

NEW CONCEPT IN NUTRACEUTICAL AS ALTERNATIVE FOR PHARMACEUTICALS

Vaishali D. Magar*, Prajakta Sonwane, Dr. Sudarshan Nagrale, Dr. Amita Dongare

Dattakala College of Pharmacy, Swami Chincholi (Bhigwan).

Article Received on
17 October 2023,

Revised on 06 Nov. 2023,
Accepted on 27 Nov. 2023

DOI: 10.20959/wjpr202321-30428



***Corresponding Author**

Vaishali D. Magar

Dattakala College of
Pharmacy, Swami Chincholi
(Bhigwan).

ABSTRACT

Using food products to promote health and cure disease is renowned. Currently, most of the drug molecules available in the formulations were anciently used in their crude form. Dr Stephen De Felice first coins the term nutraceuticals in 1989 to provide medical or health benefits including the prevention and treatment of diseases. Nutraceuticals are products, which other than nutrition are also used as medicine. A nutraceutical product may be defined as a substance, which has physiological benefit or provides protection against chronic disease. 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 present new concepts about nutraceuticals based on their diseases modifying indications. The recently published papers about different aspects of nutraceuticals as alternative for pharmaceuticals were used terms included nutraceutical an allergy, cardiovascular, cancer, diabetes, immune, obesity.

KEYWORDS: Antioxidants, nutrition, food supplements, nutraceutical products, nutraceuticals, oxidative stress.

INTRODUCTION

Nutraceutical is a term derived from “nutrition” and “pharmaceutics.” The term is applied to products that are isolated from herbal products, dietary supplements (nutrients), specific diets, and processed foods such as cereals, soups, and beverages that other than nutrition are also

used as medicine. In the US, the term “nutraceutical” products are regulated as drugs, food ingredients and dietary supplements. The term is not defined the same in different countries but is usually defined as a product isolated from foods that is generally sold in medicinal forms not usually associated with food. A nutraceutical product may be defined as a substance, which has physiological benefit or provides protection against chronic diseases.^[1]

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.^[2]

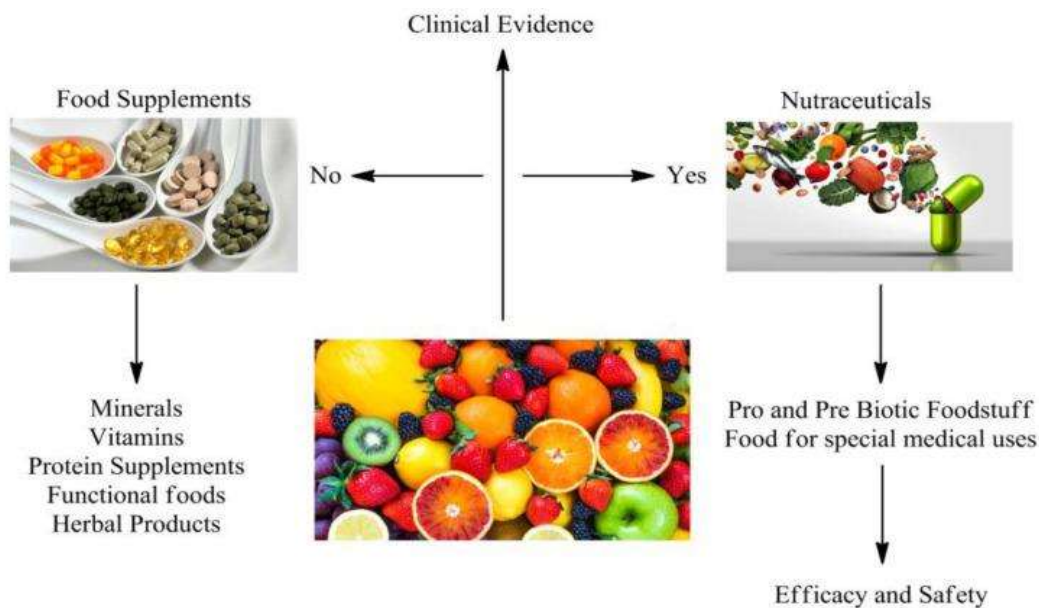


Figure:1.

