

## Recent Advancement in the Field of Nutraceuticals with Special Reference to Antioxidant

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### Abstract

### Review Article

Nutraceuticals itself is a self-explanatory word, which covers a wide horizon of meanings. In a layman term, it can be expressed as food products which bestowed additional health benefits. The modern era has seen the wide variety and use of nutraceuticals for all kind of diseases, out of which antioxidant is the pedestal. Nutraceuticals hold to prevent most chronic disease, for betterment of health, arrest aging, life longevity and aid in maintaining better anatomy and physiology of the human body. Antioxidants are the species of molecule which prevents oxidation and formation of free radical which is why it is on demand. Few examples of nutraceuticals containing antioxidant are vitamins (ascorbic acid, tocopherol), flavonoids, polyphenolics, beta-carotene. Nutraceuticals, worldly are being widely employed. As per the statistics, \$142.1 billion was used in 2011 and current surveys depicts that it will increase by \$204.2 billion by the end of 2019. Needless to say, the use of nutraceuticals as antioxidants is effective and thus is used throughout the world. With the advent of modern technology and science, the field of nutraceuticals is growing and a wide-range of products is flushing in the market with the great potential to serve mankind.

**Keywords:** Nutraceuticals, antioxidant, herbal foods, medicinal plants as antioxidant.

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## INTRODUCTION

The principle, “Let food be thy medicine, and medicine be thy food”, stated by Hippocrates (460– 377 BC), the well-renowned father of modern medicine, tells the link between nutrition and human health [1]. Nutraceutical is a prodigious which inculcates the use of any product extracted from natural sources which are used in daily food meals. These food meals have got nutritional values. Nutraceuticals are commodities that impart health and medical assistance which also have the virtue to provide prophylaxis and treatment [2]. Nutraceuticals have gained enormous publicity in the west healthcare system and its being approached for the cure of many modern day diseases. Most used in functional foods and dietary supplements, nutraceutical ingredients are natural bioactive, chemical compounds that have health promoting, disease preventing or medicinal properties.

However, the coined word nutraceuticals are in obsession, ‘cause there is no spherically accepted definition of the term. Widely clubbed, it can also be known as the extracted form of food and food derived materials, which professes to provide many healthcare

benefits. Actually, the term is so extensive that functional foods/beverages, dietary supplements, and all other kind of eatables which can provide benefits to health can be clutched under the nutraceutical category. With that being said it becomes a daunting task to study nutraceuticals thus it requires a deep study of classification [3]. That is why to keep it simple its being constricted to functional foods and beverages and dietary supplements. On the ground of jurisdiction, products may pretend to prevent long-term diseases, improve health, and delay the aging effect.

Nutraceuticals are multiple product categories with miscellaneous synonyms used worldwide. Stephen Defelice was the one who gave the term Nutraceuticals, the chairman of the foundation for innovation in medicine industry Lexicon has the great credit for this term for almost a decade. Unfortunately, it still seems to be scrambled web of complementary definitions regulatory.

From the early 1990s, there has been noticeable jumping in consumers” (mainly consumers

from evolved and prosper nations) attracted towards nutraceuticals and functional foods. Now purchasers are much more aware about health and many follow the aspect that the onset of fatal diseases can be halt by taking proper nutritional diet or taking supplements. Food supplement are not only taken to meet the dietary needs but also helps in the increment of functional mechanism, and to prevent disease.

In addition to the above-mentioned changes, consumers' preference has now shifted to natural and organic foods, beverages, and supplements than the synthetic drugs. Present days consumers are more updated, and this could be attributed to current day media, which keeps consumers abreast present generation because they have the potential to substantially reduce the expensive, high-tech, of the latest scientific developments in health and wellness. Now-a-day consumers have opted food products that are obtained from natural non-GMO (genetically modified organism) extracts. Spherically, nutraceuticals are being widely employed. As per the statistics, \$142.1 billion was used in 2011 and current surveys depicts that it will increase by \$204.2 billion by the end of 2019.

