

Understanding the Concept of “Nutraceutical”



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Abstract

Nutraceuticals, a portmanteau of “nutrition” and “pharmaceutical,” represent a rapidly growing and evolving field in the realm of health and wellness. This term refers to products that combine the benefits of both nutrition and pharmaceuticals, as they aim to promote health and prevent or manage diseases. Nutraceuticals encompass a wide range of substances, including vitamins, minerals, herbs, dietary supplements, functional foods, and bioactive compounds. The core concept behind nutraceuticals is their potential to deliver therapeutic effects beyond basic nutrition. They are designed to bridge the gap between dietary insufficiencies and pharmaceutical interventions. Nutraceuticals may enhance overall well-being, support specific physiological functions, or alleviate symptoms associated with various medical conditions.

The appeal of nutraceuticals lies in their natural origins and the premise of fewer side effects compared to traditional pharmaceuticals. These products often contain bioactive compounds with antioxidant, anti-inflammatory, or immune-boosting properties, such as omega-3 fatty acids, probiotics, and plant polyphenols. The nutraceutical industry has witnessed exponential growth due to the increasing awareness of preventive healthcare and the desire for more natural treatment options. However, it also faces challenges related to regulation and quality control, as the boundaries between food and medicine can be blurred.

Keywords: Antioxidants; Disease modifiers; Herbal nutraceuticals; Nutraceutical products; Nutraceuticals, Oxidative stress

Introduction

The original concept in these concepts goes back three thousand years. Hippocrates (460-377 BC), the nicely recognized father of current medication, said “let food be thy medicine and medicine be thy meals” to expect the courting among suitable ingredients for fitness and their therapeutic benefits. The truth in this saying is broadly regarded nowadays. The idea of nutraceuticals is not new, although it has evolved substantially over the years. In the early 1900s, meal producers inside the U.S. started out adding iodine to salt so that you can save your goiter, representing one of the first attempts at creating a functional issue through fortification. These days researchers have identified hundreds of compounds with useful characteristics, and they preserve to make discoveries surrounding the complex advantages of phytochemicals (non-nutritive plant chemical compounds which have protecting or sickness-preventative houses) in meals. In Japan, England, and other countries, nutraceuticals have already got grown to be a part of the nutritional landscape. Client hobby in the relationship between food plan and fitness has

elevated the demand for data on nutraceuticals. speedy advances in technological know-how and era, growing fitness care prices, modifications in meals legal guidelines affecting label and product claims, a growing older population, and a rising hobby in reaching wellness via food regimen are among the elements fueling U.S. interest in nutraceuticals. Credible scientific research indicates many capacity fitness benefits from meal components. These blessings should expand the fitness claims now accredited to be diagnosed using the food and Drug administration [1-3].

Approximately 2000 years ago, Hippocrates efficaciously emphasized “let meals be your medication and remedy be your meals”. presently there is an improved worldwide interest due to the recognition that “nutraceuticals” play a major position in fitness enhancement. The term “Nutraceutical” was coined by combining the terms “vitamins” and “Pharmaceutical” in 1989 via Dr. Stephen De Felice, Chairman of the inspiration for Innovation in medicinal drugs. “Nutraceutical” is a marketing term evolved for a nutritional complement that is offered to

treat or save your sickness and thus has no regulatory definition. Therefore a “nutraceutical” is any substance that can be taken into consideration as food or part of meals and affords scientific or fitness benefits, encompassing, the prevention and treatment of sicknesses. Such merchandise might also vary from isolated vitamins, nutritional dietary supplements, and diets to genetically engineered “clother” ingredients, herbal products, and processed ingredients which include cereals, soups, and liquids. Currently, over 470 nutraceutical and functional food products are to be had with documented health advantages. “Nutraceuticals and useful foods have received huge interest due to their presumed safety and capability dietary and therapeutic results”. The nutraceutical and practical meals industry is in a unique position to capitalize on clients’ hobbies. Be it a multinational pharmaceutical organization, a nutritional organization, a large meals multinational, or a small diet-promoting company, all of them apprehend the converting tendencies and are aware of the extra health-seeking consumer fashion. there may be, hence, a proliferation of this cost-delivered merchandise aimed toward no longer only maintaining oneself wholesome but also prevention/remedy of numerous illnesses ranging from coronary heart illnesses to cancer [4,5].

