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A Review on Nutraceutical: It's Types and Role in Health and Diseases

Kardile Divya Sunil, Galande Pooja Vinod, Prof. Apurva Gorakshnath Mhaske, Dr. Sanjay Ingale
Dharmaraj Shaikshanik Pratishthan's College of Pharmacy, Walki, Ahilyanagar, Maharashtra, India

Abstract: *The Foundation for Innovation in Medicine (New York, US) first used the term "nutraceutical" in 1989 to give this quickly expanding field of biomedical research a name. According to the definition, a nutritional supplement is any material that can be consumed whole or in part as food. provides medical or health advantages including the prevention and treatment of disease. These Nutraceuticals aid in the fight against a number of the century's most pressing health issues, including diabetes, cholesterol, osteoporosis, arthritic conditions, cancer, and cardiovascular illnesses, among others.*

Compared to medications, nutraceuticals have advantages because they don't have adverse effects and are naturally nutritional supplements, etc. Based on their chemical composition, natural source, and other factors, nutritional groups under three main headings: nutrition, herbal remedies, dietary supplements, etc. New food generations will result from continued research, which will undoubtedly make the barrier between food and medication more permeable. The current body of information on Nutraceuticals constitute a significant problem for doctors, dietitians, and food chemists and technologists. Public health officials take treatment and prevention into consideration. with nutraceutical acting as a potent tool to combat nutritional deficiencies and sustain health caused both acute and long-term illnesses, encouraging the best possible health, longevity, and quality of life.

Keywords: Nutraceuticals; Dietary fiber; Probiotics; prebiotics; polyunsaturated fattyacids; Antioxidants; Nutraceuticals and Disease

I. INTRODUCTION

Stephen L. Defelice, the founder and chairman of the Foundation for Innovation in Medicine in New Jersey, USA, is credited with coining the term "nutraceutical." At Rutgers, the nutraceuticalindustry was founded. Any substance that is a food or a component of food and offers medicinal or health advantages, such as illness prevention and treatment. such as beta-carotene and lycopene.

The words "nutrient" (a nourishing food or food component and "nutraceutical" are combined. "Pharmaceutical" refers to a medicinal drug. Pharmaceuticals are mostly used as drugs to treat illnesses, whereas nutraceuticals are meant to prevent illnesses. There are numerous kinds of nutraceuticals, including beverages, pills, capsules, and fortified meals, and they frequently include natural ingredients like vitamins, minerals, herbs, and amino acids. compounds with positive health effects. Nutraceuticals include, for instance, omega-3 fatty antioxidants, probiotics, and acids. Nutraceuticals are touted as a means to assist various health issues, but it's crucial to speak with a medical expert before utilizing them. Both taking supplements and eating meals that have been prepared or fortified can help people become healthier. Public education, renewable resources, local production and processing, environmental friendliness, and horticulture are further factors contributing to the expanding trend of nutraceuticals. Accessibility According to scientific research, a nutraceutical is "any non-toxic food component with health benefits. advantages such as the prevention or treatment of sickness. The food's functional element needs to be created using good manufacturing methods and standardized in the nutraceutical product.

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Figure no: 1

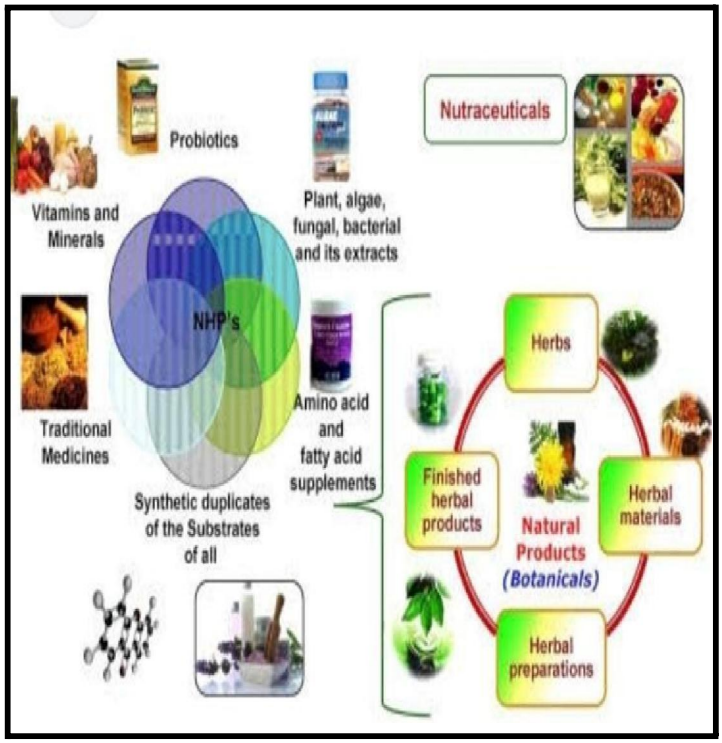

Figure no 2: Nutraceuticals

History:

In 1989, Dr. Stephen DeFelice combined the terms "nutrition" and "pharmaceutical" to create thephrase "nutraceutical" Hippocrates, some 2000 years ago, rightly noted. Allowfood to serve as medicine and medication to serve as food. Currently, there is a rise in interest worldwide as it is acknowledged that nutraceuticals are crucial for improving health .The term "nutraceutical" was first used in 1989 by Dr. Stephen DeFelice, the head of the Foundation for Innovation in Medicine, to combine the terms "pharmaceutical" with "nutrition." There is no regulatory definition for the phrase "nutraceutical," which is a marketing term used to describe nutritional supplements sold with the intention of treating or preventing disease. Therefore, any substance that has the potential to be categorized as food or a component of food and has health or medical advantages, including illness prevention and treatment, is referred to as a nutraceutical. These goods could include isolates.