## CLASSIFICATION OF NUTRACEUTICALS

### Dietary supplement

DIETARY SUPPLEMENT like vitamin B supplement is generally available in pill for nutrients which are derived from food products. These products have nutritive value which contains nutrients derived from food products that are condensed in liquid and capsule form. In the US, the Dietary Supplement Health and Education Act (DSHEA) of 1994 defined the term: "A dietary supplement is a product taken orally that contains a "dietary ingredient" intended to supplement the diet [4]. The vitamins, minerals and herbs or other botanical amino acids are the products which are sum in the term "dietary ingredients"

### Functional foods

Functional foods are formulated so that consumers can eat an enriched food which contains lots of vitamins, minerals, fibers etc., close to nature state rather than taking it in the artificial form which are produced in factories as supplements in syrup/ liquors and capsule form. Producing the natural state food as dosage form may have been either enriched or fortified. This practice restores the nutrient content in a food back to similar levels from before the food was processed. Sometimes, additional complementary nutrients are added, such as vitamin D or milk.

## GROWTH OF NUTRACEUTICALS

Globally, the growth of nutraceuticals touched \$150 billion approx. in 2011 and it's estimating to reach \$204.8 billion by 2019 and it's mushrooming at a dollar

of 6.3 million annually. According to the market report from Transparency Market Research Albany, NY, it is also expected that after the North America, Asia pacific will have a second market share by 2019. The report, "Nutraceuticals Product Market: Global Market Size, Segment and Country Analysis & Forecasts (2007-2017)," also framed that in 2011, there was a huge inclination in the dietary supplements worldwide [5].

In the dietary supplement market, proteins and peptides are expected to grow by 6.6% between 2011-2019. On the other hand functional foods and beverages also have a specific portion. On the other hand, functional foods and beverages also have a specific portion. The research claims that foods fortified with omega 3 fatty acids will grow by 6.7%.

## WHAT ARE ANTIOXIDANTS?

Antioxidants are the class of molecules that possess the quality to arrest oxidation of another molecule. They are the molecules that can prevent the body from the hazards of free radicals. It prevents the cell damage by oxidants. Antioxidants are available in nature and are found in plants such as fruits, vegetables, coffee, tea, wine, and chocolate. Apart from these sources, there are numerous of antioxidant compounds out there, like flavones (found in chocolate), resveratrol (found in wine), and lycopene (found in tomatoes). Other examples of well-known antioxidants are vitamins A (beta-carotene), C, E, and catechin. Oxidation is also called as "biological rusting" [6]. It happens when there is too much oxygen present in human tissues.

### Different Types of Antioxidants

#### Enzymatic Antioxidant

These types of antioxidants smashed the free radicals by expelling the toxic products from human body and changing into hydrogen peroxide and after that into the water. It done by infinite number procedures, a variety of cofactors is compulsory like zinc (Zn), copper (Cu), manganese (Mn) and iron (Fe) [9]. Enzymatic antioxidants automatically makes in a body, the presence of these antioxidants cannot be seen in any type of man-made supplements [7]. Mainly enzymatic antioxidants which are present in our body: Superoxide dismutase (SOD) Catalase (CAT) Glutathione peroxides (GSHpx) and glutathione reductase and Non-enzymatic antioxidants [8].

## OXIDATIVE STRESS AND ITS CONSEQUENCES

Oxidative stress, entitled as an unevenness between evolving and omission of reactive oxygen species (ROS) resulting in modification of plural oxidation of basic and regulatory processes, and there are different ways of it [10]. Rise in steady-state ROS levels is enriched by drug metabolism, ROS over expression yielding enzymes, or ionizing radiation, in

totality by due to deficient of antioxidant enzymes. The chief cause is to bring forward few instances which will replicate our understanding on the role of oxidative stress in birth of incorrigible ailments as well as its significance in disease circumstances [11]. It was it that oxidative stress is particularized over established pathology and nothing is told, if it was preliminary, starting event or it was a consequence of the metabolic shift caused by other factors. Fundamentally, it is a compulsion to quest for the horrendous diseases. These deficiencies are a consequence of mutations in genes responsible for antioxidant or related enzymes, i.e. by genetic polymorphism. Mutations are encoded in many ailment or infirmities, which can't be prohibited in many cases. Although, a proper explanation is understood of the ways from the gene to disease symptoms is a mandatory situation for therapy not to be unsuccessful. Proper care should be given to loss of enzyme activity (full or partial loss) via any external or any reason which is not directed. Many links can be drawn between specific pathologies and oxidative modification of proteins which is a resultant of antioxidants or related enzymes. Hence, if oxidative stress is initial event, possible oxidative amendments of antioxidant enzymes may worsen diseases and tell cell fate. Finally, it is worth discussing advantages and disadvantages of diverse models which serve for disclosing of mechanisms underlying ROS contribution to diseases [12].

