

A Review on Anti-oxidative Herbs

PL. Rajagopal^{1*}, VB. Narayana Swamy², SS. Kiron³ and KR. Sreejith⁴

¹Department of Pharmacognosy, Academy of Pharmaceutical Sciences, Pariyaram Medical College, Kannur, Kerala, South India.

²Professor and Principal, Department of Pharmacognosy, Karaveli College of Pharmacy, Mangalore, Karnataka, South India.

³Department of Pharmacy Practice, Academy of Pharmaceutical Sciences, Pariyaram Medical College, Kannur, Kerala, South India.

⁴Department of Pharmaceutical Chemistry, Academy of Pharmaceutical Sciences, Pariyaram Medical College, Kannur, Kerala, South India.

ABSTRACT

Plants are valuable source of the therapeutic agents in the armory of modern medicine. The method of drug development from plant sources is based on a sequence of operation leading mainly toward the isolation of pure natural products. An antioxidant is a molecule that inhibits the oxidation of other molecules. Antioxidants have been investigated for the prevention of diseases such as cancer, coronary heart disease and even altitude sickness. The major sources of anti-oxidants are reported to be from the natural source, especially from plant source.

Key words: Anti oxidant, Free radical, Medicinal Plants

INTRODUCTION

Till date as such no set definition of the term antioxidant exists. Scientists are still striving hard to find out the role of particular dietary supplements in body that have potent health benefits. Since, different antioxidant compounds found in diet considerably vary from one another; it is a difficult task to identify the role of a single compound. In simple words, "Antioxidants are a type of complex compounds found in our diet that act as a protective shield for our body against certain disastrous diseases such as arterial and cardiac diseases, arthritis, cataracts and also premature ageing along with several chronic diseases.

The above definition gives an idea about what actually an antioxidant is as still a lot of work has to be carried on getting exact information about antioxidants, their exact amount in the diet and their function. The recent research on free radicals promises a revolutionary improvement in the health and lifestyle of humans. (Science Tech Entrepreneur)

Plant based medicines have been in use against various diseases and disorders since time immemorial. The primitive man used herbs as therapeutic agents and medicaments, which they were able to procure easily. Nature has provided abundant plant wealth, which possess medicinal virtues for all living creatures. The essential values of some plants have long been published but a large number of them remain unexplored as yet. So there is a necessity to explore their uses and also to conduct pharmacognostic and

pharmacological studies to ascertain their therapeutic properties. (Bakru H.K. 1992).

In this review an attempt has been made to compile most of the Natural Herbs which possess antioxidant property. Following are the list of such medicinal herbs which are reported to be an antioxidant.

Ashwagandha (*Withania somnifera*) - Leaves, roots and berries of the plant possess antioxidant properties. It prevents premature ageing and arthritis, enhances psychomotor co-ordination & the immune system. The berry is a blood tonifier that improves circulation & absorption of nutrients by cells. Leaves are used for treatment of tumors. Withaferin A inhibits the tumor formation.

Basil-linalool rich (*Ocimum sanctum*)- The leaves of the plants are used to prevent free radical formation and have been found useful in treating arthritis, muscular pains & rheumatism. The main constituents responsible for antioxidant property of basil are ascorbic acid, β -carotene, β -sitosterol, eugenol, palmitic acid and tannin.

Black Pepper (*Piper nigrum*) - The fruit of the plant is used in the treatment of arthritis, and is effective against neuralgia, poor circulation, poor muscle tone, sprains and stiffness. Ascorbic acid, β -carotene, lauric acid, myristic acid, palmitic acid, and piperine are the main constituents responsible for antioxidant behaviour.

Burdock (*Aretium lappalo*) - The roots of the plant possess antioxidative properties and provide protection against cancer by controlling cell mutation. It possesses antibacterial and antifungal properties, purifies blood and supports immune system. Inulin and tannic acid are the constituents present in burdock that possess antioxidative properties.

Barbed Skullcap (*Scutellaria barbata*)- The tea made from this herb is fruitful in treating liver, lung & rectal cancer. It has also been found potent in reducing tumor growth. Gallic acid in scutellaria is anticancerous in function.

Carrot (*Daucus carota*)- The β -carotene found in carrot functions as an antioxidant. It prevents accumulation of toxins and is effective in treatment of arthritis, edema& rheumatism. Alanine, α -tocopherol, ascorbic acid, camphene, eugenol, γ - terpinene, histidine are the main constituents in carrot that possess antioxidant properties.

Coleus (*Coleus ferscoli*) – Commonly called as Paterchur, the roots of the plant are used for fat lowering and to prevent synthesis of high cholesterol in body. Forskoline is the main component in the tea that has antioxidative property.