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Why Nutraceuticals seems Attractive?

People regularly eat phenolic-rich meals that contain a lot of these components. Side effects are infrequent with them. Their half-lives are comparatively long. After consumption, they arereadily absorbed in the intestine. They are readily available without a prescription and don't require an appointment with a healthcare provider.

Many people think that this strategy is more organic than utilizing pharmaceutical medication. They believe taking dietary supplements will improve their make them healthier and stronger, offer them more vitality, and fend off disease. Some individuals use these goods when people believe their particular ailments have not responded to normal treatments.

The reasons for shift towards nutraceuticals are:

1. An increasing number of clients are concerned about the cost of medical care.
2. People are using nutraceuticals to improve their well-being and prevent chronic illness because they are unhappy with the way drugs promote health.
3. Medical professionals agree that crops cultivated with chemical fertilizers, pesticides, herbicides, and often genetically modified seeds are responsible for the lack of adequate levels of most nutrients in our overly processed food supply.
4. People who put prevention ahead of cure.
5. People who have chronic conditions for which allopathic medicines have not worked.
6. Patients who are struggling financially.
7. Nutraceuticals include most therapeutic areas, such as anti-arthritic, cough, cold, and sleep issues, as well as gastrointestinal issues, cancer prevention, osteoporosis, blood pressure, cholesterol, analgesics, depression, and diabetes.
8. As therapeutic products with preventative and curative properties, nutraceuticals seem to have a promising future.
9. Nutraceuticals are rapidly replacing pharmaceuticals in the treatment and prevention of both acute and chronic health problems.
10. The world's population is growing quickly.

Categories Based On Natural Source:

*Carbohydrates and Fiber
*Fat and Essential Fatty Acids
*Protein
*Minerals like Macro-minerals and Trace Minerals
*Vitamins
*Water
*Other Nutrients like Antioxidants, Phytochemicals and Intestinal Bacterial FloraRecombinant Nutraceuticals

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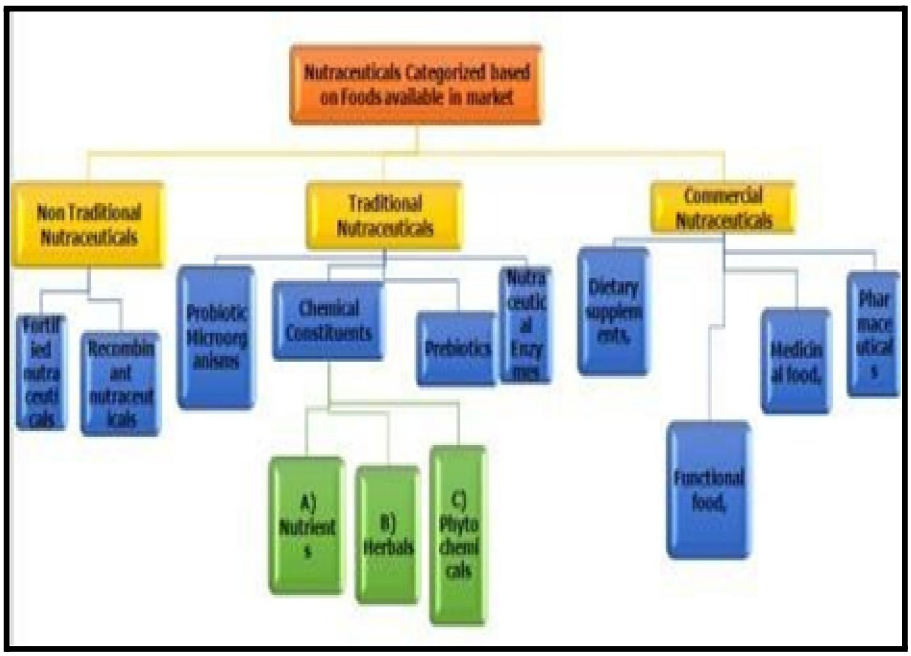

Figure no 3:Categories based on foods available in market

Types:
1) Dietary Fiber
2) Probiotics
3) prebiotics
4) Polyunsaturated fatty acids
5) Antioxidant vitamins
6) Polyphenols
7) Spices

Dietary Fiber: dietary fiber is a key components of Nutraceutical and functional foods because of its many health benefits. It's a complex carbohydrates that's mainly found in plants, such as fruits, vegetables and grains.

Types of Fiber:
Soluble Fiber: Dissolves in water and can help lower blood cholesterol and glucose levels.Found in oats, beans, and citrus fruits.
Insoluble Fiber: Does not dissolve in water and aids in digestive health by promoting regularbowel movements. Found in whole grains, nuts, and vegetables.

Advantage of Dietary Fiber

- **Digestive Health**: Promotes regular bowel movements and prevents constipation byaddingbulk to the stool.
- **Weight Management:** Increases satiety, helping to control appetite and reduceoverallcaloric intake.
- **Cholesterol Control:** Soluble fiber can lower LDL cholesterol levels, reducing therisk ofheart disease.
- **Reduced Risk of Chronic Diseases:** Linked to lower risks of various conditions,including heart disease, type 2 diabetes, and certain cancers.

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Disadvantage of Dietary Fiber

- **Gastrointestinal Issues:** High fiber intake, especially from supplements, can lead tobloating, gas, and abdominal discomfort.
- **Potential for Overconsumption:** Relying on fiber supplements may lead toexcessive intake, which can cause diarrhea or nutrient absorption issues.
- **Imbalance in Diet:** Focusing too much on fiber supplements might displace otheressential nutrients from a balanced diet.
- **Limited Effectiveness:** Some isolated fibers may not provide the same healthbenefitsas fiber from whole food sources.

