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A Review on Medicinal Plants with Antioxidant Activity

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Abstract:

A large number of molecules having medical qualities originate from natural substances found in plants and other forms of life, including bacteria, fungus, and marine creatures. There is a lot of curiosity about the antioxidant chemicals among them. Antioxidant capability is a key-feature of current, multipotent medicines due to the recognition of the fundamental position that oxidative stress bears in the course of illnesses such as ageing, cardiovascular diseases, degenerative conditions, rheumatic disorders, metabolic syndrome, and many more. Rasayana is a set of herbal remedies from the Indian traditional medicine system (Ayurveda) that have been recommended for their potential antioxidant properties. These plants have a long history of therapeutic usage.

Keywords: Antioxidant, Ayurveda, Rasayana, Oxidative stress.

INTRODUCTION

Antioxidants are compounds that have the potential to safeguard your cells against the harmful impacts of free radicals. Free radicals are molecular byproducts that arise from the breakdown of food in your body or from external factors such as tobacco smoke and radiation. Free radicals have the ability to harm cells and perhaps contribute to the development of heart disease, cancer, and other illnesses. Research indicates that consuming a diet rich in antioxidants derived from fruits and vegetables is linked to a reduced likelihood of developing cancer, cardiovascular disease, Parkinson's disease, and Alzheimer's disease. A diet consisting mostly of plant-based foods provides protection against chronic illnesses that are caused by oxidative stress. Plants included in diets have different chemical families and quantities of antioxidants. There is a hypothesis suggesting that the presence of antioxidants in plants may have a role in the positive health benefits associated with consuming plant-based foods. The aim of our study was to create a thorough food database that includes the complete antioxidant content of common foods, as well as additional dietary products including traditional medicinal plants, herbs, spices, and nutritional supplements. The scientific community has recently started investigating the therapeutic characteristics of plant components to enhance the quality and nutritional worth of plants, a practice

that dates back to ancient times. Flavonoids are a globally distributed category of polyphenolic chemicals that has powerful characteristics, including free antioxidant activity. Antioxidants have been shown to possess the ability to scavenge radicals, block hydrolytic and oxidative processes, and so reduce oxidative damage induced by free radicals.

Antioxidants Potential Plants

Free radicals are atoms or molecules that possess a singlet, or unpaired, electron, rendering them very reactive. Oxidative free radicals are produced by metabolic processes, initiating a cascade of events that result in the peroxidation of membranes and other lipids, as well as DNA damage. These factors have been linked to the development of atherosclerosis (oxidised LDL is more likely to cause atherosclerosis), malignancies, neurological illnesses, and inflammatory bowel diseases. Several endogenous and dietary substances, including as superoxide dismutase, ferritin, transferrin, reruloplasmin, tocopherol, carotene, and ascorbic acid, possess antioxidant and free radical scavenging activities. Minute quantities of reactive oxygen species are constantly generated throughout the body, namely in the cell membrane and in close proximity to the organelles of cells. They exhibit their behaviour at the location where they originate. Therefore, they have the potential to harm many cellular components such as lipid membranes, proteins, enzymes, and nucleic acids.

The human body has systems to generate the minimal quantities of oxidants that are typically produced during metabolic reactions. Reactive species, such as oxidants, are produced in regulated quantities by neutrophil leukocytes when exposed to germs. These species are advantageous to the body as they contribute to the eradication of the bacteria. An excessive amount of oxidants, on the other hand, might have detrimental effects on the body. The liver is always at risk of damage from oxidants, particularly the free radical H2O2. Lipid peroxidation has been shown to be a significant characteristic after exposure to compounds that are harmful to the liver, and it also serves as an indicator of the degree of liver damage. There are several plants and herbal formulations that may be used for scavenging activities. Furthermore, there is a worldwide inclination to restore the conventional medical systems and a growing fascination with natural therapies for the treatment of human illnesses. Antioxidants have a crucial function in preventing unfavourable alterations in the taste and nutritional value of food, as well as in protecting against tissue damage in many human illnesses. The majority of organisms possess effective defences against free radical damage, either via the presence of enzymes or the presence of substances such as ascorbic acid, α-tocopherol, and gluthione.

When the equilibrium of antioxidant defence is disrupted by the degradation of several components, it may lead to physiological dysfunctions that manifest as illnesses or accelerated ageing. Therefore, it is crucial to discover chemicals that inhibit oxidation. Antioxidants have a crucial function in preventing both unfavourable alterations in the taste and nutritional value of food, as well as tissue damage in many human illnesses. They have a significant impact in preventing degenerative diseases, including many forms of cancer, heart and brain ailments, cataracts, and dysfunctions caused by oxidative stress. Polyphenols are the primary chemicals responsible for the antioxidant capabilities of plant raw materials. The primary reason for the antioxidant action of polyphenols is their redox characteristics, which enable them to

function as reducing agents, hydrogen donors, singlet oxygen quenchers, metal chelators, and reductants of ferryl haemoglobin. Medicinal plant parts often include a high concentration of phenolic chemicals, including flavonoids, phenolic acids, stilbenes, tannins, coumarins, lignans, and lignins. These chemicals have many biological effects, including antioxidant action.