Clary Sage (*Salvia sclarea*)- The plant prevents free radical formation and is effective in treatment against arthritis and rheumatism. γ -terpinene, linalyl acetate, myrcene, palmitic acid and rosemarinic acid are the main antioxidative components in the plant.

Clove bud (*Eugenia caryophyllata*)- The inflorescence of clove is effective in treatment of arthritis, rheumatism and sprains. Acetyl-eugenol, ascorbic acid, β - carotene, β -sitosterol, caryophyllene-oxide, eugenol and isoeugenol are the main constituents in clove that possess antioxidative property.

Garlic (*Allium sativum*)- The leaves and bulbs protect against free radical formation, reduce blood clotting & cholesterol level. Alanine, α -tocopherol, ascorbic acid, camphene, eugenol, γ -terpinene and histidine are the important antioxidative constituents present in garlic.

Ginger (*Zingiber officinalis*)- The active compound of ginger [6]-gingerol which is responsible for ginger flavor has been found to inhibit human cancer growth. 6-Gingerol, alanine, ascorbic acid, histidine, lauric acid, Methionine, Myristic acid, palmitic acid and

tryptophan are the main antioxidative constituents in ginger plant.

Green Tea (*Camellia sinensis*)-Tea extract, decreases cellular tissues damage and thus prevent ageing. It also supports the immune system. Green Tea extracts which Epigallocatechin-3- gallate (EGCG) is thought to have anticancerous properties and to reduce liver cancer. EGCG and polyphenols are the main antioxidative constituents of green tea.

Ginkgo (*Ginkgo biloba*)-The extract of the plant improves blood circulation, prevents free radical damage and prevents premature ageing and ginkgogolide are the chief antioxidative constituents.

Grape (*Vitis vinifera*)-The OPC (oligomeric proanthocyanidine) is a powerful component present in grape seed. It acts as a super antioxidant, protecting cells against free radical formation. It reduces LDL cholesterol and the risk of cardiovascular tissue. It enhances the ability of collagen to repair itself thus preventing degeneration. It also increases the strength & elasticity of blood vessels, protecting against rupture, leakage & degeneration. OPC reduces high blood pressure by inhibiting the activity of Angiotensin converting enzyme (ACE). It improves the strength of capillaries & blood vessels. In comparison to Vitamin C, OPC is a more powerful antioxidant. It blocks the action of ascorbate oxydase enzyme that destroys Vitamin C. Alanine, α -tocopherol, ascorbic acid; β -carotene, β -sitosterol, histidine, methionine, OPC, palmitic acid and selenium are the main anti oxidative constituents found in grape.

Guggul (*Commifera mukul*)-The gum yielded from the plant is used for treatment of arthritis and for lowering blood pressure.

Lemongrass (*Cymbopogon flexuosus*) - It is found to have a refreshing effect on the body and possesses immune modulatory properties. β -sitosterol, myrcene and selenium in lemongrass are responsible for its antioxidative behavior.

Myrrh (*Commiphora myrrha*)- The resin exudates and sap content is found to be effective against arthritis. β -sitosterol, campesterol and eugenol in myrrh have antioxidative effect.

Nutmeg (*Myristica fragrans*)- The fruit of nutmeg beneficial against arthritis, muscular aches & pains and rheumatism, improves

circulation. It protects the nervous system and provides immunity against bactericidal infection. Camphene, eugenol, γ -terpinene, isoeugenol, lauric acid, myrcene, palmitic acid and terpene-4-ol in nutmeg possess antioxidative properties.

Olive (*Olea europaea*)- The leaf extract of olive contains α -tocopherol, apigenin, β -carotene, γ -tocopherol, kaempferol and luteolin which are immunomodulatory and help to maintain the sugar & cholesterol level in the body.

Oregano (*Oreganum vulgare*) - Thymol & rosmarinic acid in oregano prevents oxygen based damage to the cells in the body. It is found to have 42 times more antioxidant activity than apples, 30 times more antioxidant activity than potatoes, 4 times more antioxidant activity than blueberries, 12 times more antioxidant property than oranges and acts overall as an immune booster. Thymol and rosmarinic acid are the antioxidative constituents in oregano.

Peppermint (*Mentha piperita*)- Limonene and menthol in the leaves of the plant have been found to be anticancerous.

Periwinkle (*Catharanthus*)- Alkaloids (Vincristine & Vinblastine) of the plant are anticancerous.

Rosemary (*Rosemarinus officinalis*.-) The oleoresin extract of the plant scavenges superoxide radicals and inhibits lipid oxidation in food system. It contains oil soluble antioxidants. Carsonic acid, rosemaric acid, β -sitosterol, caryophyllene oxide, eugenol and iso-eugenol in the plant have been found to be antioxidative in nature.