Benefits of dietary fibers:

- control blood sugar
- weight loss and management
- lowers GI
- helps to prevent colon cancer
- lowers cholesterol levels
- Normalizes bowel movements
- improve immune function

Sources of Dietary Fiber: Whole grain cereals, wheat products.Oats, dried beans, legumes

Figure no: 4

Probiotics:

Probiotics: They establish a mutually beneficial symbiotic interaction with the human gastrointestinal system, driving out pathogens such as yeasts, other bacteria, and viruses that could otherwise cause illness. In addition to creating antitoxin and reversing some of the consequences of infection on the intestinal epithelium, such as secretory changes, they also alter the micro-flora and inhibit pathogen adhesion to the intestinal epithelium, competing for the resources needed for pathogen survival. And the movement of neutrophils. living microorganisms that, when given in sufficient

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quantities, improve the host's health Lactobacillus species, Bifid bacterium species, and Saccharomyces cerevisiae yeast Certain Bacillus and E. Coli species are also utilizedas probiotics.

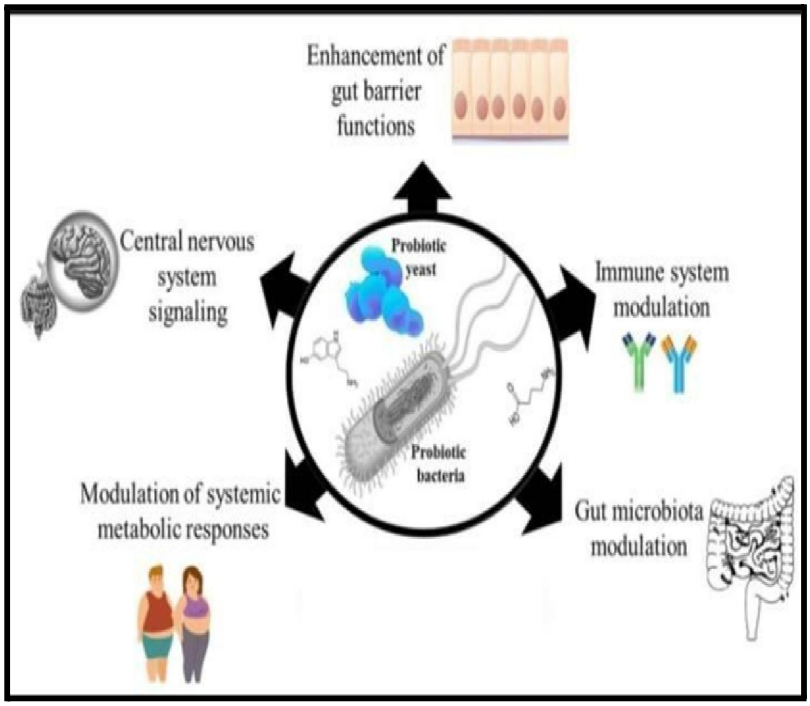

Figure no: 5 probiotic

Probiotics can treat lactose intolerance by producing ß galactosidase, a specialist enzyme that breaks down the problematic lactose into its constituent sugars. When selecting probiotic standards, the following elements should be taken into account: safety, functionality, and technology that may have a positive impact on health.

The origin of probiotics should be human.

*Commonly gram positive organism

*Can survive after passage through acid and bile.

*Can show antagonist action against pathogenic or carcinogenic bacteria.

Advantage of probiotics:

- **Gut Health:** Probiotics help maintain a balanced gut micro-biota, which can improvedigestion and enhance nutrient absorption.
- **Immune Support:** They can boost the immune system by promoting the productionof antibodies and supporting immune cell function.
- **Digestive Disorders:** Probiotics may alleviate symptoms of digestive disorders likeirritablebowel syndrome (IBS) and diarrhea, especially antibiotic-associated diarrhea.
- **Mental Health:** Emerging research suggests a link between gut health and mentalwell-being, with probiotics potentially reducing symptoms of anxiety and depression.

Disadvantage of Probiotics:

- **Strain Specificity**: Different probiotic strains have varied effects, and not all strainsare beneficial for every individual or condition.
- **Variable Efficacy:** The effectiveness of probiotics can be inconsistent, often dependingon factors like dosage, duration of use, and individual health conditions.

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- **Possible Side Effects:** Some individuals may experience gastrointestinal discomfort,bloating, or gas, particularly when first starting probiotics.
- **Infection Risk:** In immune compromised individuals, there is a risk of infections fromprobiotics, especially if they contain live bacteria.

The characteristics of probiotics:

- **Live Microorganisms**: Probiotics consist of live bacteria and yeasts that providehealth benefits when consumed in adequate amounts.
- **Specific Strains:** Different probiotic strains (e.g., Lactobacillus, Bifid bacterium)have unique properties and health benefits, making strain selection crucial.
- **Stability:** Effective probiotics must remain viable throughout their shelf life and duringdigestion to exert their beneficial effects.
- **Health Benefits:** Probiotics can support gut health, enhance immune function, improve digestion, and potentially affect mental health and weight management.

Prebiotics: prebiotics are substances that encourage the growth of beneficial bacteria in their host. Prebiotics are a more recent addition to our lexicon; they are substances that humans cannotdigest. Rather, they operate as a source of food for good probiotic bacteria. This reduces the likelihood that harmful bacteria may infiltrate our digestive tract by encouraging the growth of probiotic bacteria in a favorable environment. A prebiotic called inulin has made its way into many processed meals. This type of fiber is derived from the roots of many plants, such as dandelions, chicory, and Jerusalem artichokes.

