

A REVIEW ON MEDICINAL PLANTS HAVING ANTIOXIDANT POTENTIAL

S.K Sharma, Lalit Singh, Suruchi Singh*

Sunder Deep Pharmacy College, Ghaziabad, U.P, India.

*Corresponding author: E.mail: suruchibpharm89@gmail.com

ABSTRACT

Natural compounds from plants and other life forms (bacteria, fungi, marine organisms) represent a major source of molecules with medicinal properties. Among them, antioxidant substances are of particular interest. The understanding of the central role that oxidative stress holds in the progression of disorders as varied as: cardiovascular diseases, degenerative conditions, rheumatic disorders, metabolic syndrome, and in aging, makes antioxidant capacity to a key-feature of modern, multipotent remedies. A lot of medicinal plants, traditionally used for thousands of years, are present in a group of herbal preparations of the Indian traditional health care system (Ayurveda) named Rasayana proposed for their interesting antioxidant activities.

Keywords: Antioxidant, Ayurveda, Rasayana, Oxidative stress.

INTRODUCTION

Antioxidants are substances that may protect your cells against the effects of free radicals. Free radicals are molecules produced when your body breaks down food, or by environmental exposures like tobacco smoke and radiation. Free radicals can damage cells, and may play a role in heart disease, cancer and other diseases. Studies suggest that a diet high in antioxidants from fruits and vegetables is associated with a lower risk of cancer, cardiovascular disease, Parkinson's disease and Alzheimer's disease. A plant-based diet protects against chronic oxidative stress-related diseases. Dietary plants contain variable chemical families and amounts of antioxidants. It has been hypothesized that plant antioxidants may contribute to the beneficial health effects of dietary plants. Our objective was to develop a comprehensive food database consisting of the total antioxidant content of typical foods as well as other dietary items such as traditional medicine plants, herbs and spices and dietary supplements.

Since ancient times, the medicinal properties of the plant materials improve the quality and nutritional value of plants has been investigated in the recent scientific form. While, flavonoids are a group of polyphenolic developments throughout the world, due to their potent compounds with known properties, which include free antioxidant activities. The antioxidants have been reported to have radical scavenging, inhibition of hydrolytic and oxidative to prevent oxidative damage caused by free radical.

Antioxidants Potential Plants

Free radicals are atoms or molecules with singlet, i.e. unpaired electron which makes them highly reactive. Oxidative free radicals are generated by metabolic reactions create a chain reaction leading to membrane and other lipid peroxidation, DNA damage, etc. This has been implicated in atherosclerosis (oxidated LDL is more atherogenic), cancers, neurodegenerative and inflammatory bowel diseases. Many endogenous and dietary compounds like superoxide dismutase, ferritin, transferrin, ceruloplasmin, tocopherol, carotene and ascorbic acid have anti oxidant and free radical scavenging properties. Small amounts of reactive oxygen species are continually formed in the body in the cell membrane and close to the cells organelles. They act where they are generated. Hence, they can damage most cell structures including membrane lipids, proteins, enzymes and nucleic acids.

The body has mechanisms to produce the small amounts of oxidants normally formed during metabolic reaction. Reactive species such oxidants are formed in controlled amounts by neutrophil leucocytes on exposure to microbes are beneficial to the body in that they participate in destroying the microbes. Excess of oxidants, however, can be harmful to the body. Liver is also under constant threat of oxidants and some of the free radical especially H₂O₂. Lipid peroxidation has been demonstrated as one of the important feature after exposure to hepatotoxic substances and also is a measure of extent of hepatic damage. Several herbs and herbal formulations are available for the scavenging activity. In addition to this there is a global trend to revive the traditional systems of medicines and renewed interest in the natural remedies for treating human ailments. Antioxidants have important preventive roles, not only on undesirable changes in the flavor and nutritional quality of food, but also on tissue damage in various human diseases. Almost all organisms are well protected against free radical damage by either enzymes or compounds, such as ascorbic acid, α -tocopherol and glutathione.

When the mechanism of antioxidant protection unbalanced by the deterioration of different factors, physiological functions can occur which result in diseases or accelerated aging. Consequently, it is important to find compounds that prevent oxidation. Antioxidants have important preventive roles not only on undesirable changes in the flavor and nutritional quality of food, but also on tissue damage in various human diseases. They are effective in prevention of degenerative illnesses, such as different types of cancers, cardiovascular and neurological diseases, cataracts and oxidative stress dysfunctions. Polyphenols are the most significant compounds for the antioxidant properties of plant raw materials. Then antioxidant activity of polyphenols is mainly due to their redox properties, which allow them to act as reducing agents, hydrogen donors, singlet oxygen quenchers, metal chelators and reductants of ferryl hemoglobin. Medicinal plant parts are commonly rich in phenolic compounds, such as flavonoids, phenolic acids, stilbenes, tannins, coumarins, lignans and lignins. These compounds have multiple biological effects including antioxidant activity.

CONCLUSION

As antioxidant is a molecule capable of slowing or preventing the oxidation of other molecules. Oxidation is a chemical reaction that transfers electron from a substance to an oxidizing agent. Oxidation reactions can produce free radicals, which start chain reactions that damage cells. Antioxidants are the substances that inhibit oxidation and are capable of counteracting the damaging effects of oxidation in body tissue. They prevent damage caused by free radicals. Free radicals are very unstable molecules with an unpaired electron and are important intermediates in natural processes involving control of vascular tone, cytotoxicity and neurotransmission. Free radicals cause many human diseases like cancer, Alzheimer's disease, cardiac reperfusion abnormalities, kidney disease and fibrosis etc. Antioxidants play many vital functions in a cell and have many beneficial effects when present in foods.

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

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

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

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

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

REFERENCE

Anchana Chanwitheesuk, Aphiwat Teerawutgulrag, Nuansri Rakariyatham, Screening of antioxidant activity and antioxidant compounds of some edible plants of Thailand, Food Chemistry, 92, 2005, 491–497.

ANTAL Diana Simona, Medicinal plants with antioxidant properties from Banat region(Romania): A rich pool for the discovery of multi- target phytochemicals active in free radical related disorders, Analele Universităţii din Oradea - Fascicula Biologie Tom. XVII / 1, 2010, 14-22.

Arya Vikrant, Bhardwaj Ankur, Sharma Vinit, Pharmacology of some antioxidant plants from district kangra Himachal Pradesh- A Review, International journal of current npharmaceutical research, 3(2), 26 – 31.

Bibi Sedigheh Fazly Bazzaz, Antioxidant and antimicrobial activity of methanol, dichloro methane and, ethyl acetate extracts of *Scutellaria litwinowii*, Science Asia, 37, 2011, 327–334.

HA Ogbunugafor, FU Eneh, AN Ozumba, MN Igwo-Ezikpe, Physico-chemical and Antioxidant Properties of *Moringa oleifera* Seed Oil, Pakistan Journal of Nutrition, 10 (5), 2011, 409-414.

Khanahmadi M, Rezazadeh Sh, Review on Iranian medicinal plants with antioxidant properties, Journal of Medicinal Plants 2010, 9(35), 20-31.

Kratchanova Maria, Denev Petko, Ciz Milan, Lojek Antonin, Mihailov Atanas, Evaluation of antioxidant activity medicinal plants containing polyphenol compounds. Comparison of two extraction system, ACTA Biochemia Polonica, 57(2), 2012, 229-234.

Krishnaiah Duduku, Sarbatly Rosalam, Bono Awang, Phytochemical antioxidants for health and medicine – A move towards nation, Biotechnology and Molecular Biology Review, (4), 2007, 097-104.

Luz María Sánchez Perera, Arturo Escobar, Caden Souccar, Antonia Remigio and Betty Mancebo, Pharmacological and toxicological evaluation of *Rhizophora mangle L* as a potential antiulcerogenic drug: Chemical composition of active extract, Journal of Pharmacognosy and Phytotherapy, 2(4) , 2010, 56-63.

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Mandana B, Russly A R, Farah ST, Noranizan MA, Zaidul I S and Ali G, Antioxidant activity of winter melon (*Benincasa Hispida*) seeds using conventional soxhlet extraction technique, International Food Research Journal 19(1), 2012, 229-234.

P Kanimozhi and J Karthikeyan, A study on antioxidant potential of *Glycyrrhiza glabra* linn. in 1,4-dichlorobenzene induced liver carcinogenesis, Journal of Chemical and Pharmaceutical Research, 3(6), 2011, 288-292.

Pandey Neha, Barve Dushyant, Antioxidant activity of ethanolic extract of *Annona squamosa* Linn Bark, International Journal of Research in Pharmaceutical and Biomedical Sciences, 2(4), 2011, 1629- 1697.

Pratap Sangh., Pandey Sanjay, A review on herbal antioxidants”, Journal of pharmacognosy and phytochemistry 1(4), 28-38.

Rahmat Ali Khan, Evaluation of phenolic contents and antioxidant activity of various solvent extracts of *Sonchus asper* (L.) Hill, Chemistry Central Journal, 6, 2012, 12.

Rana Siddhant, Sutttee Ashish, Phytochemical investigation and evaluation of free radical scavenging potential of *Benincasa hispida* peel extracts, International Journal of Current Pharmaceutical Review and Research, 3(3), 43-46.

Sangh Partap, Amit Kumar, Neeraj Kant Sharma, K. K. Jha, *Luffa Cylindrica* : An important medicinal plant, J. Nat. Prod. Plant Resour, 2 (1), 2012, 27-134.

Scartezzini Paolo, Speroni Ester, Review on some plants of indian traditional medicine with antioxidant activity, Journal of Ethnopharmacology, 71, 2000, 23-43.

Shyamala BN & Jamuna P, Nutritional Content and Antioxidant Properties of Pulp Waste from *Daucus carota* and *Beta vulgaris*, Mal NJ Nutr, 16(3) 2010, 397-408.

TK Gopal, Harish G, D Chamundeeswari, C Umamaheswara Reddy, *In-vitro* Anti-Oxidant Activity of Roots of *Boerhaavia diffusa* Linn, Research journal of Pharmaceutical, Biological and Chemical Sciences, 4, 2010, 782-788.