

**A REVIEW ON BENEFITS OF NUTRACEUTICALS**Aarchi\*<sup>1</sup>, Dixit Minhas\*<sup>1</sup>

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**ABSTRACT**

Nutraceuticals are basically bioactive compounds from foods that go way beyond just basic nutrition. They help with managing and preventing diseases, and you'll find them in things like functional foods, supplements, fortified products, and herbal remedies. We're talking everything from vitamins and minerals to antioxidants, probiotics, and phytochemicals. They help strengthen your immune system, boost overall health, and lower your chances of dealing with long-term issues like heart disease, diabetes, or even cancer. These days, people are far more tuned into preventive healthcare and natural options, so the demand for nutraceuticals has shot up. Still, it's important to have solid rules, real scientific testing, and good quality control so you know they're actually safe and do what they claim.

**INTRODUCTION**

Consumers are deeply concerned about their food habits, health, and day-to-day lifestyle.<sup>[1]</sup> With the increasing population and evolution of society, maintaining good health is a priority. The consumption of fast food has increased in modern life, which results in a plethora of acute, chronic, and life-threatening diseases. Nutraceuticals or functional foods are attracting an increasing number of people as they are rich in nutrients and are also healthy. They have also received considerable interest recently because of their renewed safety and potential nutritional and therapeutic effects.<sup>[2]</sup> The term "nutraceutical" was coined by Stephen de Felice in 1989, which refers to a mixture or hybrid of "nutrition and pharmaceuticals." According to health Canada, nutraceuticals are products prepared from foods but sold in the form of pills, powders, or other medical forms. They contain lipids, proteins, carbohydrates, and other nutrients in the required

amount. Nutraceuticals may range from isolated nutrients and herbal products to dietary supplements and diets, to genetically engineered designer foods and processed products such as cereals, soups, and beverages.<sup>[3]</sup> Each pharmaceutical and nutraceutical compound could possibly be used to treat or prevent diseases; however, pharmaceutical compounds have government sanction. Recent studies have shown promising results for these compounds in various pathological complications, such as diabetes, atherosclerosis, cardiovascular diseases, cancer, and neurological disorders. This type of health-promoting product is becoming more popular among health-conscious consumers; thus, a large list of nutraceuticals containing phytochemicals from foods is now available in the market. For example, green tea supplements, probiotics, omega 3 fatty acids, vitamin B12, and liquid prenatal vitamins are available. Hence, they are considered healthy sources of health promotion, notably for the interference of life-threatening disease.

**FORMULATIONS/ACTIVE INGREDIENTS USED AS NUTRACEUTICALS<sup>[5,6]</sup>**

S.NO.	Nutraceuticals	Origin	Therapeutic uses	Formulations
1.	Coenzyme Q10	Common foods	Cardiovascular health, cancer prevention	Tablet, capsule, soft gel, chewable tablets
2.	Carnitine	Heart, skeletal muscle	Sport enhancement, cardiovascular, bone health	Tablet
3.	Lutein	Tomato, butternut squash	Cardiovascular, eye, skin health	Capsule
4.	Lipoic acid	Meat, liver	Cardiovascular, mental health,	Tablet

			veterinary health	
5.	Creatine	Skeletal muscle	Mental health, sport enhancement	Tablet, capsule, liquid, effervescent tablet
6.	Lycopene	Foods, including tomato, green algae	Cardiovascular and respiratory health, cancer prevention	Tablet, capsule, oral gel
7.	Melatonin	Bovine pineal glands	Cardiovascular health, cancer prevention, sport enhancement, sleep improvement, bone health (antioxidant)	Tablet, patch and liquid

### NUTRACEUTICALS AS HERBAL DRUGS

The use of nutraceuticals as herbal drugs dates back to human civilization. They provide a huge storehouse of remedies to treat acute and chronic diseases. Details about herbal drugs have been stored for thousands of years, and today, we have many effective means of ensuring human health. Nutraceuticals have great potential to improve healthcare and prevent chronic diseases with the help of herbal drugs.

