

Health Benefits of Nutraceuticals: A Review

Sanket Shelke¹, Archana Salunkhe², Vishal Galave^{3*}

^{1,2,3}Student, Department of Pharmacy, Navsahyadri Institute of Pharmacy, Pune, INDIA

*Corresponding author: vishalgalave99@gmail.com

Abstract: This review classified the Nutraceuticals obtaining from various sources and it show the various significant on human health. In 1989, Dr. Stephen are show the combination pharmaceuticals and nutrients to form the “Nutraceuticals”. Currently over 470 nutraceutical and functional food products are available with documented health benefits. The dietary supplement health and education act of 1994, the definition of nutraceuticals has been explained to include vitamins, minerals, herbs and other botanicals, amino acids, and dietary substance for human use as a supplement diet for human being. Nutraceuticals show health benefits as well as physical benefits. It used in various treatment such as cardiovascular disease, diabetes, cancer, and stomach disease.

Keywords: Nutraceuticals, Indian scenario, Health benefits.

1. Introduction

Hippocrates (460–377 BC), the well-recognized father of modern medicine, stated “Let food be thy medicine and medicine be thy food”, to predict the relationship between appropriate foods and health and their therapeutic benefits. Nutraceuticals may range from isolated nutrients, herbal products, dietary supplements, and diets. Nutraceuticals are non-toxic it not produced any side effect. Nutraceuticals term is derived from combination of two words such as nutrients and pharmaceuticals. In the US, the term “nutraceutical” products are drugs, food ingredients and dietary supplements.

2. Classification

A. Based on chemical constituent

1) Nutrients

Vitamin A, K, E, C, B1, B2, B3, B6, folic acid, calcium, iron, magnesium, Phosphorous, Chromium, cobalt, copper, iodine.

2) Herbals or botanical

3) Dietary supplements

1. Ketogenic diets
2. Minimally refined grains
3. Phytoestrogens
4. Several species of edible mushrooms
5. Glucosamine sulfate and chondroitin sulfate
6. Peptides/Hydrolysates
7. Dairy foods

B. Traditional and Non- Traditional nutraceuticals

1. Traditional nutraceuticals
2. Non-traditional nutraceuticals

C. Based on diseases

1. Diabetes
2. Obesity
3. Cancer
4. Anti-inflammatory activities
5. Allergy
6. Alzheimers disease
7. Vision improving agents
8. Osteoarthritis^{1,2}

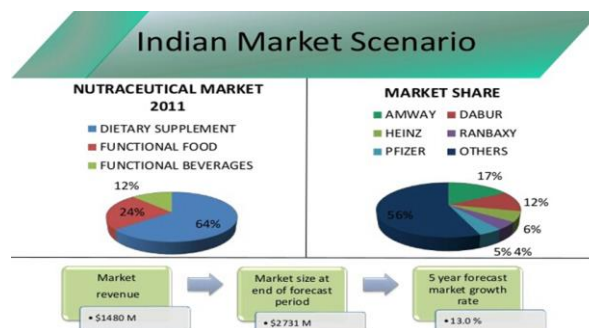
3. Concept of Nutraceuticals

Nutrition requirement for health + pharmaceuticals remedy for sickness/injury = Nutraceuticals preventative medical approach

In the pharmaceutical development process, it is a requirement to have clinical test results from animal tests and studies, for verification of the effects. On the other hand, in the case of nutrition, there was no verification method for foods in preventing diseases in the past. In recent years however, as food composition has been scientifically proven to cause lifestyle-related diseases.

A. Nutraceutical Scenario in India

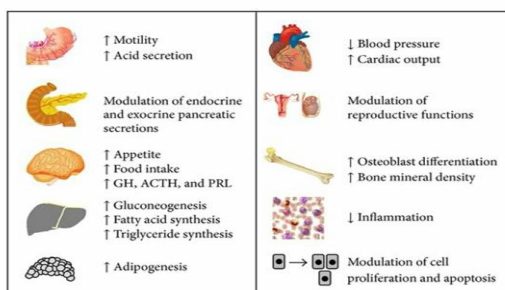
The Indian nutraceutical industry has great prospects. The Indian Nutritional market is estimated to be USD 1 Billion. While the global market is growing at a CAGR of 7%. Indian market has been growing much faster at a CAGR of 18% for the last three years. In USD 1 billion market size functional food having 54% market share followed by 32% market share of Dietary supplement and 14% share of Functional beverages. Figure 1 shows the market scenario.^{3,4}



