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Review Article

A Review of Natural Antioxidants In Medicinal Plants

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Abstract

Natural antioxidants are widely distributed in medicinal plants. These natural antioxidants, especially polyphenols and carotenoids, exhibit a wide range of biological effects, including anti-inflammatory, anti-aging, anti-atherosclerosis and anticancer. The medicinal plants are crucial to explore the potential antioxidant sources and promote the application in functional foods. The present paper provides comprehensive information on the green extraction technologies of natural antioxidants, assessment of antioxidant activity at chemical and cellular based levels and their main resources from food and medicinal plants Oxygen free radicals induce damage due to peroxidation to biomembranes and also to DNA, which lead to tissue damage, thus cause occurrence of a number of diseases. Antioxidants neutralise the effect of free radicals through different ways and may prevent the body from various diseases. Antioxidants may be synthetic or natural. Synthetic antioxidants such as butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA) have recently been reported to be dangerous for human health. Thus, the search for effective, non-toxic natural compounds with antioxidative activity has been intensified in recent years. The present review includes a brief account of research reports on plants with antioxidant potential.

Keywords: Free radicals, natural antioxidants, medicinal plants, antioxidant activity.

INTRODUCTION

The free radicals may be either Oxygen derived (ROS) or Nitrogen derived (RNS). The most common reactive oxygen species include superoxide anion (O2), hydrogen peroxide (H2O2), peroxyl radicals (ROO) and reactive hydroxyl radicals (OH). In general, the best way to eliminate a problem is to eliminate the cause. The nitrogen derived free radicals are nitric oxide (NO), peroxy nitrite anion (ONOO), Nitrogen dioxide (NO2) and Dinitrogen trioxide (N2O3). The role of silver as anti-bacterials is known for centuries and is seen in museums as daily use products where they are majorly composed. Differential spectrophotometry is an analytical technique which has been used to improve the selectivity and accuracy of the measurement. The exogenous sources of ROS include electromagnetic radiation, cosmic radiation, UV-light, ozone, cigarette smoke and low wavelength electromagnetic radiations and endogenous sources are mitochondrial electron transport chain, β-oxidation of fat. The neem has been antibacterial activity is has evaluated from the ancient times. Chemical compounds & reaction capable of generating potential toxic oxygen species/free radicals are referred to as 'pro-oxidants'. They attack macro-molecules including protein, DNA and lipid causing to cellular/tissue damage on the other hand, compounds and reactions disposing of these species, scavenging them suppressing their formation or opposing their actions are called antioxidants. In a normal cell there is an appropriate pro-oxidant:antioxidant balance. However, this balance can be shifted towards the pro-oxidant when production of oxygen species is increased or when levels of antioxidants are diminished. This state is called 'oxidative stress' and can result in serious cell damage if the stress is massive or prolonged. The drug has relative high bio-availability and half life, the controlled release formulation has its own significance for the improving the onset of action, release characteristics and reducing the side effects. The syn-

thetic anti-microbial agent shows problem of drug resistance and other side effect. Herbal antioxidants have been successfully employed as rejuvenators, for several centuries in the Indian systems of alternative medicine. 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.[1-13]

Plants with medicinal and antioxidant property

Ocimum sanctum Linn. (Tulsi, Sacred Basil)[14,15]

Family - Lamiaceae

Chemical constituents:-Eugenol (an essential oil) and ursolic acid, volatoil oil, Estragole, thymol.

Medicinal and antioxidant property:- Ocimum sanctum has anti-stress, antioxidant, hepatoprotective,immunomodulating,antiinflammato ry, antibacterial, antiviral, antifungal, antipyretic, antidiuretic, antidiabetic, antimalarial and hypolipidemic properties with a wide margin of safety. In Ayurvedic medicine, Tulsi is being used either alone or in combination with others in various clinical conditions like anxiety, chronic cough, bronchitis, fever, snake and scorpion bites9. The aqueous extract decreased LPO formation (thiobarbituric acid reactive substances TBARS) and increased antioxidant enzymes like superoxide dismutase (SOD), catalase (CAT), glutathione peroxidise (GPX), glutathione transferases (GT). It also increased antioxidant like reduced glutathione (GSH) levels in plasma and liver, lung, kidney and brain of rat. Tulsi has been found to have therapeutic potential as antidiabetic, hypolipidemic, and antioxidant medicine.

Daucus carrota Linn. (Carrot)[16,17]

Family- Apiaceae

Chemical Constituents:- Seed oil of Daucus carrota contain Carotol, daucol, terbenolene, sabinene, carotenoid, carotene, flavonoids, sugars, Alanine, α tocopherol, ascorbic acid, camphene,γ-terpinene, histidine Antitoxin.

Medicinal and antioxidant property:- Used in bronchitis, chest troubles, urinary camplaints, piles, leprosy, tumours, jaundice. Seeds useful in diseases of kidney and in dropsy.- Antioxidant and radical scavenging activities are much higher in carrot peel than phloem and xylem tissue .Phenolic acids and flavonoids made greater contribution to the total antioxidant capacity. The quality of the antioxidants in the extracts is determined by the IC50 values. A low IC50 indicates strong antioxidant activity.

