HERBAL REMEDIES AS ANTIOXIDANTS: AN OVERVIEW

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Abstracts

The primary cause of degenerative disease is not due to damaging free radicals, but rather it is due to the requirement of highly ordered cell biochemistry becoming disordered due to insufficient cellular energy to maintain the normal state of order. There is a complex defense system in the body, in which vitamins, minerals, amino acids and certain enzymes play a central role called the antioxidant system. Antioxidants are weapons for combating free radicals and mop up damaging chemicals in the body and guard against many chronic diseases. Heart disease, arthritis, cancer and many other common chronic diseases derive from the same source: fortuitous mutations caused largely by free radicals. Under optimum conditions, cells are protected against free radicals and lipid per oxidation. Antioxidants are substances, which react chemically with free radicals and render them harmless and at the same time break the vicious circle, which involves the decomposition of fatty acids & proteins, the creation of new free radicals and eventual cell death. Because free radical damage accumulates with age, people should start supplementing with antioxidants early to achieve long-term benefits. The scientific community has begun to unveil some of the mysteries surrounding this topic, and the media has begun whetting our thirst for knowledge.

Keywords: Antioxidant; Vitamin C; Vitamin E

1. Introduction

Athletes have a keen interest because of health concerns and the prospect of enhanced performance and/or recovery from injury due to exercise. The purpose of this article is to serve as a beginner's guide to what antioxidants are and to briefly review their role in exercise and general health. Traditional knowledge of medicinal plants has always guided the search for cures. In traditional drugs due to presence of antioxidants, property them contributing in cures of many diseases. The human body posses innate defense mechanisms to counter free radicals in the form of enzymes such as superoxide dismutase, catalase, and glutathione peroxide. VitaminC, vitaminE, selenium, βcarotine, lycopene, lutin and other carotinoids been used supplemantry have as antioxidantsplants secondary metabolites such as flavonoids and terpenoids play an important role in the defence against free radicals. list of Plants produces large amount of antioxidants to prevent the oxidative stress, they represent a potential source of new compounds with antioxidant.

1.1 Antioxidant²

Role of Antioxidants: An antioxidant is a chemical that prevents the oxidation of other chemicals. They protect key cell components by neutralizing the damaging effects of free radicals, Major source of antioxidants is traditional herbs which are taken by human in life. In a normal cell, there are appropriate oxidant : antioxidant balance can be sifted, when production of oxygen species is increased or when levels of antioxidants are diminished This state is called oxidative stress.

To counter the harmful effects of free radicals like Reactive oxygen species (ROS) and Reactive nitrogen species (RNS), antioxidant defense mechanism operates to detoxify or scavenge these ROS and RNS. Antioxidants, together with the substances that are capable of either reducing Reactive Oxygen Molecules (ROMs) or preventing their formation, from a powerful reducing buffer and affects the ability of the oxygen metabolites. All reducing agents, thereby form protective mechanisms, which maintain the lowest possible level of ROMs in the cell. Antioxidant defense system against oxidative stress is composed of several lines, and the antioxidants are classified into four categories based on function as follows:⁵

- First line of defense is the preventive antioxidants, which suppress formation of free radical (enzymes such as glutathione peroxidase, catalase, superoxide dismutase: carotenoids, selenoprotein, lactoferrin, etc.)
- Second line of defense is the radical scavenging antioxidants suppressing chain initiation and/of breaking chain propagation reactions, i.e., radical scavenging antioxidants.
- Third category antioxidants are repair and denovo antioxidants (some production enzymes, repair enzymes of DNA, etc.)
- Fourth line is an adaptation where the signal for production and reactions of free radicals induces formation and transport of the appropriate antioxidant to the right site. Antioxidants act as radical scavenger, hydrogen donors, electron donor, peroxide decomposer, singlet oxygen quencher, enzyme inhibitor, synergist and metalchelating agents.

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their defense system ³	

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Type of Free Radical or	Defense System		
Oxidants			
Superoxide anion (O ²)	Superoxide dismutases		
Hydroxyl radical (OH)	(SOD), Mn-SOD, Cu-		
	Zn-SOD		
Peroxy radical(ROO)	Tocopherols,		
	Ubiquinone		
Singlet oxygen $(^{1}O_{2})$	Carotenoids		
Hydrogen peroxide (H ₂ O ₂)	CATALASE,		
	Seglutathione		
	peroxide(GPx)		
Hydroperoxides (HOO)	GPx, Glutathione		
	reductase		
Transition metals ($Fe^{2+}Cu^+$)	Chelators		

Both enzymatic and nonenzymatic antioxidants exist in the intracellular and extracellular environment to detoxify ROS.

