

**REVIEW ON SOME MEDICINAL PLANTS WITH ANTIOXIDENT
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ABSTRACT

Plants produce a lot of antioxidants to control the oxidative stress caused by sunbeams and oxygen, they can represent a source of new compounds with antioxidant activity. Antioxidants are the group of nutraceutical parameters which works on regulate the prevent oxidative damage of body cause due to free radicals. Natural antioxidants play an important role scavenge harmful free radicals from our body obtained naturally from plants. they are present in various parts of plants as Ascorbic acid, vitamin E, and phenolic compounds. Antioxidants exert their mode of action by suppressing the formation of reactive oxygen species either by inhibition of enzymes or by chelating trace elements.

Free radicals are the chemical species that have an unpaired electron

and play very important role in human health and beneficial in combating against several diseases like cardiovascular disorders, lung damage, inflammation etc. These can damage cell membranes and other vital cell components, such as genetic material in the cell nucleus, and can inactivate enzymes. Damage to body cells and molecules by oxygen containing free radicals has been implicated in a wide variety of diseases. DPPH is widely used to evaluate the free radical scavenging effect of natural antioxidant. Antioxidants in different parts of plants such as ascorbic acid, vitamin E and phenolic compounds possess the ability to reduce the oxidative damage associated with many diseases including cancer, cardiovascular diseases, cataracts, atherosclerosis, diabetes, arthritis, immune deficiency diseases and ageing.

KEYWORDS: Antioxidants activity, Medicinal plants, *curcuma longa*, classification of antioxidants, *azadirachta indica*.

INTRODUCTION

Antioxidants are the substances which can be commonly derived from naturally from the plants. it is most important nutraceuticals parameter which helps in regulating normal body. antioxidant is the group of compound which having capacity to decrease the harm result in body by the various mechanism like exert their mode of action by suppressing the formation of reactive oxygen species either by inhibition of enzymes or by chelating trace elements.^[1]

Free radicals are the species with short half-life high reactivity and damaging activity towards macromolecules like proteins, DNA, Lipids. These can damage cell membranes and other vital cell components, such as genetic material in the cell nucleus, and can inactivate enzymes.

The free radicals may be either Oxygen derived (ROS) or Nitrogen derived (RNS). The most common reactive oxygen species include superoxide anion (O_2^-), hydrogen peroxide (H_2O_2), peroxy radicals ($ROO\cdot$) and reactive hydroxyl radicals ($OH\cdot$). The nitrogen derived free radicals are nitric oxide (NO), peroxy nitrite anion ($ONOO^-$), Nitrogen dioxide (NO_2) and Dinitrogen trioxide (N_2O_3). 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. Chemical compounds and reaction capable of generating potential toxic oxygen species/free radicals are referred to as 'pro-oxidants'. They attack macromolecules 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 antioxidant.^[2]

The human body has a complex system of natural enzymatic and non-enzymatic antioxidant defences which protect the body from the harmful effects of free radicals and other oxidants. Free radicals are responsible for causing a large number of diseases including cancer, cardiovascular disease, neural disorder, Alzheimer's disease, mild cognitive impairment, Parkinson's disease, alcohol induced liver diseases, ulcerative colitis, aging and atherosclerosis. Protection against free radicals can be enhanced by ample intake of dietary antioxidants.^[3]

ADVANTAGES

1. Reduce oxidative stress

Oxidative stress is a form of physiological stress caused by an imbalance between the production and accumulation of oxygen-reactive species in the cells and tissue. This can result in a gap in a system's ability to detoxify reactive products.

2. Reduction in disease condition

Reducing oxidative stress, antioxidants can support normal cellular function and offer additional protection against diseases. Antioxidants are substances that can be used to lower rates of cancer, tumours, diabetes, atherosclerosis, cardiovascular diseases and metabolic disorders in many cases.

3. Enhances the eye health

It mainly works on slowing the progression of age-related macular degeneration. Beta-carotene and vitamin E are also quite well known for these properties.

4. Enhances the brain functioning

Antioxidants have the potential to increase various forms of cognitive decline, like memory loss. It is also use to decreases the oxidative stress, which can contribute to alzheimer disease other forms of memory loss and decline in cognitive function also.

