WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 9, Issue 3, 1414-1421. Review Article ISSN 2277– 7105

# A REVIEW ARTICLE ON: NUTRACEUTICALS

**Shraddha T. Nemane, Nilesh N. Shinde*, Yuvraj M. Katu and Rushikesh R. Waghmare**

Shivlingeshwar College of Pharmacy Almala Tq. Ausa Dist. Latur, Maharashtra India.

Article Received on
18 Jan. 2020,

Revised on 07 Feb. 2020,
Accepted on 28 Feb. 2020,

DOI: 10.20959/wjpr20203-16811

***Corresponding Author**
**Nilesh N. Shinde**
Shivlingeshwar College of Pharmacy Almala Tq. Ausa Dist. Latur, Maharashtra India.

## ABSTRACT

Nutraceutical is the combination of these two i.e 'Nutrition' and 'Pharmaceutical'. Nutraceuticals, in broad are food or a fraction of food singing or showing a significant function in modifying and maintaining normal physiological function that maintains healthy human beings. The principal reasons for the development of the nutraceutical market global are the current population and the health trends. The food products used as nutraceuticals can be categorized as differentally such as prebiotics, dietary fibre, polyunsaturated fatty acids, antioxidants and other various types of herbal or natural foods. The Nutraceuticals assist in fighting with several of the major health related issue of the current century such as diabetes, obesity, cardiovascular diseases, cancer, osteoporosis, arthritis, cholesterol etc. In entire, 'Nutraceutical' has led to the new era of medicine and health, in which the food industry has develop into a research-oriented sector.

**KEYWORDS**: Dietary Fiber, nutraceuticals, prebiotics, polyphenols, spices, human diet.

## INTRODUCTION

'NUTRACEUTICAL' the term and that was coined by Stephen combining the two terms i.e. 'nutrition' and 'pharmaceutical.'[1] Defelice MD, founder and chairman for innovation in Medicine, New Jersy, in 1989. According to him,'nutraceuticals are food or part of a food that provides health benefits and are used for prevention ortreatment of a disease'[2] Hippocrates (460- 377 BC), known as the father of modern medicine stated, 'Let food be thy medicine and medicine be thy food' to establish the relationship between appropriate foodsfor health and their therapeutic benefits.[3] Nutraceuticals are the isolated product obtained from foods, mostly available in medicinal forms and play a vital role in improving health, provides protection against chronic diseases. Nutraceuticals are widely being used

rather than medicines because they reduces side-effect and have positive physiological effects on the human body. Nutraceuticals have also been developed for treating a variety of diseases like colon cancer, diabetes and Alzheimer's disease. Nutraceuticalsare derived from various sources such as medicinal plants, marine organisms, vegetables and fruits. In 2006, the Indian government passed Food Safety and Standard Act to regulate the nutraceuticalindustry. In this review, an attempt has been made to discuss all aspects of Nutraceuticals- Definition, categories, classification, present status, properties with their therapeutic benefits, their use in various diseases, marketed products, application, future and future aspects.[1] In human health, nutraceuticals play a major role in treatingvarious diseases like obesity, cardiovascular diseases, cancer, osteoporosis, arthritis, diabetes, cholesterol etc. They help in maintaining our normal physiological functions.[4]

## CATEGORIES OF NUTRACEUTICALS

I. Nutrient: A feed constituent should be available in the form and given at a level that will help support the life of an animal. Some of the feed nutrients are proteins, fats, carbohydrates, minerals and vitamins.
II. Dietary Supplement: A product that contains one or more of the following dietary ingredients: vitamin, mineral, herb or other botanical, amino acid (protein) and also includes concentrates, constituents, extracts or metabolites of these compounds.
III. Nutraceutical: Any non-toxic food component that has scientifically proven health benefits, including prevention and treatment of disease.
IV. Herbals: Herbs or botanical products are used as concentrates and extracts that provide various remedies to treat acute and chronic diseases.[5]

## PRESENT GLOBAL STATUS OF NUTRACEUTICALS

Vitamins and minerals account for 85% of the global market while antioxidants consist about 10%. The herbal extracts constitute about 5% of the market. US is the largest market for the nutraceuticals followed by India and China in the second position. Soy-food has gained popularity because of its antidiarrheal, hypolipidaemic, anticancerogenic and antiosteoporotic effects. Prebiotics are also widely used because it reduces cholesterol, prevents cancer, osteoporosis, allergy and type-2 diabetes.[6-9,10,11]

