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A Comprehensive Review on Nutraceutical

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Abstract: Nutraceuticals are food-derived substances with additional medical or health benefits beyond their basic nutritional value, encompassing dietary supplements, herbal products, genetically engineered foods, and probiotics, used for disease prevention, treatment, and health promotion.
Nutraceuticals have been used not only for nutrition but also as a support therapy for the prevention and treatment of various diseases, such as to reduce side effects of cancer chemotherapy and radiotherapy. Diverse novel nano formulation approaches tend to overcome challenges involved in formulation development of nutraceuticals. In this review article, the latest key findings (clinical studies) on nutraceuticals that show the therapeutic action of nutraceutical's bioactive molecules on various diseases have also been discussed
Keywords: Nutraceutical, interactions, nutrition, prevention, therapeutics Pharmaceutical formulation.

I. INTRODUCTION

Nutraceuticals are characterized as 'specially designed preparations', formulated with the aim of fulfilling specific dietary requirements and/or offer preventive health care. Nutraceuticals are the formulation of nutrient/nutrients which helps in prevention and treatment of some diseases, in addition to a supplement diet. Nutraceutical is a term given by Dr. Stephen De Felice in 1989 and came from two words "nutrition" and "pharmaceutical". These are foods or a part of foods that are beneficial in providing various health benefits including the treatment and/or prevention of the disease. Science of nutrition has increasingly achieved new horizons, starting from the anticipation of deficiencies in nutrients to prominence on human health and prevention and treatment of chronic ailments.

Terms 'nutraceuticals', 'food supplements', 'dietary supplements' have evolved after the concept was originated by Dr. De Felice. There is no sharp demarcation between food supplements and nutraceuticals given by regulatory authorities. Literature of recent years emphasizes on redefining the concept of nutraceuticals, taking into consideration the efficacy, safety and toxicity of these products. Food products are nourishing substances that are eaten, drunk or otherwise taken to sustain life, provide energy and promote growth. Currently, isolation of nutrients from these food products are well recognized and used. The starting point to differentiate food/dietary supplements and nutraceuticals is the identification of an epidemiological target, followed by safety and efficacy studies that understand the mechanism of action. One approach to differentiate these two types of formulations is describing 'food supplements' as agents to compensate deficiencies in micro- or macronutrients; in addition, the use of a "nutraceutical" in the treatment of a pathological disease must be supported by strong scientific evidence [1]. With adequate clinical evidence, nutritional supplements should have a strong safety profile with few undesirable side effects and better bioavailability.

There is a very fine line of demarcation between two type of formulations: the same ingredients may work as a nutraceutical or food supplement, but may be demarcated on the basis of claims. Nutraceuticals include single or combinations of pro- and pre-biotic foodstuff and food for special medical uses; and food supplements includes single or combinations of mineral, vitamins, protein supplements, functional foods and herbal products. By prolonging or eliminating the need for pharmaceuticals in subjects to fit for an alternative nonpharmacological treatment to a pathological condition, the incorporation of nutraceuticals into daily diet may aid in the prevention of pathological disorders. There are claims that foods including spices and herbs possess the tendency to decrease the risk of many diseases and can be highly beneficial in improving the quality of life [2]. There is a plethora of benefits that nutraceuticals have provided, including their promising results in the prevention and treatment of complicated diseases. However, there is a need of administration and prescription of nutraceuticals and they should be strictly regulated in order to prevent their uncontrollable use and side effects.

