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A REVIEW ON MEDICINAL PLANTS HAVE ANTI OXIDANT POTENTIAL

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ABSTRACT

Oxygen free radicals are atoms or molecules produced during metabolic reaction or by environmental exposure like tobacco smoke and radiation. Free radicals can damage cells and leads to several diseases. Antioxidants are substances that may neutralize the effect of ROS or Oxygen free radicals through different ways and may prevent the body from various diseases. Antioxidants may classify as synthetic antioxidants and natural antioxidants. The synthetic antioxidants like butylated hydroxyanisole are harmful to human health. Hence, there is a need to search for effective, non-toxic natural compounds with antioxidative potential. In the present review, summarizes some medicinal plants having antioxidant potential.

KEY WORDS: Antioxidant, Free radical, Medicinal plants.

INTRODUCTION

Cellular damage or oxidative injury arising from Reactive Oxygen Species (ROS) or free radicals. The free radicals are generated in physiological system as part of the body's normal metabolic process, from atmospheric pollutants, xanthine oxidase activity and the free radical chain reactions are usually produced in the mitochondrial respiratory chain, liver mixed function oxidases, through transitional metal catalyst, drugs, xenobiotics and by bacterial leucocytes.[1] Highly reactive free radicals or reactive oxygen species are present in living systems from various sources.[2] The oxidants or free radicals are species with very short half life, high reactivity and damaging activity towards macromolecules such as proteins, lipids and DNA. The radical oxygen species may be either Oxygen derived (ROS) or Nitrogen derived (RNS). The most common reactive oxygen species include hydrogen peroxide (H_2O_2), superoxide anion (O_2), reactive hydroxyl radicals (OH) and peroxyl radicals (ROO).

The nitrogen derived free radicals are nitric oxide (NO), peroxy nitrite anion (ONOO), nitrogen dioxide (NO_2) and dinitrogen trioxide (N_2O_3).[3] Reactive Oxygen Species (ROS) such as hydrogen peroxide, superoxide anions, hydroxyl, nitric oxide and peroxynitrite radicals play an important role in oxidative stress related to the pathogenesis of various important diseases.[4,5] Free radicals play a crucial role in the development of several diseases such as asthma, cancer, dementia, arthritis and Parkinson's disease.[6] Some of the free radicals play a positive role in regulation of cell growth , energy production and phagocytosis etc. However, free radicals may also be damaging.[7] Reactive species such as oxidants are formed in controlled amounts by neutrophil leucocytes and exposure to microbes are beneficial to the body in that they participate in destroying the microbes. However, excess oxidants can be harmful to the body. In nature there wide variety of naturally occurring anti oxidants which are different in their chemical and physical properties, composition, mechanisms and site of action.[8]

CLASSIFICATION OF ANTI OXIDANT

It is of two types.

1. Based on Line of Defense

A) Preventive anti oxidant(First Line Defense)

These are enzymes like catalase ,glutathione peroxidase, superoxide dismutase,glutathione reductase and some minerals like Se,Mn,Cu,Zn etc.[9,10] Superoxide dismutase acts by quenching of superoxide(O_2) ,catalase by catalyzing the decomposition of hydrogen peroxide (H_2O_2) to water and oxygen.Glutathione Peraxidase catalyses the reduction of H_2O_2 and lipid peroxide generated during lipid peroxidation to water using reduced glutathione as substrate.

B) Radicals Scavenging Antioxidant (Second Line Defense)

These are Vitamin A, C and E, albumin, uric acid, bilirubin, flavonoid transferin, and ceruplasmine etc. β- carotene is excellent scavenger of singlet oxygen. Vitamin C interacts directly with radical like O_2, OH.

Vitamin A, C and E are playing a crucial role in preventing peroxidation damage in the biological system.[11, 12] The protiens like albumin ,transferin, ceroplasmin restrict the production of metal catalysed free radicals .[13]

C) Repair and De-novo Enzymes (Third Line Defense)

These are a complex group of enzymes for repair of damaged DNA, Oxidised lipids and peroxides and also to stop chain propagation of peroxyl lipid radical. These enzymes repair the damage to bio-molecules and reconstitute the damaged cell membrane.[14]

2) Based On Solubility

A) Hydrophobic Anti Oxidants

Tocopheral, quinines and some polyphenoles come under liquid soluble anti oxidants.[15] They are soluble to lipids. Lipid soluble anti oxidants protects cell membranes from lipid peroxidation.

B) Hydrophilic Anti Oxidants

Ascorbic acid, uric acid and some polyphenols come under water soluble anti oxidants.[15] Water soluble anti oxidants react with oxidants in the cell cytoplasm and blood plasma.

