



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A review on Nutraceutical

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ABSTRACT:

Nutraceuticals are regarded as bioactive substance and constituents are either of known therapeutic activity or chemically defined substances generally accepted to contribute substantially to the therapeutic activity of the drug. The entire world is fighting diseases characteristic of the modern age such as obesity, osteoporosis, cancer, diabetes, allergies and dental problems. Positioned at the interface between food and drugs, a growing body of products is assuming importance; the consumer is now looking for complementary or alternative beneficial products and that's why nowadays they are using nutraceuticals. Increasingly, they are using natural dietary supplements and other forms of nutraceuticals as part of a tremendous surge to have physiological benefits or to provide protection against diseases. Nutraceutical market is seeing tidal growth mainly in United States, India and European countries. Faster access to this market is possible through business partnership models, effective regulatory compliance and by evaluating key trends and consumer reference.

Keywords: Nutrition; Disease, benefits, sources, categories, scope.

INTRODUCTION:

The phrase is a portmanteau of the phrase's "nutrition" and "pharmaceutical", used to be coined in 1989. by Stephen L. Defelice, founder and chairman of the Foundation of Innovation Medicine. Nutraceuticals are merchandise derived from meals sources that are purported to supply more health benefits, in addition to the fundamental dietary fee determined in foods. Depending on the jurisdiction, merchandise might also declare to forestall continual diseases, enhance health, prolong the getting older process, extend lifestyles expectancy, or assist the shape or characteristic of the body. (J. Singh, et al., 2012).

"Nutraceuticals and practical meals have acquired considerable pastime due to the fact of their presumed protection and potential dietary and therapeutic effects". Thenutraceutical and practical food enterprise are in a special position to capitalize on consumers' interest. Be it a multinational pharmaceutical corporation, a dietary company, a massive meals multinational or a small vitamin-selling firm, all of them apprehend the altering tendencies and are conscious of the extra health-seeking purchaser trend. There is, thus, a proliferation of these value-added merchandise aimed at no longer solely preserving oneself wholesome however additionally prevention/treatment of a number of illnesses ranging from coronary heart diseases to cancer. (A. Rajasekaran, et al., 2008)

Pharmaceuticals are substances which have (or have had) patent safety as a end result of costly trying out to conform to the specifications of respective Governments. However, many vitamins might also in no way get hold of authority's approval because no one ought to justify the price of testing necessities for supplies that can't be protected by way of patent laws. Both prescription drugs and nutrients can therapy and stop disease(s) however solely pharmaceuticals have governmental sanction. Many pharmaceuticals have their beginning in vegetation and animals and are no much less "natural" than nutrients. Classic example of vitamins is artificial vitamins. (G. Sivagnanam, et al., 2008)

The use of nutraceuticals, as a try to accomplish desirable therapeutic effects with decreased aspect effects, as in contrast with different therapeutic sellers has met with excellent financial success. The choice for the discovery and manufacturing of nutraceuticals over pharmaceuticals is nicely preferred with the aid of the pharmaceutical and biotechnology companies. Plants are one of the most vital assets of human foods and medicines. Rapidly growing understanding on nutrition, medicine, and plant biotechnology has dramatically changed the standards about food, fitness and agriculture, and brought in a revolution on them. Foods are intended to deliver a health benefit beyond providing sustenance and nutrition. Thus, the concept of "adequate nutrition" now tends to be replaced by "optimal nutrition" with consumer belief increasing at an unprecedented pace. Increasing knowledge regarding impact of diet at the genetic and molecular levels is changing the way we consider the role of nutrition, resulting in new dietary strategies. At the same time, state-of-the-art technologies, including biotechnology, have led to nutritional discoveries, product innovations, and mass production on an unprecedented scale. These developments have spawned an important and dynamic new area of research, resulting in increasing numbers of nutritional products with potential medical and health benefits. With current advances in medical and diet sciences, herbal merchandise and health promoting ingredients have obtained massive interest from each health experts and the public. (S. Lakshmana Prabu, et al., 2012).

