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Review Article

A Review on Nutraceutical

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ABSTRACT

The terms "nutrition" and "pharmaceutical" are combined to form the term "nutritraceutical." Nutraceuticals are compounds with substantial health benefits that are either food or a component of food. In the prevention and treatment of illnesses, nutraceuticals and nutritional therapy—that is, nutraceuticals are complementary therapies that provide energy and nutrients while also potentially offering therapeutic benefits—have grown in popularity. Both contemporary and conventional biotechnology techniques are used in the development and production of nutraceuticals. Because of its anticipated safety as well as their potential nutritional and medicinal benefits, nutraceuticals have gotten a lot of praise.They were employed as a substitute for contemporary medicine to improve health, raise dietary nutrient levels, and extend life expectancy. Herbal supplements and other nutrients are a major component of nutraceuticals, which help prevent many diseases and reduce the pathophysiology of disease. Additionally, it has anti-inflammatory, anti-cancer, and natural antioxidant properties. Along with several health-promoting properties, this substance has anti-diabetic, cardioprotective, and oreganoprotective properties. With the food sector adopting a research-oriented approach akin to that of the pharmaceutical industry, the nutritional revolution ushered in a new era of claimed medical and health benefits. They have been crucial in the treatment of conditions like obesity, diabetes, cancer, osteoporosis, osteoarthritis, Alzheimer's, cardiovascular disease, Parkinson's, COVID-19, and more.Nutraceuticals are nourishing substances that are biologically active, have the potential to maintain maximum health, and are a combination of pharmaceuticals and nutrition. These items are vital for human health care and endurance, especially for the development of future treatments. Nutraceuticals have gained recognition for their safety profile, medicinal efficacy, and nutritional advantages. In the areas of disease prevention, health care promotion, and other services, nutraceuticals are expanding internationally. In this review, numerous drug-nutritraceutical interactions have also been explained using a variety of cases.

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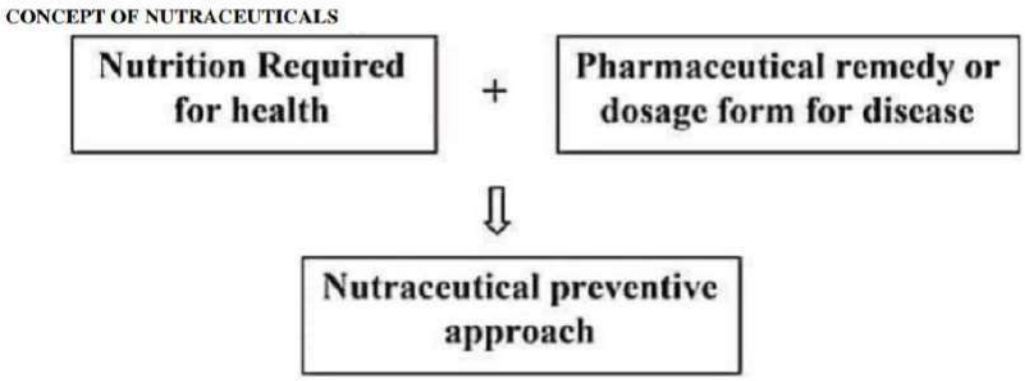
INTRODUCTION

Nutraceuticals are the "Specially designed preparations" that are intended to address specific nutritional requirements and/or offer preventative healthcare are known as nutraceuticals. Nutraceuticals are the creation of a nutrient or nutrients that help in the prevention and treatment of specific diseases, in addition to a supplement diet. Dr. Stephen De Felice coined the phrase "nutritraceutical" in 1989, combining the words "pharmaceutical" and "nutrition." These are foods or portions of foods that are good for several health reasons, such as disease prevention and/or treatment. From identifying dietary deficiencies to focusing on human health and the prevention and treatment of chronic illnesses, the science of nutrition has steadily advanced to new heights Nutrient isolation from various food items is currently widely accepted and utilized. Finding an epidemiological target is the first step in distinguishing food/dietary supplements from nutraceuticals. Safety and efficacy studies that determine the mechanism of action come next. Depicting "food supplements" as agents to make up for deficiencies in micro- or macronutrients is one way to distinguish between these two kinds of formulations; additionally, the use of a "nutraceutical" in the treatment of a pathological condition needs to be backed by substantial scientific evidence Nutritional supplements should have a solid safety profile with few unwanted side effects and improved bioavailability if there is sufficient clinical data to support them.Human lifestyles have changed significantly over the past 50 years due to factors including industrialization, urbanization, hectic schedules, and evolving cultural standards. Due to these factors, people's eating habits have changed, forcing them to eat fast food, junk food, and meals that are made rapidly. These practices have had a direct effect on our diet's nutritional value , progressively lowering the quantity and quality of nutrients. These altered dietary habits have increased the prevalence of metabolic issues, degenerative diseases,and immunological dysfunctions. Health management has been a major concern for people as they have become more conscious of their health in recent years.Nutraceuticals, foods, and phytonutrients have all seen significant advancements recently. This innovative concept for health, illness prevention, and treatment was developed by pharmaceutical companies. The therapeutic principles of Ayurveda are closely linked to healthy Aahar and Vihaar.Aahar has been utilized in traditional medicine and cooking. The term Rasayana, or rejuvenation therapy, in Ayurveda refers to a far wider concept than contemporary nutraceuticals. Around 2500 years ago, Hippocrates remarked, "Let food be your medicine and medicine be your food." His concept aligns well with the idea of nutraceuticals.