5. Use to reduce the inflammation

Antioxidants prevent inflammation by protecting the cells from damage, they can prevent those unwanted inflammatory responses from occurring at all.

6. Use to helps in skin damages

They work by helping to fight free radical damage, antioxidants can offer extra protection for the skin. Not only can the prevention of inflammation help to reduce the redness, puffiness, and premature aging, but antioxidants can also protect against UV sun damage (which causes premature aging and wrinkles). The most commonly used an effective antioxidant for skin care is vitamin C.^[4]

Principle for Antioxidant Activity

As with the chemical antioxidants, cells are protected against oxidative stress by an interacting network of antioxidant enzymes Here, the superoxide released by processes such as oxidative phosphorylation is first converted to hydrogen peroxide and then further reduced

to give water. This detoxification pathway is the result of multiple enzymes, with superoxide dismutase's catalysing the first step and then catalyses and various peroxidases removing hydrogen peroxide. As with antioxidant metabolites, the contributions of these enzymes to antioxidant defences can be hard to separate from one another, but the generation of transgenic mice lacking just one antioxidant can be informative

A chain breaking mechanism through which the primary antioxidant contributes an electron to the free radical present in the system. The removal of ROS/ reactive nitrogen species initiators (secondary antioxidants) by quenching chain-initiating catalyst is involved in the second mechanism.

Other mechanisms of antioxidants are effective on biological systems like metal ion chelation, electron donation, co-antioxidants or by gene expression regulation mechanisms.^[5,8]

Classification of Antioxidants

A. Classification on the basis of occurrences

1. Natural
2. Synthetics

B. Classification on the basis of their solubility.

1. water soluble
2. Lipid soluble

Eg. Albumin –flavonoids eg tocopherol

Ascorbate-cysteine carotenoids

C.ON THE BASIS OF THE SOURCE AND ORIGIN

Enzymatic non enzymatic^[6]

Application of an antioxidants

1. Dietary antioxidant vitamins A, C, and E are essential and required in specific daily amounts to prevent diseases.
2. Antioxidants which act's nutrients such as carotenoids, ascorbic acid (vitamin C), tocopherols and tocotrienols (Vitamin E), and other low molecular weight compounds including glutathione and lipid acid.
3. Enzymatic antioxidants, that are catalyze free radical quenching reactions including glutathione peroxidase, superoxide dismutase, and glutathione reductase.

4. Proteins that bind metals that seizes free iron and copper ions that are capable of catalyzing.
5. Oxidative reactions, such as lactoferrin, ferritin, albumin, and ceruloplasmin.
6. In the wide varieties of food A number of other antioxidant phytonutrients present.^[7,8]

The role of Natural antioxidant as compare to synthetic

The use of synthetic and natural food antioxidants regularly in medicine and foods particularly those having fats and oils to shield the food from oxidation. Butylatedhydroxytoluene (BHT) and butylatedhydroxyanisole (BHA) are the synthetic and natural food antioxidants which have been used extensively in cosmetic, food and therapeutic industries. Natural antioxidants play an important role while synthetic owing high instability at high temperature, high volatility, some synthetics antioxidants shows carcinogenic behaviours there for the to avoid above instabilities issues it preferable to the use natural type of instead of synthetics antioxidant.^[8]

Some medicinal plants having potential of antioxidant activity

1. *Curcuma longa* (Turmeric)

The common name turmeric is haldi. It is obtained from the rhizomes of *Curcuma longa* plant. belonging to the family *zingiberiaceae*. Chemical constituents responsible for antioxidant activity is curcumin. the turmeric rhizome content main chemical constituents like Curcumin, demethoxycurcumin and bisdemethoxycurcumin collectively known as curcuminoids (3-6%) which are major polyphenolic compounds. The main colouring principle of turmeric rhizome was isolated in 19th century and named as 'Curcumin'. It also shows anti-inflammatory, anti-HIV, anti-bacterial, antioxidant, nematocidal, antiparasitic, antispasmodic and anti-carcinogenic activities.^[9,10]