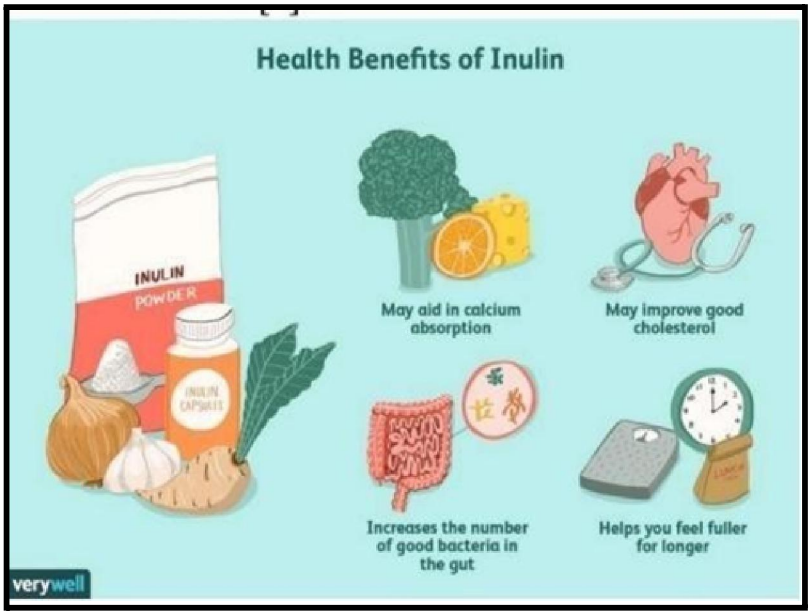

Figure no:6

Characteristics of prebiotics:

°Able to survive the passage through the Digestive system.
°Able to attach to the intestinal epithelia and colonize.
°Able to utilize the Nutrients and substrate in a normal diet.
°Non-pathogenic and non toxic.
°capable of exerting a beneficial effect on the host.

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Advantage of Prebiotics:
°multiple mechanism of action.
°resistance is infrequent.
°delivery of microbial enzymes.

Disadvantage of Prebiotics:
°they can trigger an allergic reaction.
°they might cause mild stomach problems.
°persistence possible.

Benefit of prebiotics:
Improve digestion and metabolism.
Help regulate bowel movements.
Regulate blood sugar and insulin Resistance.
Stimulate the production of hormones that aid in appetite suppression.
Lower inflammation in the body.
Strengthen the immune system.
Help balance and maintain hormone levels.
Reduce risk of allergy.
Regulate moods and reduce stress hormone levels.

Poly-unsaturated fatty acids: They are thought to be healthy for intake and provide a protective role for human health. When they are damaged by any of the following, they are more vulnerable to heat, light, and oxygen. Because oxidized fats cause inflammation, it oxidized. The polyunsaturated fatty acid (PUFA) group is separated into two categories: omega-3 (n-3)and omega-6 (n-6). These groups differ in the location of the first double C-bound. Since the human body is unable to produce these two PUFAs, they are known as essential fatty acids and are necessary for maintaining physiological integrity.

The advantages of polyunsaturated fatty acids (PUFAs).

- **Heart Health:** PUFAs, particularly omega-3 fatty acids, can lower triglyceride levels,reduce blood pressure, and decrease the risk of cardiovascular disease.
- **Anti-Inflammatory Effects:** Omega-3s can help reduce inflammation, which is beneficial for conditions like arthritis and other inflammatory diseases.
- **Cognitive Function:** Omega-3 fatty acids are linked to improved brain health,potentially reducing the risk of cognitive decline and supporting mental health.
- **Healthy Skin:** PUFAs contribute to skin health by maintaining moisture and reducingthe riskof conditions like eczema.

The disadvantages of polyunsaturated fatty acids (PUFAs) :

- **Oxidative Stability:** PUFAs are more prone to oxidation, which can lead to the formation of harmful free radicals, especially if not stored properly.
- **Imbalance in Omega Ratios:** Many diets are already high in omega-6 fatty acids, and excessive supplementation may disrupt the ideal balance between omega-3 and omega-6, potentially promoting inflammation.
- **Digestive Issues:** Some individuals may experience gastrointestinal discomfort,such as bloating or diarrhea, when consuming PUFA supplements.
- **Potential for Contaminants:** Fish oil supplements, a common source of omega-3s,can becontaminated with heavy metals or toxins if not sourced responsibly.

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Source:

Nuts and Vegetable oil (soya bean oil, flaxseed oil, peanut oil, safflower oil etc.)
Seeds Fatty fish
Meat and its productPoultry
Benefits of polyunsaturated fatty acids

