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ROLE OF NUTRACEUTICALS IN PREVENTION ON VARIOUS DISEASES: A COMPREHENSIVE REVIEW

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ABSTRACT
The words "nutrition" and "pharmaceutical" are combined to form the phrase "nutraceutical." Nutraceuticals are compounds with substantial health advantages that are either food or a component of food. In the prevention and treatment of illnesses, nutritional therapy and nutraceuticals—complementary treatments that provide nutrients and energy while also possibly having therapeutic benefits—have grown in popularity. Both conventional and contemporary biotechnology techniques are used in the development and production of nutraceuticals. Because of its anticipated safety as well as their potential nutritional and medicinal advantages, nutraceuticals have drawn a lot of attention. They were utilized in place of contemporary medicine to improve health, extend life expectancy, and raise dietary nutrient levels. Nutraceuticals have been shown to prevent or treat high blood pressure, high cholesterol, obesity, osteoporosis, diabetes, arthritis, macular degeneration, cataracts, menopausal symptoms, insomnia, memory loss, and constipation. They have also gained significant trust in the treatment of migraines and stress-related headaches, and other related products are marketed as treatments for lethargy, thinning hair, lack of confidence, poor complexion, varicose veins, alcoholism, depression, and lethargy. These products are in addition to their ability to reduce the risk of cancer, heart disease, and other related conditions. Due to their safety record, efficacy as medications, and nutritional advantages, nutraceuticals are gaining international recognition in the domains of disease prevention, health promotion, and other services. The purpose of this review article is to inform readers on the use of nutraceuticals in treating various illnesses.

Keywords: Nutraceuticals, classification, health promotion, disease prevention.

INTRODUCTION

Originally created by Stephen De Felice in 1989, the term "nutraceuticals" is a combination of the terms "pharmaceutical" and "nutrition." According to his definition, a nutraceutical is "a food (or portion of a food) that provides medical or health benefits including the prevention and/or treatment of a disease."[1] Oral dietary ingredients that are naturally present in food and are thought to have therapeutic or health benefits are known as nutraceuticals.[2] The expense of medical treatment has skyrocketed due to the rising demand for it. People have therefore attempted to improve their quality of life by consuming more fruits, vegetables, and other plant-based foods; taking nutraceuticals or dietary supplements; or substituting nutritional therapy or phytotherapy for radiation or chemotherapy. As a result of the growing demand for phytonutrients, nutraceuticals, and their therapeutic services, producers, marketers, and associated licensed professionals have expanded in tandem. [3] Nutrients and foods are essential to the body's regular operation. They aid in preserving a person's health and lowering their chance of contracting certain illnesses. As this fact became widely acknowledged, a connection between "nutrition" and "health" was established, and the idea of "nutraceuticals" developed. [4] Healthy Aahar and Vihaar are intimately related to Ayurvedic therapeutic principles. Aahar has been used in both traditional cookery and medicine. In Ayurveda, the term Rasayana, or rejuvenation therapy, refers to a far broader idea than modern nutraceuticals. Hippocrates once said, "Let food be your medicine and medicine be your food," some 2500 years ago. His theory fits in nicely with the notion of nutraceuticals.[5]

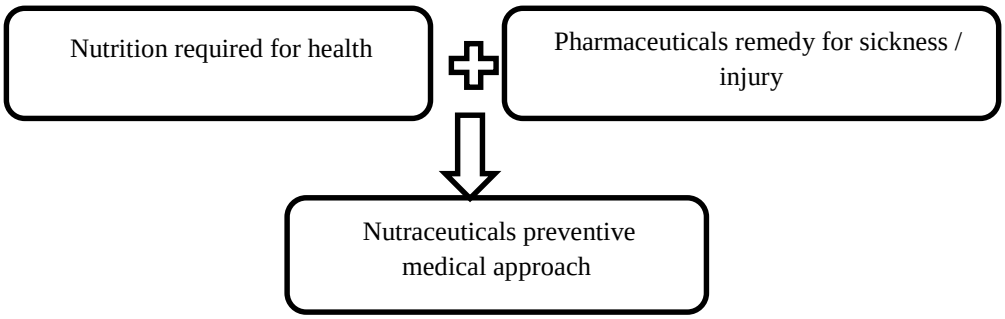


Fig: Concept of nutraceuticals [6]

Different types of nutraceuticals:

All of the natural food sources utilized as nutraceuticals fall into these categories:

- **Nutrients**:

Materials with known nutritional purposes, such as vitamins, minerals, amino acids, and fatty acids, are referred to as nutrients. Vitamins included in the majority of vegetables, whole grain cereals, dairy products, fruits, and animal products like meat and poultry can help treat cancer, heart disease, stroke, cataracts, osteoporosis, and diabetes. Plant, animal, and dairy products provide minerals that help prevent osteoporosis, treat anemia, strengthen bones, teeth, and muscles, and enhance heart rhythm and nerve impulses. Omega-3 polyunsaturated fatty acids, which are found in flaxseed and salmon, are powerful regulators of inflammation, preserve brain function, and lower cholesterol accumulation. [7] The most well recognized nutrients are fat-soluble vitamins, water-soluble vitamins, and antioxidants. Consuming antioxidants through food or supplements has been linked to a number of possible advantages. In general, antioxidants may be helpful in preventing both cancer and heart disease. A high vitamin E consumption in the diet may help to avoid Parkinson's disease. [8]