2. Brahmi

Biological source of Brahmi consists of the fresh and dried leaves and stem of *Bacopa monnieri* which belongs to the *Umbelliferae /scrophulariaceae*. Synonyms of brahmi are Guj- Barmhi Ben- Tholkuri; Hin- Brahmanduki; Tam- allarei. Chemical constituents responsible for antioxidant activity –Becoside A, and Becoside B. it also contains hersaponin, apigenin, D-mannitol, monnierasides I-III, plantainoside B and cucurbitacin; the alkaloids brahmine, herpestine and nicotine. Recently, the neuroprotective effect of Brahmi was investigated in a rat model of schizophrenia. It is also reported that to increase the level of serotonin, trigger 5-HT_{3A} receptors and CREB in hippocampus of postpartum rats thereby facilitating its learning abilities.^[12]



3. Ocimum basilicum L (Basil)

Biological sources of *Ocimum basilicum* L is obtained from the the leaves of *Occicum basillium* belongs to family *Lamiaceae*. The major chemical constituents were found to be methyl cinnamate (70.1%), linalool (17.5%), β -elemene (2.6%) and camphor (1.52%). its essential oils have been used extensively for many years in food products, perfumery, and dental and oral products. Basil essential oils and their principal constituents were found to performs antimicrobial activity against a wide range of Gram-negative and Gram-positive bacteria, mold and yeast *O. citriodorum* cultivar shows the highest antimicrobial activity. these essential oils also having an antioxidant, antibacterial and antifungal activity and can be used as natural antioxidant and antimicrobial agents in medicine, food industry and cosmetics.^[13]



4. *Ocimum Santum* (Tulsi)

Biological source of *Ocimum santum* is obtained from dried leaves of *Ocimum santum* belonging to family lamiaceae. The free radicals may be either Oxygen derived (ROS) or Nitrogen derived (RNS). The most common reactive oxygen species include superoxide anion (O_2^-), hydrogen peroxide (H_2O_2), peroxy radicals (ROO^\bullet) and reactive hydroxyl radicals (OH^\bullet). The nitrogen derived free radicals are nitric oxide (NO), peroxy nitrite anion ($ONOO^-$), Nitrogen dioxide (NO_2) and Dinitrogen trioxide (N_2O_3). 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. Chemical compounds and reaction capable of generating potential toxic oxygen species/free radicals are referred to as 'pro-oxidants'. They attack macromolecules 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 antioxidant.^[1,14]



5. Aloe vera

Biological source of aloe vera is obtained from leaves of Aloe vera Belonging to family Asphodelaceae /xanthorrhoeaceae. Chemical constituents responsible for antioxidant activity – Palmitic acid (25.99), Dibutylphthalate. it also shows 75 potentially active constituents: which includes vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids. **Vitamins:** It contains vitamins A (beta-carotene), C and E, which are antioxidants. It also contains vitamin B12, folic acid, and choline. Antioxidant neutralizes free radicals. It contains 8 enzymes: amylase, alkaline phosphatase, amylase, bradykinase, carboxypeptidase, catalase, cellulase, lipase, and peroxidase. Bradykinase helps to reduce excessive inflammation when applied to the skin topically, while others help in the breakdown of sugars and fats. calcium, chromium, copper, selenium, magnesium, manganese, potassium, sodium and zinc. They are essential for the proper functioning of various enzyme systems in different metabolic pathways and few are antioxidants.^[15]



7. Albizia amara

Albizia amara obtained from the leaves of *Albizia amara* belonging to family *Fabaceae*. Two new tri-O-glycoside flavonols: kaempferol and quercetin 3-O- α -rhamnopyranosyl (1 \rightarrow 6)- β -glucopyranosyl(1 \rightarrow 6)- β -galactopyranosides, were identified from the leaves of *Albizia*, Low lipid content is a favorable factor in preventing in rancidity of seeds stored for long periods. The ash contents (7.84%) of this seed is higher than that of other legumes which has been reported to range between 3.0-4.8%, an indication that it may possess a higher mineral content. Saponins are glycosides components often referred to as ‘natural detergent’ because of their foamy nature. It has been found that saponins have anti -carcinogenic activity,

immune modulation activities and regulation of cell proliferation as well as health benefits such as cholesterol lowering capacity. It shows 96% antioxidant activity.^[16,27]



