



Research Article

IN-VITRO FREE RADICAL SCAVENGING ACTIVITY OF AERIAL PARTS OF ETHANOLIC EXTRACT OF *CORDIA OBLIQUA*

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ABSTRACT

Antioxidants are an inhibitor of the process of oxidation, even at relatively small concentration and thus have diverse physiological role in the body. Plant sources contain a variety of antioxidants. The ethanolic extract of *Cordia obliqua* was examined for DPPH (α, α -diphenyl- β -picrylhydrazyl) radical scavenging activity, Superoxide anion, Nitric oxide and Hydroxyl radical scavenging activity with reference standard Rutin, Quercetin and Ascorbate respectively through *in vitro* models. Ethanolic extract of *Cordia obliqua* showed significant free radical scavenging activity than that of various standards. The radical scavenging activity was found to be concentration dependent manner. Ethanolic extract of *Cordia obliqua* showed strong scavenging activity against free radical compared to various standards. These *in vitro* assays indicate that this plant extract is a better source of natural antioxidant, which might be helpful in preventing the progress of various oxidative stresses.

Keywords: *Cordia obliqua*, Antioxidants, Rutin, Natural, Ascorbate, Ethanol

INTRODUCTION

Antioxidants are important in the prevention of human diseases. Oxygen free radicals induce damage due to peroxidation to bio membranes and also to DNA, which leads to tissue damage, thus cause occurrence of a number of diseases¹. Antioxidants neutralize the effect of free radicals through different ways and may prevent the body from various diseases. A variety of free radical scavenging antioxidants is found in plant sources like aerial parts, fruits, vegetables, leaves, seeds, pods, etc². *Cordia obliqua* Willd.³⁻⁷ also known as Clammy cherry, is a flowering plant species in the genus *Cordia* belonging to the family Boraginaceae. It is found worldwide, mostly in warmer parts of India and Ceylon. Traditionally *Cordia obliqua* is used for cooling effects, anthelmintic, antimicrobial⁸, expectorant^{9,10}, diuretic and it is used as treatment of diseases of spleen and leprosy. Our literature survey revealed that the antioxidant activity of various extracts from the whole plant of *Cordia obliqua* was not investigated; hence these activities have been investigated in the present study.

MATERIALS AND METHODS

Collection and Identification of *Cordia obliqua*

Cordia obliqua was collected from B. Maduvangarai, Chidambaram Taluk, Cuddalore District, Tamil Nadu, India.

Taxonomic identification was made from Botanical Survey of Medicinal Plants Unit Siddha, Government of India, Palayamkottai.

Extraction of *Cordia obliqua*

The leaves of *Cordia obliqua* were dried under shade, segregated, pulverized by a mechanical grinder and passed through a 40 mesh sieve. The powdered plant materials were stored in an air-tight container. The above powdered components were continuously extracted with ethanol in a Soxhlet apparatus using a 24 hours continuous hot percolation method. The extract was concentrated on a rotary evaporator and subjected to freeze drying in a lyophilizer until a dry powder was obtained^{11,12}.

Evaluation of Antioxidant activity by *in vitro* Techniques

These are the following methods was used to evaluate the antioxidant activity by *in vitro* methods: The effect of extract on DPPH (2,2-diphenyl-1-picryl-hydrazyl-hydrate) radical was assayed using the method of mentor *et al.*¹³. Measurement of superoxide anion scavenging activity was performed based on the method described by Winterbourne *et al.*¹⁴. Hydroxyl radical scavenging activity was assayed by using Elizabeth and Rao method¹⁵.