Nutrients	Health benefits
Vitamin A	An antioxidant that is necessary for both growth and development as well as the treatment of some skin conditions.
Vitamin E	An antioxidant that strengthens the immune system and aids in the formation of blood cells, muscles, lung, and nerve tissue.
Vitamin K	Necessary for blood coagulation.
Vitamin C	Antioxidant, promotes healthy bones, gums, teeth, and skin; aids in wound healing; wards off the common cold and lessens the symptoms of it.
Vitamin B1	Aids in the conversion of food into energy, which is vital for neurological processes.
Vitamin B2	Supports the body's chemical processes and energy generation, vitamin B2 also supports the health of the skin, eyes, and nerves.
Vitamin B3	Aids in maintaining healthy brain function and converting food into energy.
Folic acid	Generate cell genetic elements during pregnancy to avoid birth deformities, block the creation of red blood cells, and guard against heart disease.

Table : Nutrients and their significance [9,10]

- **Phytoconstituents**:

Phytoconstituents, which are nutrient-dense plant components that can protect against disease. Plants produce these non-essential nutrients primarily for self-defense, and plant-derived phytochemicals are incorporated into the diet and offer health benefits like inhibiting intestinal absorbent enzymes that bind to and remove undesirable, vital nutrients by scavenging reactive or hazardous molecules. Phytoconstituents, also known as phytonutrients, are found in a wide variety of foods, including whole grains, legumes, fruits, vegetables, herbs, and vegetables. These phytoconstituents have significant therapeutic potential for treating a variety of diseases, either alone or in combination. Important characteristics of phytochemicals include the regulation of insulin and glucose, and they provide a good substitute for traditional diabetes treatment.

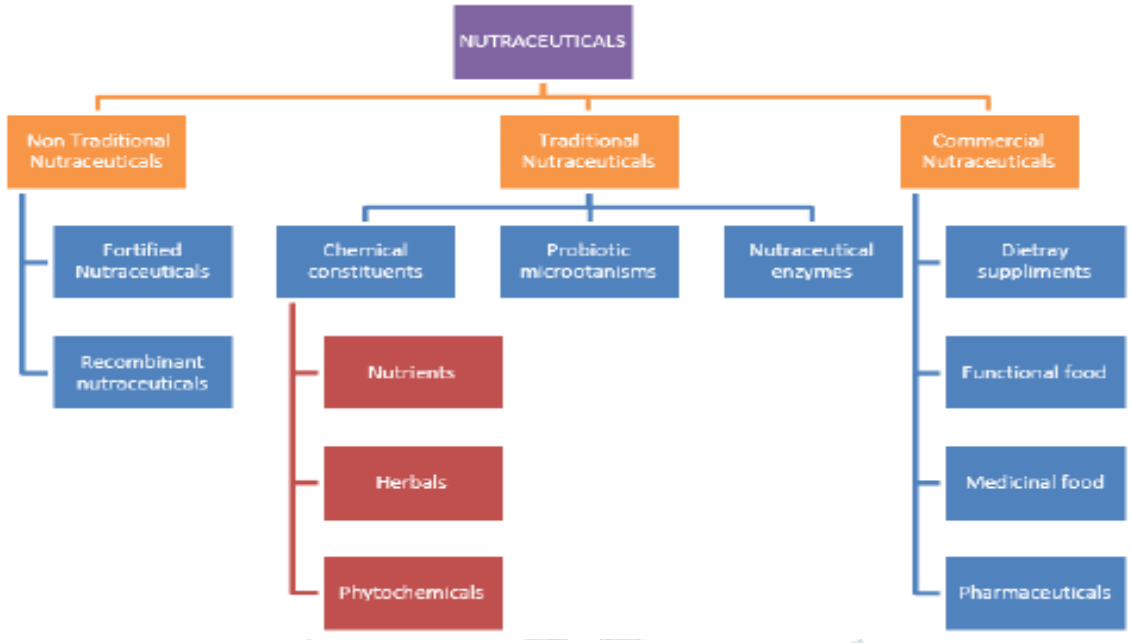


Fig 2: Classification of nutraceuticals [11]

- **Dietary fibers**:

Dietary fiber is made up of lignins and indigestible carbohydrates that are naturally present and undamaged in plants. Isolated, indigestible carbohydrates that have positive physiological effects on people make up functional fiber. Dietary and functional fibers add up to total fiber. These definitions expand the notion of functional fibers to include resistant starches, oligosaccharides, and other indigestible carbohydrates. According to the Dietary Reference Intake, an adult woman should have 25 grams of fiber per day, whereas an adult man should consume 38 grams.There wasn't enough data to establish a maximum amount of dietary or functional fiber that was acceptable. Live bacteria and yeasts known as probiotics are beneficial to your health, particularly for your digestive system. Bacteria are typically thought of as disease-causing agents.

However, both beneficial and harmful bacteria are abundant in your body. Because they support the health of your gut, probiotics are sometimes referred to as "good" or "helpful" bacteria. Your body naturally contains probiotics. They are also present in a few foods and supplements.

People have only been interested in learning more about probiotics and their health advantages since the mid-1990s. They are frequently recommended by doctors to treat stomach issues. And as a result of their recent popularity, they may be found in anything from chocolate to yogurt. They may also contain other nutritive components. A range of dosage forms, including pills, capsules, liquids, powders, extracts, and concentrates, are available for them. [12]

- **Herbals**:

Concentrates and extracts made from herbs or botanical products. [13] Herbs are plants without woody tissue that can be prepared in a variety of ways based on personal preference. It is possible to dry herbs, however doing so lessens the potency of the herbs' natural qualities.[14] Antioxidant-rich herbs have been utilized for over 2,000 years to enhance flavor and fragrance. [15] The health advantages of aloe gel, ginger root, and garlic extracts include wound healing, cholesterol reduction, anti-ulcer, and antioxidant properties. [16]

- **Phytochemicals:**

Due to their possible roles as antioxidants, antiestrogenics, anti-inflammatory, immunomodulatory, and anticarcinogenics, phytochemicals—bioactive non-nutrient plant compounds—have sparked interest in human nutrition.[17] Phytonutrients and phytochemicals are found in the majority of foods, including whole grains, legumes, fruits, vegetables, and herbs. These phytochemicals offer enormous therapeutic potential for treating a variety of illnesses, either by themselves or in combination. Because they provide protection against a wide range of illnesses and conditions, including cancer, coronary heart disease, diabetes, high blood pressure, inflammation, microbial, viral, and parasitic infections, psychotic diseases, spasmodic conditions, ulcers, osteoporosis, and related disorders, phytochemicals with nutraceutical qualities found in food are extremely important.[18]

These naturally occurring biochemicals may aid in disease prevention and are responsible for the color, taste, texture, and fragrance of plants. These natural compounds, which include lycopene in tomatoes, lignins in flaxseed, limonoids in citrus fruits, catechins in tea, and glucosesinolates in cruciferous vegetables, are physiologically active. They all have distinct functions, may be applied in different ways, such as antioxidants, and are good for your health. Recently, phytochemicals with cancer-preventive qualities have received a lot of attention. [19]

In addition to the chemo preventive properties found in fruits and vegetables, some phytochemicals obtained from herbs and spices may also have antimutagenic and anticarcinogenic properties, among other positive health effects. For the prevention of prostate and breast cancer, a wide variety of phytopharmaceuticals known as "phyto-estrogens" with purported hormonal action are advised. [20]

Tea includes the amino acid thiamine, a catechins derivative that has been found to lower blood pressure in hypertensive rats. Following a single dosage, the antioxidant status of total plasma is equally active for black and green tea. However, some research indicates that green tea works better than black tea. Tea polyphenols are useful in reducing the risk of coronary heart disease because they contain anti-inflammatory, antithrombotic, and anti-platelet qualities. [21] Flavonoids function as antioxidants and

have anti-cancer effects. Citrus fruits, soy foods, which are a special dietary source of isoflavones, green tea, which is high in epigallocatechin gallate, and curcuma longa, which is high in curcumin, all include them. Prostate cancer cell proliferation is inhibited by the primary soybean isoflavones, genistein, daidzein, and biochanin. [22]

Lycopenes and carotenoids are also crucial substances for human health. Lycopene is regarded as a strong antioxidant and a reactive oxygen species (ROS) quencher due to its unsaturated nature. According to recent reports, lycopene-containing fruits and vegetables protect against cancer by reducing oxidative and other DNA damage in people. Beta-carotene is the most potent antioxidant among the carotenes. β- Carotene is the most prevalent form and may be found in yellow, orange, and green leafy fruits and vegetables. [23]

- **Polyunsaturated fatty acids as nutraceuticals**

One of the most exciting advances in human nutrition and illness risk reduction over the last three decades is the utilization of omega-3 oils and long-chain ω3 PUFA. Because of their efficacy in preventing and treating conditions like coronary heart disease, hypertension, diabetes, arthritis and other inflammations, autoimmune diseases, mental health and neural function issues like depression and schizophrenia, and cancers, long-chain ω3 PUFA are of great interest. They are also crucial for maintaining and developing normal growth, particularly for the brain and retina. [24]Phytochemicals and polyunsaturated fatty acids (PUFAs), which comprise omega-3 and omega-6 fatty acids, are also significant as beneficial dietary bioactive substances. Numerous facets of immunity and metabolism are influenced by a diet rich in PUFAs. Furthermore, the biological effects of PUFAs may potentially be influenced by interactions with gut microbial components. [25]

It has been demonstrated that omega-3 polyunsaturated fatty acids (PUFAs) have immunomodulatory properties, reduce the synthesis of inflammatory eicosanoids, cytokines, and reactive oxygen species, and lessen inflammatory disorders.[26] Omega-3 fatty acids (n-3 fatty acids), which are found in fish, are known dietary components that influence plasma lipids and the main cardiovascular conditions, including arrhythmias.[23] Omega-fatty acids, particularly omega-3 and omega-6, are now recognized to be responsible for the health-promoting benefits of fish oil. Eicosapentaenoic (EPA) and docosahexaenoic (DHA) acids are the primary omega-3 fatty acids found in fish oil. It has been demonstrated that DHA in particular has a significant structural role in the brain and enhances memory.

More DHA has recently been added to infant food and margarines in an effort to improve brain memory development; it may also help lessen the severity of Alzheimer's disease. [26]

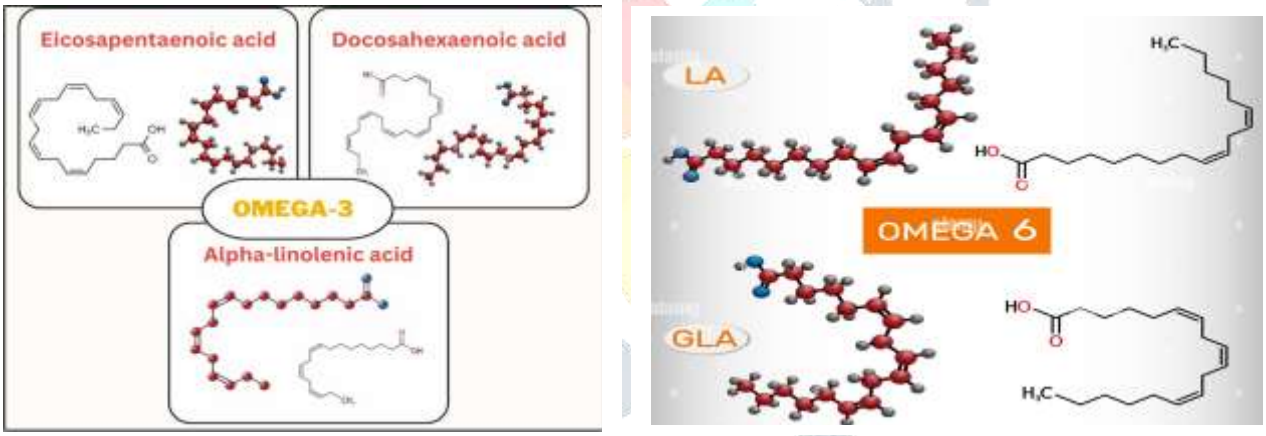


Fig: Structures of omega-3 and omega-6 (Linoeic acid, gamma linolenic acid) PUFAs[27,28]

- **Conventional and Alternative Nutraceuticals:**

Conventional:

Conventional nutraceuticals consist of natural, whole foods with up-to-date information on their possible health advantages; they have not been modified in any manner. The foods themselves have not changed, save from the consumer's perception of them. For instance, many fruits, vegetables, grains, fish, dairy, and meat products include natural compounds like lycopene in tomatoes, omega3 fatty acids in salmon, and saponins in soy that offer advantages beyond their nutritional worth. Some studies even suggest that chocolate and tea have health benefits.

Scientists have found that lycopene and omega-3 fatty acids, which are found in both salmon and tomatoes, are nutrients that provide more than simply basic nourishment.

Alternative:

Alternative nutraceuticals include orange juice fortified with calcium, cereals with added vitamins or minerals, and flour with added folic acid. Agricultural experts have successfully developed methods to increase the nutritional value of several crops, and research is currently underway to enhance the nutritional value of many other crops. These products are either the result of agricultural breeding or contain additional nutrients and/or components. [29] Microbes that promote health:Probiotics have an antimicrobial effect by changing the microflora, preventing pathogen adhesion to the intestinal epithelium, competing for nutrients necessary for pathogen survival, producing an antitoxin effect, and reversing some of the effects of infection on the intestinal epithelium, such as secretory changes and neutrophil migration. Probiotics can treat lactose intolerance by producing the precise enzyme (ß-galactosidase) that can hydrolyze the problematic lactose into its component sugars. The following safety, functional, and technological factors should be considered when selecting probiotics: Show a possible health benefit.

- Humans should be the source of probiotics.

- Gram-positive organism that is common and capable of surviving after passing through bile and acid.
- It has the ability to cling to human intestinal cells and proliferate there.
- It has the ability to exhibit antagonistic activity against microorganisms that cause cancer or other diseases.
- Benefits to health that have been clinically proved. [30]

- **Prebiotics**:

Prebiotics, which are substances that humans do not digest when we consume them, are a relatively recent phrase to enter our lexicon. They provide as a source of nourishment for the good probiotic bacteria. Because the probiotic bacteria are encouraged to thrive in a favorable environment, there is a decreased chance that dangerous germs may start to multiply in our digestive system. In the past, processed foods have made great use of the prebiotic inulin. Essentially, it is a type of fiber derived from the roots of weeds like dandelions as well as plants like chicory and Jerusalem artichokes. [31]

- **Nutraceutical enzymes**:

Our bodies wouldn't function and life wouldn't be conceivable without enzymes. Patients with conditions including hypoglycemia, blood sugar imbalances, digestive problems, and obesity can eliminate their symptoms by including enzyme supplements in their diet. These enzymes are derived from microbes, plants, and animals. [32]

- **Fortified nutraceuticals**:

They are frequently supplemented with vitamins and minerals that contain up to 100% of each nutrient's dietary reference intake. It is food that has been improved by supplementing components with folic acid, adding nutrients, or breeding crops. One example of a treatment for vitamin D deficiency is cholecalciferol-fortified milk, bread etc.

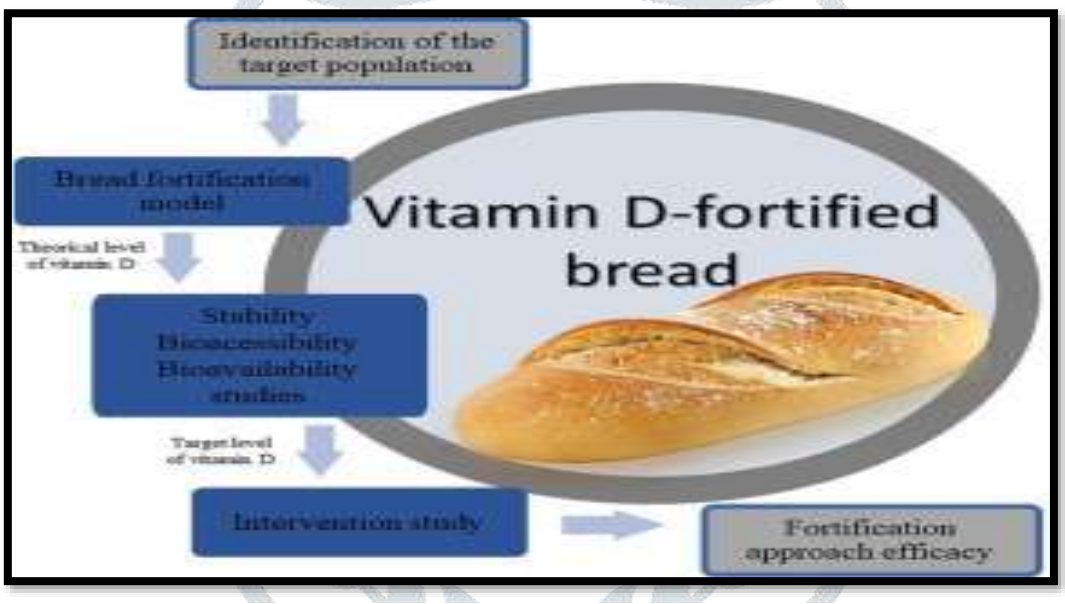


Fig: fortified nutraceutical[33]

- **Recombinant nutraceuticals**:

In the fermentation process, biotechnology techniques have been successfully applied to extract enzymes that are ideal for providing essential nutrients at an optimal level in a variety of foods, such as bread and cheese. Biotechnology facilitates the production of probiotics and the extraction of two components using fermentation or enzyme technology, as well as genetic engineering, and helps create energy-dense meals like bread, wine, fermented foods, and starches.

- **Commercial nutraceuticals**:

It is more costly, risky, and complicated than ever to find new compounds. Nutraceuticals have an undeniably sizable and growing market, which is why several pharmaceutical businesses are currently making an effort to manufacture them. Nutritional supplements include most therapeutic areas, such as osteoporosis, blood pressure, cholesterol management, depression, diabetes, arthritis, cold and flu, sleep problems, digestion, and the prevention of several cancers. The discovery of the health benefits of consuming seafood high in omega-3 fatty acids is among the most promising developments in human nutrition and disease prevention research during the previous three decades. [34]

- **Medicinal foods**:

Any ingredients that promote disease conditions or contain particular nutrients that the body cannot normally process are also excluded from foods that are specifically made to be consumed or administered internally under a doctor's supervision and intended for the specific dietary management of a disease or condition for which unique nutritional requirements are established by medical evaluation based on recognized scientific principles. Physicians prescribe it to treat a range of illnesses that impair the ingestion, digestion, absorption, or metabolism of traditional diets, including phenylketonuria, celiac disease, and lactose intolerance. [35]

- **Functional foods**:

According to its widely accepted definition, functional foods are "any food or food ingredient that may provide a health advantage beyond the traditional nutrients it provides." Functional foods are designed to enable customers to consume enhanced meals that are close to their natural condition rather than using nutritious supplements that are made in liquid or pill form. The

process of improving or strengthening functional meals is known as "nutrification." With this method, a product's nutritional value is restored to what it was before to processing. Sometimes complementary additional nutrients are added, such as vitamin D to milk "Ordinary food that has components or ingredients added to give it a specific medical or physiological benefit, other than a purely nutritional effect," is how Health Canada defines functional foods. In Japan, all functional foods must satisfy three defined requirements: foods should be. [36]

Nutraceuticals' function in promoting health and preventing disease:

In order to avoid many diseases in the first place, lessen their consequences, guard against noncommunicable diseases, increase life expectancy, and improve physiological processes, nutraceuticals are crucial.

Prevention of diseases:

1. **Cardiovascular disease:**

Nutraceuticals such flavonoids, flavones, flavanones, quercetin in onions, cruciferous vegetables, black berries, cherries, berries, apples, and other antioxidant vitamins and minerals may reduce the chance of dying from CVDs. They block the cyclooxygenase pathway and the angiotensin converting enzyme (ACE), which are responsible for hypertension. Additionally, they prevent platelets from adhering to one another and clumping together. Grape polyphenols reduce vascular disease by altering cellular communication and metabolism. The microscopic capillaries that supply each cell with oxygen and other nutrients are strengthened by flavonoids. potent antioxidant Ginger, an anti-inflammatory, is recommended to prevent palpitations and hypertension. Allicin reduces blood pressure and cholesterol. Because of its capacity to lower cholesterol, the Omega 3 series is advised for the treatment of arrhythmias.

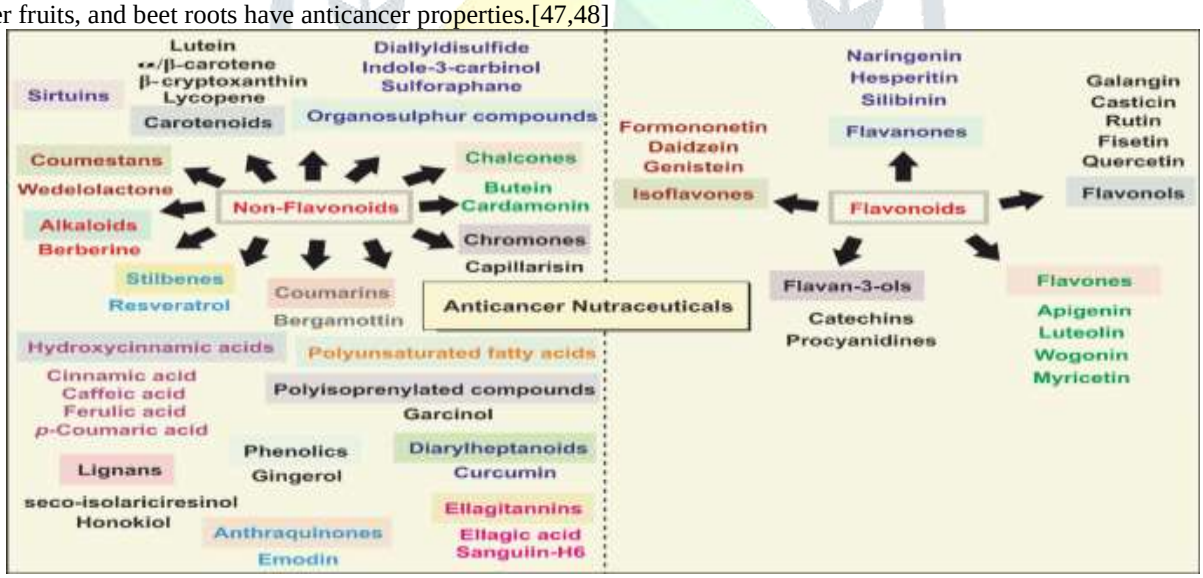
Nutraceuticals might be added to help manage CVDs. [37]

2. **Obesity:**

Among the nutraceuticals with potent anti-obesity properties are psyllium, capsaicin, and conjugated linoleic acid. A medical condition known as obesity is characterized by the buildup of excess bodily fat. Herbal nutrients that help decrease body weight, secrete lifting, and other cytokinesis like IL-1 and IL-6 include chitosan, caffeine, fenugreek, vitamin C, green tea, curcumin, and crushed black grams. They also help reduce LDL and total cholesterol and regulate food consumption. [38]Green tea extract and 5-hydroxytryptophan may help people lose weight; the latter raises energy expenditure while the former reduces hunger. [39] Momordica Charantia (MC), capsaicin, and conjugated linoleic acid (CLA) may have anti-obesity effects.[40]