As referred to in advance, purposeful foods contain larger profit margins than conventional ingredients (30 to 500 percent better). the worldwide marketplace size is anticipated between 30 and 60 billion US\$, with Japan, US, and Europe occupying the most important share. By way of 2010, the nutraceutical call is forecast to touch \$197 billion. There are lots of misunderstandings regarding the terminologies like “nutraceuticals”, “functional meals”, “nutritional supplements” “clother meals”, “scientific foods”, “pharma foods”, “phytochemicals” etc. There appears to be a thin dividing line in their interchangeable utilization using one-of-a-kind humans on one-of-a-kind events. “Prescription drugs” can be taken into consideration as tablets used especially to treat sicknesses, even as “nutraceuticals” are the ones which might be intended to save you from sicknesses.

The above difference between prescription drugs and nutraceuticals is lovable, however superficial and inaccurate. prescription drugs are materials that have (or have had) patent protection because of expensive trying out to conform to the specifications of respective Governments. However, many vitamins may in no way get hold of authorities’ approval on account that no person could justify the cost of testing requirements for materials that cannot be blanketed via patent laws. Each prescription drug and vitamin can cure and save your ailment(s), but the best prescription drugs have governmental sanctions [6-8]. Many prescription drugs have their origin in plant life and animals and aren’t any much less “natural” than vitamins. A classic instance of vitamins is synthetic vitamins. Nutraceuticals from time to time referred to as “functional ingredients”, have induced heated debate because they blur the conventional dividing line between meals and medication. When food is being cooked or prepared with the

usage of “medical intelligence” without or with the know-how of the way or why its miles getting used, then the meals are known as “functional meals.” for that reason, purposeful food provides the body with the required quantity of nutrients, fat, proteins, carbohydrates important for healthful survival. whilst practical meals aid within the prevention and/or remedy of ailment(s)/ ailment(s) other than deficiency conditions like anemia it’s miles called a “nutraceutical”. Consequently, useful food for one patron can act as a nutraceutical for any other. Examples of nutraceuticals include fortified dairy products (milk as such is a nutrient and its product casein is a pharmaceutical) and citrus result (orange juice is a nutrient and its constituent ascorbic acid is a pharmaceutical).

A dietary supplement is a product that is intended to supplement the diet that bears or includes one or extra substances like nutrition, mineral, herb, an amino acid or pay attention, metabolite, constituent, extract or mixtures of those. “Medical meals” are a particular class of therapeutic sellers which are meant for the nutritional management of a specific ailment. An example of clinical meals is formulations intended to control sufferers with inborn mistakes in amino acid metabolism. more modern medical ingredients are designed to manipulate hyperhomocysteinemia, pancreatic exocrine insufficiency, inflammatory situations, most cancers cachexia, and other illnesses. The usage of nutraceuticals, as an attempt to accomplish applicable healing outcomes with decreased facet outcomes, compared with different therapeutic dealers has met with amazing monetary success [9,10]. The desire for the discovery and manufacturing of nutraceuticals over prescription drugs is nicely appreciated by pharmaceutical and biotechnology agencies. some popular nutraceuticals consist of glucosamine (for arthritis), lutein (for macular degeneration), ginseng (for cold), echinacea (anti-immune), folic acid, cod liver oil pills, and so on. The most popular functional food and beverage products include omega-3 eggs, omega-three enriched yogurts, calcium-enriched orange juice, and inexperienced tea to mention some. Most of the nutraceuticals do own a couple of healing benefits, however in the gift overview, plenty of attempts have been dedicated to decentralizing them based on their sickness-specific essential indication. Nutraceuticals was claimed to have a physiological advantage or offer protection in opposition to the subsequent sicknesses (and/or observed to act as):

- i. Cardiovascular dealers
- ii. Antiobese sellers
- iii. Antidiabetics
- iv. Anticancer dealers
- v. Immune boosters
- vi. persistent inflammatory problems
- vii. Degenerative sicknesses
- viii. Neuro degenerative diseases [11]

