



A Review of Antioxidants from Natural Sources.

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ABSTRACT

In recent times, much interest has focused on the use of natural antioxidants in food products, as studies indicate possible adverse effects that may be associated with the consumption of synthetic antioxidants. Various growers are known sources of natural antioxidants, such as sauces, spices, seeds, fruits and vegetables. The interest in these natural elements is not only due to their natural value but also to their profitable impact, since most of them can be extracted from food by-products and other unexploited industrial species. This preparation provides an overview of current knowledge on natural antioxidants, their origin, mode of generation and stabilization. Furthermore, recent studies on their food compliance performance are also discussed; videlicet, as a preservative in various food products and in active films for edible packaging and coatings. Spices and sauces are rich sources of important antioxidants. Spices and sauces have been used more than 2,000 times for their flavor, color and aroma. They have also been used to preserve foods and beverages, mainly due to their phytochemicals. Antioxidants present in spices and sauces are really effective as they maintain excellent antioxidant effects. Spices and sauces have been used as antioxidants in the form of whole or ground spices/seasonings, partner leaflets, repeats or in mixtures. In addition to its antioxidant effects, spices and sauces are also classified as completely natural, so they are very attractive to consumers. therefore, spices and sauces can be used to control lipid oxidation in foods. important words antioxidants, oxidative stress, natural antioxidants, reproductive system, stabilization regime, freedom revolutionaries. in this review discussed antioxidant, mechanism of action, plants with medicinal and antioxidants activity, advances technology to incorporate natural antioxidant into the body processed food, natural antioxidants from plant extracts in skin care cosmetics, natural antioxidant in market trends, and application.

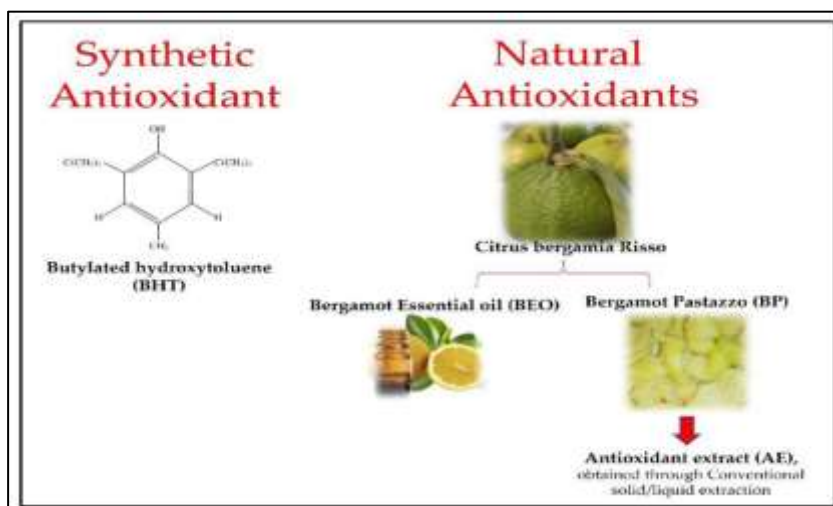
Key words : antioxidant, oxidative stress, natural antioxidant, extraction method, stabilization technique, free radicals.

Introduction :

Antioxidants are the substances that inhibit oxidation and are able of neutralizing the dangerous goods of oxidation in body towel. They help damage caused by free revolutionaries. ¹ Free revolutionaries are veritably unstable motes with an unmatched electron and are important interceders in natural processes involving control of vascular tone, cytotoxicity and neurotransmission. Free revolutionaries beget numerous mortal conditions like cancer, Alzheimer's complaint, cardiac reperfusion abnormalities, order complaint and fibrosis etc ². Antioxidants play numerous vital functions in a cell and have numerous salutary goods when present in foods.