7. Sena aviculata

Sena aviculata is obtained from *Cassia auriculata* belonging to family Fabaceae. It contains about 89% of antioxidant activity. the potency of protective effect of A.amara was about 4 times greater than synthetic antioxidant butylatedhydroxytoluene.^[17] Pod husk contains nonacosane and nonacosan-6- one, chrysophanol, emodin and rubiadin, β sitosterol, polysaccharides, flavonoids, anthracene derivatives and some dimeric procyanidins, Saponins and tannins. The chemical composition of the leaves of *Cassia auriculata* was investigated by Anandan et al. (2011) and revealed the presence of 3-OMethyl-d-glucose (48.50%), α -Tocopherol- β -D mannoside (14.22%), Resorcinol (11.80%), nHexadecanoic acid (3.21%), 13-Octadecenal, (Z)- (2.18%) and 1,2,3,4-Tetrahydroisoquinolin-6-ol-1-carboxylic acid (1.98%) which were identified by GC – MS analysis. The plant has ability to treat antipyretic, hepatoprotective, antidiabetic, antiperoxidative and antihyperglycemic and microbicidal activity.^[28]



8. *Withania somnifera* (Ashwagandha)

It is commonly known as Indian Ginseng. *Withania somnifera*, a member of the Solanaceae family, has been utilised for generations in Indian traditional medicine systems to cure a variety of illnesses. Ashwagandha's antioxidant activity shows that a common molecular mechanism may be recommended for its diverse biological effects. Active chemical constituents of *Withania somnifera* (WS) include alkaloids (isopelletierine, anaferine, cuseohygrine, anahygrine, etc.), steroidal lactones (withanolides, withaferins) and saponins. Sитоindosides and acylsterylglucosides in Ashwagandha are anti-stress agents. Active principles of Ashwagandha, for instance the sitoindosides VII-X and Withaferin-A, have been reported to that have significant anti-stress activity against acute models of experimental stress.^[18]



9. *Origanum dictamnus* (Orango)

Orangoo obtained from *Origanum dictamnus* belonging to family Lamiaceae. The aqueous extract scavenges free radicals generated by the fenton reaction and reducing oxygen consumption of a methyl linoleate emulsion.^[19] The aqueous extract scavenges free radicals generated by the fenton reaction and reducing oxygen consumption of a methyl linoleate emulsion. The active components of herb are phenolic compounds, mainly flavonoids and phenolic acids. The chemical constituents of the essential oils of the three plants, as well as their combination (1.5% v/v of pure essential oils in olive oil carrier), used in the context of upper respiratory tract infections are presented in details as Supplemental Material in Duikler et al. According to this description carvacrol (52.7%) is the main constituent of the mixture, followed by eucalyptol (12.77%) and β -caryophyllene (3.41%). The compounds *p*-cymene, γ -

terpinene, borneol and α -terpineol participate with concentrations 1.32, 1.17, 1.68 and 1.06% respectively, while the rest 15 compounds participate with less than 1%.



10. *Zingiber officinale* (Ginger)

Ginger is a popular herbal supplement that is frequently used to many different culinary dishes all over the world. It is a rhizome from the *Zingiber officinale* herb, which is a member of the Zingiberaceae family. It is extensively used in alternative medicines such as Chinese medicine, Ayurveda, Siddha and Unani. The Indian systems of medicines recommend the use of ginger as a *kaya karpam* or rejuvenator. It is rich in various chemical constituents, including phenolic compounds, terpenes, polysaccharides, lipids, organic acids, and raw fibers. The health benefits of ginger are mainly attributed to its phenolic compounds, such as gingerols and shogaols. Accumulated investigations have demonstrated that ginger possesses multiple biological activities, including antioxidant, anti-inflammatory, antimicrobial, anticancer, neuroprotective, cardiovascular protective, respiratory protective, antiobesity, antidiabetic, antinausea, and antiemetic activities.^[16]



11. *Azadirachta indica* (Neem)

