



## POTENTIAL HEALTH BENEFITS OF NUTRACEUTICALS: CURRENT STATUS IN INDIAN MARKET

Shruti Srivastava\*<sup>1</sup> and Uma Shanker Maurya<sup>2</sup>

<sup>1</sup>Amity Institute of Pharmacy, Amity University Lucknow.

<sup>2</sup>Sherwood College of Pharmacy, Barabanki.

\*Corresponding Author: Shruti Srivastava

Amity Institute of Pharmacy, Amity University Lucknow.

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### ABSTRACT

For century's nutritional medicine, a practice that uses plants, nutrients, foods and herbs to treat health problems, has been dismissed by mainstream western medicine owing to the lack of scientific evidence that it works. However, with recent scientific advancements, we are now able to isolate the chemical composition of nutrients and measure their impact on our cells and hence our lives.<sup>[1]</sup> Due to the risk of toxicity or adverse effect of drug, consumer are turning massively to food supplements to improve health. Nutraceuticals are isolated product obtained from foods, mostly available in medicinal forms and play a vital role in improving health and protection against chronic diseases. The term 'nutraceutical', was originally coined in 1989 by Stephen DeFelice, founder and chairman of the Foundation for Innovation in Medicine, is a portmanteau of the words 'nutrition' (indicating a nourishing food or food component) and 'pharmaceutical' (with reference to a drug), It identifies a food or part of a food, which can be of vegetal or animal origin, and has a potential pharmaceutical activity.<sup>[1]</sup> The Indian nutraceutical market is mainly governed by pharmaceuticals and FMCG companies, only a few companies are present which are specialized in nutraceutical products. This has created an untapped opportunity for some labs to grow in market. Increasing health consciousness and improved incomes and standard of living has boosted the growth of the nutraceutical markets in India, making it one of the fastest growing segments.

**KEYWORDS:** For century's nutritional products.

### Nutraceutical

Nutraceutical is the combination of two words "nutrition" and "pharmaceutical". It provides health as well as medical benefits, including the prevention and treatment of disease.<sup>[2]</sup> Which defines nutraceuticals as a product isolated or purified from foods, and generally sold in medicinal forms not usually associated with food to have a physiological benefits or provide protection against chronic disease.<sup>[3]</sup> nutraceuticals are mostly referred to as pharma-foods, a powerful toolbox to be used beyond the diet but before the drugs to prevent and treat pathological conditions, such as in subjects who may not yet be eligible for conventional pharmaceutical therapy. A growing demand exists for nutraceuticals, which seem to reside in the grey area between pharmaceuticals and food. Nonetheless, given specific legislation from different countries, nutraceuticals are experiencing challenges with safety and health claim substantiation.<sup>[1]</sup> These functional or medicinal foods play positive roles in enhancing health, and improving immune function to prevent specific diseases and also hold great promise to reduce side effects and health care cost.<sup>4</sup> Nutraceuticals are described as products extracted, purified or produced from a plant, animal or marine source or produced from dried, powdered, or pressed

plant material and demonstrated to have a physiological benefits.<sup>[3]</sup>

Nutraceutical ingredients and functional foods, legally defined as natural substances that may be used individually, in combination, or even added to food or beverage for a particular technologic purpose or health benefits, must have an adequate safety profile demonstrating the safety for consumption by humans.<sup>[5]</sup> Such products may range from isolated nutrients, dietary supplements and specific diets to genetically engineered foods from herbal products, and processed foods such as cereals, soups, and beverages.

### History of Nutraceuticals

The Indians Egyptians, Chinese, are just a few civilizations that have used food as medicine According to Hippocrates father of western medicine stated "Let food be your medicine". The philosophy behind is "focus on prevention".<sup>[6]</sup> The truth in this saying is widely recognized today. In early 1900 the food manufacturers in the united state began to add iodine in salt as an effort to prevent goiter, representing one of the first attempts for creating a functional component.<sup>[7]</sup> Today researchers have identified hundreds of compounds with functional

qualities. In Japan, England and other countries nutraceuticals have already become part of dietary landscape. Consumer interest between diet and health has increased the demand on information of nutraceuticals.<sup>[8]</sup> The modern nutraceutical market began to develop in Japan during the 1980s.