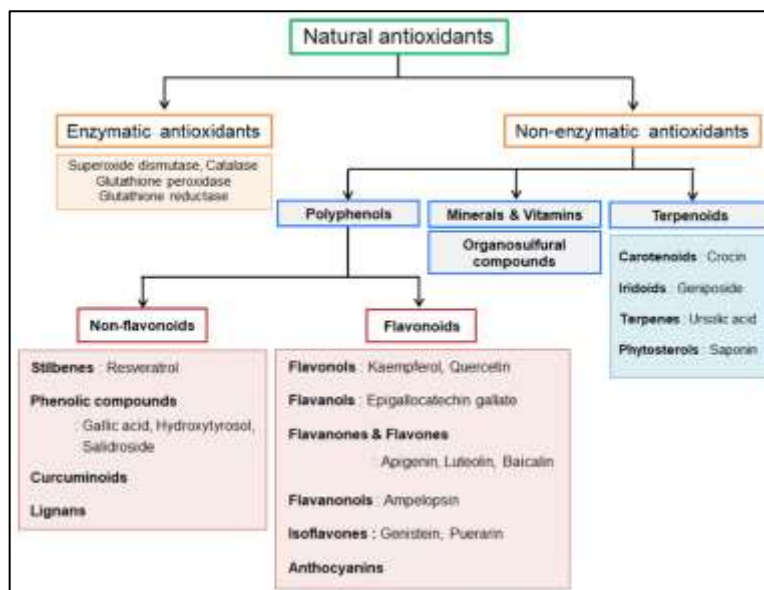
There are two main orders of antioxidants-primary and secondary-Primary antioxidants intrude the free revolutionary chain of oxidative responses by contributing hydrogen from the phenolic hydroxyl groups, these forming stable free revolutionaries that don't initiate or propagate farther oxidation of lipids. Secondary antioxidants trap revolutionaries, chelate essence, regenerate primary antioxidants, or act as emulsifying agents. ³ Natural antioxidants from factory excerpts similar as rosemary excerpts, sesame seed excerpt, green tea excerpts have formerly been proven to increase oxidative stability in comestible oil painting during processing and storehouse It also has similar antioxidative exertion as synthetic antioxidants and it also gives fresh health benefits. ⁴

Natural antioxidants uprooted from herbals are among the most important bioactive composites that can be used in food product. Polyphenolic composites are secondary metabolites of herbals and are one of the most important antioxidant composites that can be used in the product of salutary foods or to help oxidation and increase the shelf life of oxygen-sensitive foods shops are implicit sources for natural antioxidants. ⁵ Phenolic composites are considered as the main bones responsible for the potent antioxidant exertion of shops In nature there are a wide variety of naturally being antioxidants which are different in their composition, physical and chemical parcels, mechanisms and point of action



Butylated hydroxyanisole (BHA), Butylated hydroxytoluene (BHT), tert-butyl hydroquinone (TBHQ) are the constantly used synthetic antioxidants in food, whereas, natural antioxidants generally added in food are tocopherols, ascorbic acid etc. ⁶ Antioxidants neutralize free radicals by accepting or giving electrons in order to exclude the unmatched condition of the radical which leads to reacting with reactive radical and destroying them therefore having the capability to inhibit oxidation. Antioxidants and free radicals are dangerous for the body health when their load can not steadily be destroyed and accordingly induce a circumstance called oxidative stress. ⁷ Antioxidants help to cover the body against free radicals; these are substances that neutralize free radicals or their conduct. The three major antioxidant vitamins are beta-carotene, vitamin C, and vitamin E. Beta-carotene, like all carotenoids, is an antioxidant. β -Carotene is a strong antioxidant and also a scavenger of singlet oxygen. Antioxidants can also cover food by the deactivation of enzyme ions and singlet oxygen. ⁸

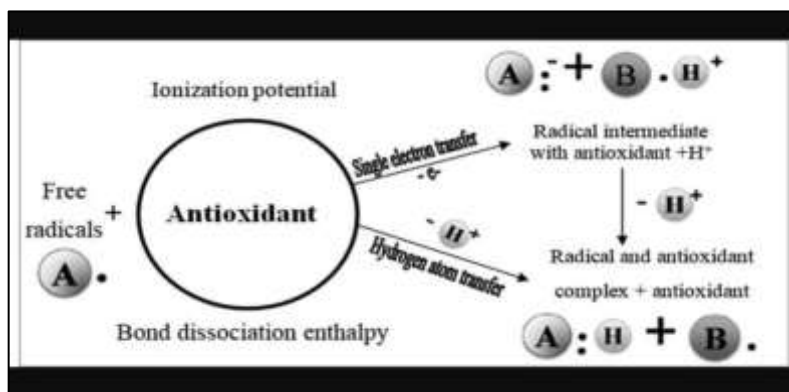
Types of Natural Antioxidant :