However, an officially shared and accepted definition of nutraceuticals is missing; these are also referred as ‘pharma food’—a powerful toolbox that is beyond the diet but before the drugs. Various formulations containing macronutrients (required in large amounts, e.g., omega-3 fatty acids, magnesium, potassium and calcium)^[3], micronutrients (required in lesser amounts, e.g., minerals or vitamins)^[4] and phytochemicals that are present in the food source^[5] and are available at drug stores. Further, probiotics, minerals, polyunsaturated fatty acids, carotenoids, amino acids and proteins, vitamins, dietary fibers, spices and phytochemicals^[6,7,8] have also become part of these formulations. Nutraceuticals exist as various types and may range from herbal products to isolated nutrient diets and may go up to existing genetically modified foods. Plant foods such as vegetables, whole grains and vitamins are rich in dietary phytochemicals. Dietary supplements are consumed as such, or as isolated active ingredients. These phytochemicals are immensely diverse, and these include carotenoids, phenolics, alkaloids, organosulfur and nitrogen containing compounds. However, these products may not be substantiated by scientific data on their safety, efficacy and effect on health and/or pathological conditions.^[9]

Nutraceuticals as Specialized Medical Products

According to the legal basis, dietary foods and enhancements for distinct medical purposes are specialized medical products. These dietary supplements should be regulated according to the regulatory agencies such as ‘European Food Safety Authority’ and the ‘U.S. Food and Drug Administration’, in addition to numerous national protocols issued most often by the ‘Ministry of Agriculture’ and/or ‘Ministry of Health’ of various countries around the world.^[10]

Nutraceuticals are non-specific biological therapies used to promote wellness, prevent malignant processes and control symptoms. Figure 2 shows a flow chart indicating role of nutraceuticals in health promotion and disease prevention.

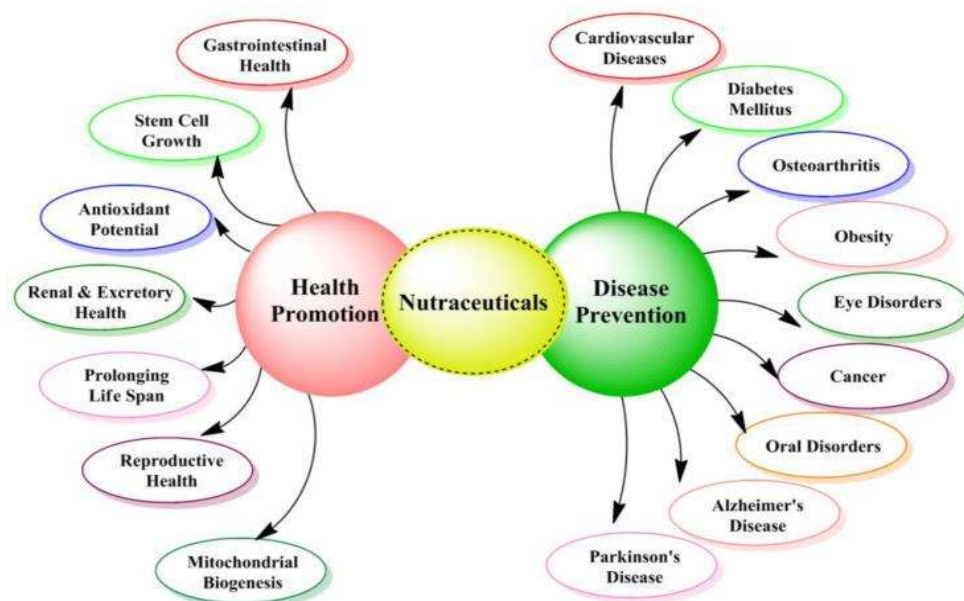


Figure:2.

METHOD

1. Cardiovascular diseases and nutraceuticals

Worldwide, the prevalence of CVD and the researches in this area is increasing CVD is a term which is used for disorders of the heart and blood vessels and includes coronary heart disease (heart attack), peripheral vascular diseases, cerebrovascular disease (stroke), hypertension, heart failure, and so on. It is believed that low intake of vegetables and fruits is associated with a high mortality in CVD.^[11] Majority of the CVD are preventable. Many studies have reported a protective role for a diet rich in vegetables and fruits against CVD.