The time period "nutraceutical" combines the phrase "nutrient" (anourishing meals or meals component) with "pharmaceutical" (a medical drug). Nutraceuticals can also comprise elements that are "natural" expressed intent of cure or prevention of sickness but might also no longer be normally identified as secure. (G. Verma, et al., 2016). The pores and skin are the greatest organ of the human body and is forever growing older through each interior and exterior element. The inside elements are apart of the herbal growing old manner inside cells, but can be accelerated with the aid of exterior elements such as ultraviolet (UV) radiation, tobacco, inadequate nutrition, and hormonal imbalances. These exterior elements motive the manufacturing

offree radicals and infection that fragmentand degrade collagen and elastic fibres. Overtime, each these inner and exterior influence lead to expanded pores and skin roughness, wrinkling, pigmentation change, telangiectasias,loss of elasticity, and diminished firmness, givingskin its aged look. (S. A. Souyoul, et al., 2018).

In recent times, nutraceuticals have attracted substantial interest owing to theirprospective nutritional, safety and therapeutic effects. They could have a role in a plethora of biological processes, including gene expression, antioxidant defences,cell proliferation, and maintenance the integrity of the mitochondria.Nutraceuticals is a comprehensive umbrella term that is used to define any product resulting from food sources with extra health benefits in addition to the basic nutritional value found in foods. They can be considered non-specific biological therapies used to promote general well-being, prevent malignant processes and control symptoms. Generally, nutraceutical is said to be a “food, or parts of a food, that provide health benefits, including the prevention and treatment of disease (Cencic and Chingwaru 2010).

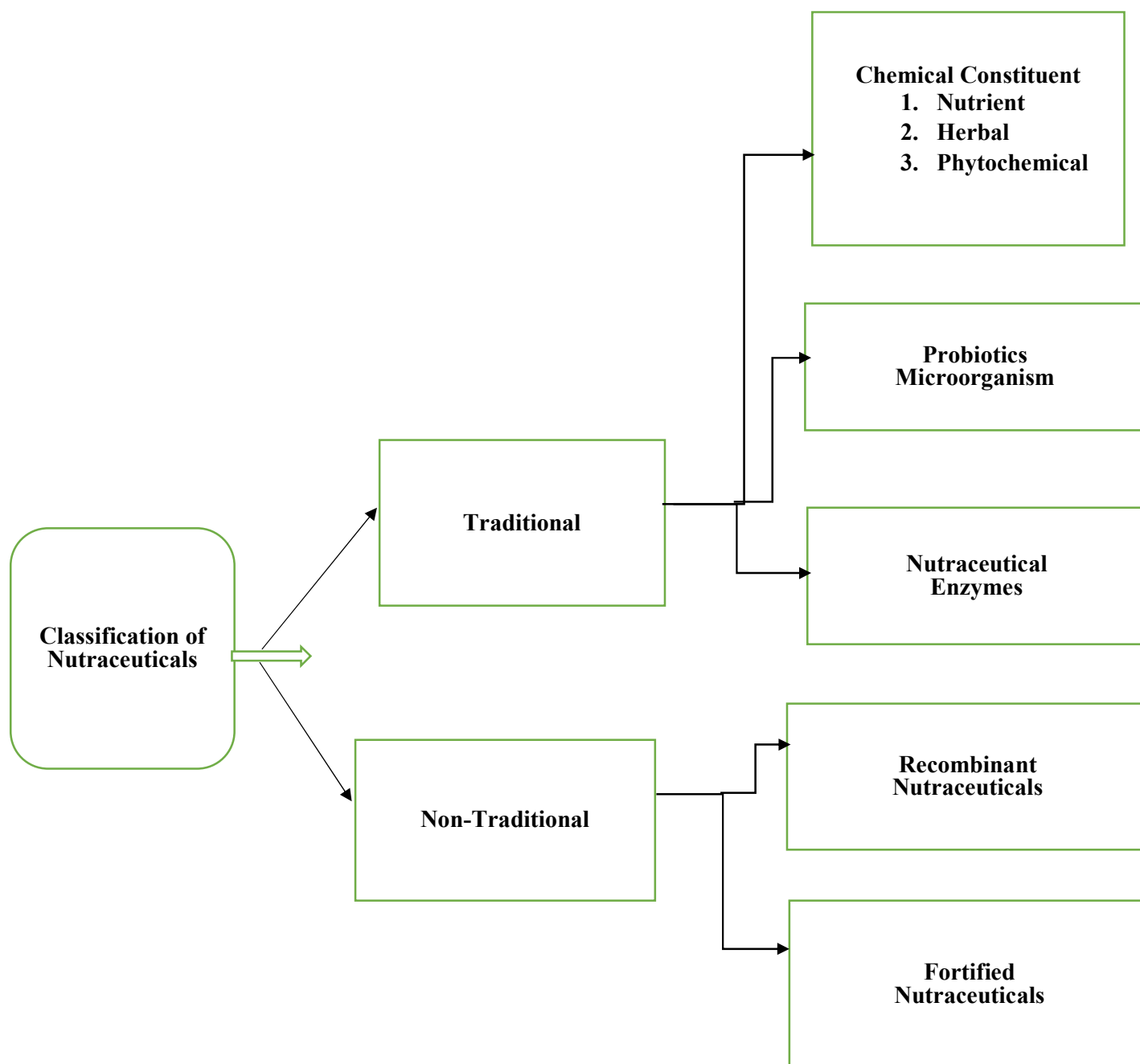
HISTORY OF NUTRACEUTICAL:

The concept of nutraceutical wants back three thousand years ago. The grate scientist Hippocrates (460-377 B.C) started let “food” be the medicine and medicine be the “food” it predicts the appropriate relationship between food for health and their therapeutic benefits. In the early 1900s, in united states food manufacturers start to adding small quantity of Iodine used to prevent or in treatment of Goiter like diseases. Now a days food and nutrients play vital role in normal functioning of the body. They are very helpful to maintaining the health of the individual and to reduce risk of various chronic diseases. Nutraceutical are the medicinal food that play a role in enhancing health, modulating immunity and thereby preventing as well as treating specific diseases.

They are easily available and economically affordable. Nutritional therapy is a healing system using dietary therapeutics or nutraceutical as a complementary therapy. This therapy is based on the food can not only be source of nutrients and energy but could it also provide medicinal benefits. By using nutraceutical as nutritional therapy, it achieves this goal by using such nutraceutical in detoxifying the body, avoiding vitamin and mineral deficiencies. Thus, the field of nutraceutical can be envisioned as one of the missing sections in health field which gives benefits to each individual life. It has scientifically proved that and supported by various research articles that nutraceutical is effective into prevention and treatment of various disease conditions.

The definite use of nutraceuticals has been to achieve desirable therapeutic outcomes with reduced side effects. Herbal Nutraceuticals are powerful instruments in sustaining health and act contrary to nutritionally induced acute and chronic diseases by promoting optimal health, longevity and quality of life.

CLASSIFICATION OF NUTRACEUTICALS:



Traditional nutraceuticals:

Under the category of traditional Nutraceuticals comes food in which no change to the food is made; It is simply natural, whole foods with new information about their potential health qualities. Traditional nutraceuticals are manufactured meals that has now not been altered in any way, and its factors are all herbal and have the doable to provide fitness benefits (Srivastava, 2018). Several herbal ingredients, such as lycopene in tomatoes, omega-3 fatty acids in salmon, and saponins in soy, are observed in a range of fruits, vegetables, grains, fish, dairy, and meat diets. Tomatoes and salmon are two ingredients that researchers have shown to supply fitness benefits past simple diet (lycopene and omega-3 fatty acids, correspondingly) (Chintale et al., 2013; Prabu et al., 2012).

Nutrients: Strokes, cataracts, osteoporosis, diabetes, coronary heart disease, and most cancers can all be handled with nutrients. Minerals derived from plant, animal, and dairy diets are beneficial in the remedy of osteoporosis and anaemia. Omega 3-PUFAs, located in flaxseed and salmon, are mighty regulators of the inflammatory process, intelligence characteristic preservation, and ld. cholesterol accumulation reduction.

Herbals: Herbs, regularly recognised as botanical foods, are as ancient as human civilization and supply a wealth of treatments to treat each acute and persistent illnesses. Several nutraceuticals are observed in medicinal herbs of vital components, providing a total storage facility of medication to deal with severe and power illnesses (Khan et al., 2016; Prabu et al., 2012).

Phytochemicals: Non-nutritive plant compounds with defensive or disease-protective skills are acknowledged as phytochemicals. They are

nonessential vitamins that plant life makes in particular to defend themselves. Phytochemicals obtained from flora are used in the weight loss plan and provide fitness advantages such as Substrate for biochemical reactions, enzymatic response cofactors, enzyme inhibitors, enzyme intestinal absorbents that bind to and get rid of undesirable constituents and beautify the absorption and/or balance of vital vitamins by using scavenging reactive or detrimental molecules.

