Research Article

# PHYTOPHARMACOGNOSTICAL STUDY OF STEM OF *GYMNOSPORIA MONTANA*: A NATIVE OF GUJARAT

**Dhru Bhavita[1], Zaveri Maitreyi[1,*] and Lakshmi B[2]**

1. K.B. Institute of Pharmaceutical Education and Research, Sector-23, GH-6, Gandhinagar-382023, Gujarat. India.
2. Department of Biotechnology, Kadi sarva vishvawidhyalaya, Sector-23, GH-6, Gandhinagar-382023, Gujarat. India.

*Corresponding author's E-mail: khandharmaitreyi@gmail.com

**Received on:** 14-10-2010; **Finalized on:** 15-12-2010.

**ABSTRACT**

Currently there is lot of interest all over the world in drugs used in Ayurvedic therapeutics and many are being used. Internationally, in consonance with the present scientific ambience it is important to undertake an evaluation of plant drug like *Gymnosporia montana* belonging to the family *Celeastraceae* commonly known as Vikalo. Ethanomedicinally fresh leaves of Vikalo are chewed in tribal regions of Gujarat to cure jaundice. Pharmacognostical evaluation including examination of morphological and microscopical characters, determination of quality control parameters such as ash values, extractive values, moisture content, foreign matter, and microbial contamination were carried out of *Gymnosporia montana* stem. Phytochemical screening including qualitative chemical examinations was also carried out. Hence, the present attempt was undertaken to investigate the Phytopharmacognostical study of stem of *Gymnosporia montana*. The study revealed the presence of epidermis, cortex with starch grain and crystals of calcium oxalate, a band of yellowish colour matter, broken ring of pericyclic fiber, phloem region associated with dark colour matter and uniseriate medullary rays, composed with phloem parenchyma, and pith showed parenchymatous cells containing starch grain, dark colour matter in the stem of *G.montana*. Phytochemical screening of stem of *G.montana* showed the presence of phytoconstituents like phenol, flavonoids, alkaloids and saponins.

**Keywords:** *Gymnosporia montana,* Phytopharmacognostical, Ethanomedicinal plant.

## INTRODUCTION

Diseases that remain most challenging in today's healthcare system tend to be complex involving multiple mechanisms, targets and drugs for effective disease management. In contrast to current combination therapies, however, plant based drugs contain a mixture of multiple components thereby saving considerable time and expense[1]. Plants and plant-based medicaments are the basis of many of the modern pharmaceuticals we use for our various ailments[2]. The discovery of medicinal plants has usually depended on the experience of the populace based on long and dangerous self experiment. Progress over the centuries towards a better understanding of a plant derived medicine has depended on two factors that have gone hand in hand. One has been the development of increasingly strict criteria of proof that a medicine really does what it is claimed to do and the other has been the identification by chemical analysis of the active compound in the plant[3]. According to world health organization (WHO), more than 80% of the world's population relies on traditional medicines for their primary health care needs. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive compounds of plants are alkaloids, flavonoids, tannins and phenolic compounds. The phytochemical research based on ethno pharmacological information is generally considered an effective approach in the discovery of new medicinal properties from higher plants[4]. