



ANTIOXIDANT HERBS IN SIDDHA MEDICINE –A MINI-REVIEW

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ABSTRACT

An antioxidant is a chemical compound that inhibits the oxidation of other molecules. Oxidation reactions can produce free radicals. These radicals can start chain reaction, it can cause damage or death to the cell. Antioxidants terminate these chain reactions by removing free radical intermediates. Antioxidants such as Vitamin- C, Vitamin-E and carotenoids, which include beta-carotene, lycopene and lutein help protect healthy cells from damage caused by free radicals. The review article mainly focuses on the role of antioxidant herbs in Siddha medicine. We developed a search strategy to find publication about antioxidant herbs in Siddha medicine and its merits, so we searched CRI Library, Medline, Pubmed, Dove Press, Bentham Publishers, Bibliographic databases using the key phrases, herbs, antioxidant Siddha medicine and animal products. Our review article suggests that rejuvenating therapy known as “kayakarpam”. Those kayakalpa drugs include, herbal, mineral and animal products, containing more antioxidant properties of siddha medicine. However our study enlightened antioxidant herbs such as *Embllica officinalis*, *Azadirachta indica*, *Tinospora cordifolia*, *Terminalia chebula*, *Feronia elephantum*, *Aloe vera*, *Withania somnifera*, *Semecarpus anacardium*, *Citrus lemon*, and *Eclipta alba*.

Keywords: Antioxidants, Vitamins, Siddha herbs, free radicals, Kayakarpam.

INTRODUCTION

An 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 terminate these chain reactions by removing free radicals intermediates, and inhibit other oxidation agents such as thiols, ascorbic acid or polyphenols [1]. Although oxidation reactions are crucial for life, they can also be damaging; hence, plants and animals maintain complex systems of multiple types of antioxidants, such as glutathione, vitamin C, and vitamin E as well as enzymes such as catalase, superoxide dismutase and various peroxidase. Low levels of antioxidants, or inhibition of the antioxidants enzymes, cause oxidative stress and may damage or kill cells. As oxidative stress might be an important part of many human diseases, the use of antioxidants in pharmacology is intensively studied, particularly as treatments for stroke and neurodegenerative diseases. However, it is unknown

whether oxidative stress is the cause or the consequence of disease [2].

In general, the reactive oxygen species circulating in the body tend to react with the electron of other molecules in the body and these also effect various enzyme systems and cause damage which may further contribute to conditions such as cancer, ischemia, aging, adult respiratory distress syndromes, rheumatoid arthritis etc.,[3]. Antioxidants are widely used in dietary supplements and have been investigated for the prevention of diseases, Siddha system of medicine is one of the ancient system of medicine in india. It was gifted by 18 siddhars. It said the longevity of the human was upto 100 years [4], but nowadays it was reduced due to lifestyle modification to avoid it, we are in demand to stop oxidation stress. By identifying and using those kayakalpa herbs make the longevity of the human. One in 18 siddhars called thirumoolar, he says the concept of kayakalpa in his thirumandiram briefly. In siddha, the concept of kayakalpa, antioxidant deals with the prevention of NARAI (Grey hair), THIRAI (Shrinking of Skin), MOOPU (Aging), SAAKADU (Death), kayakalpa

herbs were described in Karuvuravadhakaviyam and Theriaryemagavenba[5].

Antioxidant *invitro* and *in vivo* study - data collection: ***Emblica officinalis***

It is used for the treatment of Vomiting, vertigo, dizziness, constipation, sinusitis, anemia, dropsy, menorrhagia, common cold, scurvy, cancer and heart disease, ascites, and used as Kaya karpam [6]. Its chemical constituents are tannins and other phenolic compounds and flavonoid quercetin. It is a rich source of Vitamin C. It interacts directly with radicals and scavenges them and hence, shows antioxidants activity [7].