Probiotic microorganisms: Probiotics are stay microorganism that are given to the host in sufficient volume to grant a fitness benefit. They exist in powder, liquid, gel, paste, or granule form, as properly as pill form, and are normally used to deal with gastrointestinal (GI) disorders such as lactose intolerance, acute diarrhea, and antibiotic-related gastrointestinal aspect consequences (Jain, 2020). Probiotic cure has a range of essential effects, including enhancing intestinal wellbeing via microbiota guidance, enjoyable and enhancing the immune system, delivering and increasing the bioavailability of supplements, reducing the aspect outcomes of lactose influence, and reducing the chance of a number of ailments (Nagpal et al., 2012).

Nutraceutical enzymes: Enzymes are vital elements of life; besides them, our our bodies would now not characteristic correctly. Anyone struggling from digestive problems such as hypoglycaemia, blood sugar abnormalities, or weight problems would possibly alleviate their signs and symptoms by including enzyme dietary supplements to their eating regimen bought from microbial, plant, and animal sources (Singh and Sinha 2012).

Non-traditional nutraceuticals: Non-traditional nutraceuticals are bought from agricultural breeding by including vitamins and/or ingredients, such as calcium-fortified orange juice, vitamin- and mineral-fortified cereals, and folic acid-fortified flour. Agricultural specialists have effectively developed techniques to expand a crop's nutritional content material (Singh and Sinha 2012).

Recombinant nutraceuticals: Biotechnology methods have been efficiently employed in a fermentation procedure to extract enzymes suitable for imparting fundamental vitamins at an ultimate stage in a range of meals such as cheese and bread (Chanda et al., 2019). Biotechnology assists in the formation of energy-delivering meals such as bread, wine, fermented starch, yogurt, cheese, vinegar, and others. Biotechnology permits for the manufacturing of probiotics and the extraction of bioactive factors the usage of enzyme/ fermentation technologies, as properly as genetic engineering (Singh and Sinha 2012)

Fortified nutraceuticals: Fortified nutraceuticals are made by means of fortifying dietary elements and then including micronutrients (trace factors or vitamins) to the last product (Srivastava, 2018). In youngsters with diarrhea, respiratory infections, and serious illnesses, prebiotics, and probiotics, preserved milk containing *Bifidobacterium lactis* HN019 are ingested (Sarawak et al., 2010). Persistent bananas may want to be developed as superb ingredients to fight iron deficiency precipitated through malnutrition (Kumar et al., 2011)

Benefits of Nutraceuticals

- improve overall health.
 - boost energy.
 - relieve anxiety.
 - improve mental clarity.
 - enhance sleep quality and quantity.
 - prevent chronic diseases.
 - reduce drug cravings.
 - delay the aging process
- **The food sources used as nutraceuticals are all natural and can be categorized as**
 1. Dietary Fiber
 2. Probiotics
 3. Prebiotics
 4. Polyunsaturated fatty acids
 5. Antioxidant Vitamin
 6. Polyphenols
 7. Spices

Dietary Fiber:

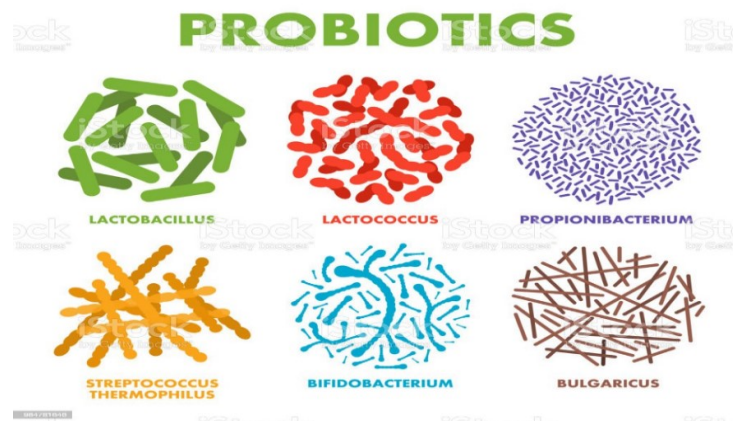
Dietary fiber (DF) consists of non-digestible carbohydrates and lignin's that are intrinsic and intact in plants. Functional fiber (FF) consists of isolated, non-digestible carbohydrates that have recommended physiological effects in humans. These definitions broaden the class and enable resistant starches, oligosaccharides and different non-digestible carbohydrates to be categorized as purposeful fibers. The sufficient consumption for fiber described with the aid of the Dietary Reference Intake (DRI) is 38 grams/day for person guys and 25 grams/day for adult women. There used to be inadequate proof to set a tolerable top consumption stage for dietary or useful fiber.

