Journal of Global Biosciences
ISSN 2320-1355
Volume 4, Number 7, 2015, pp. 2790-2794
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Research Paper

NUTRACEUTICAL – MEDICINE OF FUTURE

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Abstract

Traditional use of medicines is recognized as a way to learn about potential future medicines. The World Health Organization estimates that 80 percent of the world's population presently uses herbal medicine for some aspect of primary health care. The concept of nutraceutical has been accepted internationally. The terms "functional foods" and "nutraceuticals" are emerging out of benefits from foods that go beyond those attributable to essential nutrients. In recent years there is a growing interest in nutraceuticals which provide health benefits and are alternative to modern medicine. Nutrients, herbals and dietary supplements are major constituents of nutraceuticals which make them instrumental in maintaining health, act against various disease conditions and thus promote the quality of life.

Key words: *Nutraceutical, functional foods, dietary supplements, herbal, quality of life*.

INTRODUCTION

Today consumers are strongly concerned about their food habits, health and lifestyle. With globalisation and economic development the quality of life has improved. Besides development a major challenge in the form of lifestyle diseases has also grown up. Consumption of junk food has increased manifold, which has led to a number of diseases related to nutritional deficiencies. Nutraceuticals can play an important role in controlling them. The word Nutraceutical arises from two broad terms- "Nutrition" and "Pharmaceutical". These products may range from isolated nutrients, dietary supplements and specific diets to genetically engineered designer foods and herbal products [1, 2]. Nutraceuticals can be defined as "alternative beneficial products designed wholly or partly from food that maintains optimal health and act against nutritionally induced diseases, thereby promoting the quality of life."

IMPORTANCE

From the consumers' point of view functional foods and nutraceuticals offer many benefits.

- Increase the health value of our diet.

- Help us live longer.
- Help us to avoid particular medical conditions
- Perceived to be more "natural" than traditional medicine and less likely to produce unpleasant side-effects
- May present food for populations with special needs (e.g. nutrient-dense foods for the elderly) [3].
- Used for the prevention, treatment or cure of a condition or disease
- It can be administered with a view to restoring, correcting or modifying physiological functions in human beings.
- Nutraceuticals not only supplement the diet but also aid in the prevention and/or treatment of disease and/or disorder.
- Nutraceuticals are represented for use as a conventional food or as the sole item of meal or diet [4].

CLASSIFICATION OF NUTRACEUTICALS:

In order to distinguish between the wide varieties of products there are multiple different types of products that fall under the category of nutraceuticals:

1) Dietary supplements

A dietary supplement is a product that contains nutrients derived from food products that are concentrated in liquid or capsule form. Dietary supplements include- Vitamins, minerals, co-enzyme Q, carnitine, etc. The Dietary Supplementation Health Education Act (DSHEA) formally defined "dietary supplement" using several criteria. A dietary supplement:

- is a product (other than tobacco) that is intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, a mineral, an herb or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by increasing the total daily intake, or a concentrate, metabolite, constituent, extract, or combinations of these ingredients.
- is intended for ingestion in pill, capsule, tablet, or liquid form.
- is not represented for use as conventional food or as the sole item of a meal/ diet.
- is labelled as a "dietary supplement."
- includes products such as an approved new drug, certified antibiotic, or licensed biologic that was marketed as a dietary supplement or food before approval, certification, or license (unless the Secretary of Health and Human Services waives this provision) [4].

2) Functional Foods

Functional foods are designed to allow eating enriched foods close to their natural state, rather than by taking dietary supplements manufactured in liquid or capsule form. Sometimes, additional complementary nutrients are added, such as vitamin D to milk [5]. (E.g. Oats, bran, psyllium and lignins for heart disease and colon cancer Prebiotics - oligofructose for control of intestinal flora, Canola oil with lowered triglycerides for cholesterol reduction, etc.

3) Medical Foods

Medical foods are foods that are specially formulated and intended for the dietary management of a disease that has distinctive nutritional needs that cannot be met by normal diet alone [6]. Medical foods aren't available as an over-the-counter product to consumers. The FDA considers medical foods to be "formulated to be consumed or administered internally under the supervision of a physician, and which is intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements, on the basis of recognized scientific principles, are established by medical evaluation." Medical foods can be ingested through the mouth or through tube feeding. Medical foods are closely monitored by medical supervision.

4) Farmaceuticals

The term farmaceuticals is more frequently associated, in agricultural circles, with medical applications of genetically engineered crops or animals. Farmaceutical is a melding of the words farm and pharmaceuticals. It refers to medically valuable compounds produced from modified

agricultural crops or animals (usually through biotechnology). E.g. Transgenic cows and lactoferrin for immune enhancement, transgenic plants for oral vaccination against infectious diseases. [7].

DEVELOPMENT OF NUTRACEUTICALS:

i) Identification of components:

Numerous nutraceuticals currently are on the market. Table1 represents some of available nutraceuticals, their components and their potential human health benefits.

