
Categorization, Current Trends and Upcoming Opportunity of Herbal Nutraceutical

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Abstract

Within the health and wellness market, the field of herbal nutraceuticals a combination of medications and nutrition is one that is growing quickly. In addition to offering vital nutrients, many goods provide therapeutic qualities that help prevent and treat illness. Herbal nutraceuticals are becoming an essential part of contemporary healthcare as the demand for natural and plant-based therapies increases globally. The expanding field of herbal nutraceuticals, which blends the terms “pharmaceutical” with “nutrition” to provide health advantages beyond simple food consumption. These products, which come from plant-based sources, support general health by managing and preventing illnesses. Herbal powders, pills, teas, and oils manufactured from herbs including ginseng, garlic, turmeric, ashwagandha, and green tea are popular forms. From the beginning of time, herbal nutraceuticals utilised, and when the need for organic and preventative healthcare treatments grows, so does their importance in contemporary healthcare. The products assist people retain excellent health, increase life expectancy, and improve their quality of life by preventing acute and chronic disorders brought on by nutrition. The categorization of nutraceuticals, which includes non-traditional ones created using biotechnology and conventional ones that include nutrients, herbals, and probiotics. Herbal nutraceuticals are a popular option for treating problems including diabetes, obesity, hypertension, and cardiovascular diseases because the regulatory environment, mentioning Act of 2006 on Food Safety and Standards by Indian government, which guarantees both the product’s safety and quality. Herbal nutraceuticals are poised for substantial growth in the global market as consumer interest in natural health solutions increases. This growth is anticipated that continue the upcoming years, propelled by advances in nutraceutical research and growing health conscious.

Keywords – Nutraceutical, Global marketing, Upcoming opportunities, Health benefits, Regulation, Immunity, Disease, Prevention, Dietary supplements, Plant-based remedies, Natural health solutions, Nutrient.

INTRODUCTION

Herbal nutraceuticals are dietary supplements or functional meals derived from plant extracts that provide advantages to health beyond simple dietary intake. These goods might aid in illness management or prevention, increase physical performance, or promote general health. Herbal powders, pills, teas, and oils are just a few of the many goods that fall under this broad category. Herbs including ashwagandha, ginseng, turmeric and garlic are frequently used. ^[1] Nutraceuticals are mix of the phrase’s “nutrition” along with “pharmaceutical created in 1989 by Dr. Stephen Defelice.^[2] “Let food be your medicine,” advised the Greek physician Hippocrates. Concentrate on Avoidance disease” is the guiding concept. Herbal nutraceuticals are functional foods or dietary supplements made from plant extracts, offering Health benefits that go beyond basic nutrition. These products may help Prevent or manage diseases, enhance physical performance, or improve overall well-being.

The term covers a broad range of products, including herbal powders, capsules, teas, and oils. Popular herbs used include turmeric, garlic, ginseng, ashwagandha, and green tea. Herbal nutrition is the oldest known form of medical care. Ayurveda, homeopathy, and other type of conventional drug all include it as a key component. It is estimated by the WHO that 80% of the world's Individuals, use herbal remedies.

Categorization of Nutraceutical

Based on their use and toxicity

For generations, people have utilized herbs as food and medicine. Herbs have been an essential component of human society since the dawn of civilization. Herbs may roughly split in three divisions according to their toxicity along with intended uses.

Food herbs

Toxicity and are not likely to react negatively when ingested. It has neither acute nor long-term toxicity when used in large dosages for extended periods of time.

Medicinal herbs

These are potent medications that should only be taken as directed by a healthcare professional for a certain amount of time and for particular medical problems. These herbs frequently have negative Side effects and occasionally interact with medications.

Poisonous herbs

These must only be used under the close supervision of qualified healthcare professionals due to their high potential for acute or long-term toxicity.

The first group consists of superior pharmaceuticals, which are tonic and non-toxic; the second group consists of middle-class drugs, which support superior medicines and may have some minor toxicity. The third group consists of lower-class drugs, which are toxicant remedies used only temporarily for certain disorders. [3]

Classification of Herbal Nutraceutical

Traditional Nutraceutical

Chemical Constituents

Nutrient - fatty acids, vitamin, and mineral are among the element with established nutritional roles. The majority of meals include vitamins that aid to treatment of conditions like cardiovascular condition, stroke, along with cataracts.