Nutraceuticals vs Other Terminologies

There is a lot of bewilderment concerning the terminologies like nutraceuticals, useful meals, dietary supplements, fashion designer foods, clinical foods, pharma foods, phytochemicals, and so on. "Prescribed drugs" can be taken into consideration as pills used specifically to deal with sicknesses, at the same time as "nutraceuticals" are those that are supposed to save you illnesses. Inside EU drugs law a nutraceutical can be described as a remedy for two motives: it may be used for the prevention, remedy, or remedy of a condition or sickness or be administered so that you can restore, correct, or enhance physiological functions in human beings. Each prescription drug and vitamin can treat and save your disease(s), but the best-prescribed drugs have the governmental sanction. Capsules are concerned with an approval process before marketing. To be accredited, a drug should exhibit safety and efficacy for its supposed use. Nutraceuticals aren't capsules without a doubt due to the fact they have no longer long passed via an approval system. Many prescribed drugs have their starting place in plants and animals and are not any much less "natural" than nutrients. A conventional instance of nutrients is synthetic vitamins. "Medical foods" are a specific class of healing agents that can be meant for the dietary control of a selected ailment. An instance of scientific meals is formulations meant to manipulate patients with inborn errors in amino acid metabolism. More recent scientific meals are designed to manage hyperhomocysteinemia, pancreatic exocrine insufficiency, inflammatory conditions, cancer cachexia, and other illnesses. Meals are usually diagnosed as secure whereas Nutraceuticals may additionally contain materials that might be "herbal" but won't be formally recognized as safe [12-14].

Nutraceuticals occasionally referred to as "purposeful foods", have induced heated debate due to the fact they blur the conventional dividing line between meals and medication. Nutraceuticals barely range from useful foods. When food is being cooked or prepared the usage of "medical intelligence" with or without an understanding of the way or why its miles getting used, the food is called useful food. Hence, functional food provides the body with the specified quantity of vitamins, fats, proteins, carbohydrates, etc. Wanted for its healthful survival. Whilst practical meals aid within the prevention and/or treatment of ailment(s) and/or disorder(s) other than anemia, it is known as Nutraceutical. (Because maximum of the useful foods act in a few ways or the opposite as anti-anemic, the exception to anemia is considered to have a clear distinction between the 2 phrases, functional meals, and nutraceutical.) Examples of nutraceuticals consist of fortified dairy merchandise (e.g., milk) and citrus culmination (e.g., orange juice) and veggies. US Nutritional Complement Fitness and Training Act (DHSEA), defined "nutritional supplement" as the usage of numerous criteria. A nutritional supplement is a product (aside from tobacco) that is supposed to

supplement the weight-reduction plan that bears or consists of one or greater of the subsequent dietary components: a vitamin, a mineral, an herb, or a different botanical, an amino acid, a dietary substance to be used through man to complement the weight loss plan through increasing the overall daily consumption, or a concentrate, metabolite, constituent, extract, or combos of those substances [15].

A dietary supplement: is meant for ingestion tablet, pill, pill, or liquid shape. isn't represented to be used as a conventional food or as the sole object of a meal or eating regimen. is labeled as a "nutritional supplement." consists of products together with an accepted new drug-certified antibiotic, or licensed biologic that was advertised as a dietary complement or food before approval, certification, or license.

for this reason, nutraceuticals vary from nutritional dietary supplements within the following components: Nutraceuticals ought to not only complement the weight-reduction plan but must also resource in the prevention and/or ailment. Nutraceuticals are requested for use as a traditional food or as the sole object of a meal or diet. Nutraceuticals are manufactured to strict requirements and are regulated beneath food safety and satisfactory control regulations [16]. A ray of "treatment desire" in the mind of commonplace patients revolves around nutraceuticals due to their false notion that 'all herbal medicines are true.' also, the excessive cost of prescription drugs and the reluctance of a few coverage businesses to cowl the expenses of medicine helps nutraceuticals solidify their presence inside the worldwide marketplace of healing procedures and therapeutic marketers [17].

Type of Nutraceuticals

Nutraceuticals are labeled based on various chemical constituents present in herbal flowers. desk 1 suggests the listing of numerous nutraceuticals, their additives, supply, and their capacity blessings. Discussion nowadays, nutraceuticals have obtained high hobbies because of their capacity dietary, and safety profile, aside from healing capability. Pharmaceutical and dietary groups are aware of the converting traits that are due to the advantages of these compounds. most nutraceuticals possess more than one therapeutic advantage. The prevailing examines devoted to a better understanding of nutraceuticals primarily based on their pharmaceutical and therapeutic warning signs. It has to be noted that there might be numerous confusions associated with the terminology of nutraceuticals, including phytochemicals, pharma foods, medical meals, practical foods, nutritional supplements, clothier ingredients, and so forth., there may be a thin dividing line between their interchangeable usage with the aid of distinct humans on one-of-a-kind activities. prescribed drugs are ordinarily taken into consideration as medications that are used especially to treat illnesses, but nutraceuticals are the substances that are often considered to prevent illnesses.