1.2 Enzymatic Antioxidants:⁷⁻⁸ :The first lines of defense against O_2 and $H_2 O_2$ mediated injury are antioxidant enzymes like SOD, GPx, and CAT.

• Superoxide dismutase (SOD): Superoxide dismutase (SOS) is a family of metallo-enzymes that convert O₂ and H₂O₂ by the reaction:

$$\mathbf{O}_2 + \mathbf{O}_2 \xrightarrow{} \mathbf{H}_2 \mathbf{O}_2 + \mathbf{O}_2$$

It is considered to be stress protein, which is synthesized in response to oxidative stress. SOD is the most important enzyme as it is found in all aerobic organisms and is also present in mitochondria & cytosol. There are four families of SODs: Cu-SOD, Cu-Zn-SOD, Mn-SOD and Fe-SOD enzyme and has been detected in a large number of tissues and organism, and is thought that it is present to protect the cell from damage caused by O_2 .

Increased plasma level of SOD has been reported in various diseases. Breast cancer patients have been reported to possess increased levels of plasma copper and zine. Thus, increased production of SOD in various genetic diseases may be in response of higher production of free radicals in those diseases.

Glutathione peroxidase (GPx): Glutathione peroxidase (GPx) is a selenium containing enzyme, which catalyses the reduction of H_2O_2 and lipid hydroperoxide (LO2H), generated during lipid peroxdation, to water using reduced glutathione as substrate. It is found in both cvtosol and mitochondria and is a well-known first line of defense against oxidative stress, which in turn requires glutathione as a cofactor. It is involved in the generation of nucleotide precursors of DNA via the reduction of ribonucleotides to deoxyribonucleotides. GPx catalyses the oxidation of Reduced Glutathione (GSH) to Oxidized Glutathione (GSSG) at the expense of H_2O_2 , by its selenium dependency. Since, selenium is an integral component of GOx, the measurement of this enzyme has been used as a functional index of selenium level.

Low levels of selenium have been associated with a high risk of cardiovascular diseases and cancer in humans. Plasma GPx activity was found to be significantly elevated with respect to the controls in breast cancer patients. The reason of higher GPx activity in breast cancer patients may be in response to higher production of ROMs.

• Catalase (CAT): Catalase (CAT) is present in most cells and catalyses the decomposition of hydrogen peroxide to water and oxygen. The mechanism of action is as follows:

$2H_2O_2{\rightarrow}\ 2H_2O{+}O_2$

CAT is found to act 104 times faster than peroxidase and is mainly localized in mitochondria and in subcellular respiratory organelles. CAT is found to be important in the inactivation of many environmental mutagens. Plasmid DNA strand scission causes by xanthine/xanthine oxidase (XO) has been reported to be prevented by both SOD and CAT enzymes. It also has a role in preventing chromosomal accompanied by significant increase in IL-2, which correlated with increased lymphocyte production³⁵.

By using parenteral nutrition with w-3 fatty acids, following haemorrhagic shock, it was possible to prevent an increase in the release of PGE_2 , and maintain normal defensive functions of splenocytes and macrophages.

A rise in IL-2, as well as maintenance of postoperative interferon-production could be shown for surgical patients on parenteral w-3 fatty acids nutrition. These results indicated the positive influence of parenterally administering w-3 fatty acids to weakened post-operative and post-traumatic defensive functions.

An animal experiment on rabbits even showed that intravenous administration of 1.5gm fish oil per kg body weight per day increased the elimination of bacteria from blood, in comparison with soyabean oil.