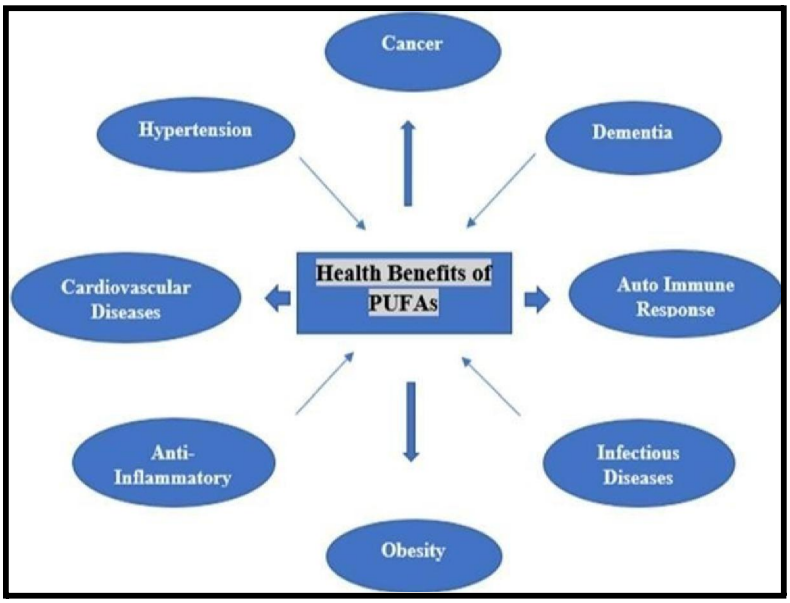

Figure no: 7 Benefits of PUFAs

Antioxidant vitamins: Antioxidant vitamins: Damage to cells generated by free radicals is believed to have a central role in the aging process and in disease progression. Our first line of defense against damage from free radicals is antioxidants, which are essential for preserving the best possible health and wellness .Being a highly reactive atom, oxygen can combine to form potentially harmful are sometimes referred to as "free radicals." Free radicals have the ability to harm healthy cells of the body, causing them to lose their structure and function. Antioxidants have the ability to stopping free radicals in their tracks before they have a chance to damage cells. Without a doubt, antioxidants are vital to preserving the best possible cellular and systemic health and wellbeing. People have developed a very intricate and complex system of antioxidant defense. It includes a range of parts, both exogenous and endogenous in origin, which work in concert to eliminate free radicals through mutual interaction and synergy

The advantages of antioxidant vitamins:

- **Cellular Protection:** Antioxidant vitamins help neutralize free radicals, reducing oxidative stress and preventing cellular damage.
- **Chronic Disease Prevention:** Regular intake is associated with a lower risk ofchronic diseases such as heart disease, diabetes, certain cancers.

The disadvantages of antioxidant vitamins:

- **Potential Overconsumption:** Excessive intake, especially from supplements, canlead to toxicity or adverse effects, such as gastrointestinal issues.
- **Nutrient Imbalance:** Focusing on antioxidant supplements may displace otheressential nutrients, leading to an unbalanced diet.

Antioxidants are of 3 categories:
1. True antioxidants 2. Reducing agents 3. Antioxidant synergists

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Additional physiological antioxidants are –
Endogenous Antioxidants
Bilirubin
Thiel, e.g., glutathione, lipoid acid, N-acetyl cysteine
NADPH and NADH
Ubiquinone (coenzyme Q10)
Uric acid
Enzymes:
copper/zinc and manganese-dependent superoxide
iron-dependent catalase
*selenium-dependent glutathione peroxidase
Dietary Antioxidants
Vitamin C
Vitamin E
Beta carotene and other carotenoids andoxycarotenoids
b)such as lycopene and lutein
a. Polyphenols, e.g., flavonoids, flavones and flavonesc.proanthocyanin's
Examples of antioxidant:Beta-carotene

Lutein Lycopene Selenium Vitamin A
Polyphenols; Secondary metabolites of plants, polyphenols are mostly found in fruits, vegetables, cereals, and drinks. Due to its anti-mutagenic, anti-carcinogenic, anti-inflammatory, and antioxidant qualities, polyphenols have been of interest for a long time: More than 8000 polyphenolic compounds, including phenolic acids, flavonoids (Ndiaye M et al., 2008), tilbenes
,lignans, and polymeric lignans, have been identified in whole plant foods. Polyphenols are naturally occurring phytochemical compounds foundin plant-based foods like fruits, vegetables, whole grains, cereal, legumes, tea, coffee, wine, and cocoa. These substances are plant secondary metabolites that serve as an antidote to oxidants and UV radiation.as well as infections . Based on the quantity of phenol rings and the structural components that connect these rings to one another, polyphenols can be divided into a variety of groups . About one-third of the polyphenolic chemicals found in food are phenolic acids, which fall into two primary categories**:**
hydroxybenzoic acid derivatives (protocatechuic acid,gallicacid, p-hydroxybenzoic acid) and
hydroxycinnamic acid derivatives (caffeic acid, chlorogenic acid, coumaric acid, Ferulic acid, sinapic acid); berry fruits, kiwi, cherry, apple, pear, chicory and
Coffee are the foods with high content of these phenolic acids.

The advantages of polyphenols:

- **Antioxidant Properties:** Polyphenols help neutralize free radicals, reducing oxidative stress and cellular damage.
- **Anti-Inflammatory Effects:** They can lower inflammation, which is beneficial forconditions such as arthritis and cardiovascular diseases.

The disadvantages of polyphenols:

- **Bioavailability Issues:** Many polyphenols have low bioavailability, meaning they arepoorly absorbed in the body, which can limit their effectiveness.
- **Digestive Discomfort:** High doses of polyphenol supplements can cause gastrointestinal issues, such as bloating, gas, or diarrhea.

