

ANTIOXIDANT HERBS IN INDIA: A CRITICAL REVIEW

J. Thenmozhi, K. Vignesh Babu, L. V. Vigneshwaran, M. Senthil Kumar

E-Mail Id: vigneshwaran85@gmail.com

Sree Abirami College of Pharmacy, Coimbatore, Tamil Nadu, India

Abstract- Countless Indian restorative plants have been used in the customary arrangement of medicine like ayurveda, siddha and folk medicine since the beginning of human evolution. In the topical application, the antioxidants are widely used as innovative ingredients in the field of dermatology and also used for treating many diseases in internal application. Antioxidant is an oxidation inhibitor which affords the defense to living organism damage caused by unrestrained production of reactive oxygen species (ROS). A variety of free radical scavenging antioxidant was found in numerous herbs which especially present in India. Now a day interest is increasing to recognize antioxidant compounds throughout the world because which are pharmacologically active with not as much of or no side effects. In the present work five plants (*Acorus calamus*, *Lantana Camara*, *Rauwolfia serpentine*, *Ocimumbasillicum*, *Curcuma aromatica*) are reviewed for their historical, morphological, Phytochemical and pharmacological aspects.

Keywords: Phytochemical, free radical, antioxidant, DPPH.

1. INTRODUCTION

Antioxidants provide the protection to living organism damage caused by uncontrolled production of reactive oxygen species (ROS) and reactive nitrogen species (RNS). So the antioxidant plays a vital role in the prevention of diseases. Free radical, ROS and RNS formed by endogenous and exogenous causes like metabolism, chemicals and ionizing radiation. Oxidative stress is a state of imbalance between generation of ROS and antioxidants defense mechanism of a cell or tissue[1].The oxidative stress causes several disease conditions such as diabetes, different types of cancers, Cardiovascular diseases, inflammation and ageing. Thus, the antioxidant needed for the management of oxidative stress. So, many phytochemicals act as an antioxidant. There are Phenolics, Flavonoids, Anthocyanins, Carotenoids, Ascorbic acid, Terpenoids, and Tocopherol.

2. HERBS WITH ANTIOXIDANT ACTIVITY

Among different types herbs, Most of the herbs having antioxidant activity which are investigated for their antioxidant activity. In the present study, the following antioxidant activity of five plants was explained.

2.1 *Acorus Calamus*

Synonyms: sweet flag

Biological source:*Acorus calamus* Linn.

Family: Araceae

Part used: Rhizomes [2]

Vernacular Names: **English** - sweetflag; **Tamil**-vasambu; **Telugu**- vadajavasa; **Kannada** - Bajei; **Malayalam**-vayambu; **Sanskrit**-Bhutanashin,jatilad; **Hindi**-Bajai, Gora bach,vasa bach.

2.2 Description

Rhizome: Aromatic rhizome; Cylindrical; Thickness-2.5cm; External color-purplish brown to light brown color; internalcolor-white.

Root: Roots creeping longly below the soil surface.

Leaves: Thick leaves; Appearance like iris; mid vein-single. Secondary vein-Slightly rises both sides. Tertiary veins-Fine. Wide-0.7-1.7cm.

Flower: Flowers are very rare; long - 8cm; Shape-cylindrical; Color-greenish brown

Fruit: Small, Berry like c-diglucoiside.



Fig. 2.1 Part of Plant (I) And Dried Rhizomes (II) Of *Acorus Calamus*

2.2 Chemical Constituents

Alpha-asarone, Beta-asarone, Cis-asarone, Galgravin, Epiudesmin.

2.3 Antioxidant Activity

The plant having phenolic compounds which is well known for their ability of scavenging free radical which shows antioxidant activity. The antioxidant activity of *Acorus calamus* proved by extract of plants showed an increased and decreased levels of certain parameters due to exposure to noise stress. Phenolic antioxidant contains anticholinesterase activity.