Some internally generated sources of free radicals are

a) Mitochondria b)phagocytosis c)Xanthenes oxidase d) Inflammation e) Arachidonate pathways g) Exercise h) Ischemia/Reperfution injury

Some externally generated sources of free radicals are:

a) Cigarette smoke b) Radiation c) Industrial solvent d) Environmental pollutants e) Certain drugs and pesticides f) Ozone

The free radical diseases: Oxidative Or free radical injury is a fundamental mechanism of human diseases. Increasing evidence suggests that such injury is important in the pathogenesis of a diverse group of neurological disorders (Ebadi,2001) Various diseases/disorders linked to free radical and reactive oxygen species were listed in table1

Table 2: Major diseases/ disorders linked to free radicals^{1, 9, 10}

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Aging	Kidney diseases			
Cancer	Liver diseases			
Cardiac myopathy	Lung diseases			
Cataract	Neurodegenerative			
	diseases			
Chronic granulomatous	Nutritional			
diseases	deficiencies			
Diabetes mellitus	Radiation injury			
Immune system	Skin disorders			
disorders				
Ischemia/reperfusion	Toxic states			
injury	(xenobiotics, metal			
	toxicity)			

Table 3: Central nervous system dis	sorders
associated with reactive avvgan sn	Anting

ussociated with reactive oxygen species			
Amyotrophic lateral	Multiple sclerosis		
sclerosis			
Alzheimer diseases	Parkinson diseases		
Downs syndrome			

Counteracting free radical damage: The human body has mechanisms to counteract damage by free radicals and other oxygen species. These act on different oxidants as well as in different cellular components. Various antioxidant defenses were listed in table

Table 4: Natural antioxidant defenses				
Antioxidant enzymes	Antioxidants	Metal binding proteins		
Superoxide dismutase	Vitamin C,E	Albumin		
Glutathione peroxidase	Carotenoids(β- carotene, lycopene,etc)	Ceruloplasmin		
Catalase	Thiols,Bilirubin	Haptoglobin		
	Flavonoids Ubiquinol	Metallothionein		
	Uric acid	Trasferrin		

 Table 4: Natural antioxidant defenses

Food rich in antioxidants: Antioxidants are abundant in fruits and vegetables as wells as in nuts, grains and some meats, poultry and fish. The list below describes food sources of common antioxidants

- Beta-carotenes is found in many foods that are orange in color, including sweet potatoes, carrots, cantaloupe, squash, apricots, pumpkin, and mangoes. Some green leafy vegetables including collard greens, spinach, and kale are also rich in beta- carotene.
- Lutein, better known for its association with healthy eyes, is abundant in green, leafy vegetables such as collard green, spinach, and kale.

Lycopene is a potent antioxidant found in tomatoes, watermelon, guava, papaya, apricots, pink grapefruits, etc. Estimates suggest that 85% of American dietary intake of lycopene comes from tomatoes and tomatoes products.

Selenium is a mineral but not an antioxidant nutrient. However, it is a component of antioxidant enzymes. Plants like rice and wheat are the major dietary sourcwe of selenium in most countries. The amount of selenium in soils, which varies by region, determines the amounts of selenium in the food grown in the soil. Animals the eat grains or plants grown in selenium- rich soil have higher levels of selenium in their muscle. In the united states, meat and bread are common sources of united states, meat and bread are common sources of dietary selenium while brazil nuts also contain large quantities of selenium's.

Vitamins A is found in thre main forms: retinol (vitamin A), 3,4- didehydroretinol (vitamins A2), and 3-hydroxyretinol (vitamins A3). Food rich in vitamin A include liver, sweet potatoes, carrots, like, egg yolk and mozzarella cheese.

Vitamin C or ascorbic acid can be found in high abundance in many fruits and vegitables and is also found in cereals, beaf, poultry and fish.

Vitamin E or tocopherol is found in almonds, oils including wheat germs, sunflower, corn and soybean (oils), mangoes, nuts, broccoli and other foods.