Glycyrrhiza glabra: - (Licorice,Mulathi) [16,17,18]

Family: - Leguminosae.

Chemical constituents: Glycyrrhizin, flavones, coumarins,saponin, aroma of licorice is due to mixture of estragole,anethole,eugenole,indole,and cumic alcohol.

Medicinal and antioxidant property: Its medicinal uses are in acute case of conjunctivitis, diuretic, demulcent, anti-inflamatory, in peptic ulcer, vomiting, asthama, bronchitis, in curing wounds, tonic ,genitourinary diseases, cough and sore throat. Its extract was tested by studying the inhibition of radiation induced lipid peroxidation in rat liver microsomes. It shows its activity through free radical scavenging property.

Curcuma longa (Turmeric)[19,20]

Family:- Zingiberaceae

Chemical constituents:- Rhizome contains pigments curcumin, beta-pipene, camphene, Eugenol.

Medicinal and antioxidant property: Turmeric is used in India to treat anorexia, liver disorders, cough, diabetic wounds, rheumatism, and sinusitis, antifungal, antibacterial, insecticide. curcumin is a potent antioxidant, it may scavenge the epoxides and prevent binding to macromolecules. In other words, this spice's cell-protective properties are similar to nutrient antioxidants, vitamins C and E, which inhibit free radical reactions.

Zingiber officinale (Ginger)[16,18,21]

Family:- Zingiberaceae

Chemical constituents:- zingiberene, the main terpenoid and 6-gingerol, the pungent principle, volatile oil, starch, acrid resinous matter, shagoals, zingerone, peradols etc.

Medicinal and antioxidant property:- prevent nausea, vomiting, coughs and asthma, anti inflammatory, laxative and digestive, appetiser, relief in diarrhoea, headache, toothache and elephantiasis. Ginger extracts possess strong antioxidant radical activities as evidenced by the ABTS assay .Both aqueous and ethanol extracts of ginger have significant natural antioxidant activity. Therefore, consumption of ginger might be helpful in combating the progression of various diseases with oxidative stress components such as atherosclerosis, diabetes mellitus among others.

Melia azedarach L. (Margosa)[16,22]

Family – Meliaceae

Chemicalconstituents:- Azaridine, sterols, tannins, paraisine, rutin, seeds are rich in fatty oil consisting of palmitic, oleic, linoleic acid.

Medicinal and antioxidant Property:- Root bark is used in ascariasis,skin disease, eczema, leucoderma, malarial fever, wounds, diabeties, insecticidal, intestinal worms. Antioxidant activity is evaluated by DPPH radical scavenging assay and free radical scavenging ability of the extracts. The result showed that the extract of Melia azedarach., which contains highest amount of phenolic compounds exhibited the greatest antioxidant activity. The high scavenging property may be due to hydroxyl groups existing in the phenolic compounds chemical structure that can provide the necessary components as a radical scavenger. IC50 value and the total polyphenol content indicating that increasing the polyphenol content strengths the antioxidant activity.

Some Medicinal Plants Having Potential of Antioxidant Activity[23]

Name of plants	Common English Name	Family	Plant part used
Allium sativum	Garlic	Alliaceae	Bulb
Artemisia campestris	'T'gouft	Asteraceae	Aerial part
Zingiber officinale,	Ginger	Zingiberaceae	Rhizome
Crocus sativus L	Saffron	Iridaceae	Tepals
Dodonaea viscose	Hopbush	Sapindaceae	Flower
Barleria noctiflora	Night-Blooming Barleria	Acanthaceae	Aerial part
Anacardium occidentale	Cashew	Anacardiaceae	Leaves
Datura fastuosa	Kecubung	Solanaceae	Seeds
Caesalpinia bonducella	Nata Karanja	Caesalpiniaceae	Leaves
Vernonia cinerea	Dandotapala	Compositae	Leaves
Platycodon grandiflorun	Balloon Flower/ Platycodon	Campanulaceae	Roots
Ficus beecheyana	Erect Fig	Moraceae	Roots
Costus pictus	Spiral ginger / insulin plant	Costaceae	Leaves
Stevia rebaudiana	Sweetleaf	Asteraceae	Leaves
Coscinium fenestratum	Tree turmeric	Menispermaceae	Stem and leav
Hemidesmus indicus	Ananthamul	Apocynaceae	Stem
Plumbago zeylanica	Chitra	Plumbaginaceae	Root
Bacopa monnieri	Brahmi	Scrophulariaceae	Leaves
Aloe vera	star cactus/ Indian aloe	Asphodelaceae	Leaves
Citrus aurantifolia	key lime	Rutaceae	Leaves
Cannabis sativa L.	Hemp/marijuana	Cannabaceae	Seed
Mentha Pulegium	Pennyroyal	Lamiaceae	Leaves

CONCLUSION

The Current research reveals the different potential application of antioxidant manipulations in prevention or control of diseases. All plants discussed in this review exhibited significant, phenolic compounds, such as flavonoids, phenolic acids, tannins, lignins. To protect the cells and organ systems of the body against reactive oxygen species, humans have evolved a highly sophisticated and complex antioxidant protection system.The present investigation suggests that medicinal plants which possess good antioxidant potential are the best supplements for the diseases associated with oxidative stress.