Nutraceuticals, products derived from food sources with added health benefits, often overlap with herbal drugs. Some common examples of nutraceuticals that are also used as herbal drugs are as follows:

- **Ginseng (panax ginseng):** Ginseng is an herbal remedy used for various health conditions, including boosting energy, reducing stress, and improving cognitive function.<sup>[7]</sup>
- **Ginkgo biloba:** Ginkgo biloba extract is derived from the leaves of the ginkgo tree and is used as a dietary supplement to improve memory, cognitive function, and blood circulation.<sup>[8]</sup>
- **Garlic (allium sativum):** is a popular culinary herb with medicinal properties. It is used as a dietary supplement to support heart health, lower cholesterol levels, and boost the immune system.<sup>[9]</sup>
- **Turmeric (curcuma longa):** Turmeric contains the active compound curcumin, which has potent anti-inflammatory and antioxidant properties. Turmeric supplements are used to reduce inflammation, relieve pain, and support overall health and well-being.<sup>[10]</sup>
- **Echinacea (echinacea purpurea):** Echinacea is a common herbal remedy used to prevent and treat the common cold and other respiratory infections. It is also used to boost the immune system and reduce inflammation.<sup>[11]</sup>
- **Milk thistle (Silybum marianum):** is an herbal remedy that is traditionally used to support liver health and detoxification. It contains a compound called silymarin, which has antioxidant and anti-inflammatory properties.<sup>[12]</sup>
- **St. John's wort (hypericum perforatum):** St. John's wort is an herbal remedy used to treat depression, anxiety, and sleep disorders. It is believed to work by increasing the levels of certain neurotransmitters in the brain.<sup>[13]</sup>

### NUTRACEUTICALS USED AS DIETARY SUPPLEMENTS

- **Omega-3 fatty acids:** Omega-3 fatty acids, found in fish oil supplements, are known for their anti-inflammatory properties and are commonly used to support heart health and brain function.<sup>[14]</sup>
- **Vitamin D:** Often referred to as the "sunshine vitamin," vitamin d plays a crucial role in bone health, immune function, and mood regulation. It is commonly supplemented, especially in regions with limited sunlight exposure.<sup>[15]</sup>
- **Probiotics:** Probiotics are beneficial bacteria that promote gut health and digestion. They are commonly found in fermented foods like yogurt, kefir, and sauerkraut, as well as in supplement form.<sup>[16]</sup>
- **Curcumin:** Curcumin is the active compound found in turmeric, a spice known for its anti-inflammatory and antioxidant properties. Curcumin supplements are used to support joint health, reduce inflammation, and support overall well-being.<sup>[17]</sup>
- **Green tea extract:** Green tea extract is rich in antioxidants called catechins, which have been shown to have various health benefits, including supporting heart health, boosting metabolism, and promoting weight loss.<sup>[18]</sup>
- **Resveratrol:** Resveratrol is a compound found in red wine, grapes, and berries. It is known for its antioxidant properties and has been studied for its potential benefits in heart health, brain function, and longevity.<sup>[19]</sup>

These dietary supplements are often used as nutraceuticals because of their potential health benefits and preventive properties.

### NUTRACEUTICALS: HERBAL MEDICINES

Nutraceuticals, also known as herbal medicines, are products derived from food sources that are purported to provide health benefits beyond basic nutritional value.

- **Turmeric (Curcuma longa)**  
**Health benefits:** Turmeric contains curcumin, a compound with powerful anti-inflammatory and antioxidant properties. It has been studied for its potential role in treating various conditions, such as arthritis, digestive disorders, and certain types of cancer.<sup>[20]</sup>

- **Ginger (*Zingiber officinale*)**

**Health benefits:** Ginger has been used for centuries to alleviate nausea, reduce inflammation, and aid digestion. It contains bioactive compounds, such as gingerol, which contribute to its medicinal properties.<sup>[21]</sup>

- **Garlic (*Allium sativum*)**

**Health benefits:** Garlic has been shown to have antibacterial, antiviral, and antifungal properties. It may also help reduce blood pressure and cholesterol levels.<sup>[22]</sup>

- **Ginkgo biloba**

**Health benefits:** Ginkgo biloba extract is commonly used to improve cognitive function and memory, especially in elderly individuals. It contains flavonoids and terpenoids, which have antioxidant properties.<sup>[23]</sup>

- **Green tea (*Camellia sinensis*)**

**Health benefits:** Green tea is rich in polyphenols, particularly catechins, which have antioxidant properties. Regular consumption of green tea has been associated with reduced risk of cardiovascular disease, cancer, and weight loss.<sup>[24]</sup>

- **Echinacea**

**Health benefits:** Echinacea is often used to boost the immune system and shorten the duration of the common cold. It contains active compounds, such as flavonoids and alkaloids.<sup>[25]</sup>

- **St. John's wort (*Hypericum perforatum*):**

**Health benefits:** St. John's wort is commonly used to treat mild to moderate depression. It contains hypericin and hyperforin, which are believed to be responsible for its antidepressant effects.<sup>[26]</sup>

### BENEFITS OF DIFFERENT NUTRACEUTICALS

Nutraceuticals have been used to many beneficial reasons. These are:

- Nutraceuticals help to increase the health value of our diet.
- Nutraceuticals help us to live longer and healthy life.
- Nutraceuticals can help prevent particular medical conditions.
- Nutraceuticals have no known side effects on body.
- Nutraceuticals increase or maintain life expectancy and improve immunity.
- Nutraceuticals provide the appropriate amount of nutrients for the human body.
- Nutraceuticals can help to cure or prevent chronic diseases.
- Nutraceuticals affect the functioning of the respiratory, immune, and digestive systems.
- Nutraceuticals help to support and regulate body functions.
- Nutraceuticals help to increase energy levels and body functioning.

- Nutraceuticals help to reduce the effects of stress and helps to improve the mental clarity as well as to relieve anxiety.
- Nutraceuticals help to prevent signs of ageing.
- Nutraceuticals are used as antioxidants, dietary fibres, omega-3 fatty acids, vitamins, minerals for avoidance and treatment of a cardiovascular disease.

### ROLE OF NUTRACEUTICALS IN PRESENT ERA

In recent times, interest in nutraceuticals has increased significantly due to their implicit health benefits. "Nutraceuticals are defined as biologically active composites deduced from food that give health benefits beyond introductory nutrition."<sup>[31]</sup> these composites can be set up in a variety of food sources, including fruits, vegetables, and whole grains. In the present period, nutraceuticals weren't used in the same way they're moment. Still, numerous ancient societies honored the health benefits of certain foods, and used them as part of their mending traditions. For illustration, turmeric has been used in ayurvedic drug for centuries to treat a variety of affections. Moment, nutraceutical are decreasingly being used as a precautionary measure against habitual conditions like heart complaint and diabetes. This is because numerous nutraceuticals contain antioxidants, which can help cover the body against damage from free revolutionaries. Still, it's important to note that the efficacy of nutraceutical isn't always backed up by scientific substantiation. While some composites have been studied considerably and are known to be effective, others haven't been studied as completely. Also, numerous nutraceuticals are vended as salutary supplements, which aren't regulated in the same way as tradition medicines. In conclusion, nutraceuticals have always been a part of mortal history, but their use and understanding have evolved over time. While they can give numerous health benefits, it's important to do your own exploration and consult with a healthcare professional before taking any new supplements or making significant changes to your diet. Nutraceuticals play a significant part in the present period due to their implicit health benefits and their capability to bridge the gap between nutrition and medicinal. These products, which include salutary supplements, functional foods, and potables fortified with bioactive composites, are gaining fashion-ability worldwide as people come more health-conscious and seek natural druthers to support their well- being. Nutraceuticals play a significant part in the present period due to several factors:

1. **Health awareness:** With adding health knowledge, people are seeking preventative measures to maintain overall health and well- being. Nutraceuticals offer a ground between food and medicinal, furnishing health benefits beyond introductory nutrition. Nutraceuticals contain bioactive composites similar as vitamins, minerals, antioxidants, polyphenols, and omega- 3 adipose acids that have been shown to promote health and reduce the threat of habitual conditions like cardiovascular conditions, diabetes, and cancer.<sup>[32]</sup>

2. **Lifestyle conditions:** The frequency of life-related conditions similar as rotundity, diabetes, cardiovascular conditions, and cancer has surged encyclopaedically. Nutraceuticals offer implicit results by furnishing bioactive composites that may alleviate the threat factors associated with these conditions.
  3. **Aging population:** As the global population periods, there is a growing demand for products that can support healthy aging and ameliorate quality of life. Nutraceuticals containing antioxidants, vitamins, minerals, and other bioactive composites are decreasingly popular for their eventuality to promote life and reduce age-related health issues.<sup>[33]</sup>
  4. **Functional foods:** Potable consumers are decreasingly seeking functional foods and potables that offer specific health benefits beyond introductory nutrition. Nutraceutical constituents like probiotics, prebiotics, omega-3 adipose acids, and factory-grounded excerpts are being incorporated into a wide range of food and libation products to enhance their health-promoting parcels.
  5. **Substantiated nutrition:** Advances in technology and substantiated drug have led to the rise of substantiated nutrition approaches. Nutraceuticals can be acclimatized to individual requirements grounded on factors similar as genetics, life, and health status, offering targeted results for optimizing health and performance.<sup>[34]</sup>
  6. **Natural and organic trends:** There is a growing preference for natural and organic products driven by enterprises about synthetic complements, fungicides, and environmental sustainability. Nutraceuticals deduced from natural sources similar as fruits, vegetables, sauces, and botanicals are perceived as safer druthers to synthetic supplements.
  7. **Research and innovation:** Ongoing exploration and invention in the field of nutraceuticals have led to the discovery of new bioactive composites with implicit health benefits. Advancements in expression technologies, delivery systems, and nutrigenomics are expanding the possibilities for developing effective nutraceutical products.<sup>[35]</sup>
  8. **Regulatory support:** Regulatory agencies worldwide are decreasingly feting the significance of nutraceuticals in promoting public health. Regulations governing the labelling, safety, and efficacy of nutraceutical products help insure consumer confidence and product quality.
  9. **Supporting immune function:** Nutraceuticals can help strengthen the vulnerable system by furnishing essential nutrients and composites that support vulnerable function, similar as vitamin c, vitamin d, zinc and probiotics.
  10. **Managing life-affiliated conditions:** Nutraceuticals are decreasingly used to manage conditions related to life factors similar as rotundity, stress, and poor diet. Constituents like green tea excerpt, garcinia cambogia, and conjugated linoleic acid are popular choices for weight operation.
  11. **Cognitive health and mental well-being:** Certain nutraceuticals, including omega-3 adipose acids, phospholipids, and herbal excerpts like ginkgo biloba and bacopa monnieri, are believed to support cognitive function and internal well-being by perfecting memory, attention, and mood.
  12. **Sports nutrition and performance enhancement:** Nutraceuticals are used by athletes and fitness suckers to enhance performance, support muscle recovery, and ameliorate abidance. Constituents like protein supplements, creatine, and fanned-chain amino acids are generally employed.<sup>[36]</sup>
  13. **Anti-aging and skin health:** Nutraceuticals containing antioxidants like vitamin e, vitamin c, and polyphenols are believed to combat oxidative stress, cover against uv damage, and promote skin health, therefore contributing to anti-aging goods.
- Nutraceuticals continue to evolve as exploration advances, offering promising avenues for maintaining health and heartiness in the present period and beyond. Still, it's important to note that while numerous studies support the efficacy of nutraceuticals, farther exploration is demanded to completely understand their mechanisms of action and implicit relations with specifics or being health conditions. In summary, nutraceuticals play a vital part in the present period by offering results to colourful health challenges, supporting healthy cultures, and contributing to the growing demand for functional and individualized nutrition products.

