Pharmacognostic Study and Establishment of Quality Parameters of Leaves of *Ficus racemosa* Linn.

Gorwadiya HC, Savalia RM, Vachhani KV, Desai TR, Pandya DJ*

R. K. College of Pharmacy, Rajkot – 360020, Gujarat, India. pandyadevang82@yahoo.com

**ABSTRACT**

**Introduction:** *Ficus racemosa* Linn. syn. *Ficus glomerata* Roxb. (Family – Moraceae) is found commonly in India. Recent pharmacological findings indicate that its leaves possess significant anti-diabetic, anti-ulcer, hepatoprotective, anti-diarrheal, analgesic, larvicidal, anti-bacterial and anti-inflammatory activities, which comply with the claims made in the traditional medicinal texts. However, no conclusive pharmacognostic study of its leaves has been performed yet. **Methods:** The present investigation deals with the qualitative and quantitative microscopic evaluation of the leaf material and establishment of its quality parameters, including physicochemical and phytochemical evaluation. **Results:** Chief microscopic characters include vascular bundles having patches of perimedullary phloem and sheath of calcium oxalate cluster crystals. Chief characters of powder include hooked-top trichomes, calcium oxalate prisms, cluster crystals and xylem vessels with reticulate thickening. Various physicochemical parameters were also established. Phytochemical analysis showed the presence of many important classes of phytoconstituents like alkaloids, cardiac glycosides, saponins, flavonoids, tannins and carbohydrates. **Conclusion:** Such a study would serve as a useful gauge in standardization of the leaf material, isolation of medicinally important phytoconstituents, performing pharmacological investigations and ensuring quality formulations.

**Key words:** Cluster fig, *Ficus glomerata*, Moraceae, Udumbar.

**INTRODUCTION**

*Ficus racemosa* Linn. syn. *Ficus glomerata* Roxb. (Family – Moraceae) is also known as (English) Cluster fig, (Hindi) Umrai, (Sanskrit) Udumbar and (Urdu) Gular.[1] Its leaves are used traditionally in several disorders like bronchitis, ulcers, dysentery, menorrhagia, gum diseases, glandular swelling, cervical adenitis, hemoptysis, abscess, chronic wounds and various skin diseases. Galls on leaves are used to treat small pox. The tender leaf buds are applied on the skin, in the form of paste, to improve the complexion. Its latex is used in edema, pain, ulcers, wounds, piles, diarrhea, mumps and diabetes. Along with sesame oil, the latex is used to treat cancer.[2] Recent pharmacological studies of the leaves prove it to have potent anti-diabetic,[3,4] anti-ulcer,[5] hepatoprotective,[6] anti-diarrheal,[7] anti-bacterial,[8] and anti-inflammatory,[9,10] analgesic[11] and larvicidal[12] activities. The present investigation deals with the qualitative and quantitative microscopic evaluation of the leaf material and establishment of its quality parameters, including physicochemical and phytochemical evaluation. This thorough evaluation would be useful in standardization of the leaf material, bioactivity-guided fractionation of therapeutic phytoconstituents, performing further pre-clinical or clinical investigations and manufacturing quality formulations.

**MATERIALS AND METHODS**

**Collection and authentication of leaves**

Leaves of *F. racemosa* were collected from the herbal garden of R. K. College of Pharmacy, Rajkot in March, 2010. Herbariums and voucher sample were prepared and deposited in Department of Pharmacognosy, R. K. College of Pharmacy (Voucher no. RKCP/COG/01/2010). Authentication was done by Dr. A. N. Pandey, Department of Biosciences, Saurashtra University.