Mechanism of action of antioxidant :

In the human body, control of enzymatic and nonenzymatic natures allows ROS such as hydrogen peroxide (H_2O_2), superoxide anion radical ($O_2^{\bullet-}$), hypochlorous acid (HOCl), singlet oxygen (1O_2), hydroxyl radical ($\bullet OH$), alkoxyl radical ($RO\bullet$), and peroxy radical ($ROO\bullet$) to be inactivated due to the mechanism of antioxidants in a biological system. Enzymatic compounds, such as superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase, are considered endogenous antioxidants, and non-enzymatic compounds are bilirubin and albumin. If the body is exposed to a high concentration of ROS, exogenous antioxidants such as food, nutritional supplements, or pharmaceuticals are supplied to protect the organisms and slow down oxidative stress. ⁹

Much of the biological activity of natural antioxidants is due to their ability to remove reactive oxygen species (ROS) which helps to neutralize oxidative stress. First, natural antioxidants undergo extensive metabolism *in vivo*, altering their redox potential. Furthermore, the concentrations of natural antioxidants and their metabolites *in vivo* are typically lower than those used *in vitro*¹⁰



Essential features of free-radical-mediated chain oxidation reactions include initiation, propagation, branching, and termination steps. This process can be initiated by the action of an external agent. By heat, light, or ionizing radiation, or by chemical initiation metal ion or metalloprotein. Many chemical and physical phenomena can be caused continuously progressing oxidation in the presence of (a) suitable substrates to block defense mechanisms. Substances include oxygen, polyunsaturated fatty acids, phospholipids, cholesterol and DNA.¹¹

Plants with Medicinal And Antioxidant property:

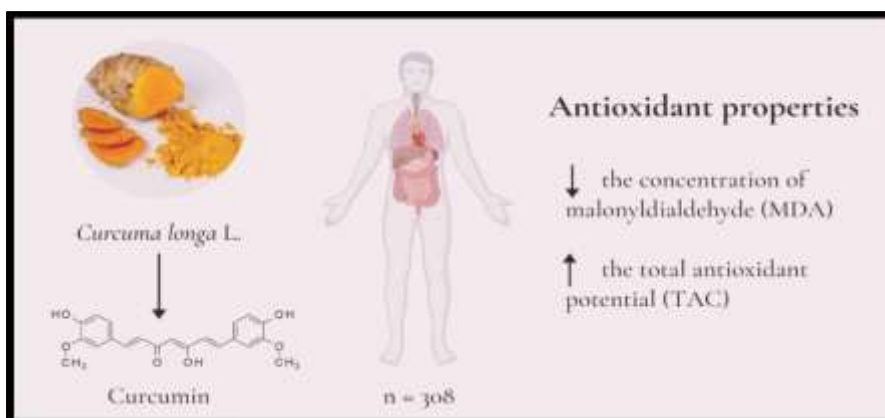
1] *Curcuma longa* (turmeric)

Family:- *Zingiberaceae*

Chemical Composition:- Rhizomes contain pigments

Curcumin, Betapyn, Camphene, Eugenol.¹⁰

Medicinal and Antioxidant :- Contains Turmeric Used in India to treat anorexia, liver disease and cough Diabetic wounds, rheumatism, sinusitis, Antifungal, antibacterial, insecticide. Curcumin is a powerful antioxidant and can eliminate it Forms epoxides and prevents bonding to macromolecules.¹² In other words, the cytoprotective properties of this spice are Nutrient antioxidants, as well as vitamins C and E, Suppresses free radical reactions.¹³



2] *Daucus Carota* Linn. (Carrot)

Family:- *Apiaceae*

Chemical Composition:- *Daucus Carota* Seed Oil carotol, dowchol, terpinolene, sabinene, Carotenoids, carotenes, flavonoids, sugars. alanine, α -tocopherol, ascorbic acid, camphene, γ -terpinene, histidine antitoxin.¹⁴