This difference between prescribed drugs and nutraceuticals may be very erroneous and superficial. pharmaceuticals and nutraceuticals each can remedy and save you sickness(s) however, the best pharmaceuticals have governmental sanction. prescribed drugs are compounds that typically own patent safety due to high-priced testing. However, nutraceuticals no longer want those checking out documents.

Scientific foods or medicinal foods are a particular category of healing marketers that might be taken into consideration for the nutritional control of a specific ailment. as an instance, medicinal foods are designed to manage inflammatory situations, most cancers, hyperhomocysteinemia, pancreatic exocrine insufficiency, and other diseases. They also play significant protection against numerous age-related or continual illnesses. Natural drug treatments which are used as a nutrient are considered in this category. Nutraceuticals are in many results

and vegetables are answerable for health advantages. because of these health blessings of nutraceuticals, they could often be taken to treat or lessen the risk elements together with excessive LDL cholesterol, excessive blood strain, and diabetes. several of the most popular nutraceutical products marketed these days are botanicals which include ginseng, ginkgo biloba, St. John's wort, and echinacea. [The list of nutraceuticals being studied is changing usually and reflects ongoing marketplace developments, research, and consumer interest. With rapidly increasing interest in nutraceutical intake, sizeable research is important to warrant the nutraceuticals utilization secure and powerful. The mechanistic actions of nutraceuticals aren't clean. However, they are probably concerned with a wide type of biological techniques, including activation of signal transduction pathways, antioxidant defenses, gene expression, cellular proliferation, differentiation, and upkeep of mitochondrial integrity.

Classification of nutraceuticals: (Table 1-3)

Table 1: Classification of nutraceuticals based upon food source.

Food source	Examples
Plants	β - Glucan, Ascorbic acid, γ - Tocotrienol, Quercetin, Luteolin, Cellulose, Lutein, Gallic acid, Perillyl alcohol, Indole-3-carbonol, Pectin, Daidzein, Glutathione, Potassium, Allicin, δ -Limonene, Genestein, Lycopene, Hemicellulose, Lignin, Capsaicin, Geraniol, β - Ionone, α - Tocopherol, β - Carotene, Nordihydrocapsaicin, Selenium, Zeaxanthin, Minerals
Animals	Conjugated Linoleic Acid (CLA), Eicosapentaenoic acid (EPA), Docosahexenoic acid (DHA), Spingolipids, Choline, Lecithin, Calcium, Coenzyme Q10, Selenium, Zinc, Creatine, Minerals
Microbes	<i>Saccharomyces boulardii</i> (yeast), <i>Bifidobacterium bifidum</i> , <i>B. longum</i> , <i>B. infantis</i> , <i>Lactobacillus acidophilus</i> (LC1), <i>L. acidophilus</i> (NCFB 1748), <i>Streptococcus salvarius</i> (subs, Thermophilus)

Table 2: Classification of nutraceuticals based upon mechanism of action.

Anticancer	Positive Influence on Blood Lipid Profile	Antioxidant Activity	Anti inflammatory	Osteogenetic or Bone Protective
Capsaicin	β - Glucan	CLA	Linolenic acid	CLA
Genestein	γ - Tocotrienol	Ascorbic acid	EPA	Soy protein
Daidzein	δ - Tocotrienol	β - Carotene	DHA	Genestein
α - Tocotrienol	MUFA	Polyphenolics	GLA	Daidzein
γ - Tocotrienol	Quercetin	Tocopherols	acid) (gamma - linolenic	Calcium
CLA	ω -3 PUFAS	Tocotrienols	Capsaicin	Casein phosphopeptides
Lactobacillus acidophilus	Resveratrol	Indole-3-carbonol	Quercetin	FOS
Sphingolipids	Tannins	- Tocopherol	Curcumin	(fructooligosaccharides)
Limonene	β - Sitosterol	Ellagic acid		Inulin
Diallyl sulfide	Saponins	Lycopene		
Ajoene	Guar	Lutein		

α - Tocopherol	Pectin	Glutathione		
Enterolactone		Hydroxytyrosol		
Glycyrrhizin		Luteolin		
Equol		Oleuropein		
Curcumin		Catechins		
Ellagic acid		Gingerol		
Lutein		Chlorogenic acid		
Carnosol		Tannins		
L. bulgaricus				

Table 3: Classification of nutraceuticals based upon chemical nature.

