

## Nutraceuticals-An Upcoming and Dynamic Area of Interest in Pharmaceuticals

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### Abstract

*Nutraceuticals are the herbal products which are helpful in maintaining the ideal nutritional needs of body and are gaining abundant importance in treatment of many forms of diseases. These are now recognized globally throughout the world and much of emphasis is given on the research of these agents in exploring their hidden benefits. Many researchers have proved their selective benefits in the treatment of harmful diseases like osteoporosis, obesity, cardiovascular diseases, cancer and many more. The review which is presented here is an effort to enlist the importance of these agents, to classify the different types of nutraceuticals and their role in prevention of diseases.*

**Keywords:** Conventional, Nonconventional, Herbal Nutarceuticas, Treatment

### INTRODUCTION

Nutraceutical is a term which is made up of two separate words, "Nutrition" as well as "Pharmaceutical". Nutraceutical term was introduced by a doctor Stephen DeFelice in the year 1989 who was from America. This is the most promising and upcoming field in the area of Pharmaceuticals these days. It has proven medical and health related results in treating & preventing various forms of diseases [1]. Nutraceuticals are entirely herbal medications and thus the risk of adverse drug reactions is minimal. Herbal Nutraceuticals are ensuring to be a great help in maintaining excellent health and quality of life amongst human beings. A dietary supplement is the product which is given along with diet and may contain some important ingredients like minerals, vitamins, amino acids, a medical herb or a combination of all these ingredients to fulfill the total intake of diet. Nutraceuticals are a form of dietary supplements only.

Nutraceuticals have become now a dynamic area of interest due to their large

nutritional benefits as well as therapeutic benefits. A market research has already proposed that the market of nutraceuticals in the world is expanding enormously and would reach US \$250 billion by 2018 [2]. Food sources are generally used for the production of nutraceuticals and these nutraceuticals consist of basic nutritional value along with some more benefits related to health.

### Types of Nutraceuticals

Nutraceuticals itself have a diverse class of substances under it which have different categories. The main difference between pharmaceuticals and nutraceuticals is that pharmaceuticals involve the process of patents and sanctioning by government is essential but nutraceuticals cannot be patented and further the government sanctioning is also not involved in this [3]. Nowadays it is observed that the diet and lifestyle related disorders have taken a major place in between the individuals. People have become now much aware and attentive towards their health as compared to the past decades. It can be appreciated that some sophisticated and comprised

methods are also available nowadays for determination of the nutritional level of diet [4].

The different types of nutraceuticals which can be categorized are:

- a. Conventional nutraceuticals
- b. Non-conventional nutraceuticals
- c. Functional foods
- d. Medicinal foods
- e. Dietary supplements
- f. Established and Potential nutraceuticals
- g. Fortified nutraceuticals
- h. Herbal nutraceuticals

### **Conventional nutraceuticals**

These are the substances which are used from old time and are natural in their origin. These have natural ingredients and are actively involved in health benefits [5]. Lycopene, an important constituent of tomatoes is an example of conventional nutraceutical [6].

### **Non-conventional nutraceuticals**

These help in increasing the nutritional content by adding nutritional agents. An important example of this category is Beta carotene enriched rice [6].

### **Functional foods**

These consist of extremely important nutrients which provide more than the normal quantities required for maintenance, growth, and development of human being. Such types of products are a part of usual diet but have several benefits that go much higher than the traditional nutritional agents [7].

### **Medicinal foods**

Medicinal foods or Medical foods, as defined by the FDA are a special kind of formulated or processed foods which are entirely made for patients as a partial or sole source of nutrition as a part of oral diet. The classes of patients who cannot orally ingest food are given these products through an enteral feeding tube. Such kind of special products does not require

approval by FDA but it must be emphasized that these must only be used under the supervision of a physician for the specific dietary management of a disease [8]. They may look similar to normal foods but their ingredients are modulated according to their nutritional benefits. They may be available in the form of pills, tablets or beverages. Example: Lofenalac for the management of Phenylketonuria.

### **Dietary Supplements**

It is a form of product which consists of a constituent, added as a supplement which is used to treat any disease or a specific condition. Dietary products are also used to increase the level of overall fitness in individuals and in building body. Some tonics are also available which decrease down the process on ageing. In the market, we can find a huge amount of products having vitamins and minerals as their main constituents which are dietary supplements only [9]. Such kind of products is regulated by FDA under a different category of regulations which is the Dietary Supplement Health and Education Act of 1994 (DSHEA) [10].

Important examples of dietary supplements are: Yoghurt used for health of intestine, Canola oil for decreasing cholesterol level, Oats and Bran for healthy heart.

### **Established and Potential Nutraceuticals**

Established nutraceuticals are the substances in which the properties of their ingredients are already known for decades such as vitamins, minerals, fatty acids and amino acids [11]. Their property is already realized in providing health benefits, thus they are termed as established nutraceuticals.

On the other side, potential nutraceuticals are those agents which could become established ones but only after specific

studies like clinical trials on them to prove their therapeutic effect in a particular condition.