Medicinal and antioxidant properties:- Used for: bronchitis, chest problems, urinary problems, hemorrhoids, Leprosy, tumors, jaundice. Seeds that help with disease Kidney and edema. (16) Has many antioxidant and free radical scavenging properties More abundant in carrot skin than in phloem and xylem tissue Increased phenolic acids and flavonoids Contribution to overall antioxidant capacity. of Antioxidant quality in extracts Determined by the IC50 value. Low IC50 values indicate this A powerful antioxidant.¹⁵

3] Zingiber officinal (Ginger)

Family: *Zingiberaceae*

Chemical Composition: - Zingiberene, main component hot components of terpenoids and 6-gingerol, essential oils, starches, pungent gums, shogaol, Zingerone, Perador, etc.¹⁶

Medicinal and Antioxidant: - Prevention nausea, vomiting, coughing, asthma, anti-inflammatory, laxative and digestive, appetite-stimulating, sedative Diarrhea, headache, toothache, etc. Elephantiasis. Strong effect of ginger extract Antioxidant radical activity demonstrated by ABTS assay. Both Aqueous and Ethanol Extracts of Ginger It has a pronounced natural antioxidant activity. Therefore, taking ginger is effective Combat various disease progression Oxidative stress components such as arteriosclerosis.¹⁷

4] Glycyrrhiza glabra (Glycyrrhiza, Murati)

Family: - *Legumes*.

Chemical ingredients:- Glycyrrhizin, flavones, Due to the scent of coumarin, saponin and licorice A mixture of estragole, anethole, eugenol and indole cumin alcohol.

Medicinal and Antioxidant:- Has medicinal properties. Used for acute conjunctivitis, diuretic, sedative, anti-inflammatory, gastric ulcer, vomiting, asthma, bronchitis, wound healing, Tonic, urogenital diseases, cough, sore throat. The extract is Radiation-induced lipid peroxidation in rat liver microsomes. It exhibits its activity through its ability to scavenge free radicals. especially diabetes.¹⁸

5] Ocimum sanctum linn (Tulsi, Holy Basil)

Family: - *Labiatae*

Chemical Composition:- Eugenol (essential oil) and Ursolic acid .9 volatile oil, estragole, thymol.

Medicinal and antioxidant properties:-

Ocimum Sanctum is a stress, antioxidant, hepatoprotective, immunomodulatory, anti-inflammatory, antibacterial, antiviral, antifungal, antipyretic, antidiuretic, antidiabetic drugs, antimalarial drug and Broad range of lipid-lowering properties safety. Tulsi is used in Ayurvedic medicine alone or in combination with other clinical symptoms such as anxiety, chronic cough, Bronchitis, fever, snake and scorpion bites.¹⁹

6] Melia Azedarach L. (Margosa)

Family: - *Meliaceae*

Chemical Composition:- Aziridines, Sterols, Tannins, Paracin, rutin and seeds are rich in fatty oils, palmitic acid, oleic acid, linoleic acid

Medicinal and antioxidant properties:- The root bark is ascariasis, skin diseases, eczema, albinism, malarial fever, wounds, diabetes, pesticides, intestinal parasites. Antioxidant activity is assessed using the DPPH radical. Scavenger test and ability to scavenge free radicals excerpt. As a result, the extract Melia Azedarach. Phenolic compounds showed the greatest antioxidant activity.(20) Provides high cleaning performance. Due to the hydroxyl group in phenol, chemical structure of a compound that can provide Formulated with ingredients necessary as a radical scavenger. IC50 value and total polyphenol content indicating it The higher the polyphenol content, the stronger the antioxidant activity.²⁰

7. Dragon fruit



These natural substances protect cells from damage caused by free radicals, molecules that can cause diseases such as cancer and premature aging. Can strengthen the immune system. Dragon fruit is rich in vitamin C and other antioxidants that are good for your immune system. Can increase

iron levels. Iron is important for carrying oxygen throughout the body and providing energy, and dragon fruit contains iron. The vitamin C found in dragon fruit also helps the body absorb and utilize iron.²¹

Food rich in Antioxidant :



Advances in technology to incorporate natural antioxidants into the body processed food :

Adding natural antioxidants to food to extend its shelf life. Products to improve sensory quality are currently being developed for the food industry. Several technical advances in this area are reported in this special issue. Another In some cases, natural antioxidants may be included in food formulations or packaging.²² Here are more examples of the first option. Anthocyanins are colored, heat-labile compounds with high antioxidant activity. Stabilization by conjugation with other molecules through glycosylation with organic acids, The molecular mechanisms and kinetics of its degradation as well as Panthea.²³