Table 1: DPPH scavenging potential of ethanolic extract of *Cordia obliqua*

S. No.	Concentration	Percentage of activity	
		Ethanolic extract of <i>Cordia obliqua</i>	Standard (Rutin)
1	125 µg/ml	15.98 ± 0.22	19.44 ± 0.30
2	250 µg/ml	39.67 ± 0.05	36.03 ± 0.07
3	500 µg/ml	54.93 ± 0.02	51.33 ± 0.05
4	1000 µg/ml	65.43 ± 0.06	69.33 ± 0.07

*All values are expressed as mean ± SEM for three determinations

Table 2: Superoxide anion radical scavenging activity of ethanolic extract of *Cordia obliqua*

S. No.	Concentration	Percentage of activity	
		Ethanolic extract of <i>Cordia obliqua</i>	Standard (Quercetin)
1	125 µg/ml	34.01 ± 0.40	35.44 ± 0.48
2	250 µg/ml	49.07 ± 0.37	47.88 ± 0.49
3	500 µg/ml	59.97 ± 0.12	61.39 ± 0.18
4	1000 µg/ml	68.54 ± 0.04	62.28 ± 0.09

*All values are expressed as mean ± SEM for three determinations

Table 3: Hydroxyl radical scavenging activity of ethanolic extract of *Cordia obliqua*

S. No.	Concentration	Percentage of activity	
		Ethanolic extract of <i>Cordia obliqua</i>	Standard (Ascorbate)
1	125 µg/ml	15.75 ± 0.06	26.87 ± 0.08
2	250 µg/ml	34.03 ± 0.03	30.30 ± 0.05
3	500 µg/ml	64.35 ± 0.01	60.64 ± 0.02
4	1000 µg/ml	65.45 ± 0.01	55.23 ± 0.01

*All values are expressed as mean ± SEM for three determinations

RESULTS AND DISCUSSION

DPPH scavenging activity

DPPH assay are widely used for the evaluation of the antioxidant capacities of natural substances, they both are spectrophotometric approaches based on quenching of stable colored radicals (DPPH) and show the radical scavenging ability of antioxidants even when present in compound biological substances such as plant extracts. The ethanolic extract of *Cordia obliqua* exhibited a maximum DPPH scavenging activity of 65.43% at 1000 µg/ml whereas for Rutin (standard) was found to be 69.33% at 1000 µg/ml. (Table 1)

Superoxide anion scavenging activity

Superoxide anions destruct bio molecules precisely or indirectly by forming H₂O₂, per oxy nitrite or singlet O₂ during aging and pathological measures such as ischemic reoxygenation injury. Superoxide has too been experiential to exactly initiate lipid per oxidation. The maximum scavenging activity of plant extract and Quercetin at 1000 µg/ml was found to be 68.54% at 1000 µg/ml and 62.28% at 1000 µg/ml respectively. Superoxide scavenging ability of plant extract might primarily be due to the presence of flavonoids. (Table 2)

Hydroxyl radical scavenging activity

Hydroxyl radical is profoundly reactive oxygen centered radical comprise from the response of various hydroperoxides with transition metal ions. It attacks proteins, chromosome, polyunsaturated fatty acid in membranes, and generally biological molecule it contacts and is acknowledged to be gifted of abstracting hydrogen atoms from membrane lipids and brings about per oxidic reaction of lipids. The ethanolic extract of *Cordia obliqua* was exhibited a maximum Hydroxyl radical scavenging activity of 65.45 % at 1000 µg/ml whereas for ascorbate (standard) was found to be 55.23 % at 1000 µg/ml. (Table 3)

CONCLUSION

In nature there are a wide variety of naturally occurring antioxidants will be available. Antioxidants derived from food and medicinal plants have been increasingly investigated for their various nutritional function and health benefits. Based on the above results, this present study was concluded that the ethanolic extract of aerial parts of *Cordia obliqua* also known as clammy cherry, which contains large amounts of phenolic compounds, exhibits high antioxidant and free radical scavenging activities. These assays indicate that this plant extract is a significant source of natural antioxidant, especially polyphenols and carotenoids, exhibit a wide range of biological effects, including anti-inflammatory, anti-aging, anti-atherosclerosis and anticancer.

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