SOURCES OF DIETARY FIBRE



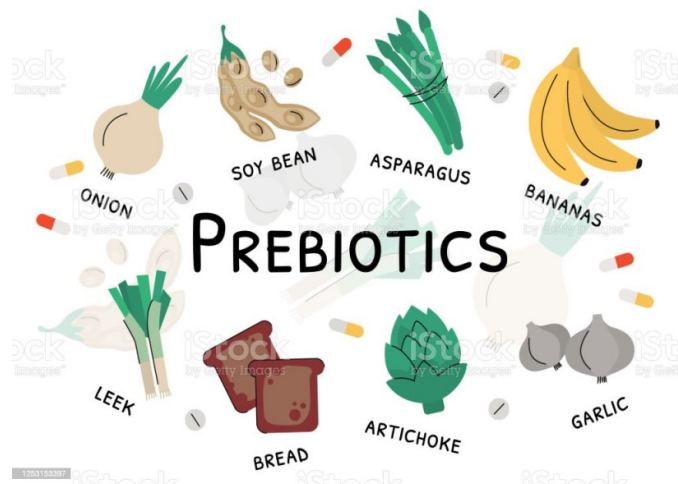
Probiotics:

Probiotics are stay microorganism and yeasts that are good for your health, particularly your digestive system. We usually assume of micro-organism as something that motives diseases. But your physique is full of bacteria, each proper and bad. Probiotics are regularly known as "good" or "helpful" bacteria due to the fact they assist hold your intestine healthy. Probiotics are naturally located in your body. You can additionally find them in some ingredients and supplements.



Prebiotics:

Prebiotics are components that set off the increase or exercise of microorganisms (e.g., micro-organism and fungi) that make a contribution to the well-being of their host. The most common instance is in the gastrointestinal tract, the place prebiotics can alter the composition of organisms in the gut microbiome. As a purposeful meal's component, prebiotics, like probiotics, are conceptually intermediate between ingredients and drugs. Depending on the jurisdiction, they commonly acquire an intermediate degree of regulatory scrutiny, in specific of the fitness claims made concerning them. Although all prebiotics are fiber, no longer all fiber is prebiotic. Classification of a meal's ingredient as a prebiotic requires scientific demonstration that the ingredient.

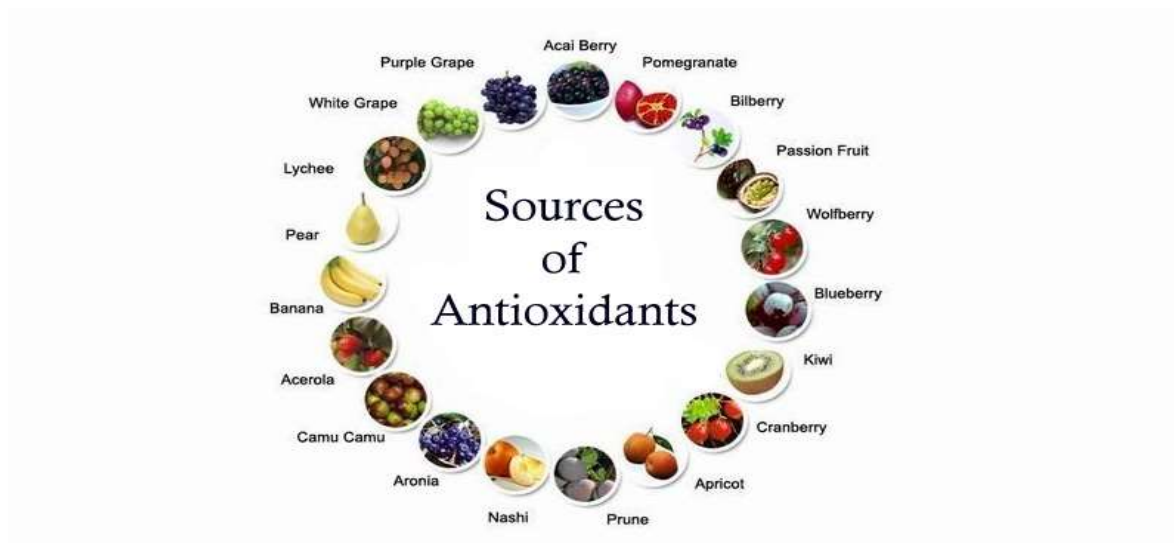


Polyunsaturated Fatty acid:

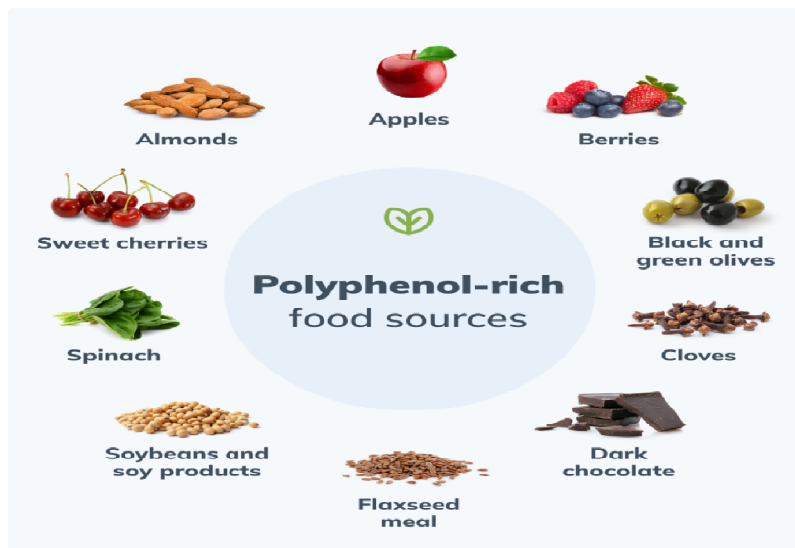
The crew of poly-unsaturated fatty acids(PUFAs) is divided into two groups: omega-3 (n-3) and omega-6 (n-6) polyunsaturated fatty acids (PUFA), differing in the place the first double C-bound is located. Therefore, they have to be obtained from the diet. One is linoleic acid (LA) and belongs to the n-6 family. The different one is α -linolenic acid(LNA) belonging to the n-3 family. These imperative mother or father compounds can be transformed in the human physique to long-chain (LC) fatty acid however human beings can't interconvert n-3 and n-6 fatty acids.

Antioxidant Vitamin:

Antioxidants are man-made or herbal materials that might also forestall or lengthen some kinds of mobile phone damage. Diets excessive in greens and fruits, which are excellent sources of antioxidants, have been located to be healthy; however, lookup has no longer proven antioxidant dietary supplements to be advisable in stopping diseases. Examples of antioxidants consist of nutritional vitamins C and E, selenium, and carotenoids, such as beta-carotene, lycopene, lutein, and zeaxanthin. This reality sheet gives primary statistics about antioxidants, summarizes what the science says about antioxidants and health, and suggests sources for extra information.

**Polyphenols:**

Polyphenols are a giant household of naturally going on natural compounds characterised through multiples of phenol units. They are plentiful in plant life and structurally diverse. Polyphenols encompass flavonoids, tannic acid, and ellagitannin, some of which have been used traditionally as dyes and for tanning garments. Polyphenols are a class of plant compounds that offers a number health benefits. Regularly eating polyphenols is thought to enhance digestion and brain health, as properly as protect in opposition to heart disease, kind 2 diabetes, and even sure cancers. Red wine, dark chocolate, tea, and berries are some of the best-known sources. Yet, many different foods additionally offer considerable amounts of these compounds. This article evaluations everything you want to know about polyphenols, such as possible meals sources.



Spices:

A spice is a seed, fruit, root, bark, or different plant substance exceptionally used for flavoring or coloring food. Spices are distinctive from herbs, which are the leaves, flowers, or stems of flora used for flavoring or as a garnish. Spices are from time to time used in medicine, non-secular rituals, cosmetics or fragrance production. For example, vanilla is frequently used as an ingredient in heady scent manufacturing.

