Antioxidant Potential of Cordia dichotoma: A Review

Ram Chand Dhakar1*, Sunil Kumar Prajapati1*, Sheo Datta Maurya3, Vijay Kumar Tilak4, Manas Kumar Das5, Soumya Das6, Krishan Kumar Verma7*, Nilesh Jain8

1 Hospital Pharmacy, SRG Hospital & Medical College Jhalawar, Rajasthan, India-326001
2 Professor, Institute of Pharmacy, Bundelkhand University, Jhansi, India
3 Principal, Sarvodaya College of Pharmacy, Azamgarh, India
4 Apex Professional University, Pasighat, Arunachal Pradesh-791102, India
5 Director, Orlean College of Pharmacy, 42-Knowledge Park-3, Greater Noida, U.P., India-201308
6 Associate Professor, NIET (Pharmacy Institute), 19-Knowledge Park-2, Greater Noida, U.P., India-201308
7 Professor, Lloyd School of Pharmacy, Plot No 3, Knowledge Park-1, Greater Noida, U.P., India-201308
8 Sagar Institute of Research Technology & Science-Pharmacy, Bhopal, India.

Abstract

Many plants of genus Cordia comprise of trees and shrubs are widely distributed in warmer regions and have been utilized in management of various diseases. Many phytochemicals like flavonoids, alkaloids, terpenes, tannins, and glycerides having different activities were screened and isolated from different parts of C. dichotoma. Various important Pharmacological properties including Antiulcer, Contraceptives, anti-inflammatory, anthelmintic, analgesic, anticancer, Antioxidant, antimicrobial, hepatoprotective, anti-diabetic and others have been well documented for this plant. C. dichotoma is a promising source of natural antioxidants which possess remarkable therapeutic action as inflammatory activity. In the present review, we have briefly reviewed the Antioxidant Potential of C. dichotoma that can be followed for future research on this plant for health benefits.

Keywords: Cordia dichotoma, Antioxidant, anti-inflammatory, flavonoids

Introduction

Management of diseases with agents devoid of any side effects is still a big challenge to the researchers. There is increasing interest in natural medicine due to these reasons. Plant species of the genus Cordia are utilized for the treatment of various illnesses that affect many human systems. C. dichotoma is a tree of tropical and subtropical regions, commonly known as Lasura in Hindi and Shleshmataka in Sanskrit.

Various phytoconstituents like flavonoids, triterpenes, tannins, alkaloids and fatty acids possessing different bioactivities were isolated from different plant parts of C. dichotoma. Many researchers reported various pharmacological applications of C. dichotoma such as Anti-ulcer1, Contraceptives2, anti-inflammatory3, 4, 5, 6 anthelmintic, analgesic, anticancer4, 7, 8, Antioxidant8, 9, antimicrobial10, antifungal10, hepatoprotective11 and diuretic purposes and for treating digestive system, respiratory, urogenital, cardiac, vascular and blood disorders. C. dichotoma is a promising source of natural antioxidants which possess remarkable therapeutic action as inflammatory activity and may serve as food ingredients12, 13, 14, 15. Thus objectives of the present review are to provide an overview of the uses of C. dichotoma as herbal antioxidant.
**Classification:**
Kingdom: Plantae;
Division: Magnoliophyta;
Class: Dicotyledons;
Subclass: Astaridae;
Order: Lamiales;
Family: Boraginaceae;
Genus: Cordia;
Species: *C. dichotoma* Forst.

**Distribution:**
*C. dichotoma* is a tree that found in tropical and subtropical regions. It grows in the sub-Himalayan tract and outer ranges, ascending up to about 1500 m elevation. It is found in different types of forests ranging from the moist deciduous forests of the Western Ghats and tidal forests in Mayanmar to the dry deciduous forest of Rajasthan. In Maharashtra, it grows in the moist monsoon forest also.

**Botanical description:**
*C. dichotoma* family Boraginaceae is a small to moderate size deciduous tree with a short bole, short crooked trunk and spreading crown. The stem bark is grayish brown in color, longitudinally wrinkled or smooth. Leaves are simple, entire and slightly dentate, elliptical-lanceolate to broad ovate with the round and cordate base. These flowers are 25mm long, dull pinkish edible fruits with sticky flesh flowers are short-stalked, bisexual and white in color, appear in loose corymbose cymes. The fruit is a yellow or greenish-yellow shining globose or ovoid drupe seated in a saucer-like enlarged calyx (fig. 1). It turns black on ripening and the pulp gets viscid. The hard stone is 1-4 seeded.

**C. dichotoma as Herbal Antioxidant:**
Free radicals are responsible for many diseases like arthritis, cancer, diabetes mellitus, aging, etc. Herbal antioxidants have gained great importance in recent years as they are utilizing in the management of such diseases due to their ability to neutralize free radicals. As plants are the source of natural antioxidants, much attention has been gain to plants. Currently, there has been an increased interest globally to identify antioxidant compound that has potent bioactivities and has low or no side effects.

Oxidative stress is defined as an imbalance between the production of free radicals and the ability of the organism to counteract or detoxify their harmful effects through neutralization by antioxidants. As free radicals are very reactive species, their overproduction during oxidative stress can cause damage to all biological macromolecules, such as DNA, proteins and lipids, thus leading to cell damage and subsequently, to the manifestation of pathological conditions as cardiovascular diseases, diabetes and inflammatory diseases. Antioxidants are secondary molecules or metabolites that act as ROS scavenger and activator of cellular antioxidative enzymes to prevent the damages induced by ROS in biological system. Hence, naturally occurring antioxidants from plant polyphenols are getting more attention in terms of practical usage as safe and potent bioactive compounds.

Antioxidant activity of this plant may be attributed to presence of phenols, flavones, isoflavones, flavonoids, xanthones, alkaloids, anthraquinones, phytosterols, steroids, amino acids, anthocyanins, isothiocyanate...
Many in vitro and in vivo studies on antioxidant activity of *C. dichotoma* are available in literature. Quercetin from *C. dichotoma* is a phytochemical with high antioxidant activity that has been shown to maintain blood pressure levels and thus improve cardiovascular function. Quercetin can inhibit platelet aggregation, increase nitric oxide activity and improve endothelial function.

Sharma et al. studied the role of free radical scavenging activity of *C. dichotoma* seeds and leaves extract in degenerative disorders. Author state that these models demonstrate positive antioxidant activity in a concentration dependent manner and demonstrate that highest concentration exhibits highest (100 μg/ml) antioxidant activity. Result concluded that antioxidant activity was more pronounced in leaves as compared to seeds.

Singh et al. were carried out a comparative study of methanolic extract of seeds and leaves of *C. dichotoma* for free radical scavenging potential in the management of degenerative disorders. Antioxidant activity was more pronounce in methanolic extract of leaves as compared to seeds.

Nariya et al. evaluated the phenolic contents and antioxidant potential of methanolic and butanol extract of *C. dichotoma* bark. In the present study three in vitro models were used to evaluate antioxidant activity. The first two methods employed direct measurement of radical scavenging activity and in remaining one method evaluated the reducing power. *C. dichotoma* showed strong antioxidant activity by inhibiting DPPH activity and reducing power activities when compared with standard L-ascorbic acid. In addition, both the extracts were found to contain a noticeable amount of total phenols, which play a key role in controlling oxidation. The results present study show that the extract can be used as an easily available source of herbal antioxidant. The chemicals present in the bark such as alkaloids, terpenoids, reducing sugars, flavonoids, proteins, steroids, and tannins may be responsible for such activity.

Shuge et al. carried out a study aiming to determine the phytochemical composition and antioxidant activity of air-dried *C. dichotoma* seeds. The results from this study indicate that *C. dichotoma* seeds are a rich source of polyphenolic compounds and amino acids, which can be used for quality assessment. Results revealed that ethanolic extract of *C. dichotoma* seeds has good antioxidant capacity. Mahasweta et al. examined the antioxidant potential of *C. dichotoma* seeds. Hentricontanol Fraction (HTF), Hesperetin fraction (HF) and Taxifolin fraction (TF) from the seeds of *C. dichotoma* showed promising DPPH free radical scavenging activity at a concentration of 100 μg/mL.

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<th>S.N.</th>
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<td>1</td>
<td>Sharma et al 2007</td>
<td>To study the role of free radical scavenging activity of <em>C. dichotoma</em> seeds and leaves extract</td>
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<td>16</td>
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<td>2</td>
<td>Singh et al. 2010</td>
<td>To compared the methanolic extract of seeds and leaves of <em>C. dichotoma</em> for free radical scavenging potential</td>
<td>Both the extracts showed significant activity but antioxidant activity was more pronounce in methanolic extract of leaves as compared to seeds thus it can be used in the management of degenerative disorders</td>
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<td>3</td>
<td>Nariya et al 2011</td>
<td>phenolic contents were screened from methanolic and butanol extract of <em>C. dichotoma</em> bark to evaluate its antioxidant potential</td>
<td>Both extract showed strong antioxidant activity by inhibiting DPPH activity and reducing power activities when compared with standard L-ascorbic acid. Both the extracts were also found to contain a noticeable amount of total phenols, which play a key role in controlling oxidation. Thus extracts can be used as an easily available source of herbal antioxidant.</td>
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<td>4</td>
<td>Rahman et al 2017</td>
<td>To evaluate anticancer activity of the methanolic extract of <em>Cordia dichotoma</em> leaves (MECD) against a human prostate carcinoma cell line, PC3.</td>
<td>Results of this study confirm that MECD possesses antioxidant property due to presence of flavonoids in MECD and may be responsible for anti-cancer activity due to dual antioxidant and pro-oxidant properties.</td>
<td>25</td>
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<td>5</td>
<td>Ibrahim et al 2019</td>
<td>To investigate the chemical composition, antioxidant and</td>
<td>The CDFPE showed a powerful effect in scavenging superoxide radicals and chelating metals ions as well</td>
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### Conclusion and Future Prospective

Over the past three decades, much scientific information has been accumulated regarding phytochemicals and pharmacology of *C. dichotoma*. However, this information has not been collectively discussed together, which is very important in understanding the therapeutic utility of this plant. Various compounds like flavonoids, triterpenes, tannins, alkaloids and fatty acids possessing different bioactivities were isolated from different parts of this plant. The various pharmacological studies carried out with extracts of different parts indicates that the *C. dichotoma* possess analgesic, anti-inflammatory, antimicrobial, antiviral, wound healing, antidiabetic and antifertility activities. Antioxidant activity was mainly attributed to the presence of flavonoids and phenolic compounds, which was confirmed by the IC50 data correlation in various reported work. Due to the very long tradition using *C. dichotoma* for management of various diseases and also because of what is known today about its chemical constituents and biological activities, it seems to be worth the effort of exploring this plant further and such information may be used for further research work related to *C. dichotoma* and other traditional systems of medicine.

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### Conflict of Interest

There are no conflicts of interest

### References