Herbs– It aid in preventing chronic illnesses and enhancing health. The majority of them have astringent, antipyretic, analgesic, anti-inflammatory, and antiarthritic properties. Menthol, a key ingredient in peppermint, helps treat colds and the flu.

Phytochemicals Plant compounds known as phytochemicals have certain natural processes which enhance people well-being. Another name is phytonutrients.

Microbes that promote health

Antibiotic are “life-long.” Those referred to living microbes, which when taken in reasonable doses. These microbes are sensitive bacteria that aid in proper nutrition absorption and digestion. Most significantly, their job is to eradicate infections like yeasts.

Nutraceutical Enzyme

Enzymes are derived from microbiological, creatures, and physes sources. Our physiques could no function at their best without enzymes, which are vital to life. Enzyme supplements help treat medical illnesses like blood sugar disorders, obesity, and digestive issues by removing their symptoms from the body.[4]

Not conventional Nutraceutical –

They're the produced via biotechnology artificial meals. The meal samples' biological constituents are designed as an generate things are beneficial to people's well-being.

Nutraceuticals that have been fortified and recombinant are two categories into which they might be placed. Bioactive ingredients that are designed to create goods for human health can be found in food samples. Examples of unconventional nutraceuticals include flour fortified with folic acid and grains that have extra vitamin. Agricultural experts have developed methods for increasing the nutritional value of some crops with success.

2 types

Nutraceuticals with added nutrients

Recombinant nutraceuticals

Nutraceuticals with added nutrients

These are supplemental nutrients and/or substances, or nutraceuticals derived via agricultural breeding. Examples include vitamin D-deficient grain use extra minerals, cholecalciferol-added nutrients milk. [5]

Recombinant nutraceuticals

Creation of probiotics, extracting biological active compound using fermentation. Energy-boosting meals, such bun, liquor, yoghurt, cheese, vinegar, and others, created using the aid of contemporary biological technology. [6]

Based on Modes of Action

Antioxidants

Protect against oxidative stress and cell damage. Example: Green tea Polyphenols, Grape seed extract.

Anti-inflammatory Agents

Reduce inflammation in the body. Example: Boswellia, Ginger.

Immunomodulators

Enhance or regulate the immune system. Example: Echinacea, Astragalus.

Adaptogens

Assist the organism in overcoming biological, pharmacological, or physical stress. Example: Ashwagandha.

Detoxifier

Aid in detoxifying the body. Example: Milk thistle, Dandelion. [7]

Based on Traditional Medicine System

Ayurvedic Nutraceuticals

Derived from Indian herbal traditions. Example: Ashwagandha, Triphala.

Traditional Chinese Medicine (TCM) Nutraceuticals

Derived from Chinese herbal Practices. Example: Ginseng, Goji berries.

Western Herbalism

Derived from European and North American herbal practices. Example: St. John's Wort, Echinacea.

Indigenous Herbal Practices

Derived from native traditions around the world.

Example

Cat's claw (used in Amazonian traditions), Devil's claw (African herbal medicine). [8]

Meal source utilized as a nutraceutical category

Fiber in the diet

Probiotics

Unsaturated fatty acid

Antioxidants vitamin

Polyphenols [9]

Health benefits of Herbal Nutraceutical:

Prevent the adverse effect.

Could enhance the positive impact on health.

It may include dietary supplement that are naturally occurring and do not cause undesirable side Effects.

May improve the human health, our diet, and overall well-being.

It could be readily accessible and reasonably priced.

It preserves health.

Life span is extended by it.

It stays away from the illness.

In conditions of illness, it is helpful.

The health supplements are called nutraceuticals.

It is a typical dish. It strengthens defences against illness

Nutraceuticals or dietary treatments are used as supplemental therapies in nutritional therapy, which is a healing approach. The idea behind nutritional therapy and nutraceuticals states that this is accomplished by utilizing these products' capability help the physique detoxify. By preventing micronutrient shortages, encouraging feeding behaviour, phytonutrients—plant-based substances with biological qualities—support human well-being. ^[10]

Phytochemicals function

A substance used in biological processes.