**NUTRACEUTICALS AND DISEASES:****Cardiovascular ailments:**

Worldwide, the burdens of continual ailments like cardiovascular diseases, cancers, diabetes and weight problems is hastily increasing. In 2001, continual ailments contributed about 59% of the 56.5 million complete pronounced deaths in the world and 46% of the international burden of disease. Optimal nutrition, nutraceuticals, vitamins, antioxidants, minerals, weight reduction, exercise, cessation of smoking, limit of alcohol and caffeine plus different way of life changes can prevent, extend the onset, decrease the severity, treat, and manipulate hypertension. Nutrients and nutraceuticals with calcium channel blockading undertaking (thus antihypertensive activity) encompass α -Lipoic acid, magnesium, Vitamin B6 (pyridoxine), Vitamin C, N-acetyl cysteine, Hawthorne, Celery, ω -3 fatty acids et. Anti-oxidants, Dietary fibres, Omega-3 polyunsaturated fatty acids, Vitamins, minerals for prevention and cure of CVD. Polyphenol(in grape) stop and manipulate arterial ailments Flavonoids (in onion, vegetables, grapes, purple wine, apples, and cherries) block the ACE and make stronger the tiny capillaries that lift oxygen and vital vitamins to all cells.

Obesity:

Obesity, described as an unhealthy quantity of physique fat, is a well-established chance element for many problems like angina pectoris, congestive coronary heart failure, hypertension, hyperlipidaemia, respiratory disorders, renal vein thrombosis, osteoarthritis, cancer, decreased fertility. Caloric limit and multiplied bodily undertaking have been proven to be solely relatively profitable in managing obesity. Thus, many fitness care practitioners and chubby folks are in search of the assist of prescription drugs and nutraceuticals to deal with obesity.

Diabetes:

Diabetes mellitus is characterised by means of abnormally excessive stages of blood glucose, both due to inadequate insulin production, or due to its ineffectiveness. Diabetes, like most continual fitness conditions, no longer solely locations vast monetary burdens on society as a entire however additionally imposes massive monetary burdens on man or woman sufferers and their families. Ethyl esters of n-3 fatty acids may additionally be recommended in diabetic patients. Docosahexaenoic acid modulates insulin resistance and is additionally necessary for neurovascular development. Lipoic acid, an antioxidant, for remedy of diabetic neuropathy. Dietary fibres from psyllium have been used for glucose manipulate in diabetic sufferers and to minimize lipid degrees in hyperlipidaemia.

Cancer:

A wholesome life-style and weight loss program can assist in stopping cancer. People who eat giant quantity of lutein-rich ingredients such as hen eggs, spinach, tomatoes, oranges and leafy veggies skilled the lowest incidence of colon cancer. Chronic infection is related with a excessive most cancers risk. At the molecular level, free radicals and aldehydes, produced throughout persistent inflammation, can set off deleterious gene mutation and posttranslational changes of key cancer-related proteins. Flavonoids which block the enzymes that produce estrogenicestrogen-induced cancers. Prevent

prostate/breast most cancers a vast variety of Phyto prescribed drugs with a claimed hormonal activity, known as “phytoestrogens” is recommended. Soyfoods supply of is flavones, curcumin from curry and soya isoflavones possess most cancers chemo preventive properties. Lycopene concentrates in the skin, testes, adrenal and prostate the place it protects towards cancer.

Inflammatory problems

Inflammation is the response of physique tissues to harm or irritation, characterised through ache and swelling and redness and heat. Arthritis is a popular time period that describes infection in joints. Some sorts of arthritis related with irritation include: rheumatoid arthritis shoulder tendinitis or bursitis gouty arthritis and polymyalgia rheumatica.

NUTRACEUTICAL CATEGORIES:

Dietary Supplements including botanicals:

- Vitamins, minerals, co-enzyme Q, carnitine
- Gingseng, Gingko Biloba, Saint John's Wort, Saw Palmetto

Functional Foods:

A food product that is part of usual diet but has beneficial effects that go beyond the traditional nutritional effects.

Examples:

- Yogurts - Probiotics for intestinal health.
- Foods/cereals/snacks enriched with soluble fibres, vitamins and minerals.
- Omega-3 milk in prevention of heart disease.
- Canola oil with lowered triglycerides for cholesterol reduction.
- Oats, bran, psyllium and lignin's for heart disease and colon cancer.
- Prebiotics - oligofructose for control of intestinal flora.
- Stanols (Benecol) in reduction of cholesterol adsorption.