3. **Cancer:**

Flavonoids which prevent the enzymes that produce estrogen decrease of estrogen-induced malignancies.[41] A wide variety of phytopharmaceuticals with purported hormonal action, known as "phyto-estrogens," are advised to prevent prostate and breast cancer.[42] Curcumin from curry and soy foods are sources of isoflavones, which have chemo preventive qualities against cancer.[43] The epidermis, testes, adrenal glands, and prostate are where lycopene is concentrated and provides cancer prevention.[44] Peas, soybeans, certain herbs, spinach, tomatoes, potatoes, alfalfa, and clover are good sources of saponins, which have anti-tumor and anti-mutagenic properties.[45] Turmeric's polyphenol curcumin (diferuloylmethane) has anti-inflammatory, anti-oxidant, and anticarcinogenic qualities.[46] At the Top of Form It has been observed that turmeric rhizomes, spinach leaves, cucumber fruits, and beet roots have anticancer properties.[47,48]



4. **Diabetes:**

Docosahexaenoic acid is essential for neurovisual development and regulates insulin resistance. This is particularly crucial for pregnant women with gestational diabetes mellitus, since it supports the need for vital fatty acids. [49] A common antioxidant, lipoic acid is currently being utilized in Germany to treat diabetic neuropathy. As a long-term dietary supplement intended to prevent problems in diabetics, lipoic acid could be more beneficial. [50] Psyllium dietary fibers have been widely employed as food additives, pharmaceutical supplements, and in processed foods to help people lose weight, regulate their blood sugar levels in diabetes, and lower their cholesterol levels in hyperlipidemia.[51] The state of being obese Ephedrine, caffeine, mahuangguarana, chitosan, and green tea are examples of herbal stimulants that aid in weight loss. [52]The proteins in buckwheat seeds function similarly to the natural fibers found in food. [53] A healthy magnesium level lowers the risk of diabetes and increases insulin sensitivity; chromium picolinate, calcium, and vitamin D seem to increase insulin sensitivity and improve glycemic control in certain diabetics; and extracts from cinnamon and bitter melon may be used to treat or even prevent diabetes.

Nonetheless, it has been proposed that nutraceuticals containing significant amounts of combinations may significantly prevent and most likely could be sold lawfully. [54]

5. Eye disorders:

A diet high in nutraceuticals seems to help prevent age-related macular degeneration. Green tea, lutein, DHA, carotenoids, flavonoids, vitamin E, and coenzyme Q10 all have antioxidant properties and can help with cataracts and presbyopia. Zeaxanthin is used to treat visual problems, including glaucoma. Coenzyme Q10, melatonin, spirullina, and soy isoflavones are also used to manage macular degeneration. Retinitis pigmentosa can be effectively treated with flavonoids, ascorbic acid, tocopherol, carotenoids, caffeine, and pyruvate.[55] Both lutein and zeaxanthin, which are found in rice bran, fruits, and vegetables, enhance vision and lower the risk of cataract development. Rice bran's folic acid and omega 3, 6, and 9 essential fatty acids help in support eye health. [56]

6. Stress management:

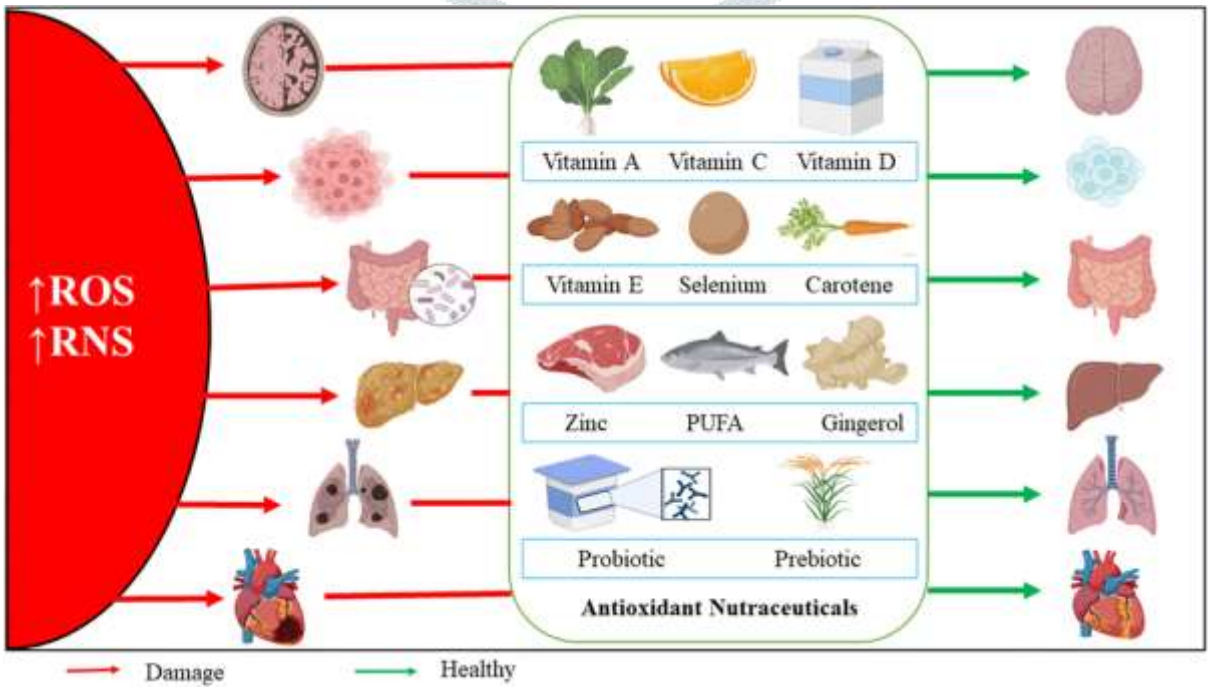
Stress poses a hazard to our survival and is an essential component of our psychological makeup. Adaptogens are naturally occurring bioactive substances that aid in preventing cellular damage caused by stress. They boost an organism's resilience to harmful stimuli in a non-specific way. They make an effort to normalize stress and offer balance measures for mental wellness. As a result, they progressively improve emotional functioning, which aids in stress-reduction. Herbal supplements such as ginseng, rhodiola, ashwagandha, and L-thiamine are powerful adaptogens that stimulate the synthesis of heat-shock protein 70 (HSP-70), which suppresses stress. Additionally, they enhance tolerance to external stress, normalize physiological systems, encourage homeostasis, lessen moderate to severe anxiety, enhance sleep, lessen sadness, and enhance secondary memory. [57]