**Pharmacognostic studies**

Morphology of fresh leaves of *F. racemosa* was studied. Photomicrography of stained and unstained transverse sections of fresh leaves was performed using Win DVR software. Leaf constants were established using camera lucida. The leaves were dried under shade, powdered to 60#, stored in airtight containers and used for powder study and quantitative microscopy (Table 1).[13]
Physico-chemical evaluation
Various physico-chemical parameters like loss on drying, ash values (total ash, water soluble ash and acid-insoluble ash) and extractive values (water soluble, alcohol soluble and petroleum ether soluble extractives) were established using the powdered drug (Table 2).[14]

Phytochemical study
Fluorescence of the powder with various reagents was observed under visible and UV light (Table 3). The powder was extracted with 500ml of different solvents at 70°C for two hours each. Various phytoconstituents present in the leaves were detected by their respective chemical tests using the appropriate extracts (Table 4).[15-21]

RESULTS AND DISCUSSION
Pharmacognostic study
Macroscopical characteristics
Leaves are simple, 7.5-15 cm × 3.2-6.3 cm, ovate-oblong or elliptic-lanceolate, apex acute, margin wavy, surface glabrous, texture membranous, base symmetric, venation reticulate, color of upper surface dark green and lower surface light green. Three prominent veins seem to be arising from the base of the lamina. Petiole is angular and reddish-brown (Figure 1).

Microscopy: Transverse section
Lamina of the transverse section shows a prominent hypodermis beneath the upper epidermis. Underlying the
Vascular bundles are bicolateral, crescent shaped, having patches of perimedullary phloem and 3-4 secondary vascular bundles above the primary vascular bundle. Sheath of calcium oxalate cluster crystals are present below the primary vascular bundle. Starch grains are scattered throughout the ground tissue. Trichomes are covering, long, unicellular or bicellular, few having a hooked-top (Figure 2, 3).

Figure 2: A - Diagrammatic T. S. of leaf. B - Detailed T. S. of leaf (X40)

(Co, Collenchyma; Ep, Epidermis; Hp, Hypodermis; Pal, Palisade; Vb, Vascular bundles; Crs, Calcium oxalate cluster crystal sheath; Tr, Trichomes; PPh, Perimedullary phloem)
Evaluation of the leaves. Main microscopic characters include cluster crystal sheath of calcium oxalate and vascular bundles having patches of perimedullary phloem. Diagnostic characters of powder include hooked-top trichomes, calcium oxalate cluster crystals, calcium oxalate prisms, starch grains, anomocytic stomata and xylem vessels with reticulate thickening. Such a pharmacognostic study is useful for standardizing crude drugs and can be used to differentiate closely related species. Various physicochemical parameters were established which can be important in detecting adulteration and mishandling of the crude drug. Phytochemical analysis showed the presence of many important classes of phytoconstituents like alkaloids, cardiac glycosides, saponins, flavonoids, tannins and carbohydrates. This indicates that the plant can be useful for treating different diseases because the therapeutic activity of a plant is due to its phytochemical constituents.

CONCLUSION

Leaves of *Ficus racemosa* have been proven to possess a wide spectrum of pharmacological activity. The present work deals with the microscopic, physicochemical and phytochemical evaluation of the leaves. Main microscopic characters include cluster crystal sheath of calcium oxalate and vascular bundles having patches of perimedullary phloem. Diagnostic characters of powder include hooked-top trichomes, calcium oxalate cluster crystals, calcium oxalate prisms, starch grains, anomocytic stomata and xylem vessels with reticulate thickening. Such a pharmacognostic study is useful for standardizing crude drugs and can be used to differentiate closely related species. Various physicochemical parameters were established which can be important in detecting adulteration and mishandling of the crude drug. Phytochemical analysis showed the presence of many important classes of phytoconstituents like alkaloids, cardiac glycosides, saponins, flavonoids, tannins and carbohydrates. This indicates that the plant can be useful for treating different diseases because the therapeutic activity of a plant is due to its phytochemical constituents.
to the presence of particular class of compounds. Such a detailed study would be decisive in performing standardization of the leaf material, preparation of its monograph, isolation of phytoconstituents, performing further pre-clinical and clinical investigations and manufacturing of its formulations.

**REFERENCES**