REFERENCES

1. Gupta S., Shukla R., Sharma K.K., "Antidiabetic, Antihypercholesterolemic and antioxidant effect of Ocimum sanctum Linn. Seed oil", Ind. Jr. Exp. Biol., Apr. 2006, 44(4), pp.300-303.
2. Telrandhe R. Nanotechnology for cancer therapy: Recent development. Eur J Pharm Med Res. 2016;3(11): 284-294.
3. Telrandhe R, Mahapatra D K, Kamble M A. Bombax ceiba thorn extract mediated synthesis of silver nanoparticles: Evaluation of anti-staphylococcus aures activity. Int J Pharm Drug Anal. 2017;5(9): 376-379.
4. Kokate C.K.(a), Purohit A.P., "Text book of pharmacognosy", 2004, 29, pp.542.
5. Shende V, Telrandhe R. Formulation and evaluation of Tooth Gel from Aloe vera leaves extract. Int J Pharm Drug Anal. 2017;5(10):394-398.
6. Deshmukh P, Telrandhe R, Gunde M. Formulation and Evalua-tion of Herbal Toothpaste: Compared With Marketed Preparation. Int J Pharm Drug Anal. 2017;5(10): 406-410.
7. Panchawat S, Rathore KS, Sisodia SS. A review on herbal antioxidants. International Journal of PharmTech Research 2010; 2(1): 232-239.
8. Trivedi L, Telrandhe R, Dhabarde D. Differential spectrophotometric method for estimation and validatuion of Verapamil in Tablet dosage form. Int J Pharm Drug Anal. 2017;5(11): 419-422.
9. Rothekar H, Telrandhe R, Jumade P. Development and validation of RP-HPLC method for simultaneous determination of rosuvastatin and clopidogrel in tablet dosage form. Int J Pharm Drug Anal. 2017;5(12): 475-482.
10. Sharma SK, Singh Lalit, Singh Suruchi, A review on medicinal plants having antioxidant potential, Indian J of Research in Pharmacy and Biotechnology,Vol1(3)May-Jun, 2013,PP404-409.
11. Telrandhe R. Novel UV-Spectropphotometry and RP-HPLC Method for the Simultaneous Estimation of Rosuvastatin and Clopidogrel in Tablet Dosage Form: Method Development and Validation. Inventi Rapid: Pharm Analysis & Quality Assurance, 2018(1):1-9, 2017.
12. Bawane S, Telrandhe R, Pande S D. Formulation and Evaluation of Oral Fast Dissolving Film of Bisoprolol Fumarate. Int J Pharm Drug Anal. 2018;6(2): 105-115.
13. Telrandhe R. Development and Validation of UV Spectrophotometry and RP-HPLC Method for simultaneous determination of Rosuvastin and Clopidogrel in Tablet Dosage Form. Asian J. Pharm. Ana. 2018; 8(1): 25-32.
14. Mohan Lalit,AmberkarM.V.,Kumari Meena,Ocimum sanctum (a taulsi) –An overview,Int.J. Pharmaceutical Sci.Review and Research,Vol 1,Issue 1,2011,PP51-53.
15. Hussain EHMA, Jamil K and Rao M. Hypoglycemic, hypolipidemic and antioxidant properties of Tulsi (Ocimum sanctum) on streptozotocin induced diabetes in rats. Indian J of Clin Biochemistry, 2001; 16(2): 190-194.
16. Prajapati Narayan Das,Purohit S.S.,Sharma A.K.,Kumar Tarun,A hand book of Medicinal Plants,Agrobios (India),ISBN-81-7754-134-X.
17. Zhang Donglin and Hamauzu Yasunori, Phenolic compound and their antioxidant properties in different tissue of carrot,international journal of food, agriculture and environment 2002.
18. Panchawat S.,Rathore K.S.,Sisodia S.S.,A review on herbal antioxidants, Int J. Pharma Tech Research,Vol.2,No 1,pp232-239, Jan-March 2010.
19. Gupta Vivek kumar and Sharma Surender Kumar,Plants as natural antioxidants,Natural Product Radiance, Vol. 5(4)2006 pp326-334.
20. Braga ME, Leal PF, Carvalho JE, Meireles MA. , Comparison of yield, composition, and antioxidant activity of turmeric (Cur-

cuma longa L.) extracts obtaine using various techniques. J Agric Food Chem.2003; 51(22):6604–6611.

21. Morakinyo AO, Oludare GO, Tasdup A, Antioxidant and free radical scavenging activities of aqueous and ethanol extracts of zingiber officinale,Biology of medicine,3(5): 25-330,2011.
22. Nahak Gayatri and Sahu Rajani Kanta, In vitro antioxidative acitivity Azadirachta indica and Meliaand Science 2010;8(4).
23. Ayoub Z, Mehta A, Mishra S K, Ahirwal L. Meducinal Plants as Natural Antioxidants: A Review. Journal of Botanical Society, University of Saugor, Vol.48, 2017; ISSN 2229-7170.