ISSN: 0975 -8542

Journal of Global Pharma Technology

Available Online at: www.jgpt.co.in

RESEARCH ARTICLE

Antioxidant Potential, Total Phenolic and Flavonoids Content of Aerial Parts of Ethanolic Extract of Cordia Obliqua

S. Sivakrishnan*, M. Swamivelmanickam

Department of Pharmacy, FEAT, Annamalai University, Annamalai Nagar, Chidambaram, Tamil nadu, India.

***Corresponding Author: S. Sivakrishnan**

Abstract

Objective: The aim of this work was to estimate the total phenolic and flavonoids content, and to evaluate in-vitro antioxidant activity of ethanolic extract of *Cordia obliqua*. Methods: The ethanolic extract of *Cordia obliqua* was examined by Iron chelating activity, Total antioxidant activity, Total phenol and flavonoids with reference standard EDTA (Ethylenediaminetetraacetic acid), Ascorbate and catechol respectively through *in vitro* models. Results: The antioxidant activities of the extract were positively associated with the total phenolic and flavonoid contents of the ethanolic extract of *cordia obliqua*. Conclusion: Ethanolic extract of *Cordia obliqua*. Showed strong scavenging activity. These *in vitro* assays indicate that this plant extract is a better source of natural antioxidants. The presence of antioxidants such as phenolics, flavonoids, tannins and proanthocyanidins in plants may provide protection against a number of diseases including cancer, neurodegeneration and inflammation.

Keywords: *Total phenols, Antioxidant, Cordia obliqua, Flavonoids, in vitro*

Introduction

Antioxidant [1] supplements or foods rich in medicinal plants may be used to help the human body in reducing oxidative damage [2-4] by free radicals and active oxygen. The presence of antioxidants such as phenolics[5], flavonoids[6], tannins and proanthocyanidins in plants may provide protection against a number of diseases. *Cordia obliqua Willd* [7-10].

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. It is a medium size deciduous tree, 10.5 meters high, the girth of trunk full bearing tree being 75.5 cm, branchlets glabrous, wood soft, light grey, no heartwood, leaves are alternate, flowers are bisexual and fruit is drupe.

There are two forms of *Cordia obliqua Willd*., which are found in Himachal Pradesh and the major difference in between these two forms is the size of their fruits, one have smaller fruit than other. Even through traditionally *Cordia obliqua* is used for cooling effects, anthelmintic, antimicrobial [11], expectorant [12-13], diuretic and it is used as treatment of diseases of spleen and leprosy, etc. and no scientific data in its support is available. The scope of this work was to estimate the total phenolic and flavonoids content, and to evaluate *in-vitro* antioxidant activity of ethanolic extract of *Cordia obliqua.*

Materials and Methods

Collection, Identification, Extraction and Isolation 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.

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.

©2009-2019, JGPT. All Rights Reserved

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 [14-15].

Evaluation of Antioxidant activity by *in vitro* Techniques

These are the following methods was used to evaluate the antioxidant activity, total phenol and flavonoids contents [16]: Iron chelating activity was done by the method of Benzie and strain [17] was adopted for the assay. The total antioxidant activity of the sample was evaluated by the transformation of Mo (VI) to Mo (V) to form phosphomolybdenum complex (Prieto et al., 1999) [18]. Estimation of total phenol [19] was done by 0.5 ml of Folins phenol reagent and 2 ml of sodium carbonate (20%). The reaction mixture was kept in boiling water bath for 1 min. the absorbance was measured at 650 nm in a spectrophotometer. Estimation of total flavonoids [20] was done by 0.5 ml of extract and 4 ml of the vanillin reagent (1% vanillin in 70% conc. H_2SO_4) was added and kept in a boiling water bath for 15 mins. The absorbance was read at 360 nm. A standard was run by using catechol (110 µg/ ml).

Results

Iron Chelating Activity

Maximum chelating of metal ions at 1000µg/ml for plant extract and EDTA was found to be 63.34 ± 0.01% and 63.78±0.03% respectively.

Table 1: Iron Chelating Activity of Ethanolic extract of *Cordia obliqua*

S.No	Concentration	Percentage of activity	
		Ethanolic extract of *Cordia obliqua*	Standard (EDTA)
1	125 µg/ml	13.88±0.05	18.02 ±0.07
2	250 µg/ml	36.76±0.03	47.77±0.07
3	500 µg/ml	55.23±0.02	56.89±0.05
4	1000 µg/ml	63.34±0.01	63.78±0.03

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

Total Antioxidant Activity (Phosphomolybdic Acid Method)

The ethanolic extract of *Cordia obliqua* exhibited a maximum total antioxidant activity of 58.42±0.01% at 1000 µg/ml whereas for ascorbate (standard) was found to be 55.23 ± 0.01% at 1000 µg/ml.

Table 2: Total antioxidant capacity of Ethanolic extract of *Cordia obliqua*

S. No	Concentration	Percentage of activity	
		Ethanolic extract of *Cordia obliqua*	Standard (Ascorbate)
1	125 µg/ml	23.68±0.07	26.87 ± 0.08
2	250 µg/ml	48.76±0.04	30.30 ± 0.05
3	500 µg/ml	54.33±0.02	60.64 ± 0.02
4	1000 µg/ml	58.42±0.01	55.23 ± 0.01

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

Total Phenol and Flavonoids

Total phenol Phenols are very important plant constituents because of their scavenging ability due to their hydroxyl groups. The total phenolic content and total amount of flavonoids content of ethanolic extract *Cordia obliqua* was presented in Table 3. Ethanolic extract of *Cordia obliqua* had found higher content of phenolic components and flavonoids content. Both phenolic compounds and flavonoids present in food of plant origin are also potential antioxidants.