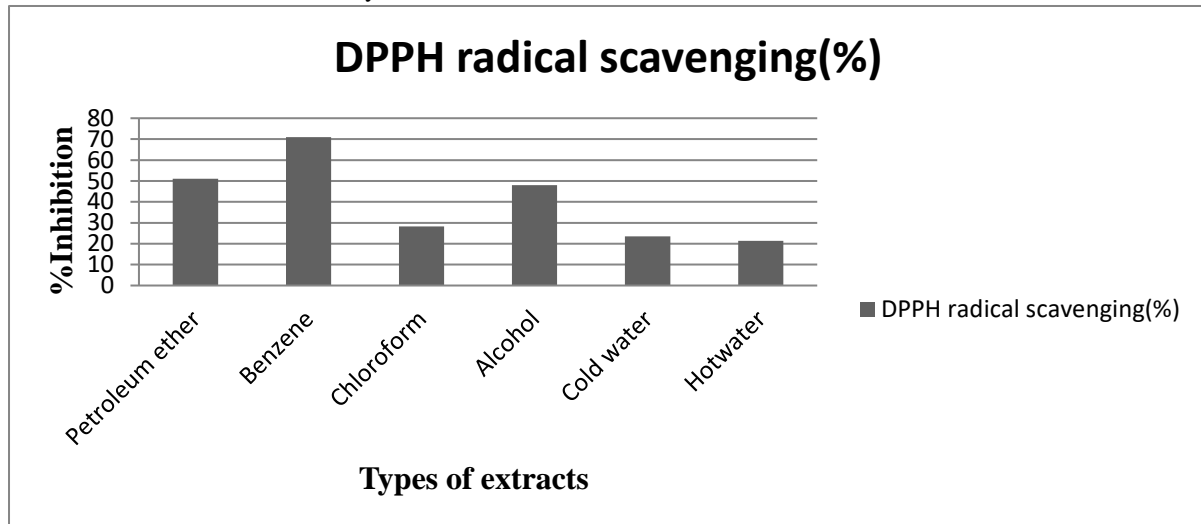


Fig. 2.2 Antioxidant Activity Of *Acorus Calamus* By DPPH Model[3]

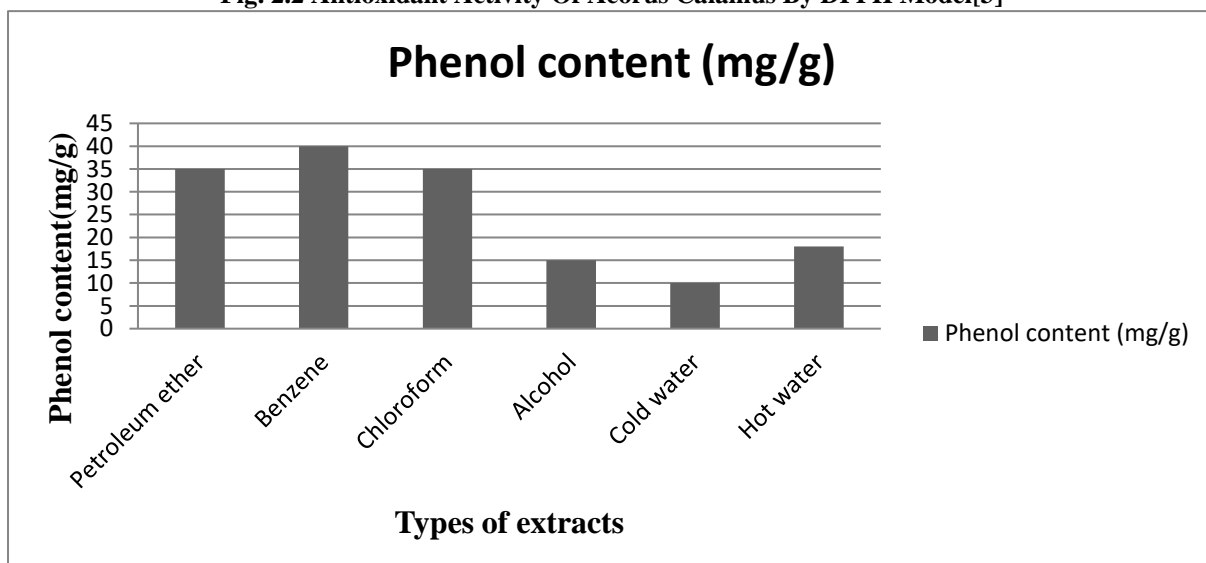


Fig. 2.3 Antioxidant Activity Of *Acorus Calamus* By Phenol Content (Mg/G)[4]