#### NUTRACEUTICALS IN DISEASE PREVENTION

Nutraceuticals play veritably important part in the health and complaint prevention. Nutraceuticals, a carryall of nutrition and medicinal," are food or food products that give health and medical benefits, including the forestalment and treatment of complaint. They encompass a wide range of products similar as salutary supplements, functional foods, and herbal products. Over the times, exploration has decreasingly shown the eventuality of nutraceuticals in complaint forestalment due to their colourful bioactive composites.

1. **Cancer:** Cancer development is active and a veritably long-term process. This process involves numerous complicated factors with accretive progression. These factors eventually lead to an unbridled spreading and growth of the cancerous cells throughout the body. Thus, it's also known as metastasis. According to epidemiological studies, salutary factors can modify the carcinogenesis. Thus, flavonoids which blocks the enzymes that produce an estragon to dwindle an estragon-convinced cancer. Spinach leaves, beet roots, turmeric rhizomes, cucumber fruits were honored to have antitumor exertion numerous food constituents with undetermined nutritive advantages set up to retain anticarcinogenic parcels and antimutagenic parcels. Thus, nutraceuticals help in prostrating side-goods of cancer treatment and ameliorate general health of case. Experimententer states that the most

common reason of cancers deaths are preventable by life- style changes, which include an applicable nutrition. Alkaloids the vinca species (vincristine and vinblastine) and of the pacific yew taxus brevifolia(taxol) are effective in cancer complaint. Also, botanicals are extensively used in the treatment of cancer complaint. Hence, nutritive modulation may be salutary in the treatment of cancer cases.<sup>[37]</sup> There's suggestion that foods, comparatively low quantum in simple carbohydrates with moderate quantum of high-quality protein, fibre and fat are salutary for cancer cases. Nutraceuticals may also help to reduce the toxin, associated with radiation remedy and chemotherapy. It may lead to be better life conditions by reducing the cancer. Cancer is a major global health concern, and several nutraceuticals have shown pledge in its forestalment.

- **Polyphenols:** Polyphenols, set up in green tea, berries, and dark chocolate, have been considerably studied for their anti-cancer parcels. They help cancer by inhibiting the growth of cancer cells and reducing inflammation.
  - **Curcumin:** Curcumin, an emulsion set up in turmeric, has shown implicit in precluding and treating colourful types of cancer by inhibiting cancer cell growth and promoting apoptosis.<sup>[38]</sup>
- 2. Cardiovascular complaint (CVD):** For the forestalment and treatment of cardiovascular complaint minerals, anti-oxidants, salutary filaments, vitamins, omega- 3 polyunsaturated adipose acids are substantially used and veritably useful. Experimenter reports show that low consumption of fruits and vegetables associated with an increased death rate in cardiovascular complaint.<sup>[39]</sup> Rice bran helps to lowering serum cholesterol situations in the blood, lowers the position of LDL and increase the position of HDL in cardiovascular health. Advanced the rate more will be the parlous of coronary heart complaint. People who take a healthy diet, don't bomb and consume lower quantum of alcohol tends to have a reduced threat of cardiovascular complaint. Diet leads to elevate serum total cholesterol, LDL- cholesterol and triacylglycerol attention, while leads to reduced HDL- cholesterol attention and it leads to reduced threat of coronary roadway complaint. Cardiovascular conditions (CVDs) are a leading cause of death worldwide. Nutraceuticals have gained attention for their eventuality in precluding and managing CVDs.<sup>[40]</sup>
- **Omega- 3 adipose acids:** Omega- 3 adipose acids set up in fish oil painting have been shown to reduce the threat of CVDs by lowering triglyceride situations, reducing blood pressure, and precluding shrine buildup in highways.
  - **Antioxidants:** Antioxidants like vitamins c and e, and flavonoids set up in fruits, vegetables, and nuts, help reduce oxidative stress and inflammation, thereby reducing the threat of CVDs.

