



NEUTRACEUTICAL REVIEWS

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ABSTRACT

The term "Nutraceutical" is a collection of "Nutrient" and "Medicament". The typical definition of a nutraceutical is "a food or component of a food that contributes significantly to the modification and maintenance of the normal physiological effect that maintains human health." Nutraceuticals, a form of complementary medicine that offers health advantages, have gained popularity in recent years. Vegetables and fruits that are high in nutrients are a crucial part of a healthy diet. The present demographic and health trends are the primary drivers of the global nutraceutical industry.

Dietary fibre, prebiotics, probiotics, polyunsaturated fatty acids, antioxidants, and other different kinds of plant-based/natural foods can all be classified as food products utilised as nutraceutical. Scientists and researchers are drawn to the period when nutrients first became medications in the pharmaceutical industry because of its salient advantages. In order to design and develop various dosage forms for the distribution of these herbal compounds in relation to their applications, interdisciplinary techniques are currently being applied.

The use of these compounds in treating a wide range of illnesses, including cancer, arthritis, metabolic irregularities, diabetes, asthma, and many others, has been made clear by extensive research. With examples and information about how they are used to treat different ailments, the review that is being provided makes an effort to categorise all different forms of nutraceutical. Importance and difficulties were also stated for the application of dosage form design and development to provide a better delivery carrier for nutraceutical. In the end, they guarantee a higher quality of life and assist in creating the upcoming innovative research agenda in the emerging field of nutraceutical.

KEY WORDS Nutrition, dietary supplements, health advantages, and therapeutic effects.

INTRODUCTION

Due to the extensive usage of various chemicals, heavy metals, electromagnetic waves, and other potentially hazardous man-made things, industrialization has resulted in numerous instances of air and water pollution, soil contamination, and food contamination. Due to these issues, the prevalence of diabetes, obesity, different malignancies, vascular illnesses, physiological issues, and other degenerative diseases has increased. The cost of medical treatment has significantly increased due to rising health care demands. A resurgence in the study of nutrition and health has resulted from research into novel dietary supplements with therapeutic qualities. Research on quality of life is entering a new phase thanks to nutraceutical. It can lower the risk of illness by preserving good health and enhancing immunity.[1]

One of the most significant sources of human nourishment and medication are plants. The ideas of food, health, and agriculture have undergone a radical upheaval and revolution as a result of growing knowledge of nutrition, medicine, and plant biotechnology. Natural goods and meals that promote health have drawn a lot of interest from the public and health professionals in recent years thanks to developments in nutrition and medical science.[2,3]

According to Stephen De Felice, who first used the term "nutraceutical" in 1979, it refers to "food or parts of food that provide medical or health benefits, including the prevention and treatment of disease." The philosophy of nutritional treatment is founded on the complementary therapy of nutraceutical since food has curative properties in addition to being a source of energy and nutrients.

HOW COME NUTRACEUTICS?

For many of us, eating typical foods will not provide us with enough nutrition. Second, the environment we live in is so polluted and full of pesticides that it interferes with our bodies' ability to manage them. We currently have a wide-spread epidemic of a number of new diseases. Strengthening our system or environment is a more sensible course of action than settling with antibiotics

that are no longer effective. Because they are not natural to the body, drugs typically have negative effects, but high-quality supplements that the body can absorb and use can actually strengthen and energise our bodies

Why does nutritional medicine appear appealing?

Humans often consume a variety of diets high in phenolic components, which have a relatively long half-life and few negative effects. They are easily absorbed in the gut after consumption, do not need a doctor's appointment, and are widely available without a prescription. This strategy, in the eyes of many, is more natural than using prescription medications. They believe that taking supplements will make them feel better physically and mentally, give them more energy, and stave off sickness. When they believe that conventional treatments for their particular ailments have failed, some people turn to these products.

Nutraceuticals theory

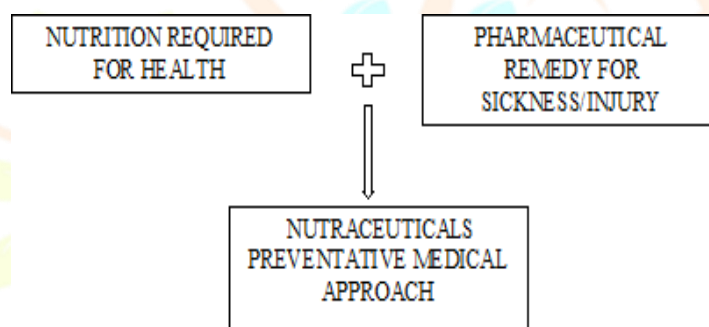
It is necessary for the pharmaceutical development process to have clinical test outcomes for animal experiments and research to confirm their therapeutic effects. However, there was no means of validation for the role of diet in the prevention of disease in the past. But in recent years, it has been demonstrated scientifically that food composition contributes to diseases linked to a particular lifestyle and has become a social issue. Nutraceutical products are known to have health benefits, including lowering the risk of heart disease and cancer, as well as preventing or treating hypertension, high cholesterol, obesity, osteoporosis, diabetes, arthritis, cataracts, and menopause.

Other goods claim to treat symptoms including thinning hair, low self-esteem, terrible skin, varicose veins, alcoholism, depression, and lethargy. Other products also claim to improve symptoms like insomnia, impaired memory and concentration, indigestion and constipation, as well as headaches.

The idea of nutraceutical has begun to gain acceptance as one of the strategies for preventing the industry's growth.

Nutraceuticals and functional foods are now a multi-billion dollar industry on the international market. The requirement for accurate labelling and evaluation of the health impacts of nutraceutical and functional foods places major restrictions on this industry's ability to grow internationally. The world's largest and fastest expanding market for functional foods and nutraceutical is now found in the United States of America (US)

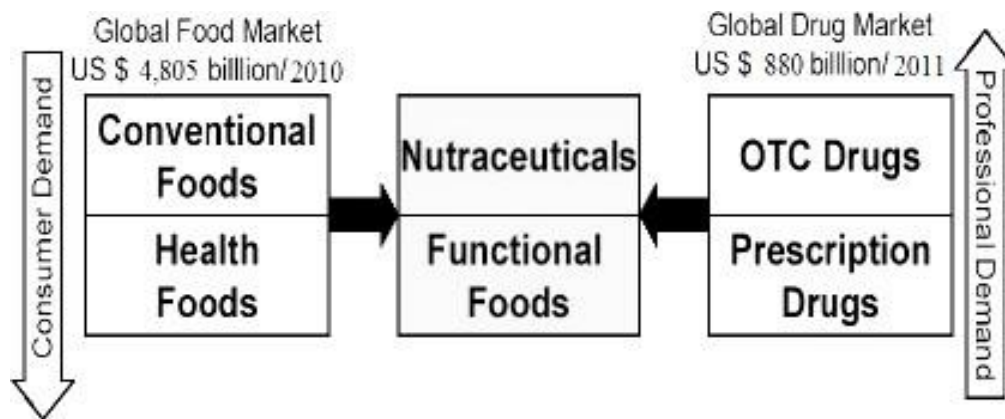
Fig.1 concept of nutraceutical



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the location of numerous medicinal herbs, spices, and tree species with a substantial domestic market. However, the USA and Japan remain India's top export markets.[16] the expansion of the worldwide food industry for nutraceutical is depicted. The public sector has seen a growth in the use of nutraceutical and functional foods due to the efforts of numerous scientific organisations and government organizations[17–23]. The industry will have the chance to offer consumers a variety of new goods that can be created for specialised markets by recognising the distinctions in functional fo

Fig 2 global food market growth about the nutraceutical



Japan and the USA.[16] In Fig. 2, the expansion of the worldwide food industry for nutraceutical is depicted. The public sector has seen a growth in the use of nutraceutical and functional foods due to the efforts of numerous scientific organisations and government organizations[17–23]. The industry will have the chance to offer consumers a variety of new goods that can be created for specialised markets by recognising the distinctions in functional foods and nutritional makeup.ing these illnesses.[8-14] depicts the notion of nutraceutical.

Classification

1. Conventional Chemical elements phytochemicals, herbs, and nutrients.
Probiotic creatures.
dietary supplement enzyme.

2. Nonstandard
Recombinant nutraceutical. Fortified nutraceutical.

3. Ingredients with known nutritional purposes
fatty acids, amino acids, vitamins, and minerals.

4. Botanical items or herbs

5. Reagents from further sources
Pyruvate, chondroitin sulphate, and precursors to steroid hormones

6. Nutrient-rich foods
Seven. Prebiotics and probiotics
Eight. Polyunsaturated fats

7. Vitamin antioxidant
ten) Polyphenols

8. Spices

CLASSICAL NUTRACEUTICALS

Foods in this category are those that have not undergone any manual modifications. The ingredients are all-natural and have the ability to actively contribute to positive health effects.

Examples of foods that include lycopene include tomatoes, pink grapefruit, guava, papaya, and watermelon. Lycopene has antioxidant properties that can help prevent the growth of cancer, including prostate, bladder, cervix, and leukaemia.

UNTRADITIONAL

Increasing the nutritional content by adding nutrients and dietary ingredients to improve the quality of nutrition are included in this category of nutraceutical.[24] For instance, -carotene found in carrots and other fruits and vegetables. It may have health benefits from carrots, oranges, and tangerines.

SOURCES OF REAGENTS FROM OTHERS

Chondroitin and Glucosamine

Glucosamine is a precursor to the glycosaminoglycan molecule, which is essential for cartilage growth and repair. Source: calf or beef cartilage. In many European nations, glucosamine sulphate is the first-line treatment for arthritis. In the synovial fluid, glucosamine sulphate promotes the formation of hyaluronic acid. Pain is reduced and the mobility of injured cartilage is enhanced by hyaluronic acid. Glucosamine supplementation resulted in a dose-dependent rise in proteoglycan, according to an in vitro investigation. Typically, it is offered for sale as a salt hydrochloride or sulphate. Both substances work to reduce inflammation. There are glucosamine and chondroitin supplements available. The almost current glycosaminoglycan in cartilage, chondroitin, is what gives cartilage its resilience.

Flavonoids

Flavonoids are the primary nutritionally active components in plants. In addition to their powerful effects on the central nervous system, phenolic compounds typically have antioxidant, antimicrobial, antibacterial, antiviral, and antifungal, antiulcer, hepatoprotective, antiinflammatory, antidiabetic, vasorelaxant, antiatherosclerotic, antithrombotic, cardioprotective, and antineoplastic properties.

Fibre and dietary supplements

A food that has an additional nutritional component added as a treatment for deficiencies or illnesses is known as a dietary supplement. The popularity of dietary supplements has given rise to a wide range of products for bodybuilding, fitness, anti-aging, and health enhancement. A dietary component is something that enhances the nutritional worth and quality of food. There are products with multiple ingredients or just one component that contain vitamins and minerals as dietary supplements.

Herbs, plant compounds, amino acids, pure extracts, concentrates of several constituents, and organ and gland tissue extracts are dietary supplements in addition to vitamins and minerals. It is not believed to be consumed regularly in meals or as a part of a normal or traditional diet.[31] Dietary fibre and high-fiber foods are highly sought-after due to their numerous health advantages.

Bowel transit times are normalised by these products. Brown rice, bananas, whole grains, oats, dry beans, and legumes are some of its sources.

Phytochemicals

In this communication, phytochemicals are considered nutraceutical and offer therapeutic and medical advantages. There have been fascinating reexaminations of conventional diabetic treatments, and glucose and insulin regulation are significant characteristics of phytochemicals. In actuality, less than 100 plants have undergone scientific study while more than 1,000 have been claimed to offer additional unique benefits in the treatment of diabetes. Additionally, the health benefits of mushrooms, including their nutritional, tonic, and therapeutic qualities as well as their anticancer, antiviral, and hypolipidemic effects, have long been acknowledged. The host's resistance to infections by bacteria, fungi, parasites, and viruses, including the AIDS-causing culprit, is boosted by lentinan.

BENEFICIAL MEATS

Functional foods are a source of nutrients that are absolutely necessary and supply more than what is needed for maintenance, growth, and development.[32] There are numerous additional subcategories within the functional food category, including fermented foods, cereals, and legumes. Functional foods, such as grains like rice, corn, wheat, millet, sorghum, and buckwheat, have been shown in numerous studies to be able to lower blood pressure, eliminate the chance of tumour development, and prevent coronary heart disease.[33, 34] Beans, chickpeas, lentils, and soybeans have significant antioxidant and diabetic and heart disease preventive properties.[35, 36] Chocolate is the richest source of protein, calcium, iron, magnesium, and riboflavin, making it a subclass of functional foods.

[37-39] Another category of functional foods is citrus fruits, which have been shown to have anti-cancer, antiviral, antioxidant, and immune system-stimulating properties in studies.[40] Another example of a food with beneficial digestive effects is fermented milk and associated products. For instance, yoghurt is a fermented food that is incredibly nutrient-dense and has been linked to anticancer activity. It has also been claimed to reduce atherosclerosis and gastrointestinal illnesses.

PUBLIC BIOLOGIES AND PREBIOLICS

Live, health-promoting microbial food ingredients are under the probiotics group. Their method of action entails specific areas on the gastrointestinal tract adhering to them, and pathogens are eliminated in order to survive.[42-45] The prebiotics category contains fibre or specifically fermented nutrients that encourage changes in the gut microbiota and have positive impacts on the host's health. The probiotic bacteria in the colon use them as fertiliser. Acidic stomach contents and stomach pH have no effect on them. As an illustration, consider insulin, which produces oligofructose and galactooligosaccharide upon further hydrolysis.[46-50]

ACIDS OF POLYUNSATURATION

Omega-3 (n-3) and omega-6 (n-6) polyunsaturated fatty acids (PUFA), which differ in the position of the first double C-bound, are the two categories of polyunsaturated fatty acids (PUFA). Because they cannot be synthesised by the human body and are needed for physiological integrity, the two PUFAs are known as essential fatty acids. As a result, it is essential to get them through food.

ANTIOXIDANT

Free radical-induced cell damage is thought to be a key factor in how quickly ageing and illness develop. Antioxidants are crucial for preserving the best possible level of health and wellbeing since they serve as our first line of defence against free radical damage. Oxygen is a highly reactive atom that can combine with other elements to form the potentially dangerous compounds known as free radicals. Healthy bodily cells can be attacked by free radicals, which can result in them losing their structure and functionality. Free radicals can be stabilised or inactivated by antioxidants before they damage cells. To sustain good cellular and systemic health and wellbeing, antioxidants are a must. A highly evolved and intricate system of antioxidant defence has been created by humans. It has a number of endogenous and external elements that interact and cooperate to neutralise free radicals.

POLYPHENOLS

Polyphenols are naturally occurring phytochemical components found in foods derived from plants, such as fruits, vegetables, whole grains, cereals, legumes, tea, coffee, wine, and cocoa. More than 8000 polyphenolic chemicals, including phenolic acids and flavonoids, have been found in whole plant diets. These substances are secondary plant metabolites that protect plants against UV rays, oxidants, and infections. Based on the amount of phenolic rings and the structural components that hold these rings together, polyphenols can be categorised into a number of groups. About one third of polyphenolic chemicals are phenolic acids.

These phenolic acids are found in foods like berries, kiwis, cherries, apples, pear, chicory, and coffee and fall under the categories of hydroxybenzoic acid derivatives (protocatechuic acid, gallic acid, and p-hydroxybenzoic acid) and hydroxycinnamic acid derivatives.

SPICE

Spices are whole, ground, or crushed aromatic plant materials whose primary use in food is seasoning rather than nourishment. These seasonings give food a distinctive flavour, aroma, and pungency. Spices with volatile oils that are responsible for aroma, flavour, and oleoresin also add pungency. Spices play a significant role in the economy of the producing country because they are used extensively in domestic medicine, pharmaceuticals, nutraceuticals, aromatherapy, preservatives, beverages, natural dyes, perfumes, dental preparations, cosmetics, and herbal preparations as pesticides in addition to aromas and flavours. These characteristics are a result of the wide variety of compounds that this spice produces. There is evidence that certain spices, including turmeric, red pepper, black pepper, cloves, ginger, garlic, coriander, rosemary, saffron, and cinnamon, can help prevent neurodegenerative illnesses.

JUSTIFICATION FOR NUTRACEUTICAL USE

Dietary factors have a significant impact on the development, progression, morbidity, and mortality of chronic diseases. Nutraceuticals do not include traditional medicine. Foods for special dietary applications are processed or made expressly to suit special dietary needs that arise from a physical or physiological state, a particular disease, or a problem. These are presented in this way because their nutritional profiles must differ significantly from those of typical foods of a similar sort as defined by the Indian Standard (IS).



USE OF NUTRACEUTICS IN THE MANAGEMENT OF DISEASE

Numerous studies have shown that nutraceuticals are used to treat a wide range of illnesses, including sleeplessness, digestive issues, irregular blood pressure, colds and coughs, depression, delayed digestive tract emptying, and many other conditions that call for particular attention. Nutraceuticals are now understood to be helpful for conditions like Parkinson's, Alzheimer's, obesity, diabetes, cancer, osteoporosis, and coronary heart disease. Evidence suggests that a variety of biological processes, including the activation of antioxidant defences, signal transduction pathways, and cell survival, are involved in the mechanical action of natural chemicals.

The risk of dying from CVDs may be decreased by dietary supplements that contain flavonoids, flavones, flavonones, quercetin from onions, cruciferous vegetables, blackberries, cherries, berries, apples, and other antioxidant vitamins and minerals. High blood pressure is caused by the cyclooxygenase pathway and the angiotensin converting enzyme (ACE), which are inhibited.[51] The small capillaries that deliver oxygen and vital nutrients to all cells are strengthened by flavonoid groups. Ginger, a strong anti-inflammatory and antioxidant, is advised for the prevention of hypertension and palpitations. Blood pressure and cholesterol are reduced by allicin. Supplementing with various lipid-lowering nutraceuticals and maintaining a healthy lifestyle can help manage CVD.[52] Multi-herbal preparations may work in concert to achieve a potential therapeutic goal.[53]

Cancer

Dietary components that are bioactive and high in nutraceuticals have the capacity to prevent cancer.[54] Nutraceuticals made from herbs have anti-mutagenic and anti-carcinogenic qualities. Carotenoids and lycopene's antioxidant properties are useful against cancer. They reduce oxidative stress and are oxygen quenchers. Nutritional supplements regulate the cells' DNA-damaging agents and stop DNA transcription in tumours. Fruits and vegetables include chemo preventive elements that may have anti-mutagenic and anti-carcinogenic effects. Yellow and orange fruits contain beta carotene, which has anti-cancer properties. Cruciferous vegetables reduce the risk of lung and colorectal cancer. They suppress the enzymes that fuel tumour growth. Recent studies have also revealed that herbal nutraceuticals can change the way that cancer spreads metastatically.

Diabetes

It has been demonstrated that herbal dietary supplements with nutraceuticals can treat type 2 diabetes. Fenugreek, cinnamon, and other universal antioxidants like lipoic acid and catechins are utilised to treat diabetic neuropathy, nephropathy, and retinopathy. Magnesium, chromium, calcium, and vitamin D improve glycemic management and promote insulin sensitivity. Caffeic acid lowers high plasma glucose in people with insulin resistance. Green tea and epicatechin 3 gallate enhance insulin resistance by lowering fasting and postprandial glucose. Pomegranates and bitter melon are beneficial for diabetes because they control metabolism and deliver glucose from the blood into cells.[55]

Osteoarthritis

All joint tissues are affected by osteoarthritis, which has a complex aetiology that includes both biochemical and mechanical mechanisms that work in concert to break down cartilage. Joint pain makes it harder to exercise, which leads to an energy imbalance and weight gain. The complications are treated using nutraceuticals such as chondroitin sulphate, glucosamine, diacerin, banana, ginger, green tea, pomegranate, boswellia, oxaceprol, tipi, willow bark, curcumin, avocado, soybean, and collagen hydrolysates. Along with their usual role as nutrients, they also play a significant role in the regulation of gene expression and have pharmacological effects. The effectiveness of nutritional antioxidant agents in treating joint damage, pain, and inflammation is well established.[57] Olive oil application also improves knee condition, physical function, and discomfort, stiffness, and swelling.