The demand for nutraceutical ingredients has increased from 5.8% annually to $ 15.5 billion. China and India are the fastest growing nutraceutical markets. Herbal and non-herbal extracts are used worldwide and widely used by medical professionals and increased from 6.5%

annually to $1.85 billion in 2010. Nutrients, minerals and vitamins demand reached $ 9.5 billion in 2010 up to 6.3% annually from 2005. Global demand for nutraceutical vitamin ingredients increased up to 4.6% annually to $4.2 billion in 2010.[10]

## NUTRACEUTICALS AND DISEASES

### Nutraceuticals against Alzheimer's disease (AD)

Alzheimer's disease (AD), it is also called SDAT (senile dementia of the Alzheimer type), primary degenerative dementia of the Alzheimer's type (PDDAT), or generally in another word Alzheimer's, is the mainly common form of dementia.[12]

### Cardiovascular diseases[13-20]

Worldwide, the burdens of chronic diseases like cardiovascular diseases, cancers, diabetes and obesity is rapidly increasing. In 2001, chronic diseases contributed near about 59% of the 56.5 million entirety reported deaths in the world and 46%of the global lumber of disease. Cardiovascular diseases (CVD) is the name for the group of disorders of the heart and blood vessels and include hypertension (high blood pressure), coronary heart disease (heart attack), cerebrovascular disease (stroke), heart failure, peripheral vascular disease, etc. In 1999 CVD i.e Cardiovascular diseases only contributed to a third of global deaths and by 2010 it would be the leading cause of death in developing countries. Majority of the CVD are preventable and controllable. It was reported that low intake of fruits and vegetables is associated with a high mortality in cardiovascular disease.[13,14] Many research studies have identified a protective role for adiet rich in fruits andvegetables against CVD21. Apart from this, nutraceuticals in the form of antioxidants, dietary fibers, omega-3 polyunsaturated fatty acids (n-3 PUFAs), vitamins, and minerals are suggested together with physical exercise for prevention as well as treatment of CVD. It has been established that the molecules like polyphenols present in grapes and in wine modify cellular metabolism and signalling, which is consistent with reducing arterial disease.[16] Flavonoids are broadly contributed in onion, endives, cruciferous vegetables, black grapes, red wine, grapefruits, apples, cherries and some berries too.[17] Flavanoids in plants available as flavones (containing the flavonoid apigenin found in chamomile); flavanones (hesperidins - citrus fruits; silybin- milk thistle flavonols (tea: quercetin, kaempferol and rutin grapefruit; rutinbuckwheat; ginkgo flavonglycosides - ginkgo)[18] play a major role in curing the cardiovascular diseases[19,20]

### Parkinson's disease[21-23]

Parkinson’s disease is a brain disorder that results from nerve damage in certain regions of

the brain causing muscle rigidity, shaking, and difficult walking[21] usually occurring in mid to late adult life. Canadian researchers indicated that vitamin E in food may be protective against Parkinson's disease.[22] Creatine appeared to modify Parkinson's disease features as measured by a decline in the clinical signs.[23]

**Diabetes**

Lipoic acid, an antioxidant is used for treatment of diabetic neuropathy[26] dietary fibres from psyllium have been used for glucose control in diabetic patients and to reduce lipid level in hyperlipidemia.[27] Ethyl esters of n-3 fatty acids may be beneficial in diabetic patients.[28] Docosahexaenoic acid modulates insulin resistance and is also vital for neurovisual development.[29]

**Cancer**

Flavonoids which block the enzymes that produce estrogen reduce of estrogeninduced cancers.[30] Phytoestrogens is recommended to prevent prostate/breast cancer.[31] Soy foods are source of Iso-flavones, curcumin from curry and soya isoflavones possess cancer chemo preventive properties.[32] Lycopene concentrates in the skin, testes, adrenal and prostate protects against cancer.[33]

## FUTURE ISSUES AND PROPOSALS

Change in the lifestyle can definitely avoid the diseases like metablic syndromes. One of the solutions in the lifestyle change is changes in their daily diet.

The key issues for Nutraceuticals are

Establishment of scientific evaluation standard for avoidance of diseases.

Establishment of evaluation system for disease prevention by different human trials & Establishment of seamless system to convey stage from basic research to different industrialization. Nutraceuticals are not essentially a single material; therefore the expected result for the prevention of disease might be somewhat complex action of various components which are present in the product, it is also important to compare preventative effects for different types of food. Hence, it is important to conduct biomarker research for avoidance of target diseases. Therefore, it is also essential to define the measurement method of biomarkers and standardize the indicators.[34]

Rising awareness levels about fitness and health, spurred by media coverage are prompting

the Most of the of people to lead healthier lifestyles, additional exercise, and eat healthy. The expanding nutraceutical market shows that the end users are seeking minimally processed food with extra nutritional benefits and organoleptic value. This improvement, in turn, is propelling growth in the nutraceutical markets globally. The emerging nutraceuticals industry seems destined to occupy the landscape in the new millennium. Its tremendous growth has implications for the food, pharmaceutical, healthcare, and agricultural industries.