2.4 Therapeutic Uses

Cough Bronchitis, Gout, and Epilepsy, Convulsions, Depression and Other mental disorders.

3. LANTANA CAMARA

Synonyms: *Lantana aculeate*

Biological source: *Lantana camara* Linn

Family: Verbenaceae

Parts used: Flowers, leaves, stem, fruits, seeds.

Vernacular names: English-Lantana; Tamil-Unnchedi; Telugu- Pulikampa; Kannada-Kakke; Hindi-Raimuniya; Sanskrit-Chaturang

3.1 Description

Leaves: It is ovate or ovate oblong, 2-10cm wide, arranged in opposite pairs. intense green, lightly hairy, with notch margins and emit a pungent odor.

Stem: Non-thorny, woody, square in cross section, hairy when young, cylindrical. It grows up to 15 cm thick as it grows older.

Flowers: It contains 20-40 flowers, 2.5cm, white cream or yellow to orange pink, purple or red. Mainly flowering happen between March to August.

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Fruits: It is greenish blue blackcolor, 5-7mm in diameter, drupaceous, shining, with two nutlets, seed setting takes place between September to May with 1-20 seeds on each flower.

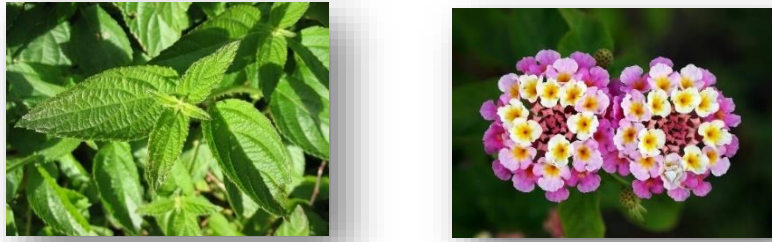


Fig. 3.1 Leaves (i) and Flowers (ii) of Lantana camara

3.2 Chemical Constituents

Roots and Leaves: Iridoids, Theveside, The viridoside, Geniposide, 8-epilogami, Lamiridode, Shanzhside methyl ester, Triterpenoids, Oleanolic acid, Lantanolic acid,

Stem and Leaf: Lantadenes A, B, C, & D, Lantic acid, Camaric acid, Camarolic acid.

3.3 Antioxidant Activity

Antioxidant activity of the leaves of *L. camara* was reported by reducing power activity and 1, 1- diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay[5]. Alkaloids are present only in the leaves of *L. camera*. *Lantana camara* had higher amount of flavonoid compound in the defatted methanolic extracts of the leaves and flowers. So it exhibits the antioxidant activity[6]

3.4 Therapeutic Uses

The leaves exhibit insecticidal, biocidal, antimicrobial, fungicidal and nematocidal. Diseases like swelling, eczema, asthma, ulcer, cancers, chicken pox, high blood pressure, tumors [8] and measles etc. are treating by plant extracts of *lantana camara*.

4. RAUWOLFIA SERPENTINA

Synonyms: *Ophioxylonserpentinum* Linn

Biological source: *Rauwolfia serpentina* Linn

Family: Apocynaceae

Part used: Roots, leaves

Vernacular names: **English-***Rauwolfia* root, serpentine root, serpentine root; **Hindi-**candrabhaga, chotacans;

Kanada sutranabhi; **Malayalam** Amalpori, cuvanna Amalpori; **Sanskri-**sarpagandha, candrika; **Tamil-**sarppaganti, sivan Amalpod; **Telugu-**patalagandhi.