Nutraceuticals in the form of vitamins, minerals, antioxidants, dietary fibers and omega-3 polyunsaturated fatty acids (n-3 PUFAs) together with physical exercise are recommended for prevention and treatment of CVD. The molecules such as polyphenols alter cellular metabolism and signaling, which is believed to reduce arterial disease.^[12,13]

2. Nutraceuticals in Cancer Chemo- and Radiotherapy

Radiotherapy and chemotherapy are conventional therapies for cancer therapy but have serious side effects and various complications (e.g., pain, fatigue, diarrhea, vomiting, nausea and hair loss). There are some cancers that are highly resistant to chemo- and radiotherapy and, because of this, systemic cytotoxic chemotherapy and radiotherapy are not very operative at cultivating patient subsistence. In this situation, various combination therapies

overlay an efficient means to treat cancer. Likewise, there are a variety of plants and natural supplements that are observed to reduce side effects of radiotherapy and chemotherapy. Thus, these should be used in the combination with radio- or chemotherapy for the reduction of side-effects and to augment treatment effectiveness. Proliferation of cells leading to cancer results in the need to treat, and the nutraceutical industry is evolving to treat the needs of the consumers. The evolution of the nutraceutical industry can be recognized as it has now reached disease prevention after it started from health promotion.^[14]

3. Allergy and nutraceuticals

Allergy is a hypersensitivity disorder of the immune system. An allergic reaction usually occurs when a person's immune system reacts to normally harmless substances. Allergic reactions are distinctive because of excessive activation of certain white blood cells 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.

Quercetin protects low-density lipoprotein (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.^[15]

4. Diabetes and nutraceuticals

The use of ethyl esters of N-3 Fatty Acids may be beneficial in diabetic patients. Docosahexaenoic acids (DHA) modulate insulin resistance and are also vital for neurovascular development.^[16] Docosahexaenoic acid is an omega-3 fatty acid that is found along with eicosatetraenoic acid (EPA) in cold-water fish, including tuna and salmon. DHA plays a key role in the development of eye and nerve tissues. Various nutraceuticals are used to treat diabetes are.

- Antioxidant
- Vitamin C
- Calcium
- Vitamin D
- Carbohydrates
- Fat
- Protein

5. Immune system and nutraceuticals

A wide variety of nutraceuticals have been shown to impose crucial roles in immune status and susceptibility to some disease's conditions. Nutraceuticals that belong to the category of immune boosters are useful to improve immune function. They include extracts from the coneflowers, or herbs of the genus *Echinacea*, such as *Echinacea angustifolia*, *Echinacea pillida*, *Echinacea purpurea*. The coneflowers in particular are a popular herbal remedy used in the central United States, an area to which they are indigenous. *Astragalus mongolicus*, *Astragalus membranaceus*, and other herbs of the *Astragalus* genus are also effective immune boosters. *Astragalus* stimulates development and transformation of stem cells in the marrow and lymph tissue to active immune cells. Phytoestrogens mostly are recommended for prevention of various diseases related to hormonal imbalance. There is a special interest in soy isoflavones as potential superior alternatives to the synthetic selective estrogen receptor modulators, which are currently applied in hormone replacement therapy. Garlic and morphine also are good example of the nutraceuticals, which respectively stimulate and suppress immune system.^[17]

6. Obesity and nutraceuticals

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.^[18]

CONCLUSION

Nutraceuticals have proven health benefits and disease prevention capabilities, which should be taken under their acceptable recommended intake. Nutraceuticals play an important role in therapeutic development in the current self-medication landscape, but their success depends on maintaining their quality, purity, safety, and efficacy. At present, a wide range of nutraceuticals have been successfully marketed due to their excellent therapeutic activity against various diseases, there is currently a great demand for natural products in the market, and the nutraceutical industry in the food industry and pharmaceutical industry is also developing faster and faster. The global market is currently in a post-recession experimental growth phase, although the impact of the recession has diminished; the nutraceuticals market

is expected to remain in a growth phase, driven by new markets in countries such as India, China, Brazil, the United States, Europe, etc. People have changed their minds and decided to adopt a new healthy lifestyle and diet, creating a new concept of "Health for All".