Health Benefits of Polyphenols:
lower blood sugar

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Increase insulin sensitivity
Decrease cancer risk
Reduce inflammation
Improve heart health and digestion
Boost brain function
Polyphenols following food source:

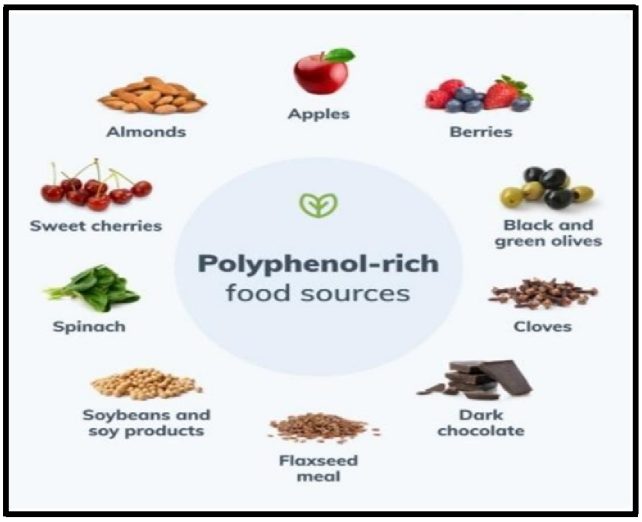

Figure no: 8 polyphenol-rich food sources

Polyphenols content and health impact of Nutraceutical Foods

Phenols	Foods	Health impact
Resveratrol	Red Wine, Peanuts and Berries	Anti-oxidant, anti-aging
Catechin (EGCG)	Green Tea	Hypertension reduction and cardioprotective effects. Body weight and waist circumference control
Curcumin	Turmeric (Indian spice)	Decrease of LDL peroxidation
Quercitin (Flavonoid Group)	Apples (4.5g/100g), Onions (22mg/100g), Capers (233mg/100g), Plums (240mg/Kg)	Early stage hypertension
Anthocyanins, flavanols, flavonols	Berries (black, blue, straw,..)	Hypertension reduction and decreased LDL/HDL ratio

Figure no: 9 Polyphenols content and health impact of nutraceutical foods:

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Spices: Since ancient times, spices have been used to flavor food, making them practically essential in culinary arts. Spices are aromatic vegetable materials that can be whole, broken, or pulverized. They are used mostly for seasoning food, not for nutritional purposes. These spices give culinary items their distinct taste, scent, and pungency. Spices with volatile oils that provideflavor, fragrance, and oleoresin add to the pungent taste.

Figure no: 10

Spices used in nutraceuticals include:

Piper nigrum-Also known as "The King of spices", this commonly used spice contains piperine, which can enhance bioavailability and has a variety of pharmacological activities.

°Chinese cinnamon- This natural food ingredient has pharmacological properties andmay help patients with cardiovascular diseases who have hypertension.

°Ferula asafoetida -

Used as a food spice in many Asian countries, it's also used in traditional herbalmedicine to treat asthma, bronchitis, ulcers, kidney stones, pain, and cancer.

°Garlic-

This polyphenolic and organo sulfur enriched spice has been consumed since ancienttimes and has shown health-promoting and disease-preventing properties.

°Ginger-This spice has many benefits for humans, including as a raw material for traditional medicine and nutraceuticals. It can also be used as a flavoring agent andpreservative in food.

The advantages of spices:

- **Health Benefits:** Many spices, such as turmeric (curcumin), ginger, and cinnamon,have anti-inflammatory, antioxidant, and antimicrobial properties that can promote overall health.
- **Blood Sugar Regulation:** Certain spices, like cinnamon, can improve insulin sensitivity and help regulate blood sugar levels.

The disadvantages of spices:

- **Variability in Potency:** The active compounds in spices can vary significantly depending on the source, cultivation, and processing, affecting their effectiveness.
- **Potential Allergens:** Some individuals may have allergies or sensitivities to specificspices,leading to adverse reactions.

Spices Health Benefits:

1. Regulating sugar and cholesterol
2.Ginger Helps shrink the tumor in Cancer
3.Turmeric protects against osteoporosis strengthens immune system
4. Omega-3 and omega-6 clove bloating is dying

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TOP 10 NUTRACEUTICAL PRODUCTS

- **Raspberry Ketones:** Another health supplement, raspberry ketones has great fat-blocking and thermogenic properties.
- **Green Tea Supplements:** The market for green tea is enormously lucrative. additions. Green tea pills have actually brought in more than $135 million in the nutraceuticals sector. Recognized as a potent antioxidant, it's also an excellent substitute for coffee to get a hit of caffeine.
- **Echinacea:** used to treat a variety of illnesses, such as bloodstream infections,herpes,and UTIs illnesses, syphilis, and other issues. It is also used to treat skinconditions likepsoriasis, eczema, Bee stings and skin damage caused by the sun.
- **Omega-3 Fatty Acids:** These are essential for heart and brain function and are frequently obtained from algae or fish oil.
- **Probiotics:** Good microorganisms that strengthen the immune system and supportintestinalhealth work.
- **Curcumin:** The key ingredient in turmeric, recognized for its ability to reduceinflammationand antioxidative qualities.
- **Coenzyme:** An antioxidant that promotes cell energy generation and heart health.
- **Glucosamine and chondroitin:** Often used to support joint health and reduce thesymptoms of arthritis.
- **Vitamin D:** Frequently taken as a supplement, it is necessary for immune system andbonehealth. Areas with little sunlight.
- **Magnesium:** Associated with over 300 processes, it supports nerve and musclefunction. Bodily metabolic processes.

Nutraceuticals and Diseases:

Cardiovascular Diseases: Generally characterized by abnormalities of the heart and blood vessels, cardiovascular diseases are chronic conditions including elevated blood pressure, heart failure, peripheral vascular disease, and coronary heart disease. The inner surface of arteries develops atherosclerotic plaques in coronary heart disease, which constrict the lumen and decrease blood flow. Antioxidants, dietary fibers, omega-3 polyunsaturated fatty acids, vitamins, and minerals are all important for the prevention and treatment of cardiovascular disorders.

Risk factor for cardiovascular disease:

hypertension (high blood pressure):

If hypertension is poorly controlled, the artery walls may become damaged, rising therisk ofdeveloping a blood clot.