Azadirachta indica

It is used for the treatment of viral fever, Leprosy, diabetes, jaundice, skin disease and used as Kaya karpam. Its chemical constituents are limonoids, azadirone and carbohydrates (polysaccharides), sulphurous compounds, polyphenolics such as flavonoids and their glycosides, dihydrochalcone, coumarin and tannins, aliphatic compounds etc[8]. Ethanolic extract of *Azadirachta indica* leaves possess in vitro antioxidant activity, The antioxidant activity was determined by using DPPH, radical scavenging, nitric oxide (NO) radical scavenging, iron chelation and reducing power methods [9].

Tinospora cordifolia

It is used for the treatment of fever, diabetes, cough, splenomegaly, jaundice; diarrhea .It has been reported to contain immunomodulatory constituents. Earlier studies showed that the dry stem crude extract (DSCE) of this plant contained a polyclonal B cell mitogen which was polysaccharide in nature [10-13]. Its chemical constituents are rich phenolic compounds and Vitamin C. It's extract was tested by Hydrogen peroxide Scavenging activity [14].

Terminalia chebula

It is used for the treatment of Hemorrhoids, gastric ulcer, anorexia, anemia, dropsy, jaundice, hic-cough, vomiting leucorrhoea, diarrhoea, eye disease, etc. Its chemical constituents are tannins chebulinic, ellagic and gallic acids. Its extract was tested by studying the inhibition of radiation induced lipid peroxidation in rat liver microsomes. It shows free radical scavenging activity due to presence of tannins. It inhibits the development of duodenal ulcer and appeared to extract a cytoprotective effect on the gastric mucosa [15].

Feronia elephantum

It is used for the treatment of cough, bronchial asthma, anorexia, diarrhoea, hic-cough. Its fruit contains vitamins and mineral citric acid potassium, calcium and

iron salt. Seeds and fruits contained oil and protein; oil composed of palmitic, oleic, linoleic and linolenic acids besides traces of palmitoleic and stearic acids; β sitosterol, β - amyryl, lupeol and stigmasterol [16] . The stem bark yielded 5,3 - dihydroxy - 4 - methoxy - 6,6 - dimethylchromeno - flavone along with several known compounds including an alkaloid, five coumarins, a flavonone, a lignin, three sterols and triterpene[17].

The ethanolic extract of *Feronia elephantum* leaf and bark were used for investigation of antioxidants activity by using *in vivo* antioxidants parameters in alloxan induced diabetic rat (Group-2) were found to have increased SOD, CAD, GP_x levels in serum and liver as compared to control (Group-1). Treatment with *Feronia elephantum* leaf and bark extracts and glibenclamide (Group-3,4,&5) produced significant (P<0.05) decrease in LPO levels and significant increase in antioxidant enzyme levels [18].

Aloe vera

It is used for the treatment Hemorrhoids, fistula, gastric ulcer, diarrhoea, oliguria, amenorrhoea, eye problems, etc. Its chemical constituents are non-essential and essential amino acids [19,20]. The anti-oxidative properties of extracts of *Aloe vera* gel made in methanol (MEAG), 95% ethanol (EEAG), hexane (HEAG), acetone (AEAG) and chloroform (CEAG) were investigated employing various *in vitro* systems viz. 1, 1-diphenyl-2-picrylhydrazyl (DPPH), superoxide anion radicals scavenging, metal ion chelation, reducing power, hydroxyl radicals scavenging and total antioxidant activity in linoleic acid emulsion system [21].

Withania somnifera

It is used for the treatment of Peptic ulcer. Splenomegaly, Leucorrhoea, asthma, anaemia, Oligospermia, TB, Peripheral neuritis, Insomnia. The main constituents of ashwagandha are alkaloids and steroidal lactones. Withanine, somniferine, somnine, somniferinine, withanane, pseudo-withaninotropane, pseudo-tropine, choline, anaferrine, anahydrine, isopelletierine are chemical constituents present in it [22]. *In-vitro* antioxidant activity of the extracts of *Withania somnifera* was performed and Ethanol and methanol extract of *Withania somnifera* showed noticeable effect in the DPPH scavenging assay, reducing power capacity, cupric reducing antioxidant capacity and nitric oxide scavenging assay [23].

