



ISSN (E): 2320-3862
ISSN (P): 2394-0530
www.plantsjournal.com
JMPS 2022; 10(6): 37-39
© 2022 JMPS
Received: 08-09-2022
Accepted: 13-10-2022

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Pharmacognostic and phytochemical evaluation of *Caesalpinia crista* L. leaf

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Abstract

Caesalpinia crista L. is a popular medicinal herb distributed throughout the tropical and subtropical regions of Southeast Asia. Almost all parts of this plant are used in traditional medicine for the treatment of various ailments. Therefore, the aim of the present study was to investigate the pharmacognostic standards of the *C. crista* and its phytochemical analysis. The present study includes examination of macroscopic and microscopic characters, powder analysis and phytochemical properties of *C. crista* leaf. All the parameters were studied according to WHO guidelines. The result of the study could be useful in setting some diagnostic indices for the identification and preparation of a monograph of the plant.

Keywords: *Caesalpinia crista*, pharmacognostic, phytochemical, leaves, macroscopic, microscopic

Introduction

Pharmacognosy is defined as the study of physical, chemical, biochemical and biological properties of the drugs and deals with the standardization, identification, authentication and study of natural drugs [1]. Correct identification and quality assurance of the plant material is necessary to assure the reproducibility of the herbal medicine quality that deals with the safety and efficiency [2]. It is closely associated and includes the allied fields like phytochemistry, microbial chemistry, biotransformation, biosynthesis, chemotaxonomy and toxicological screening of the natural drugs [3, 4].

Caesalpinia crista is a valuable medicinal plant belongs to the family Fabaceae (Caesalpinaceae). There are several traditional medicinal applications and health benefit effects of the different parts of *C. crista* [5]. *C. crista* reported to possess Antiplasmodial [6], Antimalarial [7], Hepatoprotective [8, 9], Anti-diabetic [10, 11], Antiviral [12], Antioxidant [13], Anthelmintic [14, 15], Alzheimer's disease [16], Neurodegenerative disorder [17], Nootropic [18], Cytotoxic [19, 20], Antipyretic [21], Anticancer [22], Anti-tumour [23, 24], Antimicrobial [13, 25], Wound healing [26], Cardio protective [27], Antiulcer [28], Antioxidant and Anti-inflammatory activities [29].

Authentication and standardization are prerequisite steps especially for herbal drugs and their formulations in traditional systems of medicine [30]. Hence, the objective of the present study was to evaluate pharmacognostic standards and phytochemical analysis of *Caesalpinia crista* L. leaves.

Material and methods

The fresh leaves were collected from Saurashtra University Campus, Rajkot, Gujarat, India. The leaves were washed under tap water, shade dried and homogenized to fine powder and stored in airtight container for further studies. Macroscopic and microscopic characters were studied as described [31]. The macro-morphological features of the leaves were observed under magnifying lens. Microscopic studies were carried out by preparing thin sections of leaflet and petiole. The thin sections were further washed with water, stained with safranin and mounted in glycerine for observation and confirm its lignification. The powder microscopic studies were also carried out and the specific diagnostic characteristic features were recorded. Photographs at different magnifications were taken by using digital camera. The qualitative phytochemical tests were carried out from crude powder for detection of alkaloids, flavonoids, tannins, phlobatanins, triterpenes, steroids, saponins and cardiac glycosides were carried out following the procedure as described earlier [32, 33].

Result and discussion

Macroscopically, leaves were found compound, opposite and soft hair beneath. The average size of leaflet was 10 to 12 cm in length and 3 to 6 cm in width (Fig. 1). However in case of the microscopic observations as shown in the Fig. 2, the transverse section (T.S.) of leaflet showed presence of upper and lower epidermis. The epidermis was covered with a single layer of cuticle. The vascular bundle was surrounded by 4-6 layers of cortex. Xylem was lignified and phloem was non-lignified. The pith was made up of large cells. The anomocytic stomata were present in epidermis. In surface view, fragments of epidermis were embedded with

anomocytic stomata (Fig. 2C). Xylem vessels with spiral thickening were observed in the powder study. The result of qualitative phytochemical screening of *C. crista* is shown in Table 1. Alkaloid was present in high amount followed by the presence of flavonoids and triterpenes, while other phyto constituents were absent (Table 1). Pharmacognostic study will help to ensure the identity, quality, purity, safety and efficacy of the drug. Standardization parameters will also help in checking and preventing adulteration and substitution, which is nothing but mixing or substituting the original drug material with other spurious, substandard, defective, spoiled, useless other parts of the same or different plants [34, 35].

Table 1: Qualitative phytochemical analysis of *C. crista*.

Phytochemicals	Test	Observation
Alkaloids	Dragendorff's test	+
	Mayer's test	+++
	Wagner's test	++
Flavonoids	Alkaline reagent	+
Tannins	FeCl ₃ test	-
Phlobatanins	HCl test	-
Triterpenes	H ₂ SO ₄ test	+
Steroids	Liebermann-Burchard test	-
Saponins	Frothing test	-
Cardiac glycosides	Keller-kiliani test	-

–: No presence; +: Less presence; ++: Moderate presence; +++: High presence



Fig 1: Macroscopic characteristics of *C. crista* leaves (adaxial and abaxial surface)

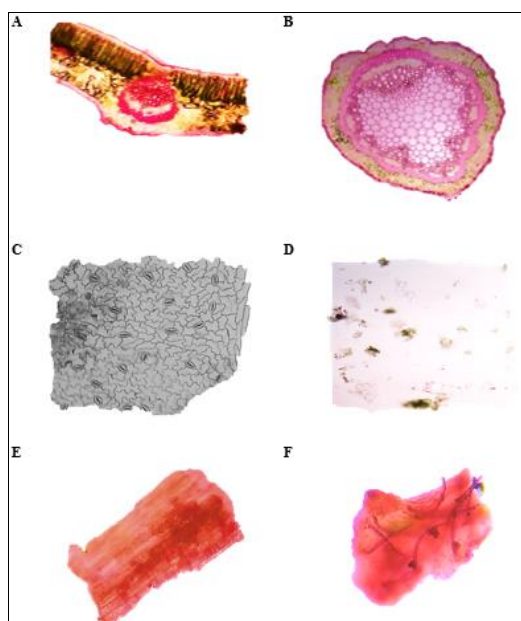


Fig 2: Microscopic features of *C. crista* (A) leaflet T.S., (B) petiole T.S., (C) surface peeling, (D-F) powder study

Conclusion

The current investigation reveals the pharmacognostic features and phytochemical properties of *C. crista*. Macro and micro morphological standards discussed here can be considered as identifying parameters to authenticate the drug and could be useful to establish the authenticity of this medicinally useful plant. Further studies are in progress in our laboratory to evaluate the various efficacies as well as isolation and characterisation of active components.

Acknowledgement

The authors thank S. P. Singh for providing necessary facilities and timely supports in order to complete research work. One of the author, Dr. Kalpna D. Rakholiya is grateful for the financial support from the Department of Science and Technology, Science and Engineering Research Board, New Delhi, India under the National Post-Doctoral Fellowship (PDF/2015/000430).

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