Smoking:

Regular smoking can narrow the blood vessels, especially the coronary arteries.

Hyperlipidemia : (high blood cholesterol):

There is a higher change of narrowing of the blood vessels and blood clots.

Stress :

Hormones associated with (mental) stress, such as raise blood sugar levels. stress is alsolinked tohigher blood pressure.

Functions:

Reducing LDL cholesterol: nutraceuticals can lower levels of LDL cholesterol in theblood.

antioxidants: nutraceuticals can neutralize radicals with antioxidants .

anti-inflammatory: nutraceuticals can help reduce inflammation.

Cancer:

Cancer development is a dynamic and long-term process. Step-by-step progression of numerous intricate elements is involved in this procedure. In the end, these elements cause metastasis—the uncontrollable growth and spread of malignant cells throughout the body. The epidemiological research indicates that dietary factors have the ability to alter carcinogenesis.

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Risk factorcancer. 1.Tobacco smoking 2.Alcohol 3.radiation

Tobacco smoking: Tobacco use is a leading cause of cancer because tobaccosmoke contains chemicals that damage DNA, which can lead to cells growing abnormally andturning into cancer.

Alcohol: Alcohol can increase the levels of some hormones in our bodies such as estrogen and insulin. Hormones are chemical messengers, and higher levels of estrogen and insulin can make cells divide more often. This increases the chance thatcancer will develop. Changes to cells in the mouth and throat.

Radiation: Radiation can cause cancer by damaging DNA in cells, which can lead to uncontrolled cell growth and mutations.

Function:

Uncontrolled growth

Cancer cells grow and divide without responding to signals that control normal cell behavior. They can invade and damage tissues and organs, and spread to other parts ofthe body

Quick reproduction

Cancer cells often reproduce very quickly, which can lead to more mistakes in their genes. These mistakes can make the cells even more immature, causing them to divideand grow evenfaster.

Hiding from the immune system

Cancer cells can trick the immune system into helping them stay alive and grow.

Mitochondrial dysfunction

Tumors with defective mitochondrial function may require up-regulated glycolysis tomeettheir energy 4 demands.

Diabetes

Unusually high blood glucose levels are a hallmark of diabetes mellitus, which can be brought on by ineffective or insufficient insulin production. The two most common types of diabetes are type 2 (95 percent), which is associated with obesity, and type 1 (5 percent), which is an autoimmune disease.

two forms of diabetes that are most common. Gestational diabetes is a form of diabetes that develops throughout a pregnancy. Like the majority of chronic illnesses, diabetesnot only has a substantial financial impact on society at large, but it also has a big effect on specific patients as well as their families. The hallmark of diabetes mellitus is unusually elevated blood glucose levels, which can be resulting from either ineffective or inadequate insulin production. Diabetes type 1 (5 percent), which is an autoimmune disease, and 95% of people have type 2 diabetes. which is associated with obesity, are the two most common forms of the disease. One type of diabetes that appears during pregnancy is called gestational diabetes. Like the majority of chronic illnesses, diabetes not only has a substantial economic impact on the community at large,but it also has a big effect on the patients themselves and their families.

Risk factor ofdiabetes

1. Family history

2. Smoking

3. Blood pressure

Family history: The risk of diabetes is increased if your parents or siblings have the disease. Share your family health history with your health care professional to find outwhat it may mean for you.

Smoking: If you smoke, there are a number of tools, medications and online resourcesthat you can use to help you quit. Talk to your health care team about thebest options foryou.

Blood pressure: In addition to causing damage to the cardiovascular system, untreated high blood pressure has been linked to complications from diabetes. People with diabetes and HBP should maintain a blood pressure of less than 130/80 mm Hg.Normalblood pressure is below 120/80 mm Hg.

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Function:

1.transports and metabolizes glucose for energy

2.stimulates storage of glucose in liver and muscle

3.signals the liver to stop the release of glucose 4.enhances storage of dietary fat in adipose tissue.

Allergy: An excessive reaction to a food or substance by the body is known as an allergy. Quercetin (QR) is a member of the flavonoid class of polyphenolic compounds. QR belongs to the group of flavonoids known as flavonols. It is extensively found in the rinds and barks of plants. Some foods that are particularly high in QR include onions, red wine, and green tea. Being a naturally occurring antihistamine, QR inhibits the effects of histamine on the body .Reactions that cause inflammation and allergies are caused by histamines. It can lessen the inflammation brought on by asthma, gout, bursitis, hay fever, and arthritis. QR inhibits the synthesis of leukotrienes and certain inflammatory enzymes, including lipid peroxidases. QR possesses immunomodulatory, antiviral, anti-inflammatory, anticancer, and gastro protectiveproperties.

Risk factor of Allergy 1.Asthma 2.AutoimmuneDiseases

Asthma: Individuals with asthma are often at a higher risk for allergies due to heightened airway sensitivity and inflammation.

Autoimmune Diseases: Certain autoimmune conditions may lead to a regulate dimmunesystem, which can heighten allergy risk.

Function:

Immune Modulation: Certain nutraceuticals may help modulate immune responses, potentially reducing allergic reactions. For example, probiotics can support gut health andimprove immune tolerance.

Anti-inflammatory Effects: Nutraceuticals with anti-inflammatory properties, such as omega-3 fatty acids may help alleviate symptoms of allergic diseases like asthma and rhinitis.

parkinson's Diseases: Parkinson's disease is characterized as a brain or motor ailment thatusually manifests in mid- to late-life adulthood and is caused by nerve loss in certain brain regions that leads to muscle rigidity, trembling, and difficulty walking. Although early research on nutritional supplements has produced some encouraging findings, it's vital to keep in mind that there is currently insufficient scientific evidence to support their use for Parkinson's disease. Some of the supplements utilized in Parkinson's disease research, known as nutraceuticals, have demonstrated encouraging outcomes in early research. Proteins like creatine, glutathione, and vitamin E appear to guard against Parkinson's disease. A decrease in the clinical symptoms of Parkinson's disease indicates how creatine alters its characteristics.