Absorptive material attaches themselves towards along with get rid of unwanted gut contents.

Improve the consistency.

A growth driver which does it specific to good germs.

A substitute of bacterial fermentation.

An inhibitor that selects of harmful internal microorganisms.

Hazardous chemical scavengers. ^[11]

Herbal Nutraceutical Therapeutic effect and adverse effect

Herbal nutraceuticals help to improve and maintain health, increase life expectancy, and enhance quality of life. Research has shown that nutraceuticals able may be utilized to treat a broad variety of conditions, including malignant tumor, neurological problems, and further more cardiovascular ailments.

Therapeutic effect

Treat Diabetes

Treat Obesity

Treat Dementia

Treat Hypertension

Treat Hypercholesterolemia

Act as Antimicrobial Agents

Act as Immunomodulators (modulating immune responses)

Some Examples

Cinnamon, bitter melon, and fenugreek have demonstrated promise in the treatment of diabetes.

Black pepper and green tea extract are well-known for their ability to prevent obesity.

There is evidence of decreasing blood pressure with the use of garlic and olive leaf extract.

Effective against a wide range of infections are tea tree oil, garlic, and oregano.

Adverse effect

Hepatotoxicity (liver toxicity)

Pulmonary Toxicity (lung toxicity)

Carcinogenicity (potential to cause cancer)

Hematotoxicity (blood toxicity)

Cytotoxicity (cell toxicity)

Nephrotoxicity (kidney toxicity)

Cardiac Toxicity (heart toxicity)

Some Examples

Liver damage has been linked to herbs including comfrey and kava.

Ephedra is a weight loss and energy supplement that has been connected to cardiovascular and respiratory issues.

Ginkgo biloba at high dosages may interact with blood thinners, causing bleeding issues.

Specific cell types may be toxic to specific herbal extracts, which could lead to organ damage. ^[12]

Global demand in Market

Usable meals, dietary aids, and organic products are the three main sectors of the industry for nutraceuticals. The health advantages of herbal medicines are gaining them recognition on a Global scale. About 80% of people in most poor countries still get their primary medical Treatment from traditional herbal drug, as per WHO. The Estimated value of the world market for nutraceuticals is USD 117 billion. The market for nutraceuticals might expand 216.23 billion US dollars between 2021 along with 2025, and expansion of market is going to increase throughout that time. In-depth market analysis is provided in this study through goods and geography. Additionally, the study examines market level of competition and offers information on a number of vendors like Coca-Cola Co. Nutraceuticals purchases expected reach \$74.7 billion at a yearly growth rate of 9.9% in 2007. This assumes world financial rebound throughout 2003 among with an end to price competition. ^[13]

The pie chart display distribution of nutrient sector in different regions:

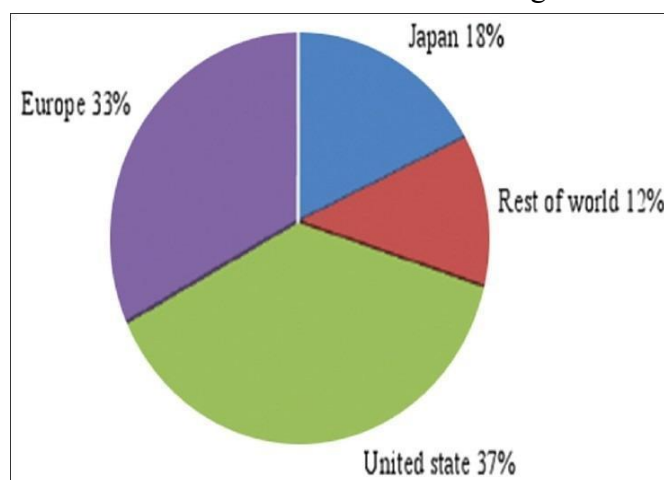


Figure 1: Nutraceutical Market in different countries (2003)

United States (37%)

This segment represents the largest share of the market, with 37% of the global nutraceutical market located in the U.S. The country's high Consumption of dietary supplements, functional foods, and beverages contributes significantly to this share.

Europe (33%)

Europe holds the second largest share of the nutraceutical market with 33%. Factors such as increasing health consciousness and a growing elderly Population are key drivers for this region's market growth.

