Annals of Plant and Soil Research 26(2): 345-350 (2024)
https://doi.org/10.47815/apsr.2024.10370

Phytochemical screening and pharmacognostical evaluation of c*ordia sebestena* Linn.

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Received, Febuary, 2024; Revised accepted, April, 2024

ABSTRACT

Plants are known as treasures of effective drugs for various ailments from ancient times. Plant metabolites played a protagonist part in the detection and development of novel chemotherapeutic mediators. Therefore, exploring the medicinal importance of plants has become extremely important concerning the evolving ailments of the present times. In the existing investigation, phyto-constituents and antioxidant activity of the plant known as Cordia sebestena Linn. were discovered for their biological importance. Cordia sebestena Linn. is an understudied medicinal plant that belongs to the family Boraginaceae and is commonly known as Aloe wood, geranium tree, and sea trumpet. The investigation objective is to develop the high-performance thin layer chromatography (HPTLC) fingerprint outline of the phytoconstituent of Cordia sebestena Linn, to identify the component of medicinal importance. In the present study, the HPTLC technique for the parting of the active constituents in extracts has been developed via the solvent system toluene: methanol: acetone (16:4:1). This study has provided the biological source which can be an eco-friendly, cost-effective, and better option than the chemically synthesized drugs. In the future, these fingerprinting descriptions will be supportive in further studies like quality regulation of the drug and estimating therapeutic worth.

Keywords: Chromatography; Flavonoids; Medicinal Plant; Herbal

INTRODUCTION

In the past few decades, people have been suffering from various diseases due to environmental deviations, food choices, deleterious behavior like smoking, and contact with carcinogenic agents (Prakash *et al.* 2020). India has one of the primogenital, richest, and utmost diverse cultural ethnicities associated with the usage of medicinal plants. This knowledge is reachable from thousands of therapeutic texts and manuscripts (Rana *et al.* 2021). The ingredients having medical value have been expansively used for treating numerous disease conditions. Herbs' existence easily available to human beings has been discovered to the extreme for their medicinal properties. Moreover, treatments and medications cause antagonistic side effects and are costly. The excessive productions of free radicals provoke acute oxidative impairment in biomacromolecules i.e., proteins, nucleic acids, lipids, etc. Which leads to triggering numerous cancers and several chronic sicknesses (Raju *et al.* 2024). Medicinal plant-derived effective composites are a countless avenue for the detection of novel anticancer medications. Plants have been considered enormously as an amazing source of abundant bioactive compounds that are appraised for innumerable treatments.

The plant phenolics and flavonoids have been widely studied for numerous pharmacological and therapeutic claims and it has manifold biological activities together with anticarcinogenic, antiviral, anti-inflammatory, antibacterial, and antiallergic (Prakash *et al.* 2020). Among the various biomolecules, flavonoids encompass a large group of plant secondary metabolites categorized by a Diphenyl propane structure (C6-C3-C6). Several preclinical and clinical investigations recommend that flavonoids have the capability for the anticipation and treatment of several ailments. Preclinical in vitro and in vivo research has revealed plausible mechanisms by which flavonoids may deliberate cancer and cardiovascular defense (Oza *et al.* 2017). Some evidence supporting the therapeutic potential of flavonoids originates from research based on the plants used in traditional medicine to cure an extensive range of diseases, which has publicized that flavonoids are communal bioactive elements of these plants (Gao *et al.* 2024). Flavonoids have been testified to own many useful properties, including anti-

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inflammatory activity, enzyme inhibition, antimicrobial action, anti-cancer, anti-allergic activity, antioxidant activity, vascular activity, and cytotoxic antitumor activity (Sopjani *et al.* 2024). Flavonoid sustenance increases the immune power and lessens glucose and blood lipids (Ghasemzadeh *et al.* 2011).

Cordia sebestena is a small tree that rises to be 25 feet tall and 5-10 cm wide. Genus Cordia is shrubs or flowering trees embracing more than 300 species distributed in the tropical zones. It transpires in coastal forests and shrublands in sand or limestone substrates (Tak *et al.* 2024). *Cordia sebestena* is commonly acknowledged as Aloe wood, geranium tree, scarlet cordial, and sea trumpet belonging to the Boraginaceae family. Leaves are cast as emollients prepared for leaves used in the treatment of respiratory disorders such as bronchitis, cough, fever, and influenza (Hikmawanti *et al.* 2020). Also, *Cordia sebestena Linn* is used for the treatment of wounds, boils, tumors, gout, and ulcers, and these species are also used as a blood purifier and febrifuge. Bioactive compounds such as sebestenoids have been isolated from the ethyl acetate extract of the fruit. The nutritional properties of the seeds have also been evaluated. They have the antioxidant, and antibacterial toxicity potential of the ethyl acetate extract of *Cordia sebestena Linn*. plant leaves. Conventionally bark and flower extract have been used as a traditional medicine for coughs and bronchial ailments. Despite this, the flower tea has been used to treat malaria, catarrh, edema, etc. Therefore, the present study has been done to determine the phytochemical constituents of the plants that can be used It will lead to cost-effective and biogenic biomolecule usage due to which people could have lesser-known side effects of the drugs. This investigation has provided the biological foundation which can be an eco-friendly, cost-effective, and healthier option than the chemically synthesized medications.

MATERIALS AND METHODS

Materials

All the chemicals used for the experiments were purchased from Himedia. Chemicals like Methanol, Acetone, Hydrochloric acid (HCL), Draggendoff's reagent, Fehling solution, A and B, Aluminum chloride, Sodium hydroxide (NaOH), Glacial acetic acid, Sodium nitrite ($NaNO_2$), Chloroform ($CHCl_3$), Sulfuric Acid (H_2SO_4), Aluminum trichloride, Potassium acetate, and distilled water were high grade and ensure purity.

Collection of Plant Samples

The plant parts of *Cordia sebestena* Linn were collected from Gokul Global University Sidhpur of Patan district in India. All the plant parts were collected, first washed with fresh water, and dried in sunlight separately. The leaves, flowers, and fruit are ground coarsely and then powdered and stored in airtight bottles. Plant parts are collected and washed with water and then dried in a hot air oven and sun-light. Plant leaves are crushed in mortal-pastel and other parts are crushed in a mixer and make a powder.

Extracts preparations

Extracts are made in different solvents such as methanol, acetone, and distilled water. 1 gm of each sample was soaked in a stopper tube containing 10 mL Methanol and distilled water and kept in an orbital shaker for 48 hours. The extracts were filtered through Whatman filter paper no.1. The supernatants were collected, covered, and labeled accordingly as methanol extract (ME) were used for the phytochemical and antioxidant activities stored at 4 ºC and used for the screening of various phytochemicals.

Qualitative Phytochemical Determination

Assessment of total alkaloid content

5 mL each of sample of plant extract was added and stirred with 5 mL of 1% aqueous hydrochloric acid in a steam bath. After that one milliliter of the filtrate was taken out in a separate test tube and a few drops of Draggendoff's reagent were added. Filtrate turns into Blue-black turbidity showing as preliminary evidence of alkaloids Evans, (2009).

Assessment of total carbohydrate content

Fehling's solution test has been executed for the total carbohydrate content. Both Fehling solutions, A and B solutions *sebestena* were boiled separately with equivalent volumes added to the plant extract. A Venetian red precipitate specified the existence of reducing sugars (Nongalleima *et al.* 2017).

Assessment of total flavonoid content

In a test tube, 5 mL plant extracts were poured then a few drops of 1% aluminum chloride solution were added to it. Solution color changed into a light-yellow coloration designating the presence of Flavonoid. Again, to validate NaOH and HCL were added and the solution became colorless confirming the presence of flavonoid content (Shraim *et al.* 2021).

Calculation of Tannin content

In the test tube, 0.5 mL of plant extract solution was added followed by 1 mL of distilled water and 1 mL of 0.1% Ferric Chloride solution. The solution color changed into blue and the formation of brown-green coloration was evident confirming the presence of tannin content within the samples. (Khasnabis *et al.* 2015).

Determination of Saponin content

In a test tube, 2 mL of distilled water was added followed by 5 mL of plant extract and shaken vigorously. Then foam was formed in the solution. Form formation is the confirmation test for the presence of Saponin (Ezeabara *et al.* 2013).

Determination of Phenol content

In the test tube, 2 mL plant extract was taken and a few drops of 5% glacial acetic acid and 5% $NaNO_2$ solution were added. In the solution, Niger-brown precipitation was formed indicating the presence of phenolic compounds in the samples (Khoddami *et al.* 2013)

Determination of terpenoid content

5 mL of plant extract was mixed with 2 mL of $CHCl_3$ in a test tube. 3 milliliters of conc. H_2SO_4 was added to the mixture. In the test tube, an interface with a sepia coloration was formed validating the presence of terpenoids in the samples (Ercioglu *et al.* 2018).

Determination of Sterol content

The plant extract was poured into the test tube. Then 1 mL chloroform followed by 1 mL conc. H_2SO_4 was added to it and shaken well. The appearance of reddish-blue color in the chloroform layer was formed in the sample indicating the presence of sterol in the samples (Amaral *et al.* 2003).

Determination of glycoside content

5 gm dried extract was taken in the test tube then add 2 mL glacial acetic acid containing one drop of ferric chloride solution and 1 mL conc. H_2SO_4. Brown ring indicated the presence of Glycosides (Le Gall *et al.* 2003).

Quantitative Phytochemical Determination

Determination of total flavonoid content

Quercetin was used as a reference compound while determining the flavonoid. Each plant extract stock solution was taken out 0.50 µl and mixed with 50 µl of aluminum trichloride followed up by the potassium acetate in the same quantity. The spectral absorption was measured at 415 nm after 30 minutes at room temperature. For calibration, a standard quercetin solution was prepared by weighing 0.01 µg quercetin and dissolving it in 20 mL of ethanol. All readings were taken out in triplicates and flavonoids quantity in plant extracts were expressed as quercetin equivalent micrograms per weight (Lallianrawna *et al.* 2013).

RESULTS AND DISCUSSION

The phytochemicals existing in the leaves of *Cordia sebestena Linn.* were alkaloids, saponins, tannins, flavonoids, steroids, and phenolic in nature. The details of the preliminary phytochemical examination is accessible in Table (1). According to the investigations the Flavonoid content in *Cordia sebestena* Linn. methanolic extract of winter leaves recorded was (935.33±1.44 µg/mL), which is supposed to be highest among samples whereas in the seed the lowest amount was detected (254.33±1.90 µg/mL). However, all extract had flavonoid content. From the phytochemical results, it is evident that extraction of bioactive compounds from leaves, flower, stem, bark, seed, and fruit of S *Cordia sebestena Linn*. has prominent potential to be used further for the medication purposes.

Phytochemical screening and TLC profile of crude extract can be very useful for developing the quality parameters. The *C. sebestena* is one of the therapeutically important plants. Since long time, it has been used for treatment of variety ofailments but the details of its quality attributes like pharmacognostic, phyto- and physicochemical characteristics were not available.

Table 1: Qualitative phytochemical screening

Sr. No	Phytochemicals	S. Leaf	W. Leaf	S. Bark	W. Bark	S. Stem	W. Stem	S. Flower	W. Flower	S. Root	W. Root	Seed
1	Alkaloids	+	+	+	++	-	-	-	-	+	+	+
2	Carbohydrates	+	+	+	+	+	+	+	+	+	+	+
3	Flavonoids	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
4	Tannin	+	++	+ +	+ +	+	+	+	+	+	+	++
5	Saponin	+	+	-	-	-	-	-	+	+	+	+
6	Phenol	++	++	++	++	++	++	++	++	++	++	++
7	Terpenoids	+	+	++	++	++	++	-	+	+	+	+
8	Sterol	+	+	-	-	-	-	-	+	+	+	+
9	Glycosides	-	-	+	++	+	++	+	+	-	-	+

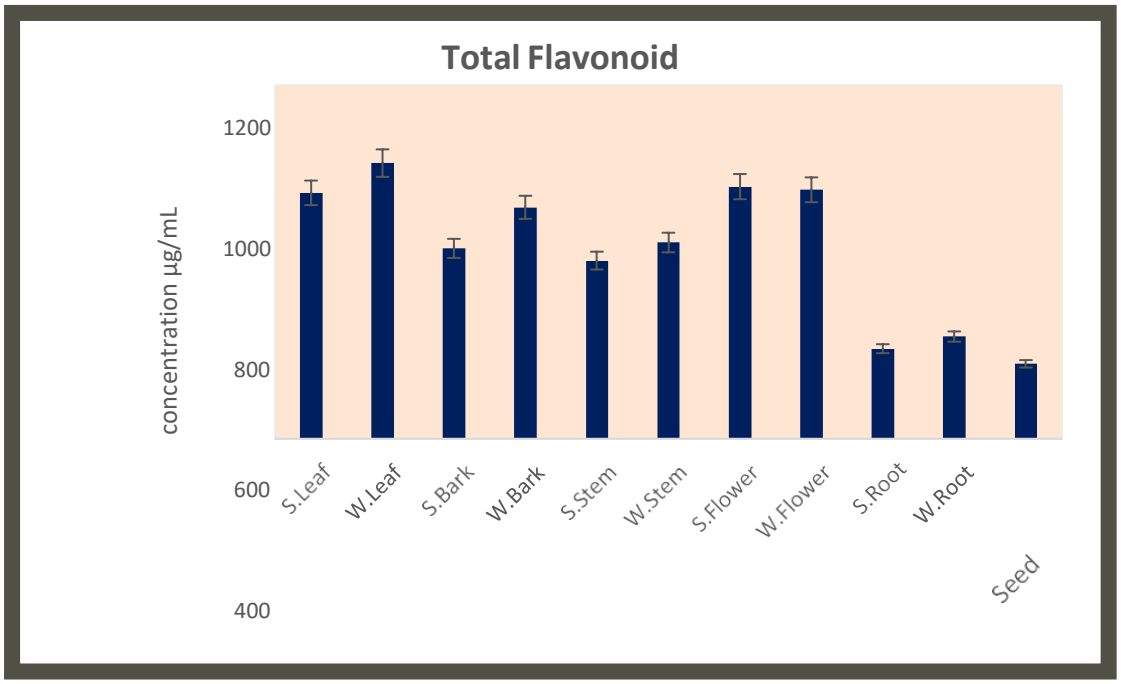

Figure 1: Total Flavonoid content in different parts of the plant

CONCLUSION

Cordia sebestena Linn. findings could be supportive in the authentication of these plant materials used in the future for further research. Phytochemical studies of extract also confirm different findings which can be useful in quality control of the plant drug. This investigation may further aid in developing the Pharmacological importance of *Cordia sebestena Linn*. but it requires more extensive research through which reference data for validation of the natural product can be confirmed.

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