### **Fortified nutraceuticals**

Fortification is the process of adding micronutrients in the food in order to increase the nutritional qualities of that food. These micronutrients generally involve some trace elements as well as vitamins. Some staples and condiments are also added with micronutrients to minimize the diseases caused by deficiency of nutrition in individuals [12]. Some important examples of such products are: Milk fortified with cholecalciferol used in Vitamin D deficiency [13], Iodized salt containing iodine, Niacin is used in bread in USA from lot of decades before to prevent pellagra [14].

### **Herbal nutraceuticals**

These kinds of nutraceuticals are medically valuable compounds which are generated by using agricultural crops or plants. These acquire important medicinal properties which could be used to treat or mitigate several forms of ailments. To make such products, generally a fresh plant can be used or parts of a plant like stem, seeds, roots, leaves can also be used. A very common example of a marketed product in India is Chyawanprash which consists of amla, ashwagandha and pippali as the chief constituents [11].

### **Nutraceuticals and their role in prevention of diseases**

Nutraceuticals are found to be very useful and potent in treating many kind of harmful diseases which poses serious problems to individuals if these diseases exist in any form. Some of the important class of diseases and the role of nutraceuticals in combating such harmful diseases are discussed below.

### **Osteoporosis**

A disease which is associated with weakening of bones due to factors like ageing, use of extensive corticosteroids, menopause in ladies and lack of some essential ingredients in diet which help in the growth of bone.

Several drugs are available in the market to treat this disease but recent interest is being developed on the use of some natural agents like nutraceuticals to treat this disease. Nutraceuticals like herbs, minerals and dairy products are much focused these days in order to fight with this disease as these agents does not accompany any side effects with them [15]. Calcirol D-3 is a common marketed nutraceutical product manufactured by Cadilla healthcare limited, Ahmedabad, India which consist of calcium and vitamins to help in osteoporosis.

### **Obesity**

It is a major health problem of human beings in the 21<sup>st</sup> century. This disease is continuously spreading all over the world at a significant rate with approximately 1.5 billion adults referred to as overweight with every third being obese in 2008.[16]. The number is expected to drastically increase over the next 5-10 years. The sedentary lifestyle and improper diet taken by individuals is resulting into an increased weight causing obesity. Many natural products are available these days to fight with this disease. Some common nutraceuticals involved in this are *Allium Sativum.L* (Garlic), *Cissus Quadrangularis* (Hadjodh), *Coriandrum Sativum* (Corander), *Foeniculum Vulgare.Mill* (Fennel), *Piper Nigrum.L* (Fennel). Together these have some important therapeutic properties like hypolipidemic, antiobesity, hypocholesterolemic and antioxidant properties [17].

### **Cardiovascular Diseases**

Cardiovascular diseases (CVD) are the disorders of heart and associated with various forms of diseases like high blood pressure, heart attack, different forms of stroke etc. Many of the drugs are already available which are used to treat the symptoms associated with CVD. But emphasis is being given these days on modern nutraceuticals which are acting like a blessing for the heart patients. A lot of foods and supplements which could be included in diet have been found to protect against the progress of CVD in individuals. Some of the important agents which have proved strongly to treat CVD are mentioned below:

**Polyphenols:** Fruits, vegetables and legumes consist of polyphenols. Drinks like tea and coffee also possess these agents. Such compounds are also present in grapes and these include anthocyanins, flavanols, stilbenes and phenolic acids [18].

**Spirulina:** It is a microalgae found in blue and green colour. Minerals, vitamins, carotenoids and proteins are found in it in excessive quantity and is helpful in prevention of CVD.

### **Parkinsons Disease**

It is a neurological disorder which is associated with ageing. Nerve damage in specific regions of brain is the main cause of this neurodegenerative disease. PD is usually characterized by movement disorders in which patient could not walk properly and shaking of limbs is one of the particular symptoms related with this disease. The decreased level of dopamine in brain generally causes PD and from decades, several drugs are available to treat it. These drugs are usually accompanied with many of the side effects on other parts of body.

Now, focus is being given on the natural agents which are helpful in decreasing the progression of PD. These nutraceuticals include fish oil supplements in diet which have already proven effects in slowing down the symptoms of PD [19]. A research conducted in Canada has proven results that Vitamin E is also beneficial to treat PD [20]. Creatine and glutathione are also important agents which decline the progression of Parkinsonism.

### **Cancer**

This is a disorder which is characterized by an abnormal growth of body cells which do not die themselves and spreads in the surrounding tissues which results into many complications. In the normal state, the cells grow and divide to form new cells according to the need of the body. Cells on growing old are replaced by new cells automatically.

But in the state of cancer, the older cells are not replaced by newer ones and the same cells keep on dividing and spreading in accompanied tissues causing damage. Important nutraceuticals reported in the treatment of cancer are:

**AHCC:** It is the active hexose correlated compound which is the extract which is obtained from Mushrooms. It has proven results in escalating and strengthening the immune system of human body [21]. The side effects accompanied with chemotherapy can also be decreased by using AHCC. This agent is helpful in suppressing the factors which inhibit the immune system.