Japan (18%)

Japan accounts for 18% of the market. Japan has a well-developed Nutraceutical sector, particularly in functional foods and beverages, owing to its

Aging population and strong regulatory framework.

Rest of the World (12%)

This portion represents the nutraceutical market outside of The U.S., Europe, and Japan. It accounts for 12% of the global market.

The market demand has been greatly increased by Consumers' growing desire for natural components in dietary supplements and health products. Through 2032, The herbal nutraceuticals industry from the useful meals segment expected to increase significantly since these products combine the advantages of conventional herbal medicines with Cutting-edge nutritional research. [14]

Regulation

If a claim was made about a nutraceutical product that suggested a medicinal benefit, the product would have to follow the regulations regarding medicinal item that has regard as a methods for Security and effectiveness and quality control. This would apply to food items that offer health benefits, such as dietary supplements or fortified foods. [15] In Foods were subject to FDA regulation, including dietary supplements for many years in order to guarantee their safety, wholesomeness, and accurate labelling.

The FSSA Act's advantages

Harmonization of international laws.

Eight laws have been unified, or the stages to harmonization.

Standards based on science.

Unanimity and clarity about new food categories.

Promote the reduction of corruption.

The proposed legislation aims to create a unified food law and support scientific advancements in the food processing sector. It was passed in 2009.

Benefits of Regulation

Encourages innovation in food and drink goods.

Provides more legal certainty and predictability in the environment.

Stops manufacturers utilizing deceptive and fraudulent promises to engage in unfair competition.

No one is required by the regulation to make negative claims about the product if positive claims cannot be made. [16]

Current Trends and popularity

Herbal nutrients have gained immense popularity in the last few years because to a number of factors:

Consumer Preferences for Natural Products

There is a growing preference for plant-based and organic products, as people are increasingly Wary of synthetic chemicals and pharmaceutical

Preventive health care

Consumers are adopting nutraceuticals as part of preventive healthcare strategies to mitigate the possibility of long-term conditions like hypertension among with obesity.

Global interest in traditional medicine

Herbal nutraceuticals are derived from convectional drug sector, Ayurveda, TCM, and Native American medicine are a few examples. Global recognition these systems has fueled demand for such products.

2024's Trends in Herbal Nutraceuticals to Observe

Individualized Dietary Plans

As genetic testing and AI-driven algorithms continue to progress, tailored diet will become increasingly popular by 2024. Nutraceutical product customization to a person's genetic profile, lifestyle, and health objectives will increase in popularity, opening up new avenues for individualized approaches that maximize health results.

The Revolution of Plants

The plant-based movement has been gaining traction, and it is anticipated that this tendency will carry on in 2024. Since of worries about environment, animal welfare, and their own health, more and more consumers are looking for plant-based alternatives to meet their nutritional demands. Anticipate the release of additional cutting-edge plant-based goods and ingredients.

Emphasis on cognitive health

In 2024, cognitive health will become increasingly important as mental health becomes increasingly recognized worldwide. The market for nutraceuticals that improve mood, memory, focus, and brain health is expected to increase significantly due to consumer demand and scientific research.

Defence Immune System

The significance of immunological health has increased in light of the COVID-19 pandemic. As 2024 draws near, the market for nutraceutical products that enhance immune function will keep expanding. In order to strengthen their body's defenses, consumers will look for immune-boosting components such vitamins, minerals, antioxidants, and herbal extracts.

Telehealth and Digitization

In 2024, the nutraceutical business will continue to be shaped by the digital revolution. In order to provide individualized nutrition solutions and encourage direct consumer participation, telehealth platforms, customized mobile apps, and other digital tools will be essential.