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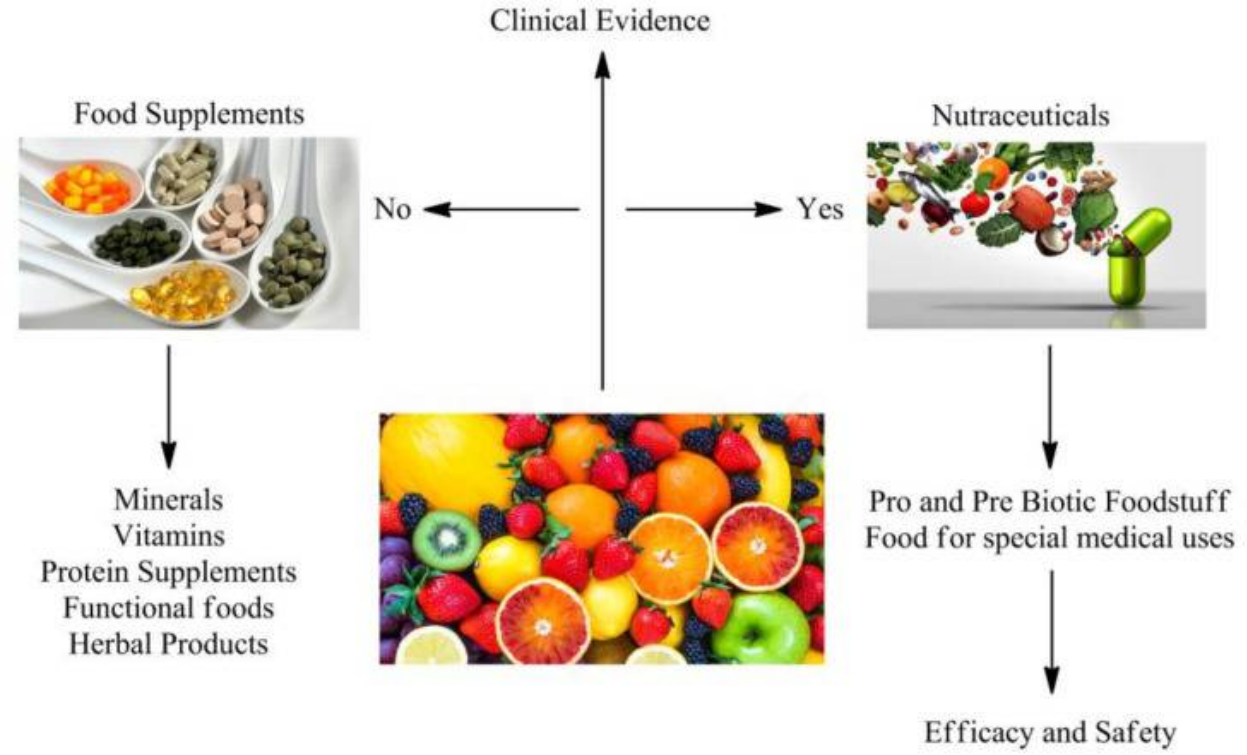


Figure 1
Potential roles of nutraceuticals.

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.

B. Diabetes

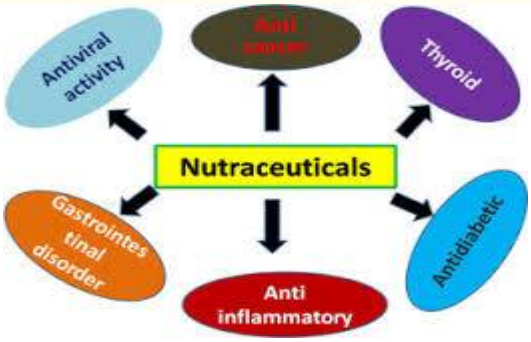
Diabetes mellitus is diseases caused due to abnormally high levels of blood glucose, either due to insufficient insulin production, or due to its ineffectiveness. There are two types of diabetes mellitus are type 1 diabetes (5%), an autoimmune disorder, and type 2 diabetes (95%), which is associated with obesity. Globally the total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2003. Diet therapy is the cornerstone for the management of gestational diabetes mellitus. Although there is widespread use of herbal dietary supplements that are believed to benefit type 2 diabetes mellitus, few have been proven to do so in properly designed randomized trials. Nutraceuticals used in diabetes are Lipoic acid, an antioxidant, for treatment of diabetic neuropathy. Ethyl esters of n-3 fatty acids may be beneficial in diabetic patients.

C. 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.

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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.