**Caffeine:** An agent “Adenosine” is strongly responsible for suppressing the immune system resulting into many complicated disorders. A study has reported the usage of caffeine in suppressing this agent “Adenosine”, thus protecting the function of our immune system [21]. Coffee is therefore recommended to such patients.

**Fish Oil:** EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) are the two important long chain fatty acids which are found in fish oil and are reported to decrease the symptoms associated with cancer[21]. Patients are generally recommended with a diet rich in fish oil to suppress the spread of tumor to tissues and organs.

**Proteolytic Enzymes:** These are also known as proteases and are important class of digestive enzymes found in our body. These are present in juices of stomach; pancreas and intestine. These mainly assist in the digestion of proteins.

Some recent researches have been performed which show that such class of enzymes help in the cessation of tumor and thus helpful in improving the quality of life of an individual with minimal risks and side effects associated with chemotherapy[21].

## CONCLUSION

Nutraceuticals are becoming popular globally with a very promising rate due to their excellent qualities in fighting with many forms of diseases. They have an eminent role in providing many important nutritional elements which are required for sustaining a healthy life. The benefit of treating an ailment naturally is the biggest advantage over other forms of treatment available, thus minimizing the side effects. A lot of research and development work is being done these days on nutraceuticals in exploring there much more of hidden benefits. The acceptance and willingness towards the use of nutraceuticals by individuals will certainly help in uplifting this field and in increasing its scope further.

## REFERENCES

1. Gupta SK, Yadav SK., Patil MSM. Nutraceutical-A Bright scope and opportunity of Indian Healthcare Market. *Int J Res Devl Pharm Life Sci* 2013;2:478-481.
2. Hardy G. Nutraceuticals and Functional Foods: Introduction and Meaning. *Nutrition*. 2000; 16: 688–9.
3. Rajasekaran A, Sivagnanam G, Xavier R. Nutraceuticals as therapeutic agents. *Res J Pharm Tech* 2008;4:328-40.
4. Gupta S, Chauhan D, Mehla K, Sood P, Nair A. An Overview of Nutraceuticals: Current scenario. *J Basic Clin Pharm* 2010;1:55-62.
5. Chintale AG, Kadam VS, Sakhare RS, Birajdar G, Nalwad DN. Role Of Nutraceuticals In Various Diseases:A Comprehensive review. *Int J Res Pharm Chem* 2013;3:290-91.
6. Sapkale AP, Thorat MS, Vir PR, Singh MC. Nutraceutical-Global Status and Applications: A Review. *Int J Pharm Clin Sci* 2012;1:1166-81.
7. Stephen D. A Report of National Nutraceutical Centre, Nutraceuticals India 2012 Webinar; 2012: 1-22.
8. [https://www.nutraceuticalsworld.com/issues/2018-04/view\\_columns/taking-the-mystery-out-of-medical-foods/50213](https://www.nutraceuticalsworld.com/issues/2018-04/view_columns/taking-the-mystery-out-of-medical-foods/50213)
9. Pandey M, Kumar V. Nutraceutical Supplementation For Diabetes: A review. *Int J Pharm Sci* 2011;3:33-40.
10. Kumar A, Singh S, Kumar R, Maurya P, Nath D. Nutraceutical: A New Scope and Opportunity of Healthcare. *Jour Of Pharmatutor* 2018;8:1-6.
11. Chauhan B, Kumar G, Kalam N, Ansari HS. Current Concepts and Prospects of Herbal Nutraceutical: A Review. *J Adv Pharm Tech Res* 2013;4:4–8.
12. Micronutrient Fortification And Biofortification Challenge. Copenhagen Consensus Center Retrieved 2017-06-14.
13. Singh J, Sinha S. Classification, Regulatory Acts and Applications of Nutraceuticals for Health. *Int J Pharm Biol Sci* 2012;2:177-87.
14. Park YK, Sempos CT, Bartan CN, Vanderveen JE, Yetley EA. Effectiveness of food fortification in

- the United States: the case of pellagra..American Jour Pub Heal 2000;90:727-38.
15. Rajput R, Wairkar S, Gaud R. Nutraceuticals for Better Management of Osteoporosis: An Overview. Jour Funct Foods,2018;47.
  16. World Health Organisation, Obesity and Overweight, Fact sheet no. 311. <http://www.who.int/mediacentre/factsheets/fs311/en/index.html>
  17. Kota SK, Jammula S, Kota SK, Meher LK, Nutraceuticals in pathogenic obesity; striking the right balance between energy imbalance and inflammation, Jour of Med Nutra and Nutra 2002;1.
  18. Spacil Z, Novakova L, Solich P. Analysis of Phenolic Compounds by High Performance Liquid Chromatography and Ultra Performance Liquid Chromatography. Talanta 2008;76:189-99.
  19. Mischley LK, Lau RC, Bennett RD, Role of Diet and Nutritional Supplements in Parkinson's Disease Progression, Oxid Med and Cell Long. 2017:1-9.
  20. Latif S. Moringa Oleifera: A Food Plant with Multiple Medicinal Uses. Phytother Res 2007;21:17-25.
  21. <https://www.oasisofhope.com/cancer-treatments-therapies/nutraceuticals>