### Nutraceutical regulation

Nutraceutical products are widely available and monitored with the same level of scrutiny as "dietary supplements".<sup>[9]</sup> Within the oversight of the Federal Food & Drug Administration, unlike many other countries such as Canada, the use of broad-based definitions creates inconsistent credibility distinguishing the standards, function, and effectiveness between "nutraceuticals and "dietary supplements".<sup>[10]</sup>

Food Safety and Security (FSS) Act was passed by the parliament in 2006.<sup>[11]</sup> In 2008, Food Safety and Standard Authority of India (FSSAI) came into existence. The FSSAI has prepared the draft rules and regulations for implementation of FSS Act 2006, Rules and Regulation 2011 section 22(1) of FSSA define food for special Dietary uses.<sup>[12]</sup> The draft regulation would be sent for notification for The FSSAI will make rules and frame standards to regulate nutraceuticals as outlined in the Food Safety Act, 2006.

### Nutraceutical industry

Nearly two-thirds of the American population takes at least one type of nutraceutical health product. The use of nutraceuticals as an attempt to accomplish desirable therapeutic outcomes with reduced side effects, as compared with other therapeutic agents, has met with

great monetary success. The preference for the discovery and production of nutraceuticals over pharmaceuticals is well seen in pharmaceutical and biotech companies. Some of the pharmaceutical and biotech companies, which commit major resources to the discovery of nutraceuticals include Monsanto, American Home Products, Dupont, Abbott Laboratories, Warner-Lambert, Johnson & Johnson, Novartis, Metabolex, Genzyme Transgenic, PPL Therapeutics, and Interneuron etc.<sup>[6]</sup>

The nutraceutical industry in the US is about \$86 billion. This figure is slightly higher in Europe and, in Japan, represents approximately a quarter of the \$6 billion total annual food sales. 47% of the Japanese population consume nutraceuticals.<sup>[13]</sup> Even without specific financial figures, business reports continually suggest that the market is consistently growing.

### Categories of Nutraceuticals

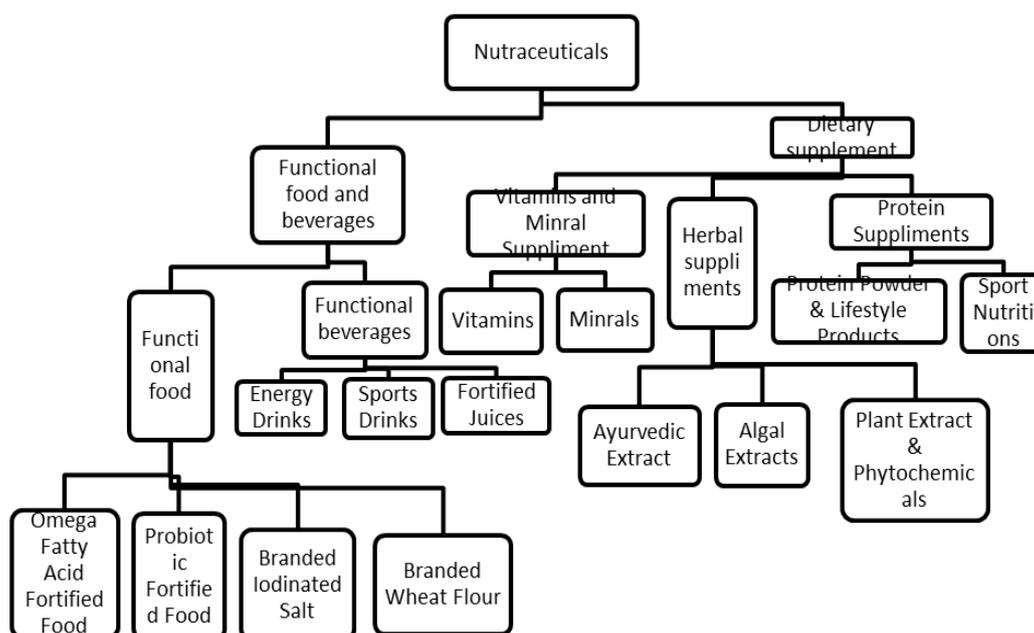
Nutraceuticals are used to promote wellness, prevent malignant processes and control symptoms. These can be grouped into the following three broad categories.<sup>[6,14]</sup>:-

**Nutrients:-** Substances with established nutritional functions, such as vitamins, minerals, aminoacids and fatty acids.