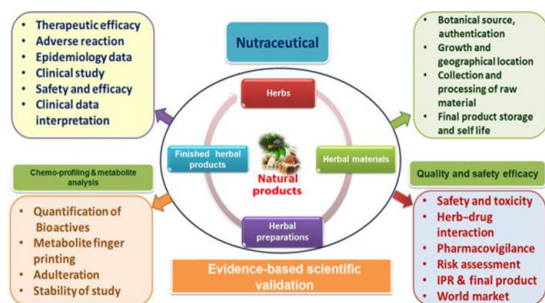
4. Significants

1. Increase the health value of our diet.
2. Help us live longer.
3. Help us to avoid particular medical conditions.
4. Use as the treatment, prevention, cure of diseases.
5. It is used as conventional food.
6. Increase the health benefits effect.
7. Not produce any side effects.
8. Used any cardio vascular disease and cancer.^{1,2,3}

5. Benefits of Nutraceuticals On Regulatory Body Function



Nutraceuticals are medicinal foods that play a role in maintain wellbeing, ornamental health, modulate protection and thereby prevent as well as treat definite diseases. Thus the meadow of nutraceutical can be envisioned as one of the misplaced blocks in the physical condition promote of a human being.



6. Role in Cancer

Nutraceuticals have the ability to reduce growth rate of cancer. It also has potential to reduce toxicity associated with chemotherapy and radiotherapy and they inhibit cell proliferation and induce apoptosis in cancer cell.⁵ Nutraceuticals can increase natural killer cells function.⁶

NF-kB is a transcription factor responsible for development of growth by altering genes of cell, cell adhesion and inflammation and growth. But some of the phytochemicals act on that factor and block its activation process to suppress carcinogenesis.⁵

Some of the phytochemicals which used in treatment of cancer are of follows,

1) Polyphenols:

A) Resveratrol- It is found in foods such as peanuts,

pistachios, grapes, red and white wine, blueberries, cranberries, and even cocoa and dark chocolate. It has natural anti-proliferative activity. It acts as Anti-cancer, Anti-carcinogenesis.

B) Epigallocatechin-3-gallate- EGCG is mainly found in green tea, it also exists in small amounts in other fruits such as cranberries, strawberries, blackberries, kiwis, cherries, pears, peaches, apples, and avocados. It has limitation due to its less bioavailability and conversion into its inactive methylated metabolites

C) Quercetin- Quercetin is the most abundant flavonoid. The source of quercetin are onions, apples, grapes, berries, broccoli, citrus fruits, cherries and tea. The effects of quercetin are related to induction of cell apoptosis.

D) Phenolic compounds:

Phenolic compounds such as cucumins, gallic acid, ferulic acid, caffeic acid are have the anticancer activity. Turmeric is source of curcumin, sources of gallic acid are walnuts, hops, apples, and flax seeds. The sources of ferulic acid are pineapple, asafoetida, grains, vegetables, beans, seeds of coffee, artichoke, peanut and nuts. Strawberries, cabbage, apples, radishes, coffee, wine, turmeric are the sources of caffeic acid.

2) Lycopene: Major source of Lycopene are the Tomatoes, guava, pink grapefruit, water melon. Because of unsaturated nature of Lycopene it is considered to be potent antioxidant. It act via decrease in oxidative stress and damageto DNA.

3) Tannins:

Tannins are present in grapes, tea, blackberries, blueberries and cranberries. It acts as scavenger harmful free radicals and detoxifycarcinogens.

4) Saponins:

Saponins are present in peas, soybeans, tomatoes, potatoes, alfaalfa, spinach. It has the Anti-tumor activity which lowers the risk of cancer. It produces activity preventing cancer cells from growing.

5) Pectins:

It is soluble fibre found in apples and prevent the prostate cancer metastasis by inhibiting cancer cell from adhering to other cell in body.

6) Vitamins:

Vitamins A, C and E have the antioxidant properties. Vitamin A deficiency enhances tumorigenesis.

7) Beta carotene:

Beta carotene is found in yellow, orange, green leafy vegetables, and fruits as tomatoes, sweet potatoes, orange, broccoli, carrots, spinach. It has antioxidant property and prevent cancer.