Oral Ailments

A new term, odonto nutraceuticals, has been identified. In dentistry, it serves as a pleiotropic phytotherapeutic drug because it controls a variety of molecular and biochemical targets. Green tea, grape, and cocoa seed extracts from Odonto Nutraceuticals are high in polyphenols, flavonoids, and proanthocyanidins. Aloe vera gel treats mucous membrane injuries and can reduce the discomfort experienced by lichen planus patients.[58] Additionally, probiotics aid in the prevention of halitosis, malodor, periodontitis, gingivitis, and dental cavities.

Alzheimer's condition

Another name for Alzheimer's disease is senile dementia. Antioxidants seem to slow the progression of the illness. In order to prevent the neuronal damage caused by oxidative stress, nutraceuticals like beta carotene, lycopene, curcumin, lutein, and lavender take advantage of their antioxidant properties. These substances have the ability to postpone the onset of dementia.[59]

Parkinson's condition

Parkinson's disease causes the brain's dopamine-releasing cells to degenerate. It ranks as the second most prevalent age-related condition worldwide. Unsaturated fatty acids, stilbenes, soybean and other phytoestrogens, and plant polyphenols have been shown to have inhibitory effects on the course of Parkinson's disease. [60] Herbal Nutraceutical (Brahmi) is a natural brain tonic that aids in hormone secretion, brain cell regeneration, migraine, headache, insomnia, depression, and anxiety as well as mental calmness and relaxation.

Eye Conditions

A diet high in nutrients may help prevent age-related macular degeneration. The antioxidant properties of lutein, DHA, green tea, carotenoids, flavonoids, vitamin E, and coenzyme Q10 are effective against cataracts and presbyopia. Retinitis pigmentosa can be treated with flavonoids, ascorbic acid, tocopherol, carotenoids, caffeine, and pyruvate.[61] The antioxidants lutein and zeaxanthin found in foods like rice bran, fruits, and vegetables help to improve vision and lower the risk of developing cataracts. The omega 3, 6, and 9 necessary fatty acids, as well as the folic acid in rice bran, all support eye health.

Stress Reduction

A crucial component of our psychological makeup is stress. The natural bioactive substances known as adaptogens aid in coping with cellular damage brought on by stress. They make an effort to balance and normalise both stress and mental wellness. They progressively raise emotional performance, which aids in the recovery process after stressful events. Adaptogens that effectively activate the production of the stress-suppressing heat-shock protein 70 (HSP-70) include herbal nutraceutical such ashwagandha and ginseng. They also enhance homeostasis, boost resilience to external stress, and stabilise physiological processes. Modernization of drug delivery systems using medicinal herbs

Scientists and researchers were compelled to explore for effective delivery systems as customers' preferences for eating healthy food products and the nutraceuticals' favourable results in treating and preventing a variety of diseases drove this trend. More and more people are becoming interested in Nano emulsions the utilisation of innovative medication delivery systems to address the efficacy problems of the products.

A nano-sized formulation known as a nano-emulsion involves the use of an emulsifying agent to combine two immiscible liquids into a single phase, thermodynamically stable isotropic system. 20 to 200 nm is the size range of the droplets.

Red grape skin, peanuts, and blueberries all contain the natural chemical resveratrol, which has been discovered to have strong antioxidant qualities. However, the compound's low bioavailability is an issue. Therefore, in order to get around the issue and improve the effect, it was enclosed in a nano emulsion created using the spontaneous emulsification approach, which improved the system's retention and qualities.

Liposomes

The spherical vesicles known as liposomes are made of phospholipids and a lipid bilayer. These can be made using natural phospholipids and cholesterol and have a spherical shape. Another recommended enhanced delivery method for nutraceutical goods is liposomes. Similar to this, it has been demonstrated that silymarin in its buccal liposomal formulation provides hepatoprotective effects with improved product absorption, improving therapeutic response. Colchicine's anti-gout topical liposomal formulation has also been shown to be particularly successful in the treatment of gout.