**Herbals:-** Herbs or botanical products or concentrates and extracts.

**Dietary supplements:-** Probiotics, Prebiotics, Antioxidants, Enzymes etc.

The Indian nutraceutical market is divided into functional food and beverages (68%) and dietary supplement (32%).



**Advantages of Nutraceuticals<sup>[15]</sup>**

1. Reduced side effects.
2. Increases health benefits.
3. Provide dietary supplements naturally.
4. Easily available and cheap.
5. It provides food for populations with special needs (eg: nutrient-dense foods for the elderly).

**Disadvantages of Nutraceuticals<sup>[10]</sup>**

**1. Bioavailability:** Nutraceuticals are being eliminated from the body and do not provide any medicinal benefit with poor bioavailability.

**2. Impact of Placebo Effect:** Consumers may not use nutraceuticals accurately for healing illness, when the body is often able to recover on its own.

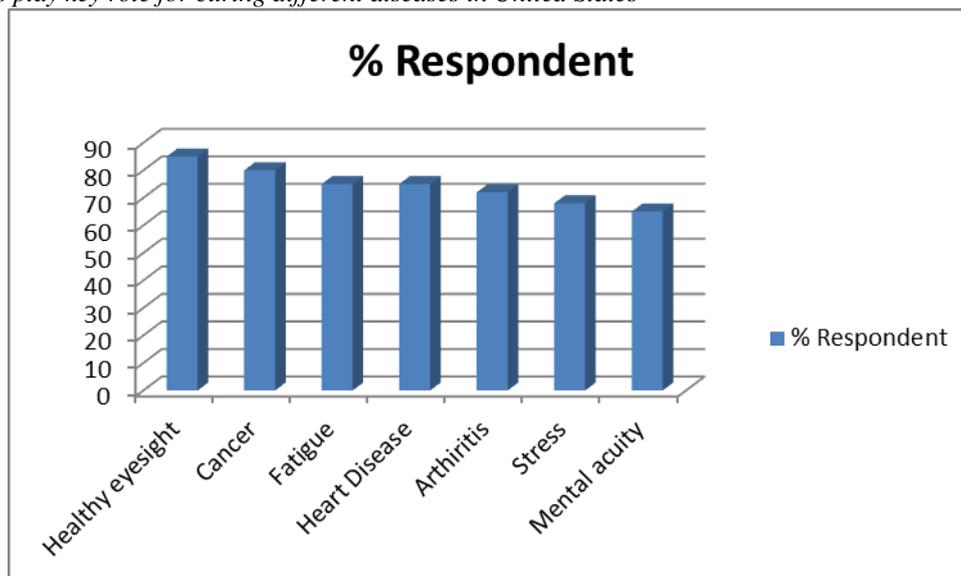
**3. Product Quality Issues:** Nutraceuticals from the international market may claim to use organic ingredients, but the lack of regulation may compromise the safety and effectiveness of products.

**4. Safety and Interactions with Other Drugs:** The problem is that many of these products do not provide consumers with proper information about their safety and effectiveness, possible side effects, interaction with prescription medicines or the effect they have on existing medical conditions.

**Scope of nutraceuticals for cure of diseases**

S no.	Disease	Nutraceuticals	Source
1	Joint health	Glucosamine <sup>[16]</sup>	ligaments, cartilage
		Chondroitin <sup>[17]</sup>	proteoglycans of articular cartilage
2	Cardiovascular Health	Co-q 10 <sup>[18]</sup>	soyabean, olive oil
		Melatonin <sup>[19]</sup>	bone marrow
		DHA <sup>[20]</sup>	fish oil
		Reseveratrol <sup>[21]</sup>	grapes, red wine
		Catechin <sup>[22]</sup>	tea extract
3	Eye health	DHA <sup>[23]</sup>	fish oil, linseed
		Pycnogeal <sup>[24]</sup>	barley
		Lutein <sup>[25]</sup>	spinach
		Carotenoides <sup>[26]</sup>	carrot, sweet potato
4	Cancer prevention	DHA <sup>[27]</sup>	fish oil, linseed
		Reseveratrol <sup>[28]</sup>	grapes, red wine
		Lycopene <sup>[29]</sup>	tomatoes, grape
		Tea extract (ellagic acid) <sup>[30]</sup>	strawberry, raspberry

*Nutraceuticals play key role for curing different diseases in United States*



## List of some medicinal plants used as nutraceuticals

NAME OF PLANT	PARTS OF PLANT	CONSTITUENTS	USES
<i>Agaruscus campestris</i> <sup>[31]</sup> (Edible Mushroom)	Vegetative parts	Glucose fructose and glycogen. It contains large amount of folic acid, thiamine and riboflavin	Mushroom are considered to be the diet for anemic patients and they are prescribed to the vegetarians for protein deficiency
<i>Allium sativum</i> <sup>[32]</sup> (Garlic/Lahsun)	Bulbs	Diallyl sulfides, diallyl disulfides and quercetin	Hypercholesterolemia condition, anti inflammatory and anti mutagenic activities
<i>Aloe barbadensis</i> <sup>[33]</sup> (Aloe vera/ Ghrita kumari)	Leaves	Glucose, Galactose, mannose and galacturionic acid and a protein with 18 amino acids	Juice is used for wound healing; it is used as a laxative and in skin disease.
<i>Asparagus racemosus</i> <sup>[34]</sup> (Asparagus/ Satavari)	Roots	Mucilage and starch	Tonic, appetizer, rejuvenating, galactogogue and antispasmodic
<i>Azadirachta indica</i> <sup>[35]</sup> (Neem tree)	Leaves, Seeds	Proteins, fibers, fat, carbohydrates and minerals like Ca,P, Fe thiamine, niacin and carotene	Burning sensation, leprosy, leucoderma, intestinal worms, TB, boils, ulcers and intermittent fevers
<i>Bacopa Monnieri</i> <sup>[36]</sup> (Brahmi)	Whole plant	Bacoside A and B. Monniren	Sweet, laxative, cooling and intellect promoting, digestive, cardio tonic, febrifuge and tonic.
<i>Camellia sinensis</i> <sup>[37]</sup> (Green tea/ Tea)	Leaves	Polyphenols, carotene, riboflavin, nicotinic acid, pantothenic acid and ascorbic acid	Excellent chemopreventor against reactive oxygen and nitrogen species, significantly increase in plasma antioxidant activity, enhances humoral and cell mediated immunity, decrease the risk of certain cancer and cardio vascular disease.
<i>Cassia angustifolia</i> <sup>[38]</sup> (Senna)	Pods, leaves	Sennosides A and B.	Laxative and purgative in constipation, loss of appetite, indigestion, malaria, jaundice and anemia.
<i>Citrus reticulata</i> <sup>[39]</sup> (Orange)	Fruit	Vitamin C, Carotene sugars and citric acid	Antibacterial Activity against gram positive bacteria
<i>Curcuma longa</i> <sup>[40]</sup> (turmeric/Haldi)	Rhizomes	Protein, fat, carbohydrates, fibers minerals like Fe, vitamin like vitamin C, niacin, tannins	Skin tumors, antigastric ulcers, anti-inflammatory, hepatitis and jaundice. Balances the endocrine systems and improves immunity. It strengthens lungs, helping to fight chronic lung problems as well as upper respiratory infection
<i>Emblica officinalis</i> <sup>[41]</sup> (Amla)	Fruit	Protein, fibers carbohydrates, minerals like Fe, vitamins like Vitamin C, niacin, tannins	Adaptogen, balances neuroendocrine systems, helping to fight chronic lung problems as well as upper respiratory infections
<i>Eugenia jambolana</i> <sup>[42]</sup> (Jamun)	Seed, fruit	Tannins, Ellagic acid, gallic acid, starch, sugar, resin and glycoside jambolin	Diabetes, diarrhea, pharyngitis, splenopathy and ringworm.
<i>Plantago ovate</i> <sup>[43]</sup> (Psyllium husk)	Seed	Phytosterols, psyllium	Antidiarrhoeal effect and includes a lowered risk of heart disease and weight. Seed increases the water content and weight of the stool because of the rich fibre content, used in constipation and to restore and maintain intestinal regularity.
<i>Terminalia bellerica</i> <sup>[44]</sup> (Baheda)	Fruit	Tannin and $\beta$ - sitosterol, gallic acid, Ellagic acid and chebulagic acid	Diarrhea and dysentery
<i>Terminalia chebula</i> <sup>[45]</sup> (Harad)	Fruit	Vitamin C, kernels contain palmitic, steric, oleic, linoleic arachidic and behenic acids, resin etc	Serves as stomachic, laxative, purgative, digestive, cardio tonic, diuretic and tonic
<i>Trigonella foenum graecum</i> <sup>[46]</sup> (Methi/ Fenugreek).	Seed	Galactomannan, carbohydrates, sugars, amino acids, fatty acids, vitamins, Saponins etc.	Tonic, galactogogue, emollient aphrodisiac
<i>Withania somnifera</i> <sup>[47]</sup> (Ashwagandha/ winter cherry)	Root	Phenols, flavonoids, tannins, saponins, alkaloids, steroids, terpenoids, glycosides.	Used in general weakness. It gives vitality and vigor and helps in building greater endurance. It promotes urination, removes functional obstructions of the body. It reduces the stress and tension, controls depressions.
<i>Zingiber officinale</i> <sup>[48]</sup> (Ginger/ Adrak)	Rhizomes	Flavonoids, Alkaloids, Saponins, Tannins and triterpenes	Antibacterial, anti fungal, molluscidal, antiparasitic, anthelmintic, hypoglycemic, cholesterol lowering, immune stimulant and anti-inflammatory

### INDIA AND NUTRACEUTICALS IN 2019

In developed countries nutraceuticals have become a part of the day to day life. It is used in disease condition such as joint pain, insomnia, rheumatoid arthritis, degenerative eye condition, enlarged prostate, weight management, immunomodulators etc. India is one of the countries where the market of nutraceuticals and dietary supplements is growing enormously. Nutraceuticals and dietary supplements are sold in India under the name of Fast Moving Healthcare Goods (FMHCG). India has passed Food Safety and Standards Act in year 2006-a modern integrated food law to serve as a single reference point in relation to regulations of food products including nutraceuticals, dietary supplements and functional foods.

India is the most potential market for Nutraceuticals and Dietary Supplement products. The middle class population in the country is increasingly becoming health conscious. The awareness about the positive impact of using nutraceuticals and dietary supplements is the new phenomenon. In India nearly 400 million people belong to the middle class and have the disposable income which made them capable to buy nutraceuticals and dietary supplements. It is an inevitable fact that affluence is one of the causes of lifestyle diseases, which nutraceuticals and dietary supplements often address.

Over the past five years (2008-2012), the Indian Nutraceuticals Market has been growing at a rapid pace. The Indian Nutraceuticals market is the fastest growing sector among other sectors of Indian food and Pharmaceuticals market and is expected to sustain its growth in the coming years. The Indian Nutraceuticals market is expected to grow from \$ 4 Bn in 2015 to \$ 10 Bn in 2022. This represents a huge growth of 21% growth annually. India represents a huge and vast market for Nutraceuticals as almost every segment has a need for some form of Nutraceuticals. Some segments have a more pronounced need for Nutraceuticals among others, like Osteoarthritis (OA), means pain related to arthritis, in this disease of joints nutraceuticals have shown to

