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## Antioxidant Activity of Some Indian Medicinal Plants

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### ABSTRACT

Methanolic extracts of 4 Indian medicinal plants, traditionally used in different ailments, were evaluated for antioxidant activity using DPPH (1,1-diphenyl-2-picryl hydrazyl) radical scavenging assay. Among the extracts, *C. lanceolatus* significantly decreased the absorption at 10 µg/ml indicating that it is effective even at a very low concentration.

**Keywords:** Antioxidant activity, Medicinal plants, Indian, DPPH free radical.

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## INTRODUCTION

Oxygen is, no doubt, an indispensable part of aerobic life. However, under certain circumstances, it can seriously affect our well being through the formation of reactive oxygen species (ROS) representing both free radical and non-free radical species, and their potential deleterious effects such as atherosclerosis, ischaemic heart disease, ageing, inflammation, diabetes, immunosuppression, neurodegenerative diseases, cancer and others<sup>1,2</sup>. The most frequently encountered free radicals are the hydroxyl radical (HO•), the superoxide radical (O<sub>2</sub>•-), the nitric oxide radical (NO•) and the lipid peroxy radical (LOO•) while non-free radical species principally being H<sub>2</sub>O<sub>2</sub> and singlet oxygen (<sup>1</sup>O<sub>2</sub>)<sup>3</sup>. Nevertheless, almost all organisms are protected from free radical attack by defense mechanisms such as a preventive antioxidant system that reduces the rate of free radical formation, and another is a system to produce chain-breaking antioxidants that scavenge and stabilize free radicals. But, when free radical production rate exceeds the capacity of the antioxidant defense mechanisms substantial tissue injury results<sup>4</sup>. Therefore, antioxidants with free radical scavenging activities may have great relevance in the prevention and therapeutics of free radical mediated diseases. Again, India is blessed with rich floristic and faunastic resources with particular reference to the antioxidant components from medicinal plants. So well designed, systematic and objective research in this area will benefit our people who are happened to be plagued with various ailments, and lack technological and economic resources to cope up with them with orthodox medicine. Considering the importance of this area, we reported a study of the antioxidant activity of four Indian medicinal plants<sup>5-7</sup>, which are traditionally used in folkloric remedies for various disorders where free radicals are thought to be involved.

## MATERIALS AND METHOD

### Chemicals

DPPH (1, 1-diphenyl, 2-picrylhydrazyl) was obtained from Sigma Chemical Co. USA. Ascorbic acid was obtained from SD Fine Chem. Ltd., India.

### Plant material

The plant materials (Table 1) were collected between November and December from different regions of Jaipur, India and carefully identified in the Department of Botany, University of Rajasthan, Jaipur. The Herbarium sheet number are given in Table 1

**Table 1: Herbarium sheet number of studied plants**

S.N.	Plant name	Plant part	Family	Herbarium sheet number
1	<i>Callistemon. Lanceolatus</i>	Roots	Myrtaceae	RUBL 20125
2	<i>Ficus. Racemose</i>	Roots	Moraceae	RUBL 19764
3	<i>Cassia Alata</i>	Roots	Caesalpinaceae	RUBL 19903
4	<i>Grewia. Tenax</i>	Roots	Tiliaceae	RUBL 20126

### Preparation of test extracts

Powdered roots of *C. lanceolatus*, *F. racemosa*, *C. alata* and *G. tenax* were extracted with methanol. Later, each of these extract was filtered, the residue re-extracted (2x) for complete exhaustion, the extracts were pooled individually and dried *in vacuo*. All the extracts were stored at 4°C in a refrigerator and final concentration was prepared in the methanol before use.

### Antioxidant activity

For free radicals scavenging activity, DPPH assay was carried out according to the method Naik *et. al.*<sup>8</sup>. A solution of  $2 \times 10^{-3}$  mg/ml of 1,1-diphenyl-2-picrylhydrazyl (DPPH) in methanol was mixed with equal volume of extract/test compound solution in methanol and kept in dark for 30 min. The absorbance at 517 nm was monitored at different concentration of extracts. Blank experiment is also carried out to determine the absorbance of DPPH, before interacting with the extract. The amount of extract in µg/ml at which the initial value decreased to half its initial value was calculated ( $IC_{50}$ )<sup>9</sup>. Later, scavenging activities of plant extracts on DPPH radical were compared to those of ascorbic acid.

## RESULTS AND DISCUSSION

For antioxidant activity, we have used the stable free radical, 1,1-diphenyl-2-picrylhydrazyl (DPPH) in which electron spin resonance experiments are conducted, because of the para -magnetism conferred by its odd electron. This compound can accept an electron or hydrogen radical to become a stable, diamagnetic molecule; it can be oxidized only with difficulty and because of its odd electron, it shows a strong absorption band at 517 nm, the solution having a deep violet colour. As this electron becomes paired off, the absorption vanishes and the resulting decolorization is stoichiometric with respect to the number of electrons taken up<sup>10</sup>. Free radical scavenging properties have been reported for number of natural compounds, especially secondary metabolites. Phenolics form the best category, which includes the flavonoids like quercetin, phenolic acids like ferulic acid and tocopherols (Vitamin E). In addition to these, some alkaloids, carotenoids and vitamin C (ascorbic acid) are also reported to exhibit this property.

In antioxidant activity (Table. 2), it was observed that the extract of *C. lanceolatus* significantly

decreased the absorption at 10 µg/ml indicating that it is effective even at a very low concentration. The IC<sub>50</sub> (8 µg/ml) in this case is nearly equivalent to that of the reference compound, ascorbic acid (IC<sub>50</sub> = 6.0 µg/ml) thus, indicating the high antioxidant potency of the roots of this plant. *F. racemosa* and *C. alata* demonstrated good activity at higher concentration only, while *G. tenax* did not exhibit activity at any concentration.

**Table 2: Antioxidant activity of studied plants**

S.N.	Plant species	Test extract	Absorbance (Concentration in µg/ml)					IC <sub>50</sub> (µg/ml)
			10	20	40	60	80	
1.	<i>F. racemosa</i> (Roots)	MeOH	1.9641	1.6393	1.2540	0.9848	0.8450	35
2.	<i>G. tenax</i> (Roots)	MeOH	2.4982	2.1807	1.8423	1.4030	1.2179	80
3.	<i>C. lanceolatus</i> (Roots)	MeOH	1.1370	0.9530	0.9041	0.7922	0.7739	8
4.	<i>C. alata</i> (Roots)	MeOH	2.5331	2.0107	0.9800	0.8499	0.7837	31.5
5.	Ascorbic acid	–	1.6102	1.4268	1.4160	0.7694	0.2105	6.0
6.	Blank	–	2.6048	–	–	–	–	–

## CONCLUSION

The present results suggest that all the tested plant extracts have moderate to potent antioxidant activity. Since a variety of constituents are known from the extracts studied, it becomes difficult to ascribe the antioxidant properties selectively to any one group of constituents without further studies which are beyond the scope of this paper. Thus, further extensive investigations are necessary to find out the active antioxidative principles present in these plants.

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