Phytosomes Phytosomes are a compound made up of physiologically active substances and phospholipids. The limited solubility of ginseng can be solved by utilising an oral formulation of ginseng phytosomes that is made via phospholipid complexation. This increases absorption in the body and improves ginseng's therapeutic impact as an immune modulator. Hawthorn (Flavonoid) oral phytosomal preparation with cardiovascular benefits

It has also been claimed that substances with preventive and antihypertensive effects have greater effectiveness. Quercetin, a substance with antioxidant and anti-cancer characteristics, was also put through an oral preparation process to improve the drug's therapeutic effectiveness.

It has also been claimed that substances with preventive and antihypertensive effects have greater effectiveness. Quercetin, a molecule with antioxidant and anti-cancer characteristics, was also put through an oral preparation process to improve the therapeutic effectiveness of the medicine.[65] Additionally, studies on curcumin phytosomal oral preparations employing the curcumin-phospholipid complexation method have shown that they had higher bioavailability and higher antioxidant activity.

Microsphere

Microspheres are spherical vesicular particles having diameters between one and one thousand micrometres. Microspheres can carry drugs to specific sites or organs because of their small size, which also allows them to be altered to any desired release profile.[66] Long-lasting anticancer effects have been associated with intravenous preparations of camptothecin (a natural product) loaded microspheres made using the oil-in-water evaporation method.

Transfersomes

Transfersomes are also referred to as ultra-deformable vesicles because they have an aqueous phase at their core and a lipid bilayer complex surrounding them. This allows the formulation to be self-regulating and optimising. Colchicine transfersomal formulation has also been investigated for better gout treatment because to improved penetration.[67] The anti-inflammatory action of curcumin on the body is improved by the transdermal formulation of curcumin transfersomes, which has been demonstrated to deliver enhanced entrapment efficiency with intensified penetration through the skin.

Health advantages

Avoid the negative impact.

May intensify the positive impact on health.

There may be naturally occurring dietary supplements, therefore there are no negative side effects.

May enhance our diet's health benefits and our ability to treat human ailments.

Possibly easily accessible and reasonably priced.

Nutritional therapy is a type of complementary medicine that treats patients using food supplements or nutraceuticals. This therapy is predicated on the idea that food can serve as a form of medicine in addition to being a source of nutrients and energy. Theoretically, nutritional treatment and nutraceuticals claim that this is accomplished by cleansing the body, avoiding vitamin Changing eating habits, as well as correcting vitamin and mineral shortages. Phytonutrients are essentially nutrients found in plants that have specific biological functions that benefit human health.

Act to Modernise FDA

After the Food and Drug Administration Modernization Act of 1997 (FDAMA) was passed, manufacturers of nutraceuticals had

more options available to them, which helped the FDA strike a balance between approving therapeutic products that will benefit patients and safeguarding the public's health.

PROPOSALS FOR FUTURE ISSUE

Diseases like metabolic syndromes can be prevented by changing one's lifestyle. Dietary adjustments are one of the answers for the lifestyle transformation. Establishing a scientific evaluation standard for disease prevention; establishing an assessment system for disease prevention through human trials; and establishing a seamless system to go from basic research to manufacturing are the main concerns for nutraceuticals.

Nutraceuticals may contain a number of different ingredients, therefore the expected effect on disease prevention may result from the complicated interaction of these ingredients. It is also important to compare the preventative effects of various food kinds. Therefore, biomarker research is essential for the prevention of the diseases of interest. As a result, it's also vital to standardise indicators and establish the biomarker measurement method.

Present Situation

Frequently mentioned health issues are fueling the increasing demand rise for bioactive ingredients for nutraceutical and functional foods:

coronary artery disease, malignancies of the breast, skin, colorectal, and brain, issues with women's health, CNS issues, Management of metabolic diseases, gastrointestinal issues, immune control.

Lack of meaningful studies published with strong clinical data is a major issue with using nutraceutical to cure diseases. Nutraceutical development, production, packaging, marketing, and sales have come a long way and continue to change.

Today's consumer prefers to use nutraceutical on a regular basis. The most recent clinical trials and scientific studies keep this business growing and gaining momentum

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