have potential in relieving pain in human clinical trials.<sup>[49]</sup>

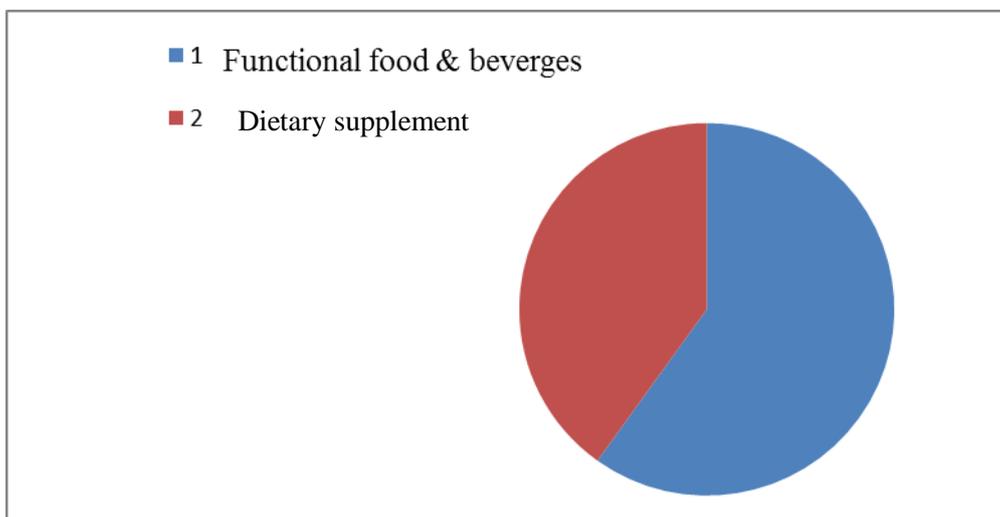
1. Growing children needs Functional food and beverage supplement to be able to perform well in academics and extra-curricular well.
2. Younger Age-groups 15-25 & 25-35 are stronger targets either due to active lifestyle or specific needs.
3. Pregnant and lactating mothers need to supplement their nutrition need.
4. Ages 60+ group are specifically vulnerable to Diabetes, Bone related diseases and other ailments and needs special preventive protection through Nutraceuticals.

Increasing health consciousness and improved incomes and standards of living has boosted the growth of the nutraceuticals markets in India, making it one of the fastest growing segments.

The nutraceuticals market in 2010 grew by 26.95% compared to results in 2009. During 2008 and 2009, sales volumes and the turnover of the industry was low although the industry showed a positive trend, led by an aging population and increasing chronic diseases. The industry is growing with a CAGR of 18.90% from 2006-2010. Urban consumers represent 67% of the vitamin and dietary supplement market, versus 33% attributed to rural consumers.

In the food supplement category, the majority share is held by herbal food products and supplements, closely followed by functional digestives.

The nutraceutical market broadly consist of two major segments –Food supplement and vitamin, the former constituting over 60% of the market and rest 40% comes from latter. Among vitamin and minerals have continued to be marketed and distributed like prescription drugs in India as the general awareness level are still low.



Food Supplement:-constituting 60% of the market, marketed and distributed like FMCG's. Vitamins and Mineral Supplement :- constituting 40% of the market, marketed and distributed like the prescription drugs in India.

The Major key players ruling the Indian Nutraceuticals market are Ranbaxy laboratory, Abbott India, Nicolas Piramal, Dr Reddy's lab and Pfizer, Dabur India, Zandu, Baidynath, GSK Consumer healthcare, Heinz, Yakult Danone, Amul, Amway, Zydus wellness, EID Parry and Herbalife.