CONCLUSION

An antioxidant is a molecule that has the ability to slow down or prevent the oxidation of other molecules. Oxidation is a chemical process in which electrons are transferred from a material to an oxidising agent. Oxidation processes have the potential to generate free radicals, which initiate chain reactions that cause harm to cells. Antioxidants are compounds that hinder the process of oxidation and have the ability to neutralise the harmful consequences of oxidation in bodily tissues. They inhibit the harm produced by reactive oxygen species. Free radicals are highly reactive molecules with an unpaired electron that play a crucial role in natural processes related to the regulation of blood vessel constriction, cell toxicity, and communication between nerve cells. Free radicals are responsible for several human disorders, including as cancer, Alzheimer's disease, cardiac reperfusion problems, renal disease, and fibrosis. Antioxidants serve several essential roles inside a cell and provide numerous advantageous outcomes when found in diet.

Table 1: List of plants exhibit antioxidant characteristics and their chemical constituents

PLANT NAME	PLANT PART	MAIN CHEMICAL CONSTITUENTS
Withania somnifera	Berries, leaves, roots	Ascorbic acid,α-tocopherol and reduced glutathione, superoxide dismutase,ascorbate peroxidase, catalase, peroxidase & polyphenol oxidase
Ocimum sanctum	Leaves, Seeds	Ascorbic acid,β-carotene, β-sitosterol, eugenol,Palmitic acid, tannin
Piper nigrum	Fruit	Ascorbic acid, β carotene,Lauric acid, myristic acid, palmitic acid, piperine
Arentium lappalo	Root	Insulin, tannic acid
Scutellaria barbata	Leaves,	Gallic acid
Daucus carrota	Leaves, Seed, Root	Alanine, α tocopherol, ascorbic acid, camphene,eugenol,γ-terpinene, histidine Antitoxin
Coleus ferscoli	Roots	Ferscolin
Salvia sclarea	Entire plant, seed	γ-terpinene, linalyl acetate, myrcene, Palmitic acid, rosemarinic acid
Eugenia caryophylla	Inflorescence	Acetyl-eugenol, Ascorbic acid, β -carotene, β-sitosterol, caryophyllene oxide, eugenol, isoeugenol
Allium sativum	Leaves, Bud	Alanine, Ascorbic acid, β-sitosterol,Caffeic acid, Kaemferol, Methionine 6-Gingerol,alanine, Ascorbic acid, Histidine, Lauricacid, Methionine, Myristic acid,Palmitic acid, Tryptophan
Zingiber officinalis	Leaves, Rhizome	EGB 761,Ginkgogolide
Ginkgo biloba	Plant	Alanine, α-tocopherol, Ascorbic acid, β -carotene, β-sitosterol, Histidine, OPC, Methionine, Palmitic acid,
Vitis vinifera	Fruit, Seed	

		selenium
Citrus aurantifolia	Fruit	Alanine, α –pinene,ascorbic acid,β -Sitosterol, caffeic acid,
Cymbopogon citratus	Leaves	Eugenol, Linalylacetate, Palmitic acid, Tannin
Commiphora myrrha	Resin, Sap	B-sitosterol,Myrcene,Selenium
Myristica fragrance	Seed, Leaf	B-Sitosterol,campestrol,eugenol
Olea europaea	Leaf	Lauric acid,Myrcene, Palmitic acid
Mentha piperata	Leaf	A -tocopherol,apigenin, β -carotene, γ -
Catharanthus roseus	Leaf	tocopherol,kaempferol, Luteolin
Rosemarionus officinalisL	Entire Plant	Menthol, Limonene
		Vincristine, Vinblastine
Santalum album	Leaf, Oleoresin	Carsonic acid, Rosemaric acid,
Curcuma domestica	Fruit, Wood	B –sitosterol , Caryophyllene oxide, eugenol,isoeugenol
Acorus calamus	Rhizome	Alanine, eugenol, β -sitosterol, Palmitic acid, phenol
Alisma plantago-aquatica L.	Rhizome	Curcumin,tannins, phenolic acids
		Only antioxidative fractions devoid of beta-asarone should be used,
Allium ursinum L.	Flowering aerial parts, roots	Triterpene (alisol B)
Cotinus coggygria Scop.	Leaf	Flavonoids, sulfur-containing compounds
Angelica sylvestris L.	Leaf	Flavones, aurones, chalcones
Anthriscus cerefolium	Root, Grains	Flavonoids, coumarins
Anthriscus sylvestris	Root, Flowering aerial part	Flavonoids (apiin), lignans
Carum carvi L.	Flowering aerial part	Flavonoids (quercetin, apigenin)
Eryngium campestre L.	Fruits	Flavonoids, volatile oil
Sanicula europaea L.	Flowering aerial part	Flavonoids, triterpenes
Achillea millefolium s.l.	Flowering aerial part	Rosmarinic acid derivative
Arctium lappa L.	Leaf, root	Flavonoids, tannins, volatile oil
Artemisia absinthium L	Flowering aerial part	Flavonoids
Artemisia vulgaris L.	Flowering aerial parts	Flavonoids
Bellis perennis L	Flowering aerial parts	Flavonoids
Bidens tripartita L.	Flowering aerial parts	Flavonol glycosides
Carlina acaulis L.	Root	Flavonoids
	Flower	Flavonoids
Carthamus tinctorius L.	Flowering aerial part, root	Flavonoids
Cichorium intybus L.	Leaf	Phenolic acids, flavonoids
	Flowering aerial part	Phenolic acids, flavonoids
Cirsium arvense (L.) Scop	Flowering aerial parts	Flavonoids, polysaccharides (mucilages)
		Flavonoids
		Flavone 6-C-Glycosides