Semecarpus anacardium

Different parts of this plant have been traditionally used to treat rheumatism, asthma, neuralgia, anthelmintic infection, cancer and psoriasis [24]. The most significant components of the *Semecarpus anacardium* Linn. are bharbilwanols, phenolic compounds, biflavonoids, sterols and glycosides. An alkaloid, bharbilwanol, has been

isolated from oil and seeds. Bhilwanol fruits was shown to be a mixture of cis and trans isomers of ursuhenol. Oil from nuts, bhilavinol, contains a mixture of phenolic compounds mainly of 1,2-dihydroxy- 3 (pentadecadienyl - 8, 11) benzene and 1,2 -dihydroxy - 3 (pentadecadienyl - 8', 11') -benzene[25]. Using Lipid per-oxidation, DPPH and nitric oxide, Superoxide and Hydroxyl radical scavenging assay to investigate the antioxidant activity of crude ethyl acetate extract from the stem bark of *Semecarpus anacardium* L[26].

Citrus lemon

It is known as Elumichai, Family -Rutaceae. It is used for the treatment vomiting, anorexia, dehydration, psychiatric disease, eye disease, ear disease [6]. Its chemical constituents are terpineol-4, linalool, linalyl acetate, terpinolene, octanal, sinensal, R-sinensal [27]. The antioxidant activity was estimated by two *in vitro*

assays, DPPH radical scavenging activity and inhibition of Fe-ADP-Ascorbate induced lipid peroxidation (LPO) method. It contains mainly citral and limonene. The antioxidant property is shown due to presence of citral[28].

Eclipta alba

It is known as Karisalai, Family - Asteraceae. It is used for the treatment anemia, dropsy, jaundice, dental problems, ear pain, etc. and also used as Kaya karpam. The most important of these bioactive compounds of plants are alkaloids, flavonoids, tannis, and phenolic compounds. Flavonoids have been reported as an antioxidant. DPPH (1,1-diphenyl-2 picryl hydroxyl) radical scavenging capacity is used for establishment of antioxidant potential of *Eclipta alba* in comparisons to ascorbic acid as standard compound [29].

Table 1. Commonly Used Antioxidant Herbs available in Siddha Medicine

S. No	Botanical name & Common name	Name in Siddha medicine	Family	Part used
1	<i>Embllica officinalis</i> (Indian Goseberry)	Nelli, Amalagam	Euphorbiaceae	Seed
2	<i>Azadirachta indica</i> (Neem)	Vembu, Nimbam,	Meliaceae	Leaves
3	<i>Tinospora cordifolia</i> (Heart leaved moon seed)	Seenthil, Amirthavalli	Menispermaceae	Stem
4	<i>Terminalia chebula</i> (Ink nut)	Kadukkai, Arithagi	Combretaceae	Fruit
5	<i>Feronia elephantum</i> (Wood apple)	Vila, Vilavu	Rutaceae	Fruit
6	<i>Aloe vera</i> (Indian aloes)	Kattrazhai, Kumari	Liliaceae	Flesh
7	<i>Withania somnifera</i> (Winter cherry)	Amukkara, Aswakandham	Solanaceae	Tuber
8	<i>Semecarpus anacardium</i> (Marking Nut tree)	Serrankottai, Vallathi	Anacardiaceae	Seed
9	<i>Citrus lemon</i> (Lime)	Elumichai	Rutaceae	Fruit
10	<i>Eclipta alba</i> (Traillingeclipta)	Karisalai, Kaiyanthagarai	Asteraceae	Leaves

CONCLUSION

Antioxidant may offer resistance against the oxidative stress by scavenging free radicals, inhibiting lipid peroxidation by many other mechanisms and thus prevent diseases. Today widely used as free radicals inhibitors in food for maintaining the freshness, flavor and odor for a longer period. Current research reveals the different potential application of antioxidant/free radical

manipulations in prevention or control of diseases. Siddha system of medicine has more number of herbs with antioxidant activity, which preventing aging and disease.

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