Neem, also known as *Azadirachta indica*, is a big, evergreen tree in the Meliaceae family that has a wide range of therapeutic uses. The Indian systems of alternative medicine employ various components of the neem tree, including the leaves, blossoms, seeds, roots, and bark, as traditional treatments for a variety of illnesses. Azadirachtin and Nimbolide are the play an imp role in antioxidant activity in the neem; also shows concentration dependent antiradical scavenging activity and reductive potential. The most important active constituent is azadirachtin and the others are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin, salannin, and quercetin. Leaves contain ingredients such as nimbin, nimbanene, 6-desacetylnimbinene, nimbandiol, nimbolide, ascorbic acid, n-hexacosanol and amino acid, 7-desacetyl-7-benzoylazadiradione, 7-desacetyl-7-benzoylgedunin, 17-hydroxyazadiradione, and nimbiol. Quercetin and β -sitosterol, polyphenolic flavonoids, were purified from neem fresh leaves and were known to have antibacterial and antifungal properties and seeds hold valuable constituents including gedunin and azadirachtin. Due to above active ingredients it shows reach source therapeutics role in health management.^[17]



12. *Momordica charantia*

It is obtained from the fruit and leaves of *Momordica charantia*. It comes under the family Cucurbitaceae. by DPPH and ABTS methods using ascorbic acid and gallic acid as standards respectively antioxidant activity of plant extract was determined. The main constituents were *trans*-nerolidol, apiole, *cis*-dihydrocarveol and germacrene D. Furthermore, the oil was tested for its antibacterial and antifungal activities. *Staphylococcus aureus* was found to be the most sensitive microorganism with MIC values < 500 μ g/ml. It shows carminative, emmenagogue, in the treatment of colics, and as antiviral, anthelmintic, antimalarial, and

antimicrobial remedy effect. also have been The health benefits of bitter gourd have been well documented, especially its anti-diabetic properties.^[20]



13. Arjuna

It is obtained from leaves and flower of *Terminalia arjuna* belongs to family Combretaceae. Chemical constituent responsible for antioxidant activity is largely due to flavonoids. It also shows tannin, polyphenol, saponin etc. The drug exhibits hypotensive action with vasodilation and decreased heart rate. Arjun bark is used as a Cardio tonic. It reduces angina frequency it is also styptic, febrifuge and anti-dysenteric. It also possesses diuretic and tonic properties. The diuretic activity is due to arjunolic acid.^[21]



14 Sonchus asper

It is obtained from leaves of *Sonchus asper* belongs to family Asteraceae. The plant *Sonchus asper* has been used for the cure of skin ailments and many other disease conditions. *S. asper* showed higher concentrations of lipids (1.32 g/100 g), carbohydrates (0.34 g/100 g), total carotenoids (5.58 mg/100 g), and Ca (96.25 mg/100 g), while *S. arvensis* had the highest

concentration of vitamins E ($72.98 \mu\text{g}/100 \text{ g}$) and K ($604.85 \text{ mg}/100 \text{ g}$). *S. oleraceus* showed higher concentrations of Fe ($23.74 \text{ mg}/100 \text{ g}$). USES *Sonchus oleraceus* used in the treatment of headaches, general pain, diarrhea, menstrual problems, fever, hepatitis, salmonella infection, warts, eye problems, liver infections, infections, inflammation and rheumatism.^[22]



15. *Annona squamosa*

Annona squamosa is obtained from leaves and fruit and seeds of *Annona squamosa* belonging to the family Annonaceae. Phenolic compounds in these plants shows antioxidant activity. is commonly found in India & cultivated in Thailand & originates from the West Indies & south America. It is known as custard apple, sugar apple, sweet après in english, & sharifa in hindi & sitaphalam in telugu in india & corossolier & cailleux, pommier cannelle in French. Six major components were identified as 1H-cycloprop(e) azulene(3.46%), germacrene D (11.44%), bisabolene (4.48%), caryophyllene oxide(29.38%), bisabolene epoxide(3.64%) and kaur-16-ene(19.13%). The oil was also screened for its antimicrobial activity which exhibited a significant antimicrobial activity against *Bacillus subtilis* & *Staphylococcus aureus*. Bullatacin is one such compound that possessed antitumoral and pesticidal activity in vitro.^[23]



CONCLUSION

It is concluded that antioxidant activity is the most important nutraceutical parameter which helps in regulating normal body functioning by regulating different activities shown by chemical constituents obtaining from different plants that is the natural antioxidants. the use of natural antioxidant is most beneficial then that of synthetics one by reducing side effect profile. natural antioxidant shows different advantages and applications.

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