Table1. Nutraceuticals available in the market

COMPONENTS	SOURCES	HEALTH BENEFITS
CAROTENOIDS		
• Beta-carotene	Carrots, various fruits	Neutralizes free radicals, which may damage cells; bolsters cellular antioxidant defences
• Lycopene	Tomatoes and processed tomato products	May contribute to maintenance of prostate health
DIETARY FIBER		
Insoluble fiber	Wheat bran	May contribute to maintenance of a healthy digestive tract
FATTY ACIDS		
Monosaturated fatty acids	Tree nuts	May reduce risk of coronary heart disease
FLAVONOIDS		
Flavonols	Onions, apples, tea, broccoli	Neutralize free radicals, which may damage cells; bolster cellular antioxidant defences
ISOTHIOCYANATES		
Sulforaphane	Cauliflower, broccoli, cabbage, kale, horseradish	May enhance detoxification of undesirable compounds and bolster cellular antioxidant defences
PHENOLS		
Caffeic acid, ferulic acid	Apples, pears, citrus fruits, some vegetables	May bolster cellular antioxidant defences; may contribute to maintenance of vision & heart health
PLANT STANOLS/STEROLS		
Stanol/sterol esters	Fortified table spreads, stanol ester dietary supplements	May reduce risk of coronary heart disease
POLYOLS		
Sugar, alcohols (xylitol, sorbitol, mannitol, lactitol)	Some chewing gums and other food applications	May reduce risk of dental caries (cavities)
PREBIOTICS/PROBIOTICS		
Lactobacilli, bifidobacteria	Yogurt, other dairy and non dairy applications	May improve gastrointestinal health and systematic immunity
PHYTOESTROGENS		
Isoflavones(daidzein, genistein)	Soybeans and soy-based foods	May contribute to maintenance of bone health, healthy brain and immune functions; for women, maintenance of menopausal health
SOY PROTEIN		
Soy protein	Soybeans and soy-based foods	May reduce risk of coronary heart disease
SULFIDES/THIOLS		
Dithiolthiones	Cruciferous vegetables	May contribute to maintenance of healthy immune function

Source: [8,9]

Development of products:

The development of nutraceutical requires a multidimensional approach.

- **Either the whole food:** Nutraceuticals are developed by incorporating the whole food which contains the desired property into the product during processing. They can be mixed either in the form of powder or juice extract. For e.g. Alma powder, fruit juices mixture etc.
- **Active component separation:** This technique involves isolation or purification of the active compound from the food and it is incorporated in other food to have physiological benefit or provide protection against diseases. For e.g. curcumin from turmeric, allyl sulphur compounds from onion and garlic, EPA and DHA from fish oils etc.

In recent years however, as food composition has been scientifically proven to cause life-style related diseases, and has become social issue. The concept of nutraceutical with new function to prevent diseases was started by the combination of genome science and technology, which has been accomplishing remarkable development for the verification. Thus, the genome technique called Nutrigenomics was created. Nutrigenomics is a newly developed methodology combined with multiple genomic techniques and molecular biology technologies. It has been then used as a basic technology that became a driving force for the creation of Nutraceuticals.

For diseases expected to increase in number, but can be prevented by lifestyle change, such as metabolic syndromes, the patients are required to positively change their lifestyles. One of the solutions is to change their diet. Nutraceuticals should contribute to prevention of such diseases. For nutraceuticals, there are three key issues of the technology:

- Establishment of scientific assessment standard for prevention of disease,
- Establishment of assessment system for disease prevention by human trials and
- Establishment of seamless system to transfer stage from basic research to industrialization.

PRESENT MARKET SCENERIO IN INDIA AND ABROAD

Global market of nutraceutical is very huge. Nutraceuticals are hugely popular among consumers in the U.S. and other parts of the world. In Japan, England and other countries, nutraceuticals already have become part of the dietary landscape. Indian nutraceutical market is in infant stage but growing at very fast rate. Indian society has always been open to new concepts and quick to adapt. Due to increased physician acceptance of the medical benefits of nutritional products increased market demand of nutraceuticals. Consumers dissatisfied with drug costs and conventional healthcare are turning to unproven and untested natural products for treatment and prevention.

The expanding nutraceutical market indicates that end users are seeking minimally processed food with extra nutritional benefits and organoleptic value. This development, in turn, is propelling expansion in the nutraceutical markets globally. Future demand of nutraceutical depends on consumer perception of the relationship between diet and disease.

FOCUS ON INDIA

India has a long heritage of traditional medicine, which includes a conglomerate of Ayurveda, Siddha and Unani. It is one of the greatest living traditions and maintains a highly respectable place in the officially recognized healthcare system of the country. In recent times, the Indian healthcare market has emerged as a new and profitable growth avenue for both existing players and new entrants. The Indian healthcare industry has been seen to offer investors a cheap entry into the relatively stable consumer and retail segment, which is benefiting from rising consumer sentiments and affluence. According to Cygnus estimates, nutraceutical market in 2007 was INR 18.75 billion [10]. Total market for nutraceutical in India is valued at INR 44 bn in 2009; it is estimated to reach INR 95 bn in 2013.

India has now become a centre of attraction for everyone because of its huge population. In fact, India is currently experiencing massive internal consumption, due to a prosperous middle class, which has the money to invest in "nutraceutical" products. The middle class has doubled and today is the fastest growing portion of the population. In the last 60 years of independence India has met remarkable educational goals and today has moved beyond basic food security issues. India has also evolved from a savings economy to consumption economy.

Also called the "Fast Moving Consumer Goods" (FMCG) category, the "mainstream market" for India includes most personal care products, cosmetics and toiletries, but few healthy product options. This class of consumers is indeed a primary target for many companies. Also India has untapped market of Ayurveda and other medicinal plants, and because of these reasons everyone is rushing to India.

CONCLUSION

In recent years there is a growing interest in nutraceuticals which provide health benefits and are alternative to modern medicine. Nutraceuticals hold great potential for the future because they are convenient for today's lifestyle. Consumer interest in the relationship between diet and health has increased the demand for information on nutraceuticals. Although nutraceuticals have significant promise in the promotion of human health and disease prevention, long-term clinical studies are required to scientifically validate the nutraceuticals in various medical conditions. State is not far where nutraceuticals will be our preferred prescription of tomorrow.

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