8) Garlic:

Allyl Sulphur compounds of garlic have ability to inhibit the risk of cancer. Flavonoids components of garlic shows strong activities of killing cancerous cells.

9) Marine nutraceuticals:

Acetylapoaranotin, Astaxanthin, Siphonaxanthin are the phytochemicals found from Marine resources which are used in

treatment of colon cancer.^{6,7,8,9,10,11.}

7. Role in Cardiovascular Disease

Dietary factors are important contributors to cardiovascular risk, either directly, or through their effects on other cardiovascular risk factors including hypertension. Protective effects against CVD have been demonstrated for several foods and dietary supplements. Several classes of nutraceuticals have been proposed to have potential benefits in the treatment of CVD and the ones with the strongest evidence are briefly summarized below.

1) Flavonoids and poly phenols: secondary metabolites in the plant kingdom are polyphenols, which contain the molecules of the flavonoid (Anthocyanins, flavan-3-ols, flavonols, flavanones, flavones and isoflavones) Flavonoids are a group of phenolic compounds found naturally in fruits, vegetables, tea and red wine that have cardioprotective and anticarcinogenic properties. It shows anti-oxidant property.^{12,13}

2) Vitamins: It endogenous and exogenous antioxidant defense mechanisms of the hypertensive patient are impaired. Vitamin C is associated in human body it shows lower the blike pressure.¹⁷

3) Lycopene: It is the obtain from red fruits Almost 90% of the total carotenoids that make up the tomato are composed of lycopene.^{15,16}

4) Garlic: It show historical Role in good and medicinal importance. It shows anti-inflammatory, antioxidant property. H₂S is a cardioprotective gas signaling molecule present in garlic.¹⁴

5) Spirulina: It is a rich source of protein, vitamins, minerals, carotenoids, and phycocyanins and has a very long history of use as a human foodstuff with no apparent concerns over safety.^{18,19}

6) Sterols: Consumption of plant sterols has been shown to be associated with lower circulating concentrations of TC in humans.²⁰

8. Role in Diabetes

Diabetes mellitus is categorized by peculiarly high level of blood glucose, each due to inadequate insulin invention, or due to its uselessness. The for the most part regular forms of diabetes are type 1 diabetes, an auto-immune disarray. Type 2 diabetes, which is related with obesity. Gestational diabetes occurs in pregnancy. Worldwide the full amount number of persons with diabetes is proposed to raise from 171 million in 2000 to 366 million in 2003.

1) Vitamin c-It is chain breaking antioxidant, has scavenging property and prevents the propagation of chain reaction that would lead to reduction. Vitamin c level impair insulin resistance.

2) Vitamin D/CALCIUM- High calcium intake acts as protective to develop diabetes. It acts by suppressing secretion of parathyroid hormone and good calcium/vitamin D level helps to prevent diabetes mellitus.

3) Vitamin E-It mainly act as antioxidant. Lowlevel of vitamin E produce increase in frequency of Diabetes.

4) Fibres-sources of fibre are fruits and vegetables. It provides protective effect against chronic diseases.

5) Omega-3- fatty acids- Reduce glucose tolerance. Ethyl ester of n-3 fattyacids beneficial in diabetic patients. Lipoic acid an antioxidant used in diabetic neuropathy.

6) Polyphenols- Polyphenols such as gallic acid, ferulic acid, caffeic acid, coumaric acid have an antioxidant activity. The sources of polyphenols are pineapple, asafoetida, grains, vegetables, beans, seeds of coffee, artichoke, kiwi, Strawberries, cabbage, apples, radishes, coffee, and turmeric.^{23,24}

7) Minerals- Minerals such as chromium, manganese, magnesium and zinc are essential for the treatment of diabetes. Chromium increases number of insulin receptor in target tissue and also enhance the binding of insulin withits receptor. Magnesium is cofactor in glucose oxidation and increases insulin secretion.²⁵

9. Conclusion

Herbal nutraceutical is a powerful instrument in maintaining health and to act against nutritionally induced acute and chronic diseases, thereby promoting optimal health, longevity and quality of life.