Therefore, the stability and solubility of natural antioxidants are Analyzed to improve absorption and interactions in the human body. for example, Naringin, a citrus flavonoid, has been esterified with oleic acid to improve its solubility and stability. Also, active packaging is a promising technology, It was developed to extend the shelf life of meat products.²⁴ In addition, there is one A great concern for our health and chemicals are being rejected by consumers. To Antioxidant ingredients are also very important for developing healthy products. Health benefits, but more needs to be done²⁵. Develop products susceptible to lipid oxidation. improving methods of preventing Oxidative deterioration develop new antioxidants from natural sources. Develop novel antioxidants which are stable at all processing condition.²⁶

Natural Antioxidants from plant extracts in skin care cosmetic: Natural antioxidants used in the cosmetics industry include a variety of substances. Extracts obtained from various plants, grains, and fruits. Protection from oxidative stress on the skin and oxidative deterioration of products. One of Active Oxygen is the main cause of oxidative stress that accelerates skin aging. (ROS). Intrinsic aging is associated with the natural aging process, and extrinsic aging is associated with the natural aging process. Aging is associated with external factors (air pollution, UV radiation, etc.) that influences the aging process. (radiation and pathogenic microorganisms). Photoaging is likely to be the main cause Production of ROS. Factors that accelerate the skin aging process include: Several potential skin targets that interact with ROS have been discovered, e.g. lipids, DNA, proteins).²⁷

Antioxidant molecules are low molecular weight enzymes or antioxidants that donate electrons to reactive species to prevent radical chaining, reactions that prevent the formation of reactive oxidants or act as metal chelators; Oxidase inhibitors or enzyme cofactors. Antioxidants can also be used to: A stabilizer that prevents lipids from spoiling. Lipid oxidation is not limited to cosmetics. Also in the human body. So if your product contains antioxidants, this may be the case that serves multiple functions. The number of radicals increases during the initiation stage Oxidation of lipids. Molecular oxygen and fatty acid radicals react as they diffuse. The phase changes, leading to the formation of

hydroperoxide products. Hydroperoxides are unstable and can decompose to form radicals, which can accelerate growth reactions. The disassembly stage is dominated by radical reactions.²⁸

Antioxidants can inhibit lipids Oxidation by reaction with lipids and peroxy radicals and their conversion to more stable substances. Non-radical product. Additionally, antioxidants can break down molecular oxygen, Inactivates singlet oxygen, removes metal peroxide ions, and converts hydrogen into other things It has antioxidant properties and dissipates UV rays.²⁹

Antioxidants can be used in cancer treatment. This is because the production of ROS changes during tumor development and has anti-inflammatory effects. and antibacterial effect. Plants are known to produce natural antioxidants that can reduce oxidative stress caused by sunlight and oxygen. Plant extracts are used in a variety of patent and commercial cosmetic products. green Black tea, rosemary, grapeseed, basil grape, blueberry, tomato, acerola seed, pine bark, Milk thistle is some of the plant extracts commonly included in cosmetic formulations.³⁰

Natural Antioxidants in Market trends:

Natural antioxidants are phenols, which are found in all parts of plants, including fruits, vegetables, nuts, seeds, leaves, roots, and bark. High Demand for Natural Antioxidants Increasing demand from the pharmaceutical industry for manufacturing of various pharmaceutical nutraceuticals and increasing use of natural antioxidants in the cosmetics industry are the major factors driving the natural antioxidants market is part of Growing awareness of the benefits of natural antioxidants. Additionally, the use of natural antioxidants such as vitamin C, vitamin E, and polyphenols has increased in the cosmetic industry in various anti-aging creams, which are naturally used to regulate the immune system and treat heart, eye, and memory diseases.

Antioxidant intake is also on the rise. It is expected to support the growth of the global natural antioxidants market. Additionally, increasing consumer awareness about the benefits of fortified foods is expected to increase the demand for natural antioxidants during the forecast period. Consumer awareness about the health benefits of consuming natural antioxidants is expected to drive market expansion.³¹

Additionally, high demand for pharmaceutical products due to high prevalence of cancer and cardiovascular diseases is also expected to drive market value growth. Exponential growth in the world population further propels the growth rate of the natural antioxidants market. Expansion of the pharmaceutical and cosmetics industry is aimed at enhancing market growth opportunities.