Class / Component	Source	Potential Benefit
Carotenoids	Carrots	Neutralizes free radicals which may cause damage to cells
Alpha - carotene		
Beta - carotene	Various fruits, vegetables	Neutralizes free radicals
Lutein	Green vegetables	Contributes to maintenance of healthy vision
Lycopene	Tomatoes and tomato products (ketchup, sauces, etc.)	May reduce the risk of prostate cancer
Zeaxanthin	Eggs, citrus, corn	Contributes to the maintenance of healthy vision
Collagen Hydrolysate		
Collagen Hydrolysate	Gelatine	May help improve some symptoms associated with osteoarthritis
Dietary Fibre		
Insoluble fibre	Wheat bran	May reduce risk of breast and / or colon cancer
Beta glucan	Oats	Reduces risk of cardiovascular disease. (CVD)
Soluble fibre	Psyllium	Reduces risk of CVD
Whole Grains	Cereal grains	Reduces risk of CVD
Fatty Acids		
Omega-3 fatty acids-DHA / EPA	Tuna; fish and marine oils	May reduce the risk of CVD & improve mental, visual functions

Research Methods

Research on nutraceuticals usually involves a multidisciplinary approach.

Literature review

A thorough review of the controlled articles, including research articles, reviews, and supervisory directions, was conducted to consider the various facets of nutraceuticals.

Data collection

Data were collected through surveys, interviews with specialists, and analyses of nutraceutical production labels and additives. The market dossier was also asked to recognize the

current situation.

Data analysis

A qualitative study was used to categorize and compile judgments from brochures, surveys, and interviews. A quantitative dossier, if available, was resolved to recognize the flows and advantages.

Results

Definition and classification of nutraceuticals

Nutraceuticals are products that come from fair beginnings or are fortified with accompanying bioactive compounds that support fitness benefits and provide further basic food. They

can be classified into various types, including working snacks, digestive supplements, and herbaceous products.

Key active ingredients

Common life factors of nutraceuticals include vitamins, minerals, antioxidants, probiotics, prebiotics, and phytochemicals. These ingredients are well known for their potential to enhance well-being and prevent illness.

Consumer perspectives

Research shows that purchasers turn to nutraceuticals for a variety of reasons, including common well-being and wellness, ailment prevention, and addressing health concerns. Consumer priorities are frequently affected by perceptions of ease and security.

Regulatory framework

The supervisory foundation of nutraceuticals varies from country to country. In many domains, distinguishing directions and controlling product quality standards guarantee device security and efficacy. Compliance with these requirements is essential for display access.

Market trends

Nutraceuticals have endorsed meaningful developments in recent years, compelled by the growing strength of knowledge among shoppers. Key currents include the rise of working foods, embodied food, and an increasing emphasis on tenable and unaffected sourcing of pieces.

Discussion

Nutraceuticals are complex and are evolving. They maintain a singular slot in food and health activities, contributing to the promise of improved comfort and health support. However, challenges related to experimental confirmation, product quality control, and regulatory agreements remain. Moreover, as manufacturing continues to evolve, it securely and efficiently balances innovation and service choice. Researchers, managers, and industry partners must agree to guarantee that nutraceuticals meet their potential while addressing these challenges.

Conclusion

Many nutraceuticals, functional ingredients, and occurring compounds that had been investigated and reported in diverse research found that these products are extraordinarily active, have a profound effect on cellular metabolism, and frequently have a little unfavorable impact. It's far natural that human beings' consciousness is moving to an effective method for the prevention of illnesses to stay healthy. Nutraceuticals are clinical vicinity generated everywhere around the globe. In many cases, nutraceuticals provide a bonus over the synthetic capsules beneath improvement by way of the prescribed drugs enterprise.

It is a novel pharmacological interest which has become exciting in its feasible scientific use and for that reason helps in the prevention and therapeutic of numerous illnesses. Maximum of the pharmaceutical companies frequently lacks the motivation to pursue those difficulties in acquiring patents. Its miles hope that government groups and research facilities will provide a guide for similar studies in nutraceuticals [18-20].

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Declaration of Interest

I at this moment declare that I have no pecuniary or other personal interest, direct or indirect, in any matter that raises or may raise a conflict with my duties as a manager of my office Management.

Conflicts of Interest

The authors declare that they have no conflicts of interest. Financial support and sponsorship.

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