Growing Older with Grace

The need for nutraceutical goods with an emphasis on healthy aging will grow as the population ages. Anticipate an increase in cutting-edge products in 2024 that address age-related issues such as skin aging, joint health, cognitive decline, and cardiovascular health.^[17]

Upcoming opportunities of Herbal Nutraceutical

Increasing Health Constant

Customers are choosing natural, plant-based vitamins as they become more health conscious. People looking for preventive healthcare choices and holistic health treatments may find value in herbal Nutraceuticals, which are made from herbs and botanicals.^[18]

Rising Demand for Natural Products

Concern over artificial chemicals in food, medication, and supplements is on the rise. The market for Herbal nutraceuticals is growing as consumers turn more and more towards natural and organic Products. This desire is also being fueled by the clean label movement, which emphasizes transparency and few ingredients.^[19]

Aging population

As the world's population ages, controlling chronic illnesses, boosting immunity, and preserving general Wellness are of greater importance. Due to their well-known therapeutic and preventive properties, Herbal nutraceuticals are anticipated to be in high demand, particularly for age-related conditions such as arthritis, cardiovascular problems, and cognitive decline.^[20]

Technology advancement

Innovations in extraction and formulation techniques have improved the efficacy and bioavailability of herbal components. As a result, consumers are more likely to trust herbal supplements and Nutraceutical products are more effective.^[21]

Regulatory support

Clearer rules are being created in a number of nations for the herbal nutraceutical industry, which is anticipated to propel market expansion. As a result of effective regulation, which guarantees product Efficacy, safety, and quality, more consumers choose to use these goods.^[22]

Personalized Diet plan

Technology developments in digital health and biotechnology are opening doors for customized nutrition. Based on dietary, lifestyle, and genetic factors, herbal nutraceuticals can be a major component of Dietary supplements that are specifically designed to meet the needs of each individual.^[23]

Herbs

Ginseng (*panax*)

Bioactive compound

Ginsenoside, Eleutherosis, polysaccharides, polyphenols

Health benefits

Immunity booster

It is commonly recognized that ginseng modulates the immune system. Through effects on the immune system. Ginseng extract improves the functioning of natural killer cells.

Panax boosted immunity and enhanced the natural killing activity in mice.

Neuroprotective effect

Anti-inflammatory and Anti diabetic properties

Dose

400-800mg per day.

Curcumin

Bioactive compound

Curcumin

Health benefits

Anti-inflammatory

Curcumin reduced edema in rats at 50–200 mg/kg dosages.

Anti- protozoal activity

The first study in the literature to link the anti-tripanosomatid Properties of curcumin and a few semi-synthetic derivatives was conducted on *Leishmania Amazonensis* promastigotes (extracellular) and amastigotes (intracellular).^[24]

Anti -oxidant properties

Anti – cancer properties

Uses

It has the capacity to lessen inflammation. Strong anti-inflammatory properties of turmeric have been shown to potentially lessen inflammation in a variety of organs and tissues. Consequently, it holds therapeutic potential for the management of chronic pain, inflammatory bowel disease, and arthritis.^[25]

Dose

5-10 g per day.

Ginger (*Zingiber Officinale*)

Bioactive compound

Gingerol

Health benefits

Effect on gastrointestinal tract- It enhance muscle Activity in the GIT, that promotes absorption and digestion while Relieving gas and constipation.

Antimicrobial effect –Strong antibacterial and somewhat antifungal qualities are seen in ginger. *Salmonella*, *Proteus* species, *Staphylococci*, *Streptococci*, and *Escherichia coli* are all inhibited in Growth by it. *Aspergillus* is a fungus that produces aflatoxin, a carcinogen, which ginger Suppresses.

The anti-Aspergillus Niger and anti-Mycoderma species properties of fresh Ginger juice were demonstrated. [26]

Senna (*Cassia angustifolia*)

Bioactive compound

Sennosides (A, B, C, D), Renin, Aloe -emodin

Health benefits

Antidiabetic activity,

Hepatoprotective activity

In a rotary evaporator, crude ethanol extract from leaves was made. Various concentrations of leaf extracts (10, 20, and 40 mg/mL) were used to treat various Helminthes representatives. The results of the extract showed that *Cassia angustifolia* Combined with *Cassia alata* caused early paralysis in all of the worms that were treated.

Immunomodulatory

Oral dosage of 200mg/kg methanolic extract were used assess the immunomodulatory effects of the extract in rats.

Uses

Antibiotic, antioxidant, laxative, and antidiabetic. [27]

Some herbal nutraceutical product in market

Omega -3 fatty acid

Some of the most well-known and extensively studied nutraceuticals available today are omega-3 fatty acids. There are valid explanations for this. It is vital to wellbeing. Empirical data indicates that they can enhance mood, blood flow, memory, and brain function. Additionally, omega-3s can lessen inflammation and aging-related brain atrophy. [28]

Probiotics

It includes in category of nutraceutical items. It mostly living microbes that are added to diets, supplements, topical applications like cosmetics. They can also be found in fermented foods.