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.[16]

METHOD

Medicinal herbs are selected through the study of their literature from the online journal and publications. The collected literature of the medicinal plants related to the plant family, source or part are used , uses or physiological activities or pharmacological activities and plant derivative compounds are put in tabular form for the analyzation.[17]

Table-1: Some Medicinal Plants Have Anti Oxidant Potential Activity

S.No	Plant Name	Family	Post Used Stem	Pharmacological Activity
1	*Alstonia Scholaris L.*	Apocynaceae	Stem	Anti oxidant, Dysentery,Diarrhea and Malaria(18,19)
2	*Allium Sativum L.*	Liliaceae	Peel	Anti oxidant Activity , Anti Cholesterol, Anti Asthmatic, Anti septic, Diuretic, Diaphoretic(20,21)
3	*Annona Reticulate L.*	Annonaceae	Leaves	Antioxidant , Anti Dysenteric, and Anti helminthic (22,23)
4	*Bidens Pilosa L.*	Asteraceae	Whole Plant	Anti oxidant,colds , flu,wounds, Hepatitis, Urinary Tract infections (24,25)

5	*Berberisvulgaris L.*	Beriberidaceae	Root bark	Anti oxindant diarrhea, Malaria, Leishmaniasis, Urinary tract Diseases[26]
6	*Bauhinia Variegate L.*	Caesalpiniaceae	Stem	Anti oxidant , Anti bacterial , Tumors Ulcer Bronchitis, Leprosy and Anti Fungal[27]
7	*Bacopa monniera L.*	Scrophulariaceae	Whole plant	Anti oxidant , Anti inflammation[28]
8	*Citrullus colocynthis L.*	Cucubitaceae	Leaves	Anti oxidant ,Cytotoxic,Anti inflammatory anti-diabetic and Hepatoprotective activity[(29,30)]
9	*CrocuS Sativus L.*	Iridaceae	Dry stigmas	Anti oxidant activity[(31,32)]
10	*Cedrus deodara G.Don*	Pinaceae	Wood	Anti oxidant, Antiseptic and astringent[(33,34)]
11	*Curculigo Orchioides*	Amaryllidaceae	Root	Anti oxidant ,Diarrhoea,Astama and Skin diceases[(35,36)]
12	*Lantana Camara L.*	Verbenaceae	Flower ,Root, Leaves,stem	Anti oxidant ,Anti bacterial,Anti tumoral and Antihypertensive[37]
13	*Moringa oleifera L.*	Moringacae	Stem	Anti oxidant , Anti crobial ,Anti inflammatory and Anti genotixic[(38,39)]
14	*Nigella Sativa L.*	Ranunculaceae	Stem	Anti oxidant , Anti histamic, Anti diabetic Anti infective and Anti peroxidative [(40,41)]
15	*Phellinus Rimosus*	Hymenichetaceae	Sporo carps	Anti oxidant [(42,43)]
16	*Psidium guajava L.*	Myrtaceae	Leaves	Anti oxidant [44]
17	*Pinus resinosa Aiton*	Pinaceae	Wood	Anti oxidant,analgesic,Anti bacterial and Anti Fungal[(45,46)]
18	*Punica granatum L.*	Lythraceae	Juice, peel	Anti oxidantand Anti inflammatory [(47)]
19	*Ocimum Sanctum L.*	Lamiaceae	Leaves	Anti oxidant,anti stress,Anti inflammatory and Anti bacterial activity[48]
20	*Seme carpus anacardium L.*	Ancardiaceae	Dry fruits	Anti oxidant , Anti inflammatory, Analgesic Anti Pyretic and Ulcerogenic activity[(49,50)]
21	*Wood fordia fruticosa Saliba*	Lythraceae	Fruit	Anti oxidant, Anti pytetic, Anti inflammatory, and Anti bacterial activity[(51,52)]
22	*Zingiber officinale*	Zingiberaceae	Rhizomes	Anti oxidant,Anti Spasmodic,Anti inflammatory,Astrigent[(53,54)]

Table-2: Some Medicinal Plants And Their Components Have Anti-Oxidant Potential Activity

S.No	Plant Name	Family	Parts used	Components
1	*Emblica officinalis*	Euphorbiaceae	Seeds	VitminC,Tanins[55]
2	*Ocimum sanctum*	Lamiaceae	Leaf	Ascorbic acid,Carotenoids[55]
3	*Carica papaya*	Caricaceae	Leaves	Terpenoids, Saponins, Tanins[56]
4	*Aloe Vera*	Xanthorrhoeaceae	Leaf	Carotenaids,Vitamin A,C,E [57]
5	*Andrographis paniculata*	Acanthaceae	Whole plant	Diterpenes,Lactones[58]
6	*Cassia fistula*	Fabaceae	Bark	Flavonoids[59]
7	*Ficus bengalensis*	Moraceae	Aerial root	Tannis,Flavonoids[60]
8	*Syzygium cumini*	Myrtaceae	Leaf	Ellagic acid,Triterpenoids[61]
9	*Cyperus rotundus*	Cyperaceae	Rhizomes	Saponin,sesquiterpenoids[62]
10	*Hemidesmus indicus*	Apocynaceae	Stem	Alkaloids,Glycosides[63]

DISCUSSION AND CONCLUSION

The selected medicinal plants in this review (Table1 and Table2) have several pharmacological activities like anti cancer activity, antioxidant activity, anti filariasis activity, anti inflammatory activity, anti diabetic activity and many more. Several medicinal herbs and their derived substance have been a prime source for the treatment of many diseases, many of which are consumed daily with the diet.

Plants having vitamins, flavonoids, polyphenols etc. possess remarkable antioxidant activity. Antioxidant may resistance against the oxidative stress by inhibiting lipid peroxidation, Scavenging free radical and many other mechanisms and thus prevents diseases.

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