	Flowers	Flavonoids, glucosinolates
Conyza canadensis L.	Flowering aerial parts	Flavonoids, glucosinolates
Cronq.		Flavonoids
Hieracium pilosella L	Flowering aerial parts	
		Flavonoids
Matricaria recutita L.	Root, Flowering aerial parts	Flavonoids
		Flavonoids, procyanidins
Onopordum acanthium	Leaf	Flavonoids, procyanidins
Solidago virgaurea L.	Leaf	Flavonoids
Taraxacum officinale agg.	Flowering aerial parts	Flavonoids, phenolic acids
Tussilago farfara L	Flowering aerial parts	Phenolic acids
		Flavonoids
Betula pendula Roth	Flowering aerial parts	Flavonoids, carotenoids
		Flavonoids
Alliaria petiolata	Glandulae	Flavonoids
Capsella bursa-pastoris	Flowers	Flavonoids
Nasturtium officinale	Leaf	Anthocyans
Humulus lupulus L.	Branches	Flavonoids,isoflavones (genistein)
Sambucus nigra L.	Branches	Flavonoids, triterpenes
Sambucus ebulus L.	Grains	Flavonoids
Viburnum lantana L.	Fruits	Triterpenes
Viburnum opulus L.	Grains, Leaf	Isoflavones
Evonymus europaeus L.	Fruits	Isoflavones
Cornus mas L.	Fruits	Isoflavones
Corylus avellana L.	Leaf, Branch	Tannins, procyanidins, flavonoids
	Flowering aerial	Tannins, procyanidins,
Juniperus communis L.	parts	Flavonoids
	Flowering aerial	Xanthones, phenolic acids
Hippophae rhamnoides	parts	Tannins, gallic acid
Elaeagnus angustifolia .	Leaf, Fruit	Flavonoids, tannins
Equisetum arvense L.	Flowering aerial parts	Flavonoids
		Flavonoids
Calluna vulgaris (L.)	Flowering aerial parts	Tannins, flavonoids
		Flavonoids, phenylpropanoids
Vaccinium myrtillus L.	Flowering aerial parts	(verbascoside)
		Flavonoids, phenolic acids
Anthyllis vulneraria L.	Flowering aerial parts	Flavonoids
		Flavonoids
Genista tinctoria L.	Flowering aerial parts	Flavonoids, phenolic acids
		Flavonoids
Lotus corniculatus L.	Flowering aerial parts	Flavonoids
		Flavonoids
Melilotus officinalis L.	Flowering aerial parts	Flavonoids
Pallas		Flavonoids, phenolic acids
Ononis spinosa L.	Flowering aerial parts	Flavonoids
		Flavonoids
Trifolium arvense L.	Bark, Flowers	Flavonoids
	Bark	

Trifolium pratense L.		Flavonoids, phenolic acids
Trifolium repens L.	Flowering aerial parts	Flavonoids, phenolic acids
Quercus petraea L.	Flowering aerial parts	Flavonoids
Quercus robur L.	Flowering aerial parts, roots	Flavonoids, iridoids
Centaurium erythraea L.	Flowering aerial parts	Phenolic acids,flavonoids, carotenoids
Erodium cicutarium L.	Flowering aerial parts	Polysacharides, flavanoids
Geranium	Flowering aerial parts	Polysaccharides (mucilages), flavonoids
		Flavonoids, coumarins
		phenylpropanoids (verbascoside)
		Tannins,

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