7. Parkinson's disease:

Parkinson's disease is a neurological condition that causes muscular stiffness, tremor, and trouble walking due to damage to nerves in certain brain areas. Frequently taking place in middle to late adulthood. According to Canadian experts, eating foods high in vitamin E may help prevent Parkinson's disease. [58] A decrease in the clinical symptoms suggested that creatine altered the characteristics of Parkinson's disease. Glutathione has also been investigated by researchers to ascertain its antioxidant capacity and nervous system effects. There is now uncertainty over the best way to administer the medication, adverse effects, and the proper long-term dosage. Although early research on nutritional supplements has shown some encouraging findings, it's crucial to keep in mind that there is currently insufficient scientific evidence to support their use in treating Parkinson's disease. [59]

8. Nutraceuticals in stem cell therapy:

Stem cell research has recently been shown to be useful in treating a number of illnesses. As an alternative to stem cell transplantation, several researchers have also looked at how specific nutrients affect stem cell development and proliferation, which may encourage indigenous stem cells to achieve healing and regenerating objectives. [60] When compared to human granulocyte macrophage colony-stimulating factor, Bickford et al. found that blueberries, green tea, catechin, carnosine, and vitamin D3 had a dose-related effect on human bone marrow proliferation. Additionally, nutrient combinations can work in concert to promote the proliferation of human hematopoietic progenitors, indicating yet another possible way that nutraceuticals support the body's capacity for health and healing. [61] However, all medications, including herbal remedies, should be thoroughly examined before being used during pregnancy. [62] The development and differentiation of newborns and early children, as well as the impact of nutritional supplements on expectant mothers, are critical to the health of future generations. Early dietary determinants are thought to have long-term implications on health, illness, and mortality risks in adulthood in addition to short-term effects on growth, body composition, and bodily functioning. Nutraceuticals including antioxidant vitamins, vital amino acids, and polyunsaturated fatty acids in baby food have been shown to have positive benefits on the immune system's development. In fact, the growth and development of bone and the human neurological system depend on the consumption of minerals like calcium, phosphorus, magnesium, iron, zinc, iron, iron, and vitamin D and K. [63]



CONCLUSION

In order to provide integrated medical aid, nutraceuticals are involved in both the medical treatment and nutrition industries, making them a potentially expanding sector. Potential health advantages include using them as dietary supplements, warding off ailments like cardiovascular disease, and aiding in the treatment of cancer and other illnesses. Thus, the nutraceutical industry has a far better grasp on the possible benefits of nutrients on human health and wellbeing. The importance of nutrient-rich foods, particularly fruits and vegetables, and their shown health benefits cannot be overstated. Not only can nutraceuticals have direct effects, like anti-inflammatory or antioxidant capabilities, but they also have indirect effects, including modulating different physiological processes. Many of the nutraceuticals discussed, such as oil extracts, plants, fruits and vegetables, and botanical extracts, have been found to benefit the cardiovascular system via components such as phenolic compounds or polyphenols, lycopene, and flavonoids. Nutraceuticals have recently gained popularity due to their potential nutritional, safety, and therapeutic benefits. Recent research has yielded encouraging outcomes for these drugs in a variety of problems. In this research, great effort has been made to give disease-modifying indications connected to oxidative stress, including cardiovascular, cancer, diabetes, eye, and Parkinson's illnesses, as well as obesity.

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