Table 3: Total Phenolic and Flavonoids content of Ethanolic extract of *Cordia obliqua*

S. No	Ethanolic extract of *Cordia obliqua*	
	Total phenol content (mg/g of Catechol) (±SEM)*	Total flavonoids content (mg/g) (±SEM)*
1	4.480±0.008	2.767 ± 0.098

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

©2009-2019, JGPT. All Rights Reserved

Conclusion

Antioxidant supplements or foods rich in medicinal plants may be used to help the human body in reducing oxidative damage by free radicals and active oxygen. Phenols are very important plant constituents because of their scavenging ability due to their hydroxyl groups. Flavonoids present in food of plant origin are also potential antioxidants. The ethanolic extract of *Cordia obliqua* was showed significant free radical scavenging activity than that of various standards. The greater amount of phenols and flavonoids were found in ethanolic extract of *Cordia obliqua* than that of other extracts. Our results suggest that *Cordia obliqua* is a potential source of antioxidant, which might be helpful in preventing the progress of various oxidative stresses.

References

1. I Gulcin (2012) Antioxidant activity of food constituents: An overview Arch. Toxicol., 86:345-391
2. B Halliwell (2007) Oxidative stress and cancer: have we moved forward? Biochem. J., 401:1-11
3. B Halliwell (2006) Oxidative stress and neurodegeneration: where are we now? J. Neurochem., 97:1634-1658
4. LR Ferguson (2010) Chronic inflammation and mutagenesis Mutat. Res. Fund. Mol., 690:3-11
5. Hatano T, Edamatsu R, Mori A, *et al* (1989) Effect of interaction of tannins with co-existing substances. VI. Effects of tannins and related polyphenols on superoxide anion radical and on DPPH radical. Chemical and Pharmaceutical Bulletin, 37: 2016-2021.
6. Salah N, Miller NJ, Paganga G, Tijburg L, Bolwell GP, Rice Evans C (1995) Polyphenolic flavonoids as scavengers of aqueous phase radicals and as chain-breaking antioxidants, Arch Biochem Biophys., 322(2): 339-346.
7. Parmar C, Kaushal MK (1982) Wild fruits of the Sub-Himalayan region. In:Wild fruits. Kalyani Publishers, New Delhi, India, 19-22.
8. Gupta R, Gupta GD (2015) A review on plant *Cordia obliqua Willd.* (Clammy cherry). Pharmacognosy reviews, 9(18):127.
9. Kritikar KR, Basu BD (1998) Dehradun: Shiva offset press: Indian medicinal plants, 1674-81.
10. Thirupathi K, Kumar SS, Raju VS, Ravikumar B, Krishna DR, Mohan GK (2008) A review of medicinal plants of the genus Cordia: Their chemistry and pharmacological uses. Journal of Natural Remedies, 8(1):1-10.
11. Yadav R, Yadav SK (2013) Evaluation of antimicrobial activity of seeds and leaves of *cordia obliqua Willd.* Against some oral pathogens. Indo-American Journal of Pharmaceutical research, 3: 6035-6043.
12. Agnihotri VK, Srivastava SD, Srivastava SK, Pitre S, Rusia K (1987) Constituents from the seeds of Cordia obliqua as potential anti-inflammatory agents. Indian Journal of Pharmaceutical Sciences, 49(2):66-9.
13. Abou-Shaaban RR, Al-Angari AA, El-Tahir KE, Al-Khamis KI, Mirghani OM (1989) Comparative hypotensive and respiratory stimulation effects of ripe and unripe fruit mucilage of *Cordia myxa* and *Cordia obliqua* in guinea pigs and rabbits. Phytotherapy Research, 3(4):126-31.
14. Sivakrishnan S, Kottaimuthu A (2014) Hepatoprotective activity of ethanolic extract of aerial parts of *Albizia Procera Roxb (Benth.)* against paracetamol induced liver toxicity on wistar rats. International journal of pharmacy and pharmaceutical sciences, 6(1): 233-238.
15. Sivakrishnan S, Kottaimuthu A Kavitha J (2013) GC-MS analysis of ethanolic extract of aerial parts of *Albizia procera (Roxb) Benth*. International journal of pharmacy and pharmaceutical sciences, 5 (3):702-704.
16. Sivakrishnan S, Kottaimuthu A. Kavitha J (2013) Antioxidant Potential, Total Phenolic And Flavonoids Content of aerial parts of ethanolic extract of *Albizia Procera* (Family: Mimosoideae). Asian Journal of Pharmaceutical and Clinical Research, 6(1):108-110.
17. Benzie IEF, Strain JJ (1996) The ferric reducing ability of plasma (FRAP) as a measure of "antioxidant power": the FRAP assay. Anal Biochem., 239:70-76.
18. Prieto P, Pineda M, Aguilar M (1999) Spectrophotometric quantitation of antioxidant capacity through the formation of a Phosphomolybdenum Complex: Specific application to the determination of vitamin E. Anal. Biochem., 269:337-341.
19. Mallick CP, Singh MB (1980) Plant enzymology and Histoenzymology (eds), Kalyani publishers, New Delhi, 286.
20. Cameron GR, Milton RF, Allen JW (1943) Measurement of flavonoids in plant samples. Lancet, 179.

©2009-2019, JGPT. All Rights Reserved