4.1 Description

Plant: A small erect shrub or beneath shrubs with red pedicels and calyx;

Leaves: Three in a whorl, Thin Glabrous, Bright green white frequently tinged with violet;

Fruits: Drupes, riped fruit appear in purplish black

Roots: Dried roots are very hard, less flexible convoluted with a yellowish tanned surface furnishes with perpendicular and uneven cracks or wrinkles, when rubbed with water yields a light yellowish tinged paste.

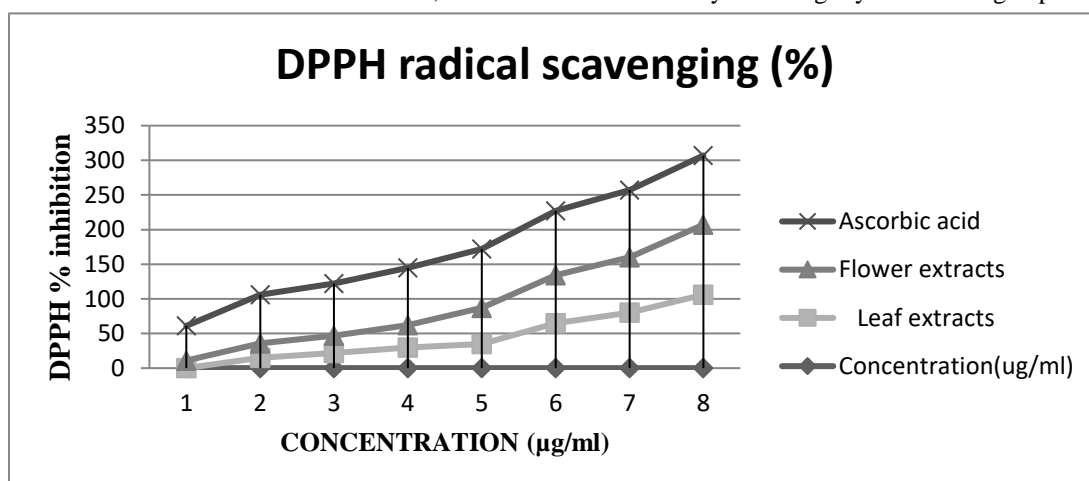


Fig. 4.1 Antioxidant Activity Of Lantana Camara[7]



Fig. 4.2 Part of Leaves (I) and Dried Roots (II) of Rauwolfia Serpentina

Bark: The bark does not separate easily from the Woody portion when dry but separates easily in fresh condition.

4.2 Chemical Constituents

Ajmalicine, Reserpine, Serpentinine, Ajmaline, Ajmalimine, Deserpidine, Indobidine, Reserpiline, Rescinnamine, Rescinnamidine, Serpentine, Yohimbine.