### Multi National Company

<b>gsk Glaxo Smith Kline</b>	<p>Glaxo Smith Kline is a science based Fast Moving Healthcare Company.</p> <ul style="list-style-type: none"> <li>• Operate in over 150 Markets in three world-leading businesses that research, develop and manufacture innovative products in pharmaceutical, vaccines and consumer healthcare.</li> <li>• In consumer healthcare division its products include Horlicks, Horlicks biscuits, maltova, Boost and viva.</li> <li>• Current market capitalization stands at Rs 20,752.24 crore.</li> <li>• Net worth: 17171.14Cr.</li> </ul>
<b>Amway</b>	<p>Nutrilite, the flagship health product from the Amway stable is a vitamins, minerals and dietary supplements.</p> <p>Besides Nutrilite, Amway has 16 healthcare products in the Indian market under the nutrition and wellness category.</p> <ul style="list-style-type: none"> <li>• Amway's sales in India in the calendar year 2016 touched Rs 1,700 crore.</li> <li>• Amway India intends to set up 50 retail stores in the country by the end of 2018 to underpin its global business model of direct and online sales, underscoring the importance of Asia's third-biggest economy in the growth blueprint of the \$9.5-billion US parent company.</li> </ul>
<b>Abbott</b>	<p>It manufactures fortified B-complex capsules.</p> <ul style="list-style-type: none"> <li>• Its nutrition products like PediaSure for toddlers, Similac for infants, Ensure for adults, Mama's Best for pregnant women and lactating mothers and Glucerna for diabetics.</li> <li>• The company had posted a net profit of Rs 67.79 crore in the year 2016</li> <li>• Abbott has worth Rs 450 crore nutrition product manufacturing plant in Gujarat which has a capacity of 40 million pounds per annum</li> </ul>
<b>Danone</b>	<p>Danone's nutrition business, which includes the acquired nutrition business of Wockhardt Group in India, comes under the umbrella of Danone Nutricia and has brands such as Protinex, Dexolac, Farex and Nusobee.</p> <ul style="list-style-type: none"> <li>• It is present in 200 cities, mainly through the indirect network of distributors and stockists.</li> <li>• Company has invested Rs.1,800 crore to build manufacturing facilities in Haryana and Punjab.</li> </ul>
<b>Kellogg's</b>	<p>The world's biggest breakfast cereal maker</p> <ul style="list-style-type: none"> <li>• Kellogg's products are manufactured in 18 countries and marketed in over 180 countries.</li> <li>• Its fiberall and Metamucil are fall under dietary supplements.</li> </ul>

### Indian Companies

<b>Dabur</b>	<p>India's largest Ayurvedic medicine &amp; related products manufacturer.</p> <ul style="list-style-type: none"> <li>• Its product range includes Nutrition products such as Chavanprash, Glucose-D, Real and Active Juices.</li> <li>• Market cap of ₹ 50643.71 Cr.</li> <li>• Products/Revenue Segments include Personal Care which contribute 53.07 %, Health Care which contribute 27.34%, Beverages which contribute 17.09 % of Total Sales.</li> </ul>
<b>Himalya</b>	<p>Himalaya Drug Company, the Bangalore-based Rs 1,200 crore manufacturer of ayurvedic drugs and cosmetics, has forayed into nutraceuticals market with the launch of a prescription-based health supplement for kids.</p> <ul style="list-style-type: none"> <li>• Himalaya entered the nutraceutical market in July 2012 with its maiden product HiOwna-Jr for kids, followed by HiOwna for adults and the elderly, the same year.</li> <li>• Stating that the ₹ 743-crore ethical nutraceutical market (promoted via doctors) is growing at 10 per cent, accounting for almost 8 per cent of the total Indian pharmaceutical market</li> <li>• Of the 1.2 million doctors in India, Himalaya has built relationships with over</li> </ul>

	4,00,000 doctors who recommend HiOwna products to their patients.
<b>Emami</b>	Emami Limited is an Indian producer of fast-moving consumer goods (FMCG), engaged in the personal care/cosmetics and healthcare businesses. <ul style="list-style-type: none"> <li>• The company is well known in India for its fairness cream products for men.</li> <li>• The company's health products unit offers tonics for colds and coughs as well as nutraceuticals.</li> </ul>
<b>Patanjali</b>	One of the giant among FMCG companies operating in India as the firm has started eating into the market share of MNCs and local players alike • In 2015-16, the Haridwar based company raked in revenues of Rs 5,000 crore, up from around Rs 400 crore in 2011-12 and Rs 2,000 crore in 2014-15. <ul style="list-style-type: none"> <li>• Patanjali has wide range of products like aloe vera juice, amla juice and many more under food supplements.</li> </ul>

**Table 2: Enlists the nutraceuticals that are marketed by different pharmaceutical companies' in india. Major Players.**<sup>[25]</sup>