1.3 Plants Having Antioxidant Activity Table 5: List of Medicinal Plants Shown to Have Antioxidant Activity

Plant Name	Part Used	Method of Screening	Mechanism of action
Acacia catechu	Bark	DPPH assay	Free Radical Scavenger ⁴²
Acanthus ilicifolius	Leaves	SOD, Hydroxy radical and lipid peroxidation assays	Free radical scavenger ⁴¹
Achvranthes aspera	Whole plant	DPPH assay	Free radical scavenger ¹²⁵
Aconitum heterophylum	Bark	DPPH assay	Free radical scavenger ⁴³
Acorus calamus	Rhizomes	DPPH assay	Free Radical Scavenger ⁴⁴
Alchornea laxifolora	Roots & leaves	Thiocyanate Method	Free Radical Scavenger ⁴⁵
Allium sativum	Aerial parts, Roots	MDA, SOD,GSH Hydroxy radical assay	Inhibits lipid peroxidation ⁴⁶
Allium vienale	Aerial parts	MDS, SOD, Hydroxy radical assay	Free radical scavenger ⁴⁶
Aloe vera	Leaf gel	Hemolysis of RBC	Free radical scavenger ⁴⁷
Alpinia sp.	Roots & Rhizomes	Thiocyanate assay	Inhibits lipid peroxidation ¹²⁵
Anethum sowa Roxb.	Seed	DPPH assay	Free radical scavenger ¹²⁵
Anthriscus	Std Extracts	DPPH, lipid peroxidation assays	Free radical scaven- ging, inhibition of lipid peroxidation ⁴⁹
Artemisia abyssinica	Essential oil	DDPH, Lipid peroxidation assays	Free radical scavenger ²⁴
Argemone mexicana	Leaves	DPPH assay	Free radical scavenger ¹²⁵
Aristolochia bracteata Retz.	Leaf, Stem, Pod	DPPH assay	Free radical scavenger ¹²⁵
Artemisia afra	Essential oil	DDPH, Lipid peroxidationassays	Free radical scavenger ²⁴
Artemisia apiacea	Entire plant	MDA. SOD. GSH. TBA assay	Free radical scavenger ¹²⁴
Artemisia arborescens	Aerial parts	Oxidation of linoleic acid	Free Radical Scavenger ⁵¹
Asparagus recemousus	Roots	SOD, TBARS assay	Membrane Protective ⁵²
Azadirachta indica	Stem bark	Hemolysis of RBC	Inhibit lipid peroxidation ⁵³
Baccharis coridifolia	Entire plant	Hydroperoxide, TBARS assay	Free radical scavenger ⁵⁴
Bacopa monniera	Stem, Leaves	SOD, CAT, GPX activity	Free Radical Scavenger ⁵⁵⁻⁵⁶
Ballaota acetabulosa	Aerial parts	TBA Assay	Free Radical Scavenger ⁵⁷
Ballaota	Aerial parts	TBA Assay	Free Radical Scavenger ⁵⁷
pseudodictamus	1	5	C C
Boehmeria nivea	Entire plant	Lipid peroxidation assay	Free radical Scavenger ⁵⁸
Bombax malabaricum	Gum	DPPH assay	Free radical scavenger ¹²⁵
Brassica hancei	Entire plant	Hemolysis of RBC, SOD assay	Free Radical Scavenger ¹²⁵
Brassica juncea	Leaves	DPPH, TBA assay	Free Radical Scavenger ^{50, 60}
Burkea Africana	Bark	DPPH assay	Free Radical Scavenger,
, , , , , , , , , , , , , , , , , , ,		-	lipoxygenase inhibitor ⁶¹
Caesalpinia sappan	Heart Wood	DPPH assay	Free radical scavenger ¹²⁵
Calamintha gladulosa	Entire plant	Hydroxy radical assay	Free radical scavenger ⁵⁹
Cassia auriculata	Leaf, Flower	DPPH assay	Free radical scavenger ¹²⁵
Cassia fistula	Pod	DPPH assay	Free radical scavenger ¹²⁵
Cassia tora	Seed	DPPH assay	Free radical scavenger ¹²⁵
Calycotome villosa	Aerial parts	Oxidation of linoleic acid	Free radical scavenger ⁵¹
Centaurea calcitrapa	Whorls	DPPH assay	Free Radical Scavenger, inhibition of lipid peroxidation ⁶²
Centella asiatica	Entire plant	MDA, GSH, SOD, assays	Inhibition of lipid peroxidation ⁶³⁻⁶⁴
Cetraria islandica	Lichen	Thiocyanate, SOD, DPPH, methods	Free radical scavenger ⁶⁵
Cinnamomum cassia	Bark	Anti-lipid peroxidation, SOD assay	Free radical scavenger ⁶⁶
Commicarpus chinensis	Leaf	DPPH radical scavenging activity	Free radical scavenger ¹²⁵
Commophora mukul	Guggulipid	Lipid peroxidation assay	Inhibition of lipid peroxidation ⁶⁷
Coriandrum sativum	Seed	DPPH assay	Free radical scavenger ¹²⁵
Cornus stolonifera	Entire plant	DPPH, XO assay	Free radical scavenger ⁶⁸