The Reasons for Shift Towards Nutraceuticals Are: -

1. A growing percentage of clients are worried about the cost of healthcare.
2. Nutraceuticals help people stay healthier and avoid chronic illnesses.
3. People who prioritize prevention over treatment.
4. Individuals with long-term illnesses for whom allopathic medicine has failed to provide a remedy. Patients with financial difficulties



Nutraceutical categories

Non-specific biological medicines called nutraceuticals are used to control symptoms, prevent cancer, and enhance well-being.

A) nutrients:-

Substances having established nutritional activities, including typical nutrients like vitamins, minerals, amino acids, and fatty acids, as well as the health benefits they are linked to.

Table 1: List of nutrients and their relevance[12]

Nutrients	Health benefit
Vitamin A	Antioxidant, essential, for growth and development and in the treatment of certain skin disorders.
Vitamin E	Antioxidant, helps form blood cells, muscles, lung and nerve tissue, boosts the immune system.
Vitamin K	Essential for blood clotting
Vitamin C	Antioxidant, for healthy bones, gums, teeth and skin, in wound healing, prevent common cold and attenuate its symptoms.
Vitamin B1	Helps to convert food in to energy, essential in neurologic functions.
Vitamin B2	Helps in energy production and other chemical processes in the body, helps maintain healthy eyes, skin and nerve function.
Vitamin B3	Helps to convert food in to energy and maintain proper brain function.
Folic acid	Produce the genetic materials of cells, in pregnancy for preventing birth defects, RBCs formation, protects against heartdisease.

B)Herbals:-Herbs or botanical products, such as extracts and concentrates of common herbs and their medicinal value.

Table 2: Herbals used and their therapeutic relevance[13]

Herbals (Botanicalsource)	Therapeutic activity
Aloe Vera gel (Aloe Vera L. N.L.Burm.)	Dilates capillaries, anti-inflammatory, emollient, wound healing properties.
Ephedra (Ephedra sinica Stapf.)	Bronchodilator, vasoconstrictor, reduces bronchial Edema.
Garlic (Allium sativum L.)	Antibacterial, antifungal, antithrombotic, hypotensive anti-inflammatory
Licorice (Glycyrrhiza glabra L.)	Expectorant, secretolytic, treatment of peptic ulcer.
Ginger (Zingiber officinale Rosc.)	Carminative, antiemetic, cholagogue, positive inotropic.

C). Dietary supplement: -

Nutritional supplements are products that are taken orally and contain nutritional ingredients that are meant to complement your diet. Ginkgo blloba for memory loss, black coats for manufacturing symptoms, and glucose amine or closed rolling for arthritis are a few examples of dietary supplements. Additionally, they fulfill specialized purposes like male resupplement and sports nutrition weight loss supplements.Supplements come in a variety of dose forms, including as tablets, capsules, liquid powders, extracts, and concentrates. Their components include vitamins, minerals, herbicides or other botanicals, amino acids, enzymes, organ tissues, gland extract, and other nutritional substances.

