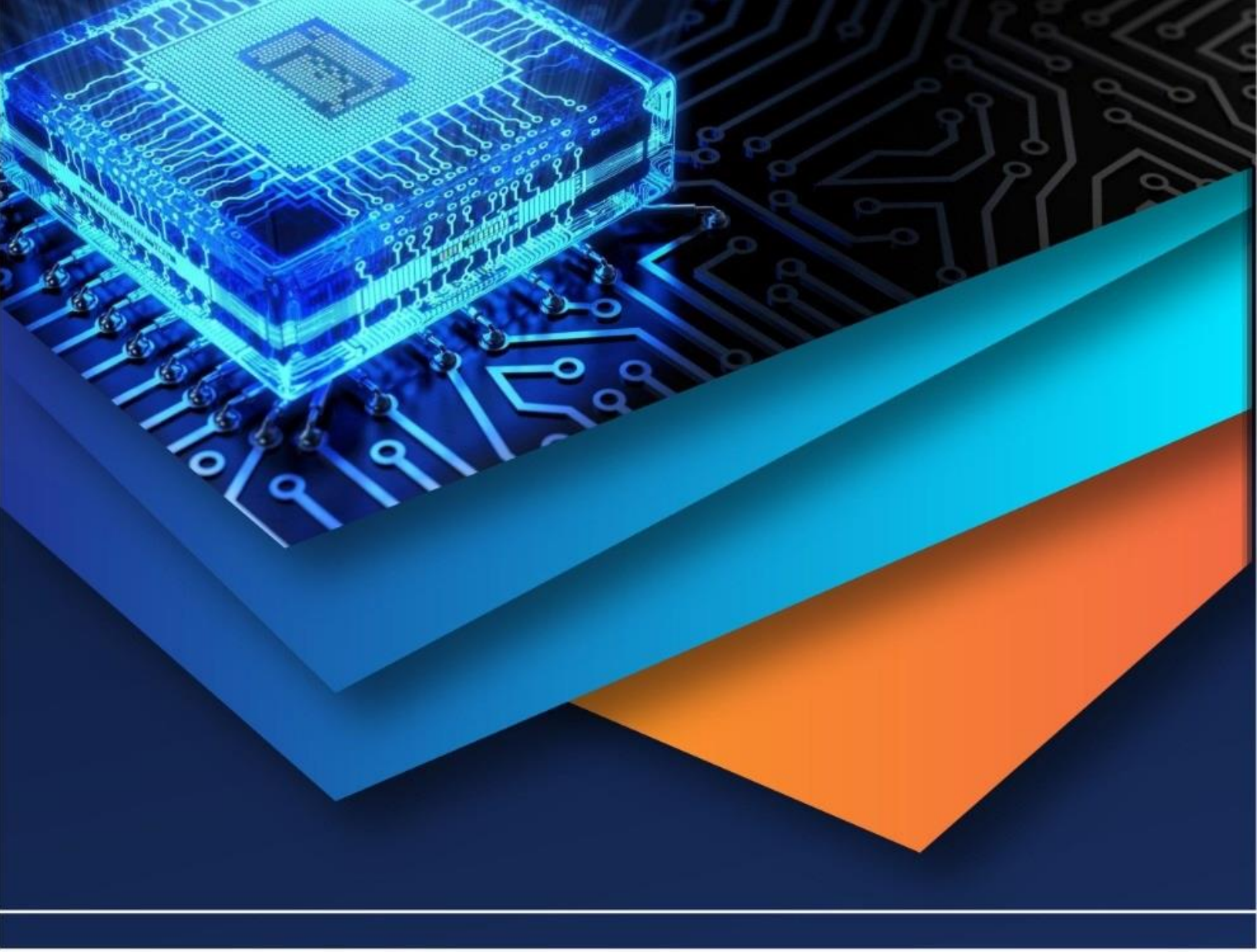

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