References

- [1] Kalioraa A C, Dedoussisa GVZ and Schmidt H. Dietary antioxidants in preventing atherogenesis Atherosclerosis 2006; 187: 1-17.
- [2] Lipi Das & Eshani Bhaumik & Utpal Raychaudhuri & Runu Chakraborty; Role of nutraceuticals in human health, 2012.
- [3] FICCI-Ernst & Young study: Nutraceuticals-Critical supplement for building a healthy India, Health Foods and Dietary Supplements Association conferences, Mumbai Sep10, 2009.
- [4] Nutraceuticals analysing Indian market.
- [5] Angel Nivya M, Raja K, Kumaravel M, Salini Sasidharan, and Seethapathy G. S, "Role of nutraceuticals in cancer", International Journal of Pharmacy and Pharmaceutical Sciences, Vol 4, Suppl 4, 2012, 415-520.
- [6] EliaRanzato, Simona Martinotti, Cinzia Myriam Calabrese & Giorgio Calabrese, "Role of Nutraceuticals in Cancer Therapy", Journal of Food Research; Vol. 3, No. 4; 2014.
- [7] Muhammad Imran Qadir, Sabalrshad, "Nutraceuticals for Management of Cancer", Fortune J Health Sci 2018; 1 (1): 007-018)
- [8] Natanamurugaraj Govindan, P. Kuppasamy et al, "Nutraceuticals as potential therapeutic agents for colon cancer: a review", Acta Pharmaceutica Sinica B; 2014;4(3):173-181)
- [9] Ahmad Salimi, EnayatollahSeydi and Jalal Pourahmad, "Use of Nutraceuticals for Prevention and Treatment of Cancer", Iranian Journal of Pharmaceutical Research (2013), 12 (3): 219-220)
- [10] S. Pulipati, Srinivasa B.P., N. BinduSree, U.E. Kumar, S.K. Shaheela, J.M. Krishna and T. Chakradhar, "Nutraceuticals", The Indian Pharmacist, Vol. 13, No. 10, April 2016.
- [11] Lipi Das & Eshani Bhaumik & Utpal Raychaudhuri & Runu Chakraborty, "Role of nutraceuticals in human health", J Food Sci Technol (March-April 2012) 49(2):173-183)
- [12] Hollman PH, Katan MB (1999) Dietary flavonoids: Intake, health effects and bioavailability. Food ChemToxicol 37: 937-942.
- [13] Kandaswami C, Middleton E (1994) Free radical scavenging and antioxidant activity of plant flavonoids. AdvExp Med Biol 366: 351-376.
- [14] Artaza JN, Mehrotra R, Norris KC (2009) Vitamin D and the cardiovascular system. CJASN 4: 1515-1522.

-
- [15] Cruz RB, González JG, Sánchez PC (2013) Functional properties and health benefits of lycopene. *NutrHosp* 28: 6-15.
- [16] Agarwal S, Rao AV (2000) Tomato lycopene and its role in human health and chronic diseases. *CMAJ* 163: 739-744.
- [17] Wolak T, Paran E (2013) Can carotenoids attenuate vascular aging? *Vascul Pharmacol* 59: 63-66.
- [18] Khan Z, Bhadouria P, Bisen P. Nutritional and therapeutic potential of Spirulina. *Curr Pharm Biotechnol* 2005;6:373-9.
- [19] Sarubin-Fragakis A., The health professional's guide to popular dietary supplements. *Am J Clin Nutr* 2003;78:808.
- [20] Wang P, Chen YM, He LP, et al. Association of natural intake of dietary plant sterols with carotid intima-media thickness and blood lipids in Chinese adults: A cross-section study. *PLoS One* 2012;7:27-336.
- [21] Structure and Physiological Actions of Ghrelin A Review; 2013.
- [22] Stauffer JE. Nutraceuticals. *Cereals Food World*. 1999; 44(2): 115-116.
- [23] Saurabh Nilesh, Vrish Dhvaj Ashwlayan, Nutraceuticals in the management of diabetes mellitus, *Pharmacy and Pharmacology International Journal* 2018, volume 6(2);114-120.
- [24] Zehra Bahadoran, Parvin Mirmiran, Fereidoun Azizi, *Journal of Diabetes & metabolic disorders* 2013, 12:43
- [25] Rohit Sharma, Hetal Amin, PK Prajapati, "Plant kingdom nutraceuticals for diabetes, *Journal of Ayurvedic and Herbal Medicine* 2016; 2(6); 224-228.