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Murraya Koenigi Leaves SOD, CAT, GSH, GPX, GST, G-6 PDH, MDA assay Free Radical Scavenger ⁶⁰ Myrestica fragrance Seed DPPH assay Free radical scavenger ¹²⁵ Nigella sativa Essential oil DPPH, lipid peroxidation assay Free radical scavenger ³¹ Ocimum Aerial parts DPPH, Lipid peroxidation assay Free radical scavenger, inhibition of lipid peroxidation ⁷² Ocimum sanctum Leaves Lipid peroxidation assay Free radical scavenger, membrane protection ⁹⁷	r		peroxidation assavs	
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Ocimum Aerial parts DPPH, Lipid peroxidation assay Free radical scavenger, inhibition of lipid peroxidation ⁷² Ocimum sanctum Leaves Lipid peroxidation assay Free radical scavenger, membrane protection ⁹⁷	Nigella sativa	Essential oil	DPPH lipid peroxidation assay	Free radical scavenor ³¹
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Ocimum sanctum Leaves Lipid peroxidation assay Free radical scavenger, membrane protection ⁹⁷ Protection Protection Protection Protection	killimandscharicum	riena parto	Dirit, Eipie peroxidation assays	of linid peroxidation ⁷²
notection ⁹⁷	Ocimum sanctum	Leaves	Lipid peroxidation assay	Free radical scavenger membrane
DIVIDUATION	Commin Senetuni	Louros	2.p.a peronaution ussuy	protection ⁹⁷

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Olea Europeans	Entire plant	Hydroxy radical, TBARS assay	Free radical scavenger, Inhibit
	A suist a suts		Inpld peroxidation
Origanum aictamnus	Aerial parts	I BA ASSay	Free Radical scavenger
bergalaosioum	Flowering tops	DPPH, assay	of lipid perovidation ⁶²
Ashackia aspara	Leaves	DPPH YO TBA assaus	Eree radical scavenger ¹⁰⁰
Panar ainsean	Entire plant	SOD Hydroxyl radical assays	Eree radical scavenger ¹⁰¹
Paullinia cupana	Entire plant	L ipid peroxidation assay	Inhibits lipid perovidation ¹⁰²
Phellinus rimosis	Wood inhabiting	Lipid peroxidation assay	Free radical scavenger ¹⁰³
1 netimus rimosis	fungus	Lipit peroxidution ussuy	The fudical seavenger
Phlomis lanate	Aerial parts	TBA Assay	Free radical scavenger ⁵⁷
Phyllanthus emclica	Fruits	MDA. SOD assays	Free radical scavenger ¹⁰⁴
Pinus nigra Sulin.	Turpentine exudes	Thiocyanate, DPPH, SOD, assays	Free radical scavenger ¹⁰⁵
Pallsiana (Lamb)	·· F · · · · · · · · · ·		
Piper betle	Leaves	TBARS, SOD, CAT assays	Free radical scavenger, Inhibition
Ĩ			of lipid peroxidation ¹²⁵
Pluchea indica	Roots	SOD, Lipid peroxidation assays	Free radical scavenger ¹⁰⁷
Podophyllum	Rhizomes	GST, SOD, lipid peroxidation	Inhibition of lipid peroxidation ¹⁰⁸
		assays	
Prunus Americana	Fruits	DPPH assay	Free Radical Scavenger ⁴⁴
Psoralea corylifolia	Seeds	Hemolysis of RBC, Lipid	Free radical scavenger ¹⁰⁹
		peroxidation	
Quercus alba	Entire Plant	DPPH, XO assays	Free radical scavenger ⁶⁸
Rhoicissus digitata	Roots, Stem,	TBA, DPPH, XO, Metal ion	Free radical scavenger, Meatal ion
	Leaves	chelating assays	chelating activities ¹¹⁰
Rhoicissus tomentaosa	Roots, Stem,	TBA, DPPH, XO, Meatl ion	Free radical scavenger ¹¹⁰
	Leaves	chelating assays	
Rhus hirata	Entire plant	DPPH, XO assays	Free radical scavenger ³⁸
Roula aquatica	Entire plant	DPPH Assay	Free radical scavenger ²
Salacia oblonga	Root	TBARS, SOD, CAT, GSH assays	Inhibition of lipid peroxidation ¹¹¹
Salvia pomfiera	Aerial parts	TBA Assay	Free Radical Scavenger"
Salvia ringens	Aerial parts	IBA Assay	Free Radical ⁵⁷ Scavenger
Sambucus cerulea	Fruits	DPPH assay	Free Radical Scavenger
Santalum album	Wood oll	GST activity	Increases GST activity and
Sinomonium acutum	Stom	DPPH SOD Hydroxy radical	Erea radical seavenger ¹¹²
Sinomonium acuium	Stem	assays	Free faulcal scavenger
Smilex china	Rhizome	GSH, Lipid peroxidation assays	Free radical scavenger ¹¹³
Sophora japonica	Seeds	DPPH, Lipid peroxidation assays	Free radical scavenger, Inhibition
			of lipid peroxidation ⁷²
Spartium junceum	Flowers	SOD, activity	Free radical scavenger ¹¹⁴
Spirulina fusiformis	Flowers	MDA, Conjugated diene, hydro	Free radical scavenger ¹¹⁵
(Blue green alges)		peroxide assays	<u> </u>
Stachys spruneri	Aerial parts	TBA Assay	Free radical scavenger ³⁷
Swertia chirata	Aerial parts	Lipid peroxidation assays	Free radical scavenger ⁷⁷
Syzygium cumini	Fruits	DPPH, assay	Free radical scavenger ¹⁰
Tamarix ramosissima	Entire plant	DPPH	Free radical scavenger ¹¹⁰
Terminalia arjuna	Bark	DPPH, Lipid peroxidation assays	Free radical scavenger, Inhibition
Terminalia bellerioa	Dork	DPDH Lipid perovidation assaus	Erea radical seavenger Inhibition
Terminana benerica	Dark	DFFII, Lipid peroxidation assays	of lipid perovidation ⁷²
Tetracera loureiri	Entire plant	DPPH assay	Eree radical scavenger ¹¹⁷
Tenacera tourent	Entire plant	Hydroxy radical assay	Free radical scavenger ⁵⁹
Tinospora cordifolia	Root	TBARS GSH CAT SOD assays	Free radical scavenger Inhibition
		, 001, 011, 000 wowy5	of lipid peroxidation ¹¹⁸
Tordylium apulum	Whorls	DPPH assay	Inhibition of lipid peroxidation ⁶²
Uncaria tomentaosa	Entire plant	TBARS, Hydro peroxide assays	Free radical scavenger ¹¹⁹
Undarial pinnatifida	Entire plant	DPPH assay	Free radical scavenger 92
Ursica dioica	Leaves	DPPH assay	Inhibition of lipid peroxidation ⁶²
Vaccinium myrtillus	Anthocyano side	Lipid peroxidation, SOD assays	Free radical scavenger, Inhibition
Valeriana oficinalis	Root	DPPH assay	Free radical scavenger ¹²⁵
Vitex negundo	Leaf	DPPH assay	Free radical scavenger ¹²⁵