Medicinal Foods:

- Health bars with added medications.
- Transgenic cows and lactoferrin for immune enhancement.
- Transgenic plants for oral vaccination against infectious diseases.

Scope:

(a) Dietary Supplements: Dietary supplements are products envisioned to complement the diet that accepts or contains one or more of the following dietary ingredients: a mineral, a vitamin, an amino acid, a herb or other botanical, constituent, metabolite, a dietary substance for use by man to supplement the diet by increasing the total daily intake, or a concentrate, extract, or combinations of these ingredients (Zeisel 1999). Dietary supplements are not intended to treat or remedy disease whereas nutraceuticals emphasize more on the expected results of these products, such as prevention or treatment of diseases.

(b) Functional Food: As defined by the United States of America Institute of Medicine's Food and Nutrition Board, functional food is “any food or food ingredient that may offer a health benefit beyond the traditional nutrients it contains”. The functional food concept is – “Food products to be taken as part of the usual diet in order to have helpful effects that go beyond basic nutritional function”. Functional foods contain physiologically active components obtained either from plants or animal sources.

Herbals as Nutraceuticals:

Herbs play a significant role in the maintenance of the quality of human life through the abundant source of bio-constituents. The herbal bioactive constituents are an essential category of nutraceuticals which have plenty of health promoting medicinal properties in addition to minerals, vitamins and other active compounds. The herbs harbour a widespread variety of active phytochemicals like flavonoids, terpenoids, saponin, and polyphenols. These herbal bioactive are most times commonly used by people who seek conventional health care as a food supplement.

Global Market/Demands of Herbal Nutraceutical Safety and Regulation

The nutraceutical industry is divided into two main segments which include dietary supplements and herbal/natural products. In the Global market, nutraceutical has become a multi-billion-dollar industry with about USD 117 billion (INR 5148 billion) as estimated cost of investment. In Canada, the nutraceutical industry has an estimated potential to grow up to 50 billion US dollars. According to the nutrition business journal in 2017, the United States of America (USA) is the largest market in the world followed by Japan which has a steady average growth rate of 9.6% per annum. These two rapidly increasing sectors of the industry were at 19.5% per year for dietary supplements and 11.6% per year natural/herbal products.

The processes of manufacturing and the quality of plant material used for herbal nutraceuticals are under the regulations of food laws, which are deficient of the specificity required for botanical drugs. This indeed may have serious consequences. Toxin contamination like fungal and bacterial toxins, adulterations and numerous other types of impurity of herbal nutraceuticals conceivably remain undetected simply because there is an almost total absence of specific quality control. Lack of quality control not only increases the potential threats to the consumer; it may also result in a total lack of the drive to conduct suitable research that determines the possible benefits of nutraceuticals or ensures their safety.

The Future Prospects of Nutraceutical Industry The world is becoming more sophisticated and interesting. Foods are becoming more attractive, appealing and fortified to meet the increasing demand of healthy nutrition. With the invention and recent advances in Living Modified Organisms (LMOs) and Genetically Modified Foods (GMFs), food for all agenda in the future will be attained or rather malnutrition would soon be history but new challenges may ensue. The target of food and nutrition societies for a world rid of hunger in the future is possible with the potentials of

nutraceuticals. At the core of the value-added market performance is the increasing responsiveness on the part of consumers as to how nutraceuticals.

- Importance of Herbal Nutraceutical Regulation:

(I) Allows better legal security and more predictable environment.

(II) Supports innovation (food, herbal and drink products).

(III) Prevents imbalanced competition from manufacturers using untruthful or misleading claims.

(IV) If confident claims cannot be made, the regulation does not gratify anyone to make negative claims about the product.

CONCLUSION:

Nutraceuticals have diverse variety of therapeutic actions, which are likely to protect the human body against a variety of pathological conditions. Nutraceuticals are currently receiving recognition as being beneficial in coronary heart disease, obesity, diabetes, cancer, osteoporosis and other chronic and degenerative diseases such as Parkinson's and Alzheimer's diseases. The global market is currently experiencing period of growth post recession even after effect of recession fades, the market for nutraceutical is likely to remain in the growth phase which is driven by emerging market of countries like India, China, Brazil etc.

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