#### **Oxidative Stress and Neurodegenerative Diseases**

Neurodegenerative diseases, such as Alzheimer's disease (AD), Parkinson's disease (PD) are well-defined by the persistent loss of specific neuronal cell populations and are coupled with protein aggregates. A communal quality of these diseases is oxidative damage of neurons, which might be reason for the dysfunction or demise of neuronal cells that consequence pathogenesis. Alzheimer's disease (AD) 4-hydroxy-2, 3-nonenal (HNE), acrolein, malondialdehyde (MDA) and F2-isoprostanes are key breakdown yields of lipid peroxidation. Hike in HNE levels have been perceived Alzheimer's disease (AD). DNA bases are open to alteration by oxidative stress concerning hydroxylation whereas augmented levels of 8-hydroxyguanine and 8-hydroxy-2-deoxyguanosine are seen in PD brains; the selective attack on guanine bases infers OH radicals as the oxidative species.

#### **Parkinson's disease (PD)**

It is distinguished by dopaminergic neurons harm at the substantial nigra and the deposition of intracellular inclusion bodies. The principal protein part of these deposits is  $\alpha$ -syncline, which is ubiquitous in the brain; transformations of  $\alpha$ -syncline (A30P and A53T) results to conventional classes of the syndromes. An identify feature of the neurons within the substantial nigra is absolutely the age-dependent concentration of neuromelanin. In PD, there is loss of the neuromelanin-containing cells. Neuromelanin is a dark brown

pigment, in spite of that researcher are incapable to find out the exact configuration of neuromelanin. It is researched that it comprised majorly metal ions, particularly Fe<sub>2</sub>. When there is breakdown of neuro melanin there is the generation of oxidative stress linked with Parkinsonism. A varied explanation of evidence is evolving that  $\alpha$ -syncline has a role in modifying the action of dopamine [13].

#### **Oxidative Stress and Heart Disease**

Numerous investigates on oxidative stress proof that it has a decisive part in pathogenesis and development of cardiovascular diseases which comprises, hypertension, dyslipidemia, and atherosclerosis, myocardial infraction, angina pectoris, and heart failure.

#### **Coronary Heart Disease (CHD)**

Since centuries vascular risk factors, including hyperlipidemia (cholesterol, LDL, etc.), hypertension, cigarette smoking, diabetes, overweight, physical idleness, age, male sex and familial tendency, only moderately expounds the surplus risk of increasing Cerebro-vascular Heart Disease (CHD). Many studies also back the role of OS in disease pathogenesis. Paradoxically, although exercise poses an acute oxidant stress, systematic fortitude exercise is connected with enhanced cardiovascular function and a declining in traditional CHD risk factors. These answers are reliable with the hypothesis that adaptations induced by acute exposures to exercise-induced oxidative stress lead to long-term vascular protection.

#### **Stroke/Ischemia-Reperfusion Stroke**

It is one the main reason of frailty and death in most of the nations. The condition like ischemia and reperfusion can be seen after stroke has been seen linked with free radical-mediated reactions potentially it is the reason for cell death [14]. However ischemic and hemorrhagic stroke have distinct risk factors and path physiological mechanisms, there is proof of an increased generation of free radicals and other reactive species in both conditions showing oxidative stress. Ischemic stroke is the consequence of the disturbance or severe decrease of blood flow in arteries followed by physiological and metabolic alterations that can be perceived within seconds of the interruption of blood flow. When anoxia is followed promptly by reperfusion, tissue can be protected but reperfusion might potentially have false impacts upon re-oxygenation, OS is rapidly built up and numerous non-enzymatic oxidation reactions take place both in the cytosols and/or in cellular organelles [15].

#### **Oxidative Stress and Kidney Disease**

Urolithiasis is the flagship among known diseases of the urinary tract which has adverse effects on mankind since ancient times. Urolith formation is a not a single step process. For most human diseases, amplified formation of reactive oxygen species is

secondary to the primary disease process. In the same way, the connection between urolithiasis and free radicals has been taken into consideration. Experiments done on animals' cultures and human sera have unveiled that there is the existence of enhanced oxidative stress in stone forming conditions. Oxalate is known to prompt lipid peroxidation by an anonymous pathway which causes harm of the fundamental integrity of the membranes. Superoxide dismutase (SOD) is a defense mechanism which is formed inside the body so that it can fight back against oxidative stress. Along with SOD in response to the damaging peroxidative effect,  $\alpha$ -tocopherol has verified to be an efficient defender to the membrane integrity. The levels of serum malondialdehyde, nitrite,  $\alpha$ -tocopherol, plasma ascorbate and erythrocyte superoxide dismutase is the cause for the pathogenesis of urolithiasis [16].