**3. Diabetes prevention:** Type 2 diabetes is a growing health concern worldwide, and nutraceuticals have been studied for their part in diabetes forestalment.

- **Cinnamon:** Cinnamon has been shown to ameliorate insulin perceptivity and reduce fasting blood sugar situations, making it potentially salutary in precluding type-2 diabetes.<sup>[41]</sup>
- **Chromium:** Chromium, set up in broccoli, barley, and oats, has been shown to improve glucose metabolism and insulin sensitivity, thus reducing the risk of type 2 diabetes.<sup>[42]</sup>

Nutraceuticals play a significant role in disease prevention, including cardiovascular diseases, cancer, and diabetes, among others. Incorporating these bioactive compounds into one's diet can contribute to overall health and well-being.

## WORLDWIDE AND INDIAN REGULATORY ASPECTS OF NUTRACEUTICALS

Nutraceuticals, a portmanteau of "nutrition" and "pharmaceuticals," represent a broad category of products that provide medical or health benefits beyond basic nutrition.

### Worldwide regulatory aspects

#### 1. UNITED STATES (U.S.)

In the U.S., nutraceuticals are regulated as dietary supplements by the food and drug administration (FDA) under the dietary supplement health and education act (DSHEA) of 1994.

Under DSHEA, manufacturers are responsible for ensuring the safety of their products before marketing them. There is no requirement for FDA approval before they are marketed.<sup>[43]</sup>

#### 2. EUROPEAN UNION (EU)

Nutraceuticals are regulated as food supplements under the eu food supplements directive (2002/46/EC).

The European food safety authority (EFSA) assesses the safety and efficacy of nutrients, which are then listed in the EU register of nutrition and health claims.<sup>[44-45]</sup>

#### 3. CANADA

In Canada, nutraceuticals are regulated as natural health products (NHPS) under the natural health products regulations.<sup>[46]</sup>

Health Canada oversees the regulation OF NHPS, ensuring they are safe, effective, and of high quality.<sup>[47]</sup>

### INDIAN REGULATORY ASPECTS

#### 1. Food safety and standards authority of India (FSSAI)

FSSAI is the apex regulatory body for ensuring the safety and quality of food products in India.<sup>[48]</sup>

Nutraceuticals are regulated under the food safety and standards (health supplements, nutraceuticals, food for

special dietary use, food for special medical purpose, functional food, and novel food) regulations, 2016.

FSSAI regulates the manufacture, import, distribution, and sale of nutraceuticals in India.

## 2. Drug controller general of India (DCGI)

Nutraceuticals with medicinal claims are regulated as drugs by the DCGI under the drugs and cosmetics act, 1940.<sup>[49]</sup>

Nutraceuticals with medicinal claims require approval from the DCGI before they can be marketed.

## 3. Labelling and claims

Nutraceuticals in India must comply with specific labelling requirements set by FSSAI.

FSSAI also regulates health claims and prohibits false or misleading claims on nutraceutical products.

In summary, while there are differences in the regulatory frameworks for nutraceuticals worldwide, both the U.S. and India have specific regulations in place to ensure the safety, quality, and efficacy of these products. In India, FSSAI and DCGI are the primary regulatory authorities overseeing the manufacture, import, distribution, and sale of nutraceuticals.<sup>[50]</sup>

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