Withania somnifera	Roots	Lipid peroxidation assay	Inhibition of lipid peroxidation ^{71,121}
Zingiber sp.	Roots & Rhizomes	Thiocyanate assay	Inhibits lipid peroxidation ⁴⁸
Ziziphora taurica	Essential oil	Phosphomolybdenum spectrophotometry method	Inhibits lipid peroxidation ¹²³

Conclusions

Currently there has been an increased interest globally to identify antioxidant compounds from plant sources which are pharmacologically potent and have low or no side effects for use in protective medicine and the food industry. Modern civilization, use of different chemicals, pesticides, pollutant, smoking and alcohol intake and even some of synthetic medicine increases the chance of disease due to free radicals. Plants produces large amount of antioxidants to prevent the oxidative stress, they represent a potential source of new compounds with antioxidant

activity. More or less the free radicals plays a role in health of modern era and the diseases caused from free radical are becoming a part of normal life. Increasing knowledge in antioxidant phytoconstituents and include them in daily uses and diet can give sufficient support to human body to fight those diseases. Phytoconstituents and herbal medicine are also important to manage pathological conditions of those diseases caused by free radicals. Explore the antioxidant principles from natural resources; identification and isolation of those phytoconstituents are

simultaneously presenting enormous scope for their better therapeutic application for treatment of human disease. Therefore it is time for us, to explore and identify our traditional therapeutic knowledge and plant sources and interpret it according to the recent advancements to fight

against oxidative stress, in order to give it a deserving place. Science herbs are considered to have less or no toxic effects would be the best alternative methods when the normal level of antioxidant defense mechanism fails. Many herbal antioxidants are used in the form of neutraceuticals products.

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