**Diabetic Nephropathy** In contemporary years, diabetes and diabetic kidney disease continue to reign and encompass population worldwide. In the USA, diabetes-associated kidney disease is a major cause of all new cases of end-stage kidney disease. All diabetic patients are considered to be attacked by nephropathy. Today we have not precise markers to expect the progress of the end-stage renal disease. Clinically control of blood sugar level and blood pressure regulations are important two parameters for the prevention of diabetic nephropathy. There is a huge quantity of in vitro and in vivo studies regarding the explanation of the mechanism of diabetes-mellitus-induced nephropathy. All of these mechanisms are a consequence of uncontrolled inclination of blood glucose level. Currently, the proposed mechanism is the glomerular hyper-filtration/hypertension hypothesis. As per the hypothesis, diabetes leads to augmented glomerular hyperfiltration which is the consequential of increased glomerular pressure. This increase in glomerular pressure leads to damage to glomerular cells and to the development of focal and segmental glomerulosclerosis. Angiotensin II inhibitors decrease glomerular pressure and prevent albuminuria [17]. Increased angiotensin II level encourages OS through activation of NADPH oxidase, stimulating inflammatory cytokines.

## SOURCES OF ANTIOXIDANTS

### BETA-CAROTENE

It is one of the categories of orange, red and yellow pigments known as carotenoids. It consists of merely 50 percent of the vitamin A which is very essential in the American diet. It is very easy to synthesize carotene in laboratories or on the other hand carotene is present in fruits, vegetables, and whole grains.

### USES OF BETA CAROTENE

It is used to treat asthma signs triggered by excessive exercise to avoid some cancers, heart disease

and cataract relating to age macular degeneration (AMD); and to treat AIDS, alcoholism, epilepsy, depression, headache, heartburn, infertility, Parkinsons' disease, rheumatoid arthritis, and skin disorders as well as psoriasis and vitiligo. Another use is in underfed women to decline the rate of demise and night blindness while pregnancy, include diarrhea and fever after giving birth. Some of the population who trapped in sunburn simply, including those with a genetic disease called erythro poietic protoporphyria (EPP), use beta-carotene to cut the risk of sunburn [18]. Moreover, carotenoids could stimulate the proliferation of B- and T-lymphocytes, the activity of macrophage and cytotoxic T-cell (CTL), the effector T-cell function, and the production of cytokines. Recently, the valuable effects of carotenoid-rich vegetables and fruits in health and decreasing the risk of diseases relied on some major carotenoids such as  $\beta$ -carotene, lycopene, lutein, zeaxanthin, crocin and also curcumin due to their role as antioxidants. It should be considered that carotenoids act in a time-and dose-dependent manner [19].

### VITAMIN –C (Ascorbic acid)

Ascorbic acid well known as vitamin C, plays a prime part in the human body, in spite of the fact that its functions at the cellular level are still unclear. It is very crucial for the synthesis of collagen, a protein that has many connective functions in the body. The major function of ascorbic acid as an antioxidant is to reduce the incident of anticancer. The requirement of vitamin c for adults is well defined but they differ across different cultures, so they are defined as per the cultural basis. Antioxidant plays a silent role in cellular functions and has been implicated in processes associated with aging, including vascular, inflammatory damage and cancer. In the case of amino acids, its antioxidants role is useful since it contributes to the maintenance of the vascular system and the reduction of atherogenesis through regulation in collagen synthesis, production of prostacyclin and nitric oxide. Ascorbic acid also has actions at molecular level because it acts as a cofactor of enzymes such as dopamine hydroxylase, influencing neurotransmitter concentration, improves lysosomal protein degradation and mediates consumer monosodium glutamate [20].

## PLANT POLYPHENOLICS

Widely spread in the plant kingdom and ample in our diet plan are one of the most talked subject among the class of phytochemicals. There are bountiful of plant-derived compounds which have hydroxyl group attached with it, which are associated with one or more benzene, that's why counted as plant polyphenolics. Presently, polyphenolics have gained a lot of fame due to their implementation as therapeutic agent as well as prophylactic agent for many diseases.