Sandalwood (*Santalum album*) - Alanine, β -sitosterol, eugenol, palmitic acid, phenol are the constituents found in the plant that have antioxidative effect. Mainly wood or the bark of the plant is used. It prevents premature ageing and rejuvenates the skin.

Thyme (*Thymus vulgaris*)- The entire plant possesses antioxidative properties. It enhances blood circulation. 4-terpenol, alanine, β -carotene, caffeic acid, camphene, carvacrol, γ -terpinene, lycopene, myrcene and palmitic acid are the active antioxidative constituents in thyme.

Turmeric (*Curcuma longa*) - Curcumin found in turmeric prevents free radical formation,

premature ageing and possesses anticancerous properties.

Antioxidants are effective because they are willing to give up their own electrons to free radicals. When a free radical gains an electron from an antioxidant it no longer needs to attack the cell and the chain reaction of oxidation is broken (Bethe and Ashkin, 1953). After donating an electron an antioxidant becomes a free radical. Antioxidants in this state are not harmful because they have the ability to accommodate the change in electrons without becoming reactive. Steric and electronic factors are also responsible for a chain-breaking antioxidant.

Plants produce a very impressive array of antioxidant compounds that includes carotenoids, flavonoids, cinnamic acids, benzoic acids, folic acid, ascorbic acid, tocopherols and tocotrienols to prevent oxidation of the susceptible substrate (Hollman, 2001). Common antioxidants include vitamin A, vitamin C, vitamin E, and certain compounds called carotenoids (like lutein and beta-carotene) (Hayek, 2000). These plant-based dietary antioxidants are believed to have an important role in the maintenance of human health because our endogenous antioxidants, provide insufficient protection against the constant and unavoidable challenge of reactive oxygen species (Fridovich, 1998).

REFERENCES

1. Bethe HA and Ashkin J. In Experimental Nuclear Physics, Segre, E., (ed.), Vol. I, Wiley, New York, 1953;166-357.
2. Fridovich I. Oxygen toxicity, a radical explanation. The J Experimental Biol. 1998;201:1203-1209.
3. Hayek MG. Dietary vitamin E improves immune function in cats. In Reinhart G. A and Carey D. P. Eds. Recent Advances in Canine and Feline Nutrition, Iams Nutrition Symposium Proceedings. 2000.
4. Hollman PCH. Evidence for health effects of plant phenols: local or systemic effects. J Sci Food Agric. 2001;81:842-852.
5. Alschuler L, Benjamin SA and Duke JA. Herbal medicine -what works, what is safe. Patient Care. 1997;31: 48-103.
6. Chattopadhyay MK. Herbal medicines. Current Science. 1996;71:5.
7. Chattopadhyay MK. Herbal medicine - some more reports. Current Science, 1997;72:6.

8. Cox PA. Will tribal knowledge survive the millennium? *Science*. 2000;287:44-5.
9. Davies KJA. in *Free Radicals and Oxidative Stress: Environment, Drugs and Food Additives* (eds Rice-Evans, C. et al.), Portland Press, London, 1995;1-31.
10. Evans M. *A guide to herbal remedies*. Orient Paperbacks. 1994.
11. Harvey AL . Medicines from nature: are natural products still relevant to drug discovery? *Trends Pharmacol Sci*. 1999;20:196-8.
12. *Indian Medicinal Plants - a compendium of 500 species Part 3* by Orient Longman Publications. 1997; 256-263.
13. Nadkarni KM. *Indian Materia Medica*, Popular Prakashan. 1993;1:480.
14. Polidori MC, Stahl W, Eichler O, Niestroj I and Sies H. *Free Radic Biol Med*. 2001;30:456-462.
15. *Quality control methods for medicinal plant materials*. World Health Organization. Geneva 1998.
16. Satyavati GV. *Medicinal Plants of India*. 377;1:ICMR.
17. Valiathan MS. *Healing Plants*. *Curr Science*. 1998;75:1122-7.
18. Vickers A and Zollman C. *ABC of complementary medicine: herbal medicine*. *BMJ*.1999;319:1050-3.
19. Mc Caleb R. *The encyclopedia of popular herbs: your complete guide to leading medicinal plants*, Roseville, Calif.,Prima Health. 2000.
20. Bown D. *Encyclopedia of herbs and their uses*, DK Publishing Inc., New York, London, Stuttgart, Moscow. 1995.
21. Bratman S and Kroll D. *National health bible*, Prima Health, U.S.A, 1999.
22. Skidmore-Roth L. *Mosby's handbook of herbs and natural supplements*, third edition, Elsevier Mosby, t. Louis, Missouri, 2006.
23. Bakhru HK. *Introduction- in herbs that heal natural remedies for good health*. Orient paperback. 1992;17:121-125.
24. *Science Tech Entrepreneur*. *Antioxidants in Medicinal and Aromatic Plants*. 2007;1-10.