III. APPLICATION

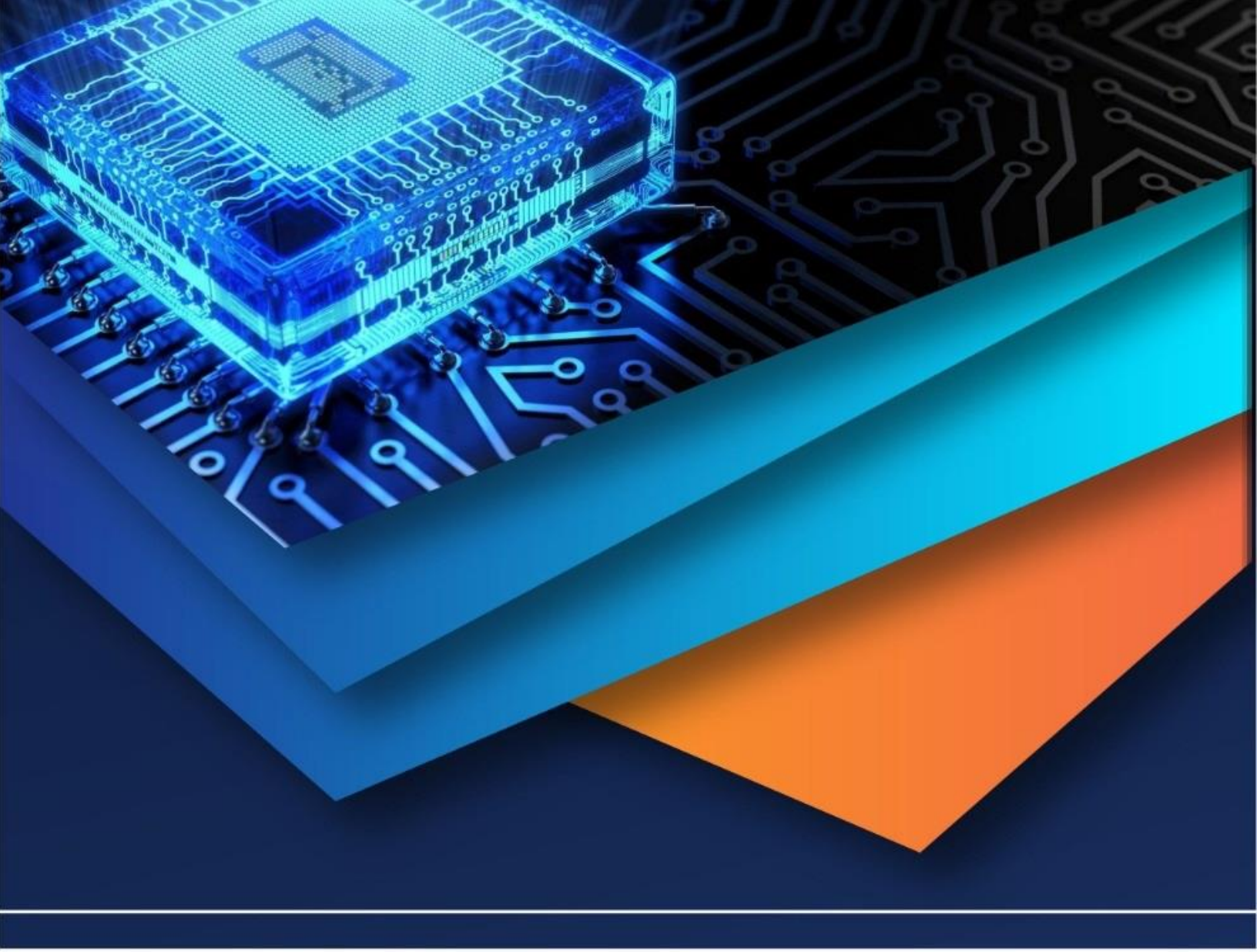
Nutraceuticals are used to prevent illness, boost immune function, and improve overall health by providing essential nutrients, antioxidants, and other bioactive compounds. They can help manage , enhance eye health, combat inflammation, support mental well-being, and provide daily vitamins and minerals. Nutraceuticals offer a natural, preventative approach to wellness, acting as specialized food-derived supplements that strengthen the body's natural defenses and support various bodily functions

IV. 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. Although nutraceuticals 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.

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