4.3 Antioxidant Property

R. serpentina exhibits the highest total phenolic content, DPPH radical scavenging activity[9].

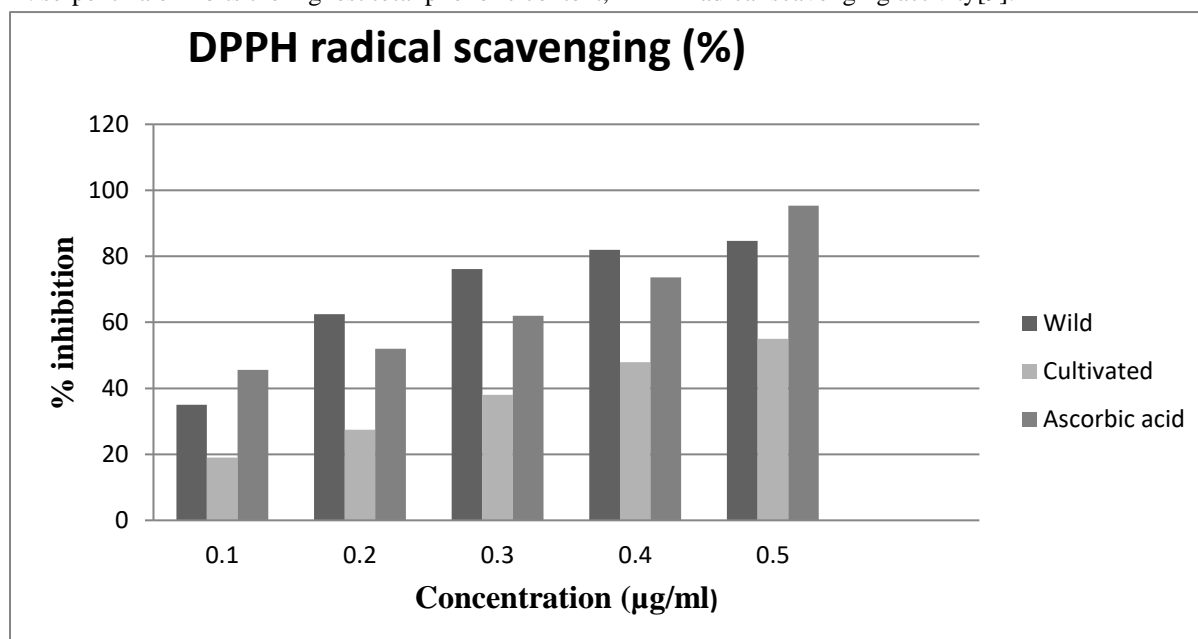


Fig. 4.3 Antioxidant Activity Of Rauwolfia Serpentina[10]

4.4 Therapeutic Uses

In Roots: Acrid, bitter taste, diuretic, anthelmintic, thermogenesis and having sedative properties. It is highly reputed for hypertension; useful in strangury, fever, wounds, colic, insomnia, Epilepsy, giddiness, dyspepsia; The decoction of the root is used to increase uterine contraction.

In Leaves: The juice of the leaves is used as a remedy for the removal of opacities of the cornea.

5. OCIMUM BASILICUM

Synonyms: Krishna tulsi[2], basil

Biological source: Ocimum basilicum Linn.

Family: Lamiaceae

Part used: leaf

Vernacular names: English-sweetbasil; Hindi-Babul; Tamil-Tirunirupaccai; Telugu-vebudipatri; Kannada-Tulasi, Kamakasturi; Malayalam-Ramat tulasi; Sanskrit-Barbari.

5.1 Description

The plant is an erect branching herb[11], aromatic. Leaves are simple, ovate, and glabrous on both surfaces. Flowers are white or pale purple color. Fruits are black, rough and ellipsoid nutlets.



Fig. 5.1 Parts of Leaves of Ocimum Basilicum

Chemical constituents: Pinene, Eucalyptol, linalool, Camphor, Estragole, Methyleugenol, Eugenol, Aromadendrene, aryo-phyllene, γ -Muurolene, B-Caryophyllene oxide, Tau-Cadinol[12].

Antioxidant property:

Antioxidant activity of ocimumbasilicum more than ocimum sanctum. Meera et.al described the antioxidant activity of ocimumbasilicum which exhibited potent antioxidants effects in the form of ethanolic extracts[11].Ocimumbasilicum contains several active antioxidant compounds. The oil obtained from this plant also shows antioxidant properties to assist sperm parameters and enhance sperm quality in rats to increase Spermatogenesis[13]