Manufacturer	Marketed Name	Active constituents	Category	Net sale in 2008-09 (INR-bn)
<b>Amway India Enterprises Private Limited</b>	Nutriline	Vitamins and minerals.	Vitamin & Mineral Supplements	11.2
<b>Abbott Nutrition</b>	B-Complex Pedia Sure	Vitamins and minerals.	Vitamin & Mineral Supplements	6.6
<b>British Biologicals.</b>	Cardiopro	Vitamins, Co enzymes, Carbohydrates and Proteins.	Cholesterol lowering,	3.5
<b>Dabur India Limited.</b>	Chawanprash, Real & Active Juices	Vitamins and many numbers of herbs.	Ayurvedic Product	3.1
<b>Glaxo Smithkline Consumer Healthcare Limited.</b>	Horlics, Maltova, Boost	Wheat Flour, malted barley, Sugar, Calcium and Vitamins	Vitamin & Mineral Supplements	16.38
<b>Parry Nutraceuticals Limited.</b>	Organic spirulina, Green tea extract	Proteins Vitamins and Minerals	Plant derived Nutritional product	2.91
<b>Ranbaxy Laboratories Limited</b>	Revitalite	Ginseng, Vitamin	Vitamin	31.8
<b>Wockhardt Limited</b>	Protinex, farex, BG-Port,	Vitamins and Minerals	Protein Supplement	1.2
<b>Zandu Pharmaceuticals</b>	Zandu chawanprash, Zandu kesari jeevan	Vitamins and many numbers of herbs.	Ayurvedic Product	1.37
<b>Piramal Healthcare</b>	Superactive complete	Vitamin, Minerals and Antioxidants	Nutritional supplement	32.8
<b>Pfizer</b>	Becosule	Vitamin-B	Vitamin	10.16

The trend towards preventive healthcare has seen Pharma companies such as Novartis, Glaxo Smith Kline and Cadila Healthcare has diversified into the production of nutraceutical. There are fast moving companies like Cadbury India and Dabur that have had a presence in the market with a slew of supplements and additives. On the other hand companies specialized in Ayurvedic or Herbal health care products like The Himalaya Drug Company. The Indian Nutraceutical market is dominated by pharmaceutical and fast moving consumer goods (FMCG) giants. Dietary supplements such as Vitamin and Mineral supplements have been captured by pharmaceutical companies. Functional food and beverages are now being brought to the market by FMCG companies. The nutraceutical industry in India is one of the rapid growing market in the Asia Pacific

region. The industry is anticipated to grow at around 20% over the period to reach USD 6.1 billion by 2019-2020. According to India Nutraceuticals Market Forecast & Opportunities 2017, the nutraceutical market in india is expected to grow tremendously in the next five years. The Indian nutraceutical market revenues are expected to reach approximately USD 4.2 Billion in 2017. The market is strongly driven by the increasing health consciousness, increasing number of people being affected by lifestyle diseases.

#### CONCLUSION

The current knowledge of the beneficial effects of nutraceuticals will undoubtedly have an impact on nutritional therapy. At present nutraceutical represent the fastest growing segment of today's food industry. The

market is estimated at 30 billion US dollar growing at 5% per annum. The present accumulated knowledge about nutraceuticals represents undoubtedly a great challenge for nutritionist, physicians, food technologists and food chemists. Increasing awareness levels about fitness and health, spurred by media coverage are prompting the majority of people to lead healthier lifestyles, and eat healthy. The expanding nutraceutical markets indicates that users are seeking minimally processed food with extra nutritional benefits. This development in turn is propelling expansion in the nutraceutical markets globally. Nutraceuticals provide all the important substances that should be present in a healthy diet for humans. Nutraceuticals provide energy and nutrient supplements to body, which are required for maintaining good health. Nutraceutical industry is growing at a much faster rate in both food and pharmaceutical industry and the DMMA estimates that the Indian nutraceuticals market is likely to grow by 16% CAGR over the next five years. It plays an important role in the promotion and care of human health to prevent diseases. The use of nutraceuticals is a key to obtain therapeutics outcomes with reduced side effects.

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