Risk factor of Parkinson's Disease.1.Inflammation

Dietary Factors

Inflammation: Chronic inflammation is associated with PD. Nutraceuticals such asomega-3 fatty acids and curcumin may help mitigate inflammatory responses.

Dietary Factors: Diets high in saturated fats and low in antioxidants may increasePDrisk. Nutraceuticals that promote a balanced diet can support brain health.

Function: 1.Mood Regulation 2.Improved Mobility

Mood Regulation: Nutraceuticals like omega-3s and certain amino acids may helpalleviate depression and anxiety, which are often comorbid with PD.

Improved Mobility: Some supplements, such as creatine and specific amino acids,may support muscle function and mobility, enhancing overall quality of life.

Health benefits of nutraceuticals:

The potential health advantages of nutraceuticals have garnered a lot of attention inrecent years. These are a few possible health advantages of nutraceuticals

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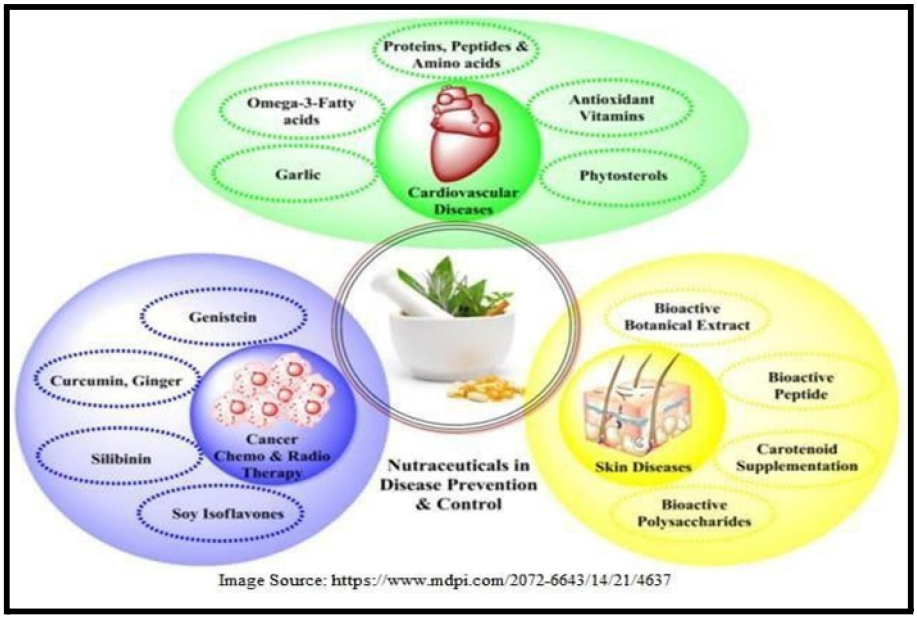

Figure no: 11

Improved heart health
Enhanced bone health
Better brain health
Boosted immune system
Anti-inflammatory effects

Advantage of Nutraceuticals:

Nutraceuticals have been used to:

Boost the nutritional value of our diet.
Make us live longer.
Assist us in avoiding specific illnesses.
Explain the psychological advantages of taking care of oneself.
Take action on the digestive, respiratory, and immunological systems.
Give our bodies the proper amount of nourishment.
Prevent chronic illnesses and the symptoms of aging.
Guard your body from long-term illnesses Improve immunity and lengthen lifeexpectancy.
Lessen the negative effects of stress, enhance mental clarity, and ease anxiety.
Improve the quantity and quality of your sleep.
Offer a feeling of wellbeing.
There are no known adverse effects of nutraceuticals.

Disadvantage of Nutraceuticals:

Unlike pharmaceuticals, they are exempt from testing and regulations.
Authorities like the FDA do not regulate them.
Nutraceuticals' bioavailability is low.
Lack of Regulation: Many nutraceuticals are not regulated as strictly as pharmaceuticals, leading to concerns about product quality, safety, and efficacy. There can be variations in ingredient quality and dosage across different brands.
Limited Scientific Evidence: Some nutraceuticals lack robust scientific research to support their effectiveness for specific health claims. Their benefits may be overstated or based on anecdotal evidence.

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Potential for Interactions: Nutraceuticals can interact with prescription medications, leading to adverse effects. For example, certain herbs and supplements may interfere with blood thinnersor other drugs.

Overuse or Misuse: People may overuse nutraceuticals, believing "natural" equals safe, whichcan lead to toxicity or imbalances in nutrients. Over-supplementation of vitamins and minerals, for instance, can have negative health consequences.

Cost: Some nutraceuticals can be expensive, and their long-term cost may not justify the benefits, particularly if they're not proven to be effective.

False Marketing: Some nutraceuticals are marketed with exaggerated claims that are not backed by credible evidence, leading to misinformation and false expectations.

Delayed Medical Treatment: Relying on nutraceuticals for serious conditions might delay more appropriate or proven medical treatments, worsening the underlying condition.

II. CONCLUSION

Nutraceuticals have demonstrated their capacity to prevent disease and improve health; as such, they should be taken in accordance with suggested intake guidelines. Nutraceuticals are crucial to the development of new treatments in the current self-medication environment. However, theirachievement relies on preserving their efficacy, safety, purity, and quality

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