## CHALLENGES AND LIMITATIONS ASSOCIATED WITH DELIVERY OF NUTRACEUTICALS

The nutraceutical formulations are been taken not as medicines but as diet. Hence, unlike the pharmaceutical preparations, nutraceuticals preparations need to fulfill a whole lot more requirements. Since, the nutraceuticals include dietary supplements, functional foods, etc., the components used in the formulation must be of food grade. This limits the choices for the researchers and decreases the scope of innovations in the nutraceutical domain. Therefore, selection of suitable material for the preparation of the formulation is a great challenge.[25]

After the selection of the materials, the next challenge appears in the selection of the delivery system. The nutraceuticals materials consist of the biological products such as herbal extracts, proteins, peptides, vitamins, and hormones which have the tendency to degrade easily. The stability of the formulation is a factor which cannot be compromised. Furthermore, the core ingredient should be released only when triggered by any external stimulus such as pressure and pH or temperature. Thus, a suitable delivery system must be chosen on the grounds of its ability to deliver the food product effectively, exerting its desired effect.[25] After the preparation of the formulation, testing of the products again requires attention. The in vitro tests performed for this purpose allows us to get an insight about the pharmacokinetic mechanism and the rate and extent of the release of the core active ingredient. However, these tests have the limitations as they are unable to provide the data for the active uptake of the product, their metabolic responses, the biological variability of the nutraceutical product. Therefore, complete testing is required to analyze the influence of factors like food on the response of the product.[24] Nutraceuticals is a subject which is not so known to the people and it still needs awareness in common people regarding its use and ability for its potential. The lack of recognition in the market paired with the deficit marketing and distribution leads to the shortfall in the investments in the food research, and this is creating a huge challenge to the growth of nutraceutical industries in India. Due to this insufficient awareness in

nutraceuticals, the manufacturing processes in several firms give negligible consideration to product extraction, enhancement of the shelf life, storage of the crude and prepared materials, meeting the quality standards of the ingredients and prevention from the contaminations. The negligence of the functional foods and nutraceuticals is not limited to social level but has reached out to the judicial level as well. There are many federal regulations which are not applicable to the food products or are still in progress which could restrain the natural products from getting supplied for the commercial purposes.[24,25]

## CONCLUSION

Natural products have been known for their therapeutic values for centuries. In the current era, these substances have been used as an immunity booster and likely antidiabetic, anticancer, antimicrobial, and gastroprotective agents etc. Therefore, these herbs could be superior options to be formulated as nutraceuticals. The nutraceutical industry is rising at a rate far beyond expansion in the food and pharmaceutical industries. Most of the nutraceutical food or food components that help in treatment and prevention of diseases are made from herbal/botanical raw material. The use of nutraceuticals is important to obtain therapeutic outcomes with reduced side effects. But their success depends on maintaining on their quality, purity, safety and efficacy.

## REFERENCES

1. Shubhra Srivastava, Pramod Kumar Sharma, S Kumara Guru; Journal of Chronotherapy and Drug Delivery; REVIEW ARTICLE Nutraceuticals: A Review, 2015; 6(1): 2249-6785.
2. Chauhan B, Kumar G, Kalam N. Current concepts and prospects of herbal nutraceuticals. J Adv Pharm Technol Res, 2013; 4(1): 4-8.
3. Rajat S, Sharma M, Singh R, Kumar S. Nutraceuticals: a review. Int Res J Pharm, 2012; 3(4): 95-99.
4. Sci Technol, 2012; 49(2): 173-83.
5. Das L, Bhaumik E, Raychaudhari U, Chakraborthy R. Role of nutraceuticals in human health. J Food Sci Technol, 2012; 49(2): 173-83.
6. Singh F, Kumar SM, Mahadevan N. Nutraceuticals: uplift in health. Int J Recent Adv Pharm Res, 2012; 2(2): 17-28.
7. Shirwaikar A, Parmar V, Khan S. The changing face of nutraceuticals. Int J Pharm Life Sci, 2011; 2(7): 925-932.