REFERENCES

1. Kalra EK. Nutraceutical – Definition and introduction. *AAPS Pharm Sci*, 2003; 5: E25. [PMC free article] [PubMed] [Google Scholar]
2. Santini A., Novellino E. Nutraceuticals—Shedding Light on the Grey Area between Pharmaceuticals and Food. *Expert Rev. Clin. Pharmacol*, 2018; 11: 545–547. doi: 10.1080/17512433.2018.1464911.
3. Lokhande S.S. Role of Nutraceuticals in Various Diseases: A Comprehensive Review. *Asian J. Pharm. Res*, 2018; 8: 236–240. doi: 10.5958/2231-5691.2018.00040.0.
4. Hopper I., Connell C., Briffa T., De Pasquale C.G., Driscoll A., Kistler P.M., Atherton J.J. Nutraceuticals in Patients with Heart Failure: A Systematic Review. *J. Card. Fail*, 2020; 26: 166–179. doi: 10.1016/j.cardfail.2019.10.014.
5. Natic M., Pavlovic A., Bosco F.L., Stanisavljevic N., Zagorac D.D., Aksic M.F., Papetti A. Nutraceutical properties and phytochemical characterization of wild Serbian fruits. *Eur. Food Res. Technol*, 2019; 245: 469–478. doi: 10.1007/s00217-018-3178-1.
6. Mishra S.S., Behera P.K., Kar B., Ray R.C. Advances in probiotics, prebiotics and nutraceuticals. In: Panda S.K., Shetty P.H., editors. *Innovations in Technologies for Fermented Food and Beverage Industries*. Springer; Cham, Switzerland, 2018; 121–141.
7. Bordignon R., Volpato A., Glombowsky P., Souza C.F., Baldissera M.D., Secco R., Da Silva A.S. Nutraceutical effect of vitamins and minerals on performance and immune and antioxidant systems in dairy calves during the nutritional transition period in summer. *J. Therm. Biol*, 2019; 84: 451–459. doi: 10.1016/j.jtherbio.2019.07.034.
8. Sokola-Wysoczanska E., Wysoczanski T., Wagner J., Czyz K., Bodkowski R., Lochynski S., Patkowska-Sokola B. Polyunsaturated fatty acids and their potential therapeutic role in cardiovascular system disorders—A Review. *Nutrients*, 2018; 10: 1561. doi: 10.3390/nu10101561.
9. Patra S., Nayak R., Patro S., Pradhan B., Sahu B., Behera C., Bhutia S.K., Jena M. Chemical diversity of dietary phytochemicals and their mode of chemoprevention. *Biotechnol. Rep*, 2021; 30: e00633. doi: 10.1016/j.btre.2021.e00633.

10. Inbathamizh L., Prabavathy D., Sudha S. Quality Assurance of Nutraceuticals and Their Approval, Registration, Marketing. *Handb. Nutraceuticals Nat. Prod. Biol. Med. Nutr. Prop. Appl*, 2022; 2: 337–360.
11. Rafieian-Kopaei M. Medicinal plants and the human needs. *J HerbMed Plarmacol*, 2012; 1: 1–2.
12. Shahbazian H. World diabetes day; 2013. *J Renal Inj Prev*, 2013; 2: 123–4.
13. Asgary S, Sahebkar A, Afshani M, Keshvari M, Haghjooyjavanmard SH, Rafieian-Kopaei M. Clinical evaluation of blood pressure lowering, endothelial function improving, hypolipidemic and anti-inflammatory effects of pomegranate juice in hypertensive subjects. *Phytother Res*, 2013.
14. Saldanha S.N., Tollefsbol T.O. The role of nutraceuticals in chemoprevention and chemotherapy and their clinical outcomes. *J. Oncol*, 2012; 2012: 192464. doi: 10.1155/2012/192464.
15. Kruger CL, Murphy M, DeFreitas Z, Pfannkuch F, Heimbach J. An innovative approach to the determination of safety for a dietary ingredient derived from a new source: Case study using a crystalline lutein product. *Food Chem Toxicol*, 2002; 40: 1535–49.
16. Anwar F, Latif S, Ashraf M, Gilani AH. *Moringa oleifera*: a food plant with multiple medicinal uses. *Phytother Res*, 2007; 21(1): 17-25.
17. Limer JL, Speirs V. Phyto-oestrogens and breast cancer chemoprevention. *Breast Cancer Res*, 2004; 6: 119–27.
18. Rubin SA, Levin ER. Clinical review 53: The endocrinology of vasoactive peptides: Synthesis to function. *J Clin Endocrinol Metab*, 1994; 78: 6-10.