Investments and positive health habits Moreover, rising investments habits will further fuel the future growth of the natural antioxidants market. Assignment high cost Natural antioxidants are very expensive compared to antioxidants. This further reduces the acceptance of natural antioxidants among consumers due to affordability issues, further hindering the growth of the natural antioxidants market.³²

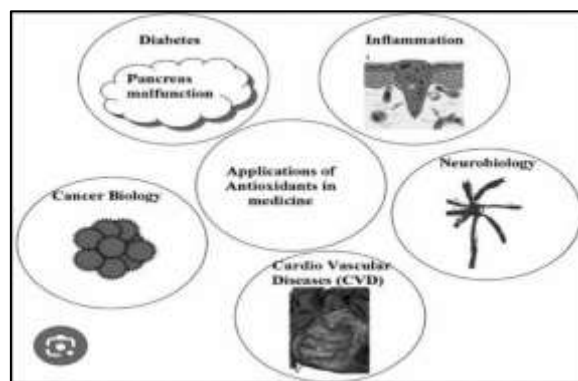
Application :

- 1) Antioxidants can be administered both orally and topically. They are widely used in systemic therapy to protect people from the risk of cancer, cardiovascular disease, diabetes, stroke and cardiovascular disease.
- 2) Antioxidants are widely used in the food industry to prevent or retard the oxidation of food components such as lipids and pigments that can cause rancidity, off-flavors, color changes and loss of nutrients.³³
- 3) In today's world, people want to eat healthier to stay healthy. This is achieved by including unsaturated and polyunsaturated fats in commercially available foods. as a human being.
- 4) Lifestyles and ways of thinking about food are changing. There is a shift from instant meals to instant meal product categories. This requires a certain amount of potential Factors that protect health called antioxidants.
- 5) Most foods and medicines now contain synthetic antioxidants. These connections will be added Foods that extend the shelf life of products, primarily by preventing the oxidation of unsaturated double bonds in fatty acids. Antioxidants are added to medicines to increase their effectiveness. Stability of chemically sensitive therapeutics Deterioration due to oxidation.³⁴
- 6) Application of plant extracts with antioxidant properties It has been studied in food processing and is currently being further investigated for its health benefits and use in preservation processes. Improved and extended shelf life.
- 7) Antioxidants from plant sources and industrially obtained can be incorporated into a variety of food matrices such as meats, oils, fruits, vegetables, and spices. Spices, root crops, legumes and grain products.
- 8) the study Development of the use of plant extracts and Antioxidant activity in food processing requires results on appropriate sources of antioxidants and innovative methods Extraction techniques, applied techniques and their respective thresholds, consequences and regulatory aspects Improves oxidative stability.

Medical application of Antioxidants :

Antioxidants not only play an important role in preventing undesirable changes in the taste and nutrition of foods; It also affects tissue damage in various human diseases.³⁵

It is effective in preventing degenerative diseases such as. Cancer, cardiovascular diseases, neurological diseases, cataracts, oxidative stress disorders. chronic diseases such as Main causes include arteriosclerosis and cancer. Death in the Western world is likely mediated by free radicals and lipids via oxidative mechanisms .



Conclusion

This study suggests that Medicinal plant with excellent antioxidants Possibilities are the best supplements for illness associated with oxidative stress. antioxidant effect Antioxidant capacity of compounds derived from spices and herbs has been identified and widely published in the scientific literature. Interest in food antioxidants from spices and herbs As it continues to grow, so does the research and technology to make it happen Develop better methods for growing spices and herbs , Higher levels of antioxidants. Find better ways to isolate active compounds and use chemometrics. Developing stronger combinations of natural food antioxidants and using blend design to optimize them Effectiveness of Mixed Spices/Herbs or Mixed Antioxidants More connections to come Consumer demand is growing. Growing Interest in Antioxidants for Health Benefits derived primarily from natural (exogenous) low molecular weight substances weight antioxidants. This is to prevent the occurrence of Emergence of oxidative stress-related diseases caused by free radical attack Important biological components such as lipids and nucleic acids.

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