8. Choudhary M, Tomer V. Cadioprotective effets of nutraceuticals. Proc Indian Nat Sci Acad, 2013; 79(4): 985-996.
9. Jana S. Nutraceutical and functional properties of cactus pear and its utilization for food application. J Eng Res Studies, 2012; 3(2): 60-66.
10. Shinde N, Bangar B, Deshmukh S, Kumbhar P. Nutraceuticals: a review on current status. Res J Pharm, 2014; 7(1): 1-5.
11. Prabu LS, Kumar Dinesh, Kumar SS, Ragavendran T. Nutraceuticals: a review. Elixir Pharmacy, 2012; 46: 8372-8377.
12. Kalra EK. Nutraceutical-Definition and Introduction. AAPS Pharm Sci, 2003; 5(3): 1-2.
13. Klatte ET, Scharre DW, Nagaraja HN, Davis RA, Beversdorf DQ. Combination therapy of donepezil and vitamin E in Alzheimer disease. Alzheimer Dis Assoc Disord, 2003; 1(7): 113-116.
14. Rissanen TH, Voutilainen S, Virtanen JK, Venho B, Vanharanta M, Mursu J and Salonen JT. Low Intake of Fruits, Berries and Vegetables Is Associated with Excess Mortality in Men: the Kuopio Ischaemic Heart Disease Risk Factor (KIHD) Study. J Nutr, 2003; 133: 199-204.
15. Temple WJ and Gladwin KK. Fruits, vegetables, and the. Prevention of cancer: Research challenges. Nutrition, 2003; 19: 467-470.
16. Hu FB and Willett WC. Optimal diets for prevention of coronary heart disease. JAMA, 2002; 288: 2569-2578.
17. German JB and Walzem RL. The health benefits of wine. Annual Review of Nutrition 2000; 20: 561-593.
18. Hollman PCH, Hertog MGL and Katan MB. Analysis and health effects of flavonoids, Food Chem, 1996; 57: 43-46.
19. Majoa, DD, Guardiaa ML, Tripolia E, Giammancoa S and Finotti E. Flavonoids as Inhibitors of Lipid Peroxidation in Membranes. Food Research Int. 2005; 38: 1161-1166.
20. Cook NC and Samman S. Flavonoids - Chemistry, metabolism, cardioprotective effects, and dietary sources. J. Nutritional Biochem, 1996; 7: 66-76.
21. Hollman PCH, Feskens EJ and Katan MB. Tea flavonols in cardiovascular disease and cancer epidemiology. Proc Soc Exper. Biol. Med, 1999; 220: 198-202.
22. Losso JN. Targeting excessive angiogenesis with functional foods and nutraceuticals Trends in Food Science and Technology, 2003; 14: 455-468.
23. Latif S, Anwar F Ashraf M and Gilani AH. Moringa oleifera: a food plant with multiple medicinal uses. Phytother Res, 2007; 21: 17-25.

24. Brower V. A nutraceutical a day may keep the doctor away. EMBO reports, 2005; 8: 708- 711.
25. Dev R, Kumar S, Singh J, Chauhan B. Potential role of nutraceuticals in present scenario: A review. J Appl Pharm Sci, 2011; 1: 26-8.
26. Crandell K, Duren SK. Nutraceuticals: What are they and do they Work. Versailles: Kentucky Equine Research, Inc, 2003; 28.
27. Coleman M.D, Eason R. C, Bailey C. J. The therapeutic use of lipoic acid in diabetes: a current perspective Environmental Toxicology and Pharmacology, 2001; 167-172.
28. Baljit S. Psyllium as therapeutic and drug delivery agent. Int J Pharmaceutics, 2004; 33(4): 1-14 (2007).
29. Sirtori C.R and Galli C Fatty acids and the Omega 3. Biomedecine & Pharmacotherapie, 2002; 5(6): 397-406.
30. Thomas B, Ghebremeskel K, Lowy C, Crawford M and Bridget affley- Shore R N., Nutrient intake of women with and without gestational diabetes with a Specifi c focus on fatty acids. Nutrition, 2006; 2(2): 230-236.
31. Frydoonfar H.R, McGrath D.R and Spigelman A.D, The variable effect on proliferation of a colon cancer cell line by the citrus fruit flavonoid Naringenin. Colorectal Dis, 2003; 5: 149-152.
32. Limer J.L and Speirs V., Phyto-oestrogens and breast cancer chemoprevention. Breast Cancer Res, 2004; 6: 119-127.
33. Mandel S, Packer L, Youdim M.B.H and Weinreb O, Proceedings from the Third Int. Conf. Mechanism of Action of Nutraceuticals. J. Nutritional Biochem, 2005; 1(6): 513- 520.
34. Kucuk O, Sarkar F. H., Sakr W, Khachik F, Djuric Z, Banerjee M, Michael N. P, John S. B, David P. W, Lycopene in the Treatment of Prostate Cancer. Pur Appl. Chem, 2001-2002; 7(4): 1443-1450.
35. Sumi Y. Research and Technology Trends of Nutraceuticals. Sci & Tech Trends, 2008; 28(1): 10-21.