Their work which focuses on their antioxidant effects is presented by the scientific community in the United States. In earlier times, herbal medicine having

antioxidant properties have been in use for various purposes and epidemiological data also point to widespread acceptance and use of these agents [21]. Plant polyphenols have been studied with intention to find compounds protecting against a number of diseases related to oxidative stress and free radical-induced damage, such as cardiovascular and neurodegenerative diseases, cancer, diabetes, autoimmune disorders and some inflammatory diseases [22]. In order to evaluate the efficacy of polyphenols as antioxidants as well as to elucidate the mode of their action, today the researchers are using the experimental models, from the simplest chemical antioxidant assays through the biologically more relevant cellular-based assays to the most accurate animal models, and ultimately clinical studies in humans. The latest scientific knowledge offers a more detailed understanding of the biological effects of polyphenols and their role in human health promotion and disease prevention [23].

## FLAVANOIDS

Flavonoids are also known as polyphenolic substances. It has an over 8000 individual compounds. They are used for different purposes like antioxidants, antimicrobial, photoreceptors, visual attractors, feeding repellents and for light screening. Many researchers have also studied that flavonoids have also biological activities, including anti-allergic antiviral, anti-inflammatory and vasodilation action. Although, most interest has been devoted to the antioxidant activity of flavonoids which is due to their ability to lessen free radical formation and to hunt free radicals. In the past years, it has been studied that flavonoids are used as antioxidants [24]. This has been studied in, *in vitro* experiments and it became the subject of many more studies and there is an establishment of SAR i.e structural- activity relationship (SAR) mostly the flavonoids decomposed into the phenolic acids in human body, some of which still possess a free radical scavenging ability. Both the absorbed flavonoids and their different metabolites may show an *in vivo* antioxidant activity, which is proved experimentally by the rise of the plasma antioxidants status, the sparing effect on vitamin E of erythrocyte membranes and low-density lipoproteins, and the preservation of erythrocyte membrane polyunsaturated fatty acids [25].

## VITAMIN E (TOCOPHEROL)

Vitamin E is a very important dietary supplement and found in naturally in many fruits. Vitamin E if combined is a collectively name for a group of fat-soluble compounds characteristics antioxidants activities. There are around eight chemical forms of naturally occurring vitamins. These include alpha-beta-gamma and delta-tocopherol and alpha – beta-gamma and delta tocotrienol that have varying levels of biological activity. Alpha-or alpha-tocopherols are the only eminent form that can meet the requirements of human diet.

The claim to fame of vitamin E is as an antioxidant. In other words, it is a scavenger of free radicals such as reactive oxygen species (e.g. superoxide, hydrogen peroxide). Free radicals are generated by number of procedures within cells and have the ability to damage cell membranes, proteins, and nucleic acids. Vitamin E is at the forefront of defense systems to prevent oxidative damage, and due to its lipid solubility, is particularly important in protecting cell membranes. Mechanistically, when vitamin E absorbs a free radical, it is changed into a radical itself. The resulting tocopherol radical is then reduced back to tocopherol by glutathione, vitamin C or other molecules [26].

## AVAILABLE PRODUCTS IN MARKET

### Vitamin D Supplements in the Indian Market

It has been widely accepted that vitamin D deficiency (VDD) is a universal health problem that impacts not only musculoskeletal health but also varied acute and chronic diseases. Lack of vitamin D has been linked with an amplified risk of Diabetes Mellitus, cardiovascular disease, certain cancers, cognitive decline, autoimmune disorders and pregnancy problems. It has been estimated that 20 to 80% of US, Canadian and European men and women are vitamin D deficient [27]. In the Middle East and Asia VDD is highly predominant in both children and adults. Even in India, numerous studies across various regions of the country indicate that approximately 70-90% of the apparently healthy population is vitamin D deficient. Low vitamin D status is prevalent irrespective of age, sex, profession, rural/urban settings or regional distribution.