Figure 1: Use of Nutraceuticals

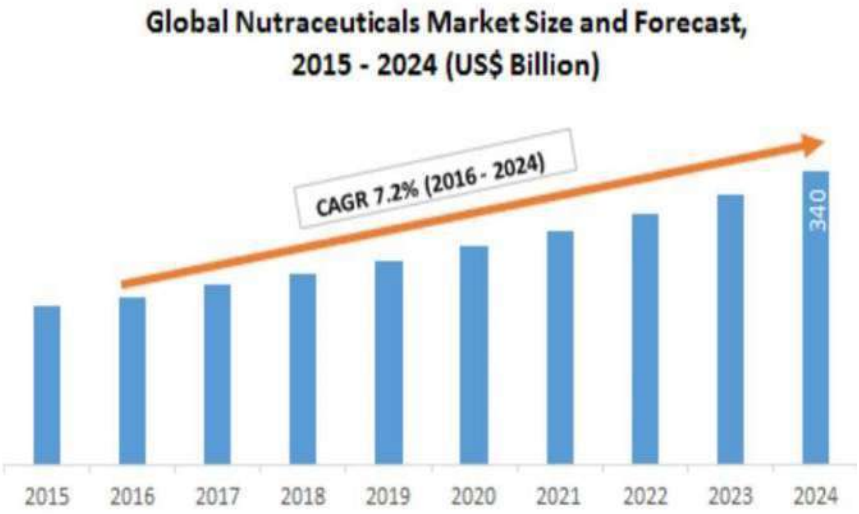


Figure 2: graph of Nutraceuticals market

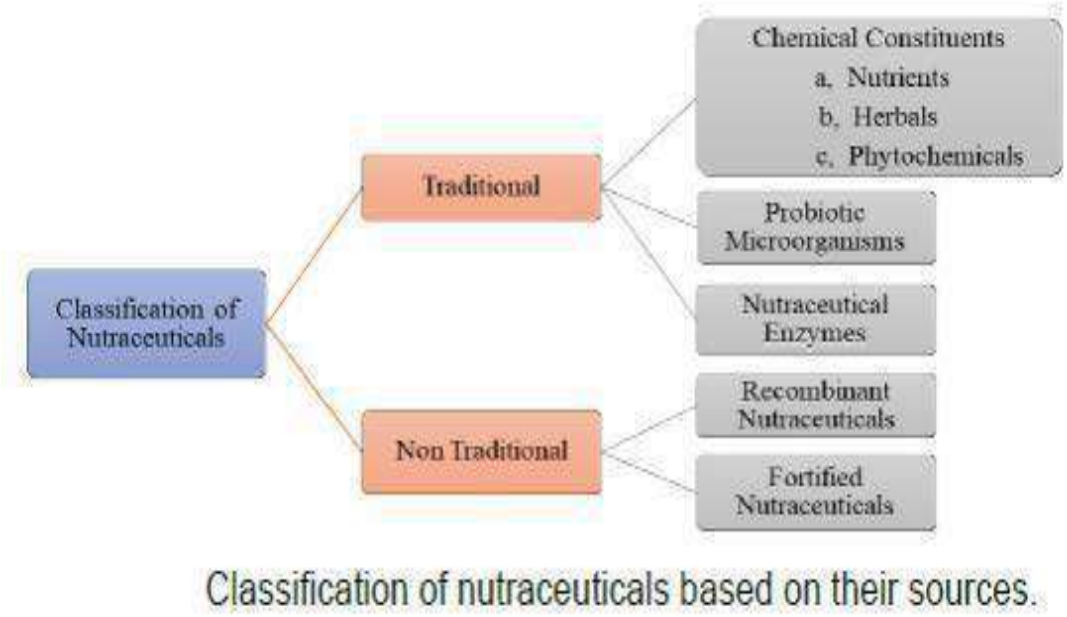


Figure: 3

Traditional nutraceuticals: -

All of the ingredients in conventional neutrals or manufactured foods that haven't been changed are natural and may offer health benefits. Many natural ingredients, including lycopene in tomatoes, omega-3 fatty acid in salmon, and saponins in soy, are present in a range of fruits, vegetables, grains, fish, and meat diets. Research has demonstrated that two foods, tomatoes and salmon, offer health benefits beyond simple nourishment. Typically, these classes are entirely taken from nature, with no alterations made to the original source.

Chemical constituents include the following classification:-

Nutrients*:* Nutrients can be used to treat cancer, heart disease, strokes, cataracts, osteoporosis, and diabetes. The nutrients included in plant, animal, and dairy diets can help alleviate anemia and osteoporosis. Flaxseed and salmon are good sources of omega-3 polyunsaturated fatty acids (PUFAs), which are powerful regulators of inflammation, brain function, and cholesterol accumulation.

Herbals*:-* As ancient as human civilization, herbs—also referred to as botanical food—offer a multitude of treatments for both acute and chronic ailments. New herbs with essential ingredients that offer a full range of medication storage options to treat serious and chronic conditions. Here are a few examples: The herb parsley (Petroselinum cripsum), which contains the flavonoids apiol and psoralem, has diuretic, carminative, and antipyretic properties. Lavender has tannins that are used to treat anxiety and depression, whereas willow bark (Salix nigra) includes salicylicin, an anti-inflammatory, analgesic, antipyretic, astringent, and arthritic active component.

Phytochemicals*:-* Phytochemicals, which I adore, are nutritious plant components that have the ability to defend against disease. Plants produce these non-essential nutrients mainly for self-defense. Plant-derived phytochemicals are incorporated into the diet and provide health benefits like replacing enzymatic reaction

cofactors in biochemical reactions and inhibiting intestinal absorbent enzymes that bind to and remove undesirable, vital nutrients by scavenging reactive or hazardous molecules. Many different foods, such as whole grains, legumes, fruits, vegetables, and herbs, include phytochemicals or phytonutrients. These phytochemicals hold great therapeutic potential for treating a range of diseases, either by themselves or in combination. Important properties of phytochemicals include the regulation of insulin and glucose, and they offer a viable alternative to conventional diabetes treatment.

Probiotic microorganism

A common treatment for gastrointestinal disorders like lactose intolerance, acute diarrhea, and antibiotic-related gastrointestinal side effects is probiotics, which are live bacteria that are administered to the host in sufficient amounts to provide health benefits. They come in powder, liquid, granule, or capsule form. Lactobacillus and bifidobacterium species are the most extensively employed probiotics however the yeast s. Lactic acid bacteria like lactobacillus species, which have been utilized for thousands of years to preserve food by fermentation, are also employed by Cerevisiae, numerous E. coli, and Bacillus species as agents for food profitability. Among the many significant benefits of probiotic therapy is the improvement of intestinal

Nutraceuticals enzymes

An enzyme supplement derived from microbial, plant, or animal sources can help people with digestive problems like hypoglycemia, blood sugar abnormalities, or obesity. Our bodies couldn't function correctly without enzymes, which are essential to life.

Non-traditional nutraceuticals

It Consist of items like calcium-fortified orange juice, vitamin and mineral-fortified cereals, and folic acidfortified flour that are produced through agricultural breeding by adding nutrients. In agriculture, methods for raising a crop's nutritional value have been effectively created. They are further separated into two categories: fortified nutraceuticals and recombinant.

Fortified nutraceuticals :

The process of adding essential minor components and nutrients to food to improve its efficacy and nutritional value is known as fortification. In children suffering from respiratory infections, diarrhea, and severe diseases, bifidobacterium lactic Hno19-containing preserved milk is combined with probiotics and prebiotics. Micronutrients (trace elements or vitamins) are added to the final product after dietary components have been fortified to make fortified nutraceuticals.

Recombinant nutraceuticals

In the fermentation process, biotechnology techniques have been effectively used to extract enzymes that are ideal for supplying essential nutrients at an optimal level in a range of foods, including bread and cheese. Biotechnology helps create energy-dense meals like bread, wine, fermented foods, and starches. It also makes it possible to produce probiotics and extract two components using fermentation or enzyme technology, as well as genetic engineering.

Aspects of safety and quality control of Nutraceutical

Businesses may increase consumer trust, adhere to regulations, and successfully market the health benefits of their products by concentrating on these factors, aside from safety and quality control.

The long-term viability and prosperity of the nutraceutical sector depend on a dedication to quality and safety.

Figure: 4

Role of Nutraceuticals in health promotion and disease prevention

Nutraceuticals are essential for preventing various diseases in the first place, reducing their complications, protecting against non-communicable diseases, extending life expectancy, and enhancing bodily functions.

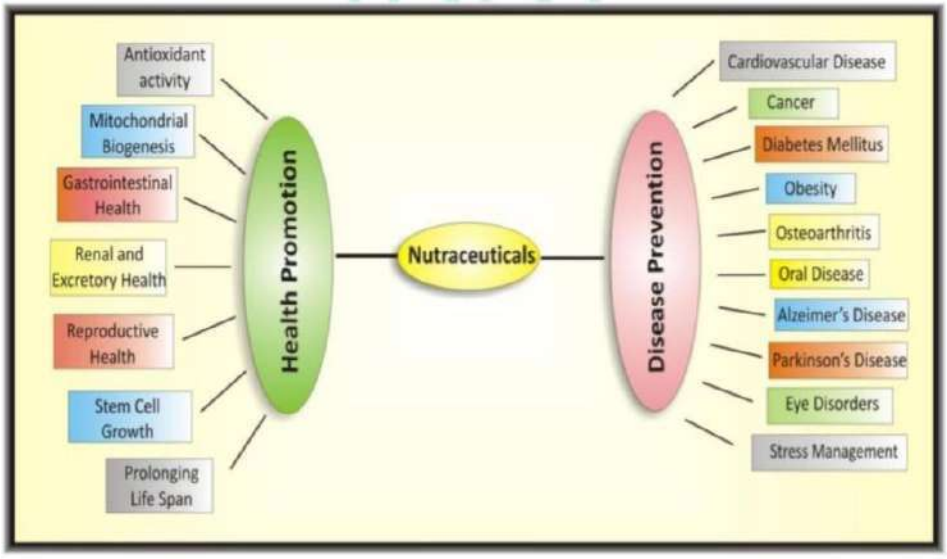


Figure: 5

Disease prevention

Cardiovascular disease :-The risk of dying from CVDs may be decreased by nutraceuticals such as

flavonoids, flavones, flavanones, quercetin in onions, cruciferous vegetables, black berries, cherries, berries, apples, and other antioxidant vitamins and minerals. They stop the angiotensin converting enzyme (ACE) and the cyclooxygenase pathway, which cause high blood pressure. They also stop platelets from sticking together and aggregating. Grape polyphenols change cellular metabolism and signaling, which lowers vascular disease. Flavonoids help to strengthen the tiny capillaries that deliver oxygen and vital nutrients to every cell. Strong antioxidant It is advised to use ginger, an anti-inflammatory, to avoid hypertension and palpitations. Allicin lowers cholesterol and blood pressure. The Omega 3 series is recommended to treat arrhythmias because of its ability to decrease cholesterol. CVDs could be controlled with the addition of Nutraceuticals.

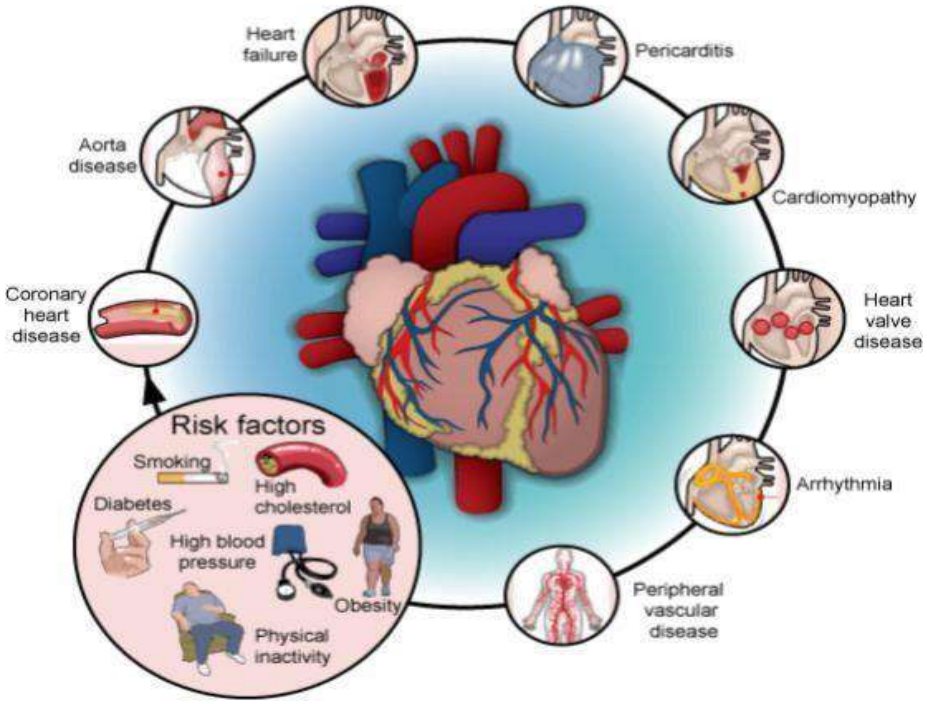


Figure: 6

Cancer: -

Bioactive dietary components that are rich in nutraceuticals can help prevent cancer. Lycopene is useful against cancer because it is an oxygen grinder and reduces oxidative stress. It also has anti-mutagenic and anticarcinogenic qualities and antioxidant activities. Nutraceuticals stop DNA transcription in tumors and regulate DNA damaging factors in sales. One fruit and vegetable that has the potential to be both carcinogenic and antimutagenic is ginseng, an anti-inflammatory chemical that prevents chronic inflammation of cancer. Orange and yellow fruits contain beta-carotene, which has anti-cancer properties. Cruciferous veggies reduce lung cancer risk. They inhibit the enzyme that encourages the growth of tumors. Garlic's sulfur component improves human health by lowering platelet aggregation and atherosclerosis.

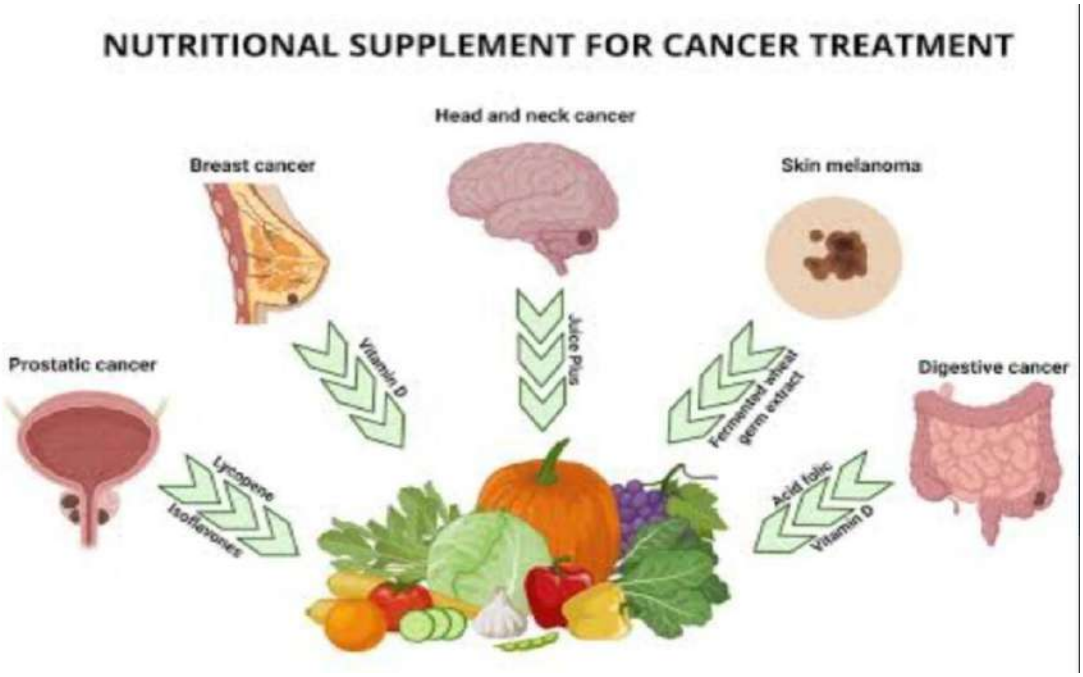


Figure: 7

Diabetes: -

Nutraceuticals found in herbal dietary supplements have been shown to have therapeutic benefits for type 2 diabetes, so isoflavones Omega-3 fatty acids increase insulin sensitivity and reduce diabetes incidence and mortality. Lower glucose tolerance and restore normal blood sugar levels universal antioxidant like lipoic acid and catechins For example, magnesium, chromium, calcium, vitamin D, fenugreek, cinnamon, and glycemic management are all used to treat diabetic neuropathy, nephropathy, and retinopathy. Caffeic acid lowers high plasma glucose, improves insulin resistance, and is found in green tea, Epic in 3, and postpaid glucose. Bitter melons are beneficial for diabetes because they reduce insulin resistance, which controls metabolism and bloodto-cell transit.

Obesity:-

Nutraceuticals with strong anti-obesity effects include conjugated linoleic acid, capsaicin, and psyllium. Obesity is a medical disorder marked by the accumulation of excess body fat. Herbal nutrients like as chitosan, caffeine, fenugreek, vitamin C, green tea, curcumin, and ground black grams aid to lower body weight, secrete lifting, and other cytokinesis like IL-1 and IL-6. They also assist to control food intake and lower LDL and total cholesterol.

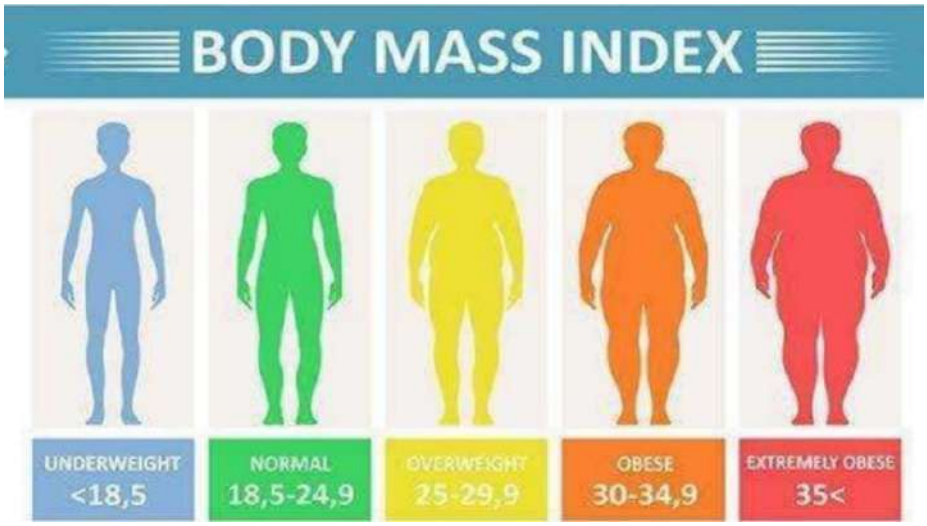


Figure :8

Oral disease:-

A new term, odontonutraceutical, has been found. It is a pleiotropic phytotherapeutic agent in dentistry because it regulates various molecular and biochemical targets. Oral diseases are prevented by active phytochemicals, which may also have a major impact on complicated and multifactorial oral illnesses. Aloe Vera gel is a mucosal wound healer and can help patients with oral lichen planus disease with their pain. It contains extracts of green tea, grapes, cocoa seeds, and proanthocyanides, which are rich in polyphenols and flavonoids. Gingivitis, periodontitis, halitosis, malodor, and other dental diseases can all be avoided with the use of probiotics.

Alzheimer's disease:-

Senile dementia is another name for Alzheimer's disease. Antioxidants seem to slow the disease's progression. Beta-carotene, lycopene, curcumin, lutein, and lavandula are examples of nutraceuticals that use their antioxidant properties to fight oxidative stress, which includes neural damage. These substances have the capacity to postpone the onset of dementia. Numerous studies show that taking vitamins like folic acid and vitamin B12 supplements lowers the number of homocytes, which also prevents the progression of disease.

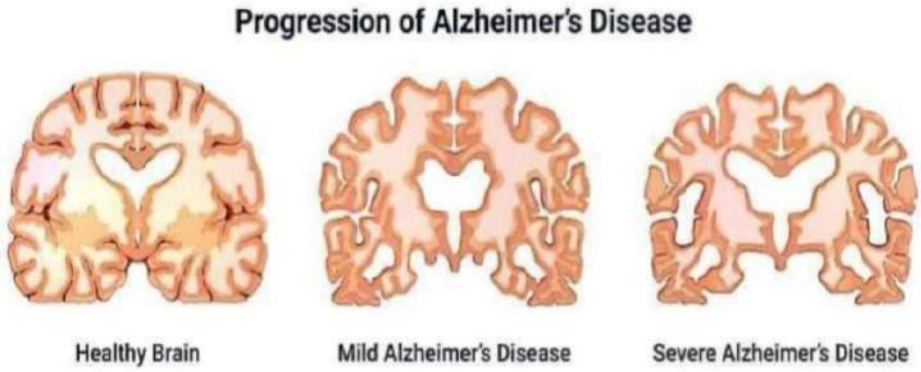


Figure: 9

Parkinson's disease :-

Parkinson's disease, the second most prevalent age-related illness worldwide, is caused by neurodegeneration that damages the brain's dopamine-releasing cells. Plant polyphenols Vitamins C, D, E, coenzyme 10, and unsaturated fatty acids, together with soybean and other phytoestrogens, have preventive effects against the advancement of Parkinson's disease. A natural brain tonic, herbal nutraceuticals aid in mental calm and relaxation, migration, headaches, sleeplessness, depression, anxiety, and the renewal of brain cells. They also promote blood circulation in the brain, enhance memory function, and secrete hormones. In order to demonstrate the progression of Parkinson's disease, researchers also used the dietary supplement inosine, which is a precursor of irate.

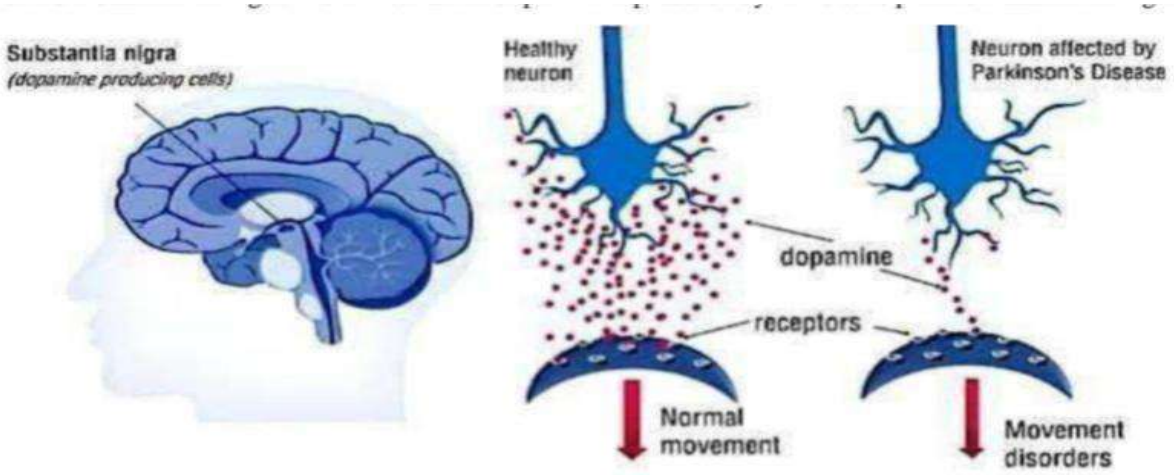


Figure: 10

Osteoarthritis:-

All joint tissues are affected by osteoarthritis, a complex disease whose etiology includes both biochemical and mechanical elements that work together to break down cartilage. Joint pain limits exercise, which leads to weight increase and energy imbalance. The following nutraceuticals are used to relieve the complication: chondroitin sulfate, glucosamine, diacerin, banana, ginger, green tea, pomegranate, boswellia, oxaceprol, tipi, willow bark, curcumin, avocado, soybean, and collagen hydrolysate. They have pharmacological properties and play a significant role in the regulation of gene expression. In addition to their normal function as antioxidant agents, they have good evidence for treating inflammation, pain, and joint destruction. The combination dosage of glucosamine and chondroitin sulfate may help prevent arthritis and joint space narrowing.

Stress management: -

Stress is an essential component of our psychological composition and permeates all aspect of our lives. are naturally occurring bioactive substances that aid in preventing associated cellular damage. They boost an organism's resilience to harmful impacts in a nonspecific way. They aim to normalize and offer a balancing action for mental wellness and stress. Nutraceuticals such as ginseng, rhodiola, ashwagandha, and L-theanine are effective adoptogenes that stimulate the creation of stress-suppressive head stock protein 70 (HSP-70), which Thursday gradually improves emotional function. Additionally, they enhance tolerance to

environmental stress, balance physiological processes, promote homeostasis, lessen moderate to severe anxiety, enhance sleep, lessen sadness, and enhance secondary memory.

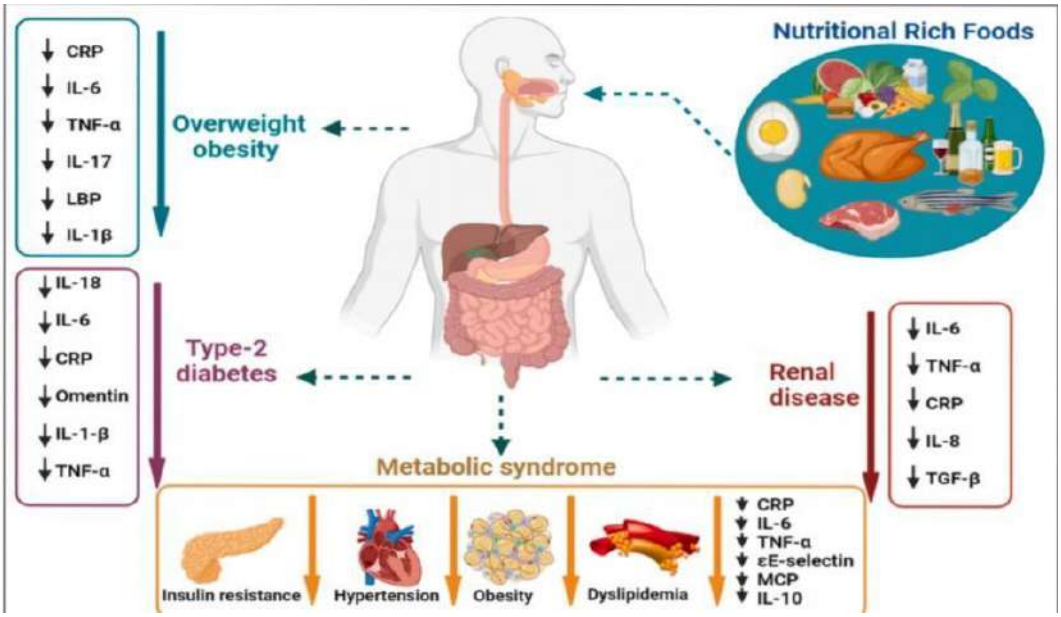


Figure: 11

CONCLUSION: -

The field of nutraceuticals has a wide range of types and variants. India's nutraceuticals market is one of the fastest-growing in the world. Consumers in the upper and middle classes view nutraceuticals as a substitute for prescription medications and only because of their positive, side-effect-free qualities. Nutraceuticals are attracting a lot of consumer interest since they increase energy levels and enhance mental and physical stamina. In order to help consumers choose the best products, the nutraceutical industry is concentrating on creating new products with creative formulations and employing effective advertising.Many Ayurvedic treatments have exceptional nutritional benefits. The abundance of conventional preparations that have not been used to treatments presents a problem for pharmaceutical companies. Further study and advancement of these nutritional supplement formulations are also required. The individual determines how nutraceuticals function. A person's lifestyle, surroundings, and genetic makeup all affect how susceptible they are to a certain disease. However, the role that nutraceuticals play in the prevention, treatment, and management of a variety of illnesses cannot be disputed. Pharmaceutical industries make extensive use of nutraceuticals. The majority of nutraceuticals, such as gamma terpinenes, beta carotene, curcumine, limonene, eugenol, pinene, safranal, geraniol, aloine, caryophylline, licopine, and sylimarine, are either mineral, animal, or vegetable derived. These ingredients are made into topical and oral dosage forms, such as lotions, creams, ointments, emulsions, unani formulations, SMEDDS, beads, tablets, emulgels, herbal formulations, and microemulsions.

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