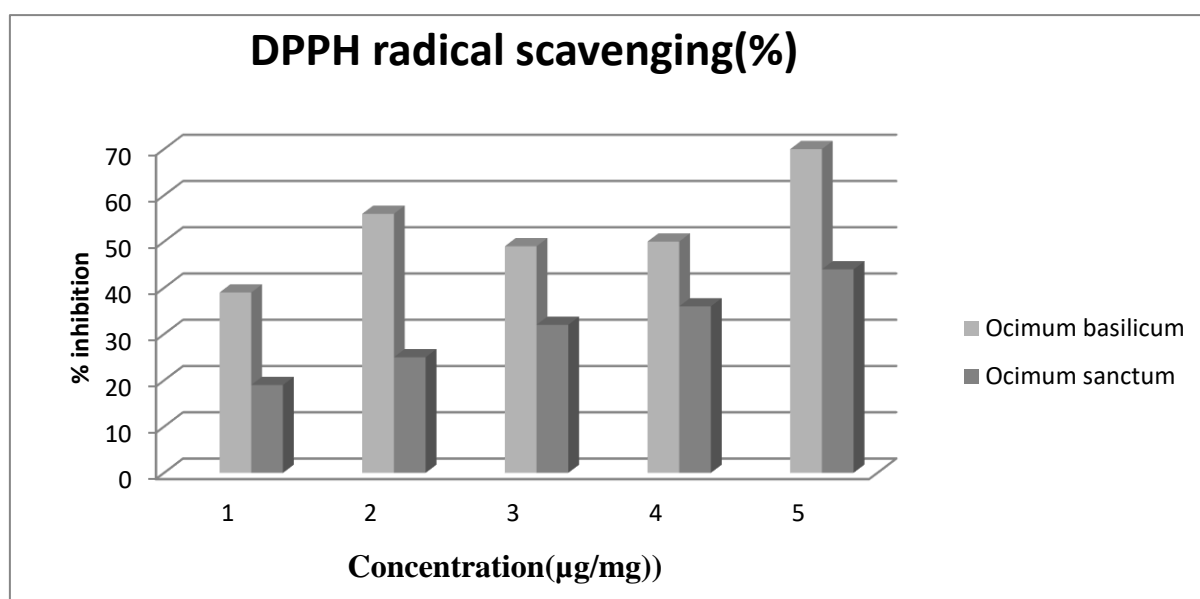


Fig. 5.2 Antioxidant activity of Ocimum basilicum[14]

5.2 Therapeutic Uses

The warm leaves juice of this plant along with honey is used to treat croup[15].It also forms an tremendous nostrum for the heal of ringworm. It is used as a lotion for painful eyes also. In Guinea, the decoction of leaves and stem are known to treat neuralgia, catarrh, fever, burning micturation and renal troubles. Spermatorrhoea, blood dysentery, haematuria, inflammation and congestion of kidney are treated by fresh mature leaves in homeopathy medicine. Otitis also treated by the juice of the leaves. Basil is useful biliousness kapha and Vata, leucoderma and disease of heart and blood. The basil juice is good for toothache, joint pain, earache and cures epistaxis when utilized with camphor. Dullness of hearing curing by the plant juice when dropped into ears. Basil cures headache, aids digestion.[11]

6. CURCUMA AROMATICA

Synonyms: Wild turmeric

Biological source: Curcuma aromaticaSalisb.

Family-Zingiberaceae

Part used: Rhizome

Vernacular name: English - Wild Turmeric; Malayalam-Kasthurimanjal; Hindi - Janglihalidi; Sanskrit - Aranyaharidra; Tamil-Kasturimanjal[16]

6.1 Description

Curcuma aromatic is erect herb, annual, light yellow colour aromatic rhizomes with camphoraceous smell. The plant having unbranched leaf stems with 1 m height underground rhizome and with developed colored bracts

tipped with pink. The flowers are aromatic and pinkish-white with an orange lip. In monsoon season, the plant grows fastly. The rhizome when mature, possesses a characteristic fragrance[17].