Benefits of product

Encourage intestinal well-being

Assistance with digestion

Assist in maintaining the proper balance of beneficial bacteria

Boost the defense system. [29]

Health care juice

This juice, which is made up of several fruits and vegetables, can offer vital vitamins and minerals that promote good cardiovascular health in general. This juice manages the cholesterol level in our body. Strong antioxidants in Cholesterol Care Juice assist control heart health and cholesterol levels. Its special combination of components helps to keep the heart healthy. This juice helps to maintain healthy cholesterol levels by managing blood flow optimally. This juice's natural components can aid in enhancing cardiovascular health in general.

Components of this juice

Garlic -aids in maintaining cholesterol levels in balance

Lemon – Rich in antioxidants

Apple Cider Vinegar -aids in the heart's normal functioning

Ginger –aids in the blood's natural flow

Honey – increases vitality and metabolism. [30]

Sleep and focus tablets

The carefully thought-out design of Sleep & Focus ensures a peaceful 6–8 hours of sleep. Melatonin helps alleviate insomnia and other sleep disorders by regulating your circadian rhythm. Not only that, but Brahmi is also present. Brahmi, also called Bacopa Monnieri, improves mental clarity, reduces anxiety, sharpens memory, and helps fight mental fatigue. You can increase your product. It mostly uses in Insomnia condition.

Ingredients

Melatonin

The Hormone for Sleep

Brahmi

Boost Concentration & Productivity

Matcha Tea extract

Reduces Anxiety and Stress

5 – HT

Natural Amino Acids for Relaxation. [31]

Diabetic health mix (Atta)

Bajra, Little millet, Foxtail millet, and cardamom are among the many nutrient-dense components that make up the Naturalist Diabetic Health Mix. There are no chemicals in this mixture at all. All these powerful components that is naturally able to regulate blood sugar levels. The combination includes millets, which are naturally gluten-free grains high in dietary fiber that aids in better digestion. To preserve nutrients, a stone milling method is used to grind all of the flours in this blend.

Uses

High in vitamins, protein, and fiber.

Supports weight management, is beneficial for heart health, and helps control diabetes.

Ideal consumed for breakfast as dosa, roti, or porridge [32]

Aloe Vera Gel

Many people claim that aloe vera extract has different regenerative, healing, or smoothing properties. utilized in the complementary and alternative medicine and cosmetic sectors. [33]

Decrease adverse impacts and promote self- healing. [34]

Uses

Aloe Vera works to heal wounds and reduce inflammation. It can aid in skin softening and healing. Despite its inability to cure acne directly, it can effectively manage the problem. [35]

CONCLUSION

An increasing consumer demand for natural, plant-based alternatives that provide therapeutic advantages beyond basic nutrition has led to the rapid expansion of the herbal nutraceuticals sector in the field of health and wellbeing. These medicines, which made from herbs and botanicals, have a great deal of promise for controlling and preventing a number of illnesses, including diabetes, cognitive decline, cardiovascular diseases, and obesity. As awareness of health issues has grown, particularly in the wake of the pandemic, more people are using herbal nutraceuticals to preserve general wellbeing, improve longevity, and strengthen immunity. This industry, which is bolstered by developments in customized nutrition and biotechnology, is expected to grow as long as studies verify the effectiveness of herbal compounds such as ginger, ginseng, aloe vera, and curcumin. Herbal nutraceuticals do, however, present a number of difficulties, namely in the areas of standardization, regulatory compliance, and consumer education.

Nutraceuticals frequently lack universal quality control frameworks, which results in variability in product effectiveness, in contrast to medicines, which are subject to strict quality standards. Furthermore, the industry is still heavily influenced by competition from synthetic supplements. Raising consumer confidence and educating the public about the special advantages of herbal choices will require strict quality control procedures, honest labelling, and successful education campaigns to overcome these obstacles. Herbal nutraceuticals have great promise as a modern healthcare pillar, promoting a more natural and sustainable approach to global health management as consumer demand for preventative and holistic health solutions rises.

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