The preparations were evaluated for the total number, different formulations, constituents, and amount of each constituent present in the formulation. Vitamin D3 is accessible in the form of cholecalciferol, alfacalcidol and calcitriol as single constituent products and in amalgamation with calcium and other micronutrients. Most of the supplements contain calcitriol (46.5%) or alfacalcidol (43%) as tablets (51.1%) and capsules (35.2%) [28]. Cholecalciferol, the preferred form of prevention and treatment of vitamin D deficient states, constitutes only 10% of the available market formulations. High market sales of calcium supplements comprising calcitriol indicate mushrooming consumption of calcitriol rather than cholecalciferol; which could predispose to toxicity. There is a need for marketing and sale prescribing of the suitable vitamin D supplement in ostensibly healthy Indian population. Employment of population-based education and intervention programs with implementation of strict regulations could produce awareness and curb the unverified ingestion of vitamin D-containing dietary supplements. This health task commands effective nutritional programs, fortification and supplementation programs and corporation between

government, healthcare, and industry to safeguard the

health of Indian population at large [29].

## PATENT

Sl.no.	Patent	Description	Category
1.	Nutrs Products Awarded New Patent	The term of Patent U.S. <u>8,853,262</u> B2, PKA Buffered Vitamin C Composition and Method has been spread by 2034 days. This patent applies to FAST-C that can absorb quicker and is buffered for stomach's wellbeing. FAST-C has experimentally displayed to produce meaningfully higher vitamin C blood levels after 30, 60 and even 90 minutes than the leading enhanced-absorption vitamin C brand, according to the company (30)	VITAMINS
2.	Natto Pharma granted Patent to Canadian company for K2 and Omega-3	New Canadian Patent (No. <u>2657748</u> ): "Pharmaceutical and Nutraceutical product containing vitamin K2". The patent includes all the Pharmaceutical and Nutraceutical product Providing vitamin K2 in combination with one or more polyunsaturated fatty acids which contains fish and/or krill oil for benefits associated to bone cartilage, and the cardiovascular system (31).	VITAMINS AND FATTY ACIDS
3.	Glanbia granted US patent for acidified whey protein	Glanbia Nutritionals Ireland has been granted US Patent No. <u>8,637,102</u> , titled, "Acidified whey proteins composition and methods for making them. The patent narrates to acidified whey proteins having organoleptic and purposeful characteristics, which also includes significantly improved flavor, odor, acidity and sweetness associated to unadventurously processed acidified whey protein, all while providing a required amount of whey protein (32)	PROTEINS
4.	Gilad & Gilad granted U.S. Patent for Agmatine	The US Patent No. <u>8916612</u> , is titled, "Agmatine containing dietary products, nutraceuticals and food". The patent gives the rights to the owner to tell users that supplements, nutraceuticals and foods which encompass active high expanses of the neuroprotective ingredient agmatine, afford neuroprotection and resilient nervous system functions. "There is an unmet need for a safe and effective supplement by millions of Americans who are imitate everyday with great challenges to their nervous system health and with threats to maintaining resilient nerve functions," said Gilad & Gilad's CEO, Dr. Gad M. Gilad (33)	AMINO ACID
5.	Bacillus coagulans Granted U.S. Patent for use in coffee, tea & cereal	<i>Bacillus coagulans</i> probiotics it has the property to bear harsh processes during manufacturing especially those required to make hot tea, coffee and cereal. The impact of these organisms can be linked to its naturally happening eating of organic material (spore), which guards the genetic core of the bacteria throughout the manufacturing process and the transit into the gut (34).	FLAVANOIDS

## CONCLUSION

Nutraceutical is no longer an alien term in the field of medical science. Every nooks and corner of the world are introduced to the term and probably knows what it means directly or indirectly. The food products possessing medicinal virtues can typically be called as the nutraceuticals. Nutraceutical as an antioxidant is entirely on focus which is highly on demand. Nutraceutical antioxidant has strong scientific support to be developed as a noble therapy for neurodegenerative diseases. Many of the antioxidants are the active scavengers of free radicals. Antioxidant as a dietary supplement improves health and help preventing diseases. Epidemiological studies show that diet rich in foods with high levels of antioxidants is associated with longevity and good health. Antioxidant as a nutraceutical has a cure for various diseases like cardiovascular diseases, macular degeneration, immune system and anti-ageing. With the advent of modern technology and modern science, nutraceutical has gained immense popularity as a new way to cure diseases. It's been expected that in near future the demand of nutraceuticals will increase. The present day statistics claim that it is occupying a firm ground as a new assistance to cure and prevent diseases. With that being said, antioxidants are on huge demand and will be

on demand till the end of time because of its reliability and potential to cure and use in all dimensions.

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