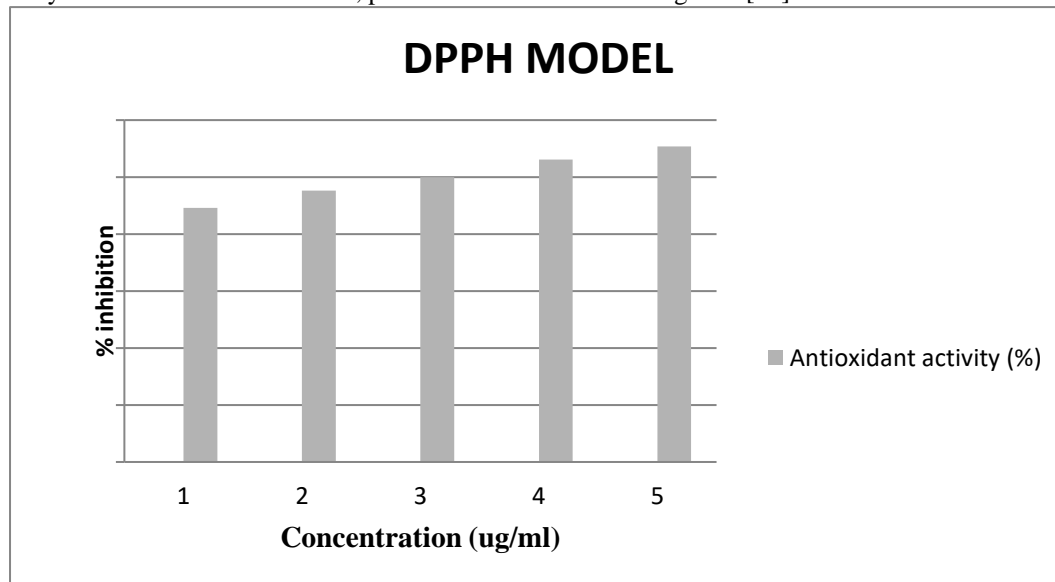


Fig. 6.1 Part of plant (i) rhizomes and powder (ii) of *Curcuma aromatica*

6.2 Chemical Constituents

Alpha-turmerone and beta-turmerone. Alpha-curcumene (ar-curcumene), beta curcumene, d-camphor, and also other compounds like d-camphene, p-methoxycinnamic acid, germacrene D, curzerene, germacrone, alpha-and beta-pinenes, borneol, alpha terpeniol, myrcene, terpinolene, gamma-terpinene, limonine, beta-thujone, alpha-copaene, alpha-bergamotene, beta-bisabolene, cuminaldehyde, cuminyl alcohol, hydroxyl isogermafurenolide, xanthorrhizol, curcuphenol, beta-elemene, zingiberene, isoborneol, linalool, beta-farnesene, 1,8-cineole, curzerenone and curcumin[18]. The constituents recognized in the oil were: borneol isoborneol, beta-curcumene, ar-curcumene, alpha-pinene, beta-pinene, camphene, 1,8-cineol, isofurano germacrene.

6.3 Antioxidant Property

Antioxidant activity of methanol aqueous extracts of hundred plants was screened using Fenton’s reagent/ethyl linoleate system. Like that, free radical scavenging activity also screened by 1,1-diphenyl-2-picrylhydrazyl free radical generating system. The results suggest that *Curcuma aromatica* may be potential sources of antioxidants. The oil and various extracts of *C. aromatica* were evaluated for their antioxidant activities by using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and superoxide radical-scavenging assays. The oil and methanol extract showed potent DPPH radical-scavenging activities, which were higher than butylated hydroxyanisole. The extracts also exhibited remarkable Superoxide radical-scavenging activities[19]



Fig. 6.2 Antioxidant Activity Of *Curcuma Aromatica*[20]

6.4 Therapeutic Uses

Wild turmeric has a peculiar fragrance and creamy color rhizomes. The rhizomes are often used in cosmetic herbal medicines[21].and as a culinary ingredient in limited quantities as a food flavor.

CONCLUSION

From this review, it has been concluded that these herbs and plants parts were found to exhibit potential antioxidant activity especially the herbal ethanolic or methanolic extract exhibit significant free radical scavenging and antioxidant activity with beneficial in suppressing Multiple diseases. The study reveals that increasing addition or intake of antioxidants may help to maintain an adequate antioxidant in the body to protect

against damaging reactive oxygen species (ROS). The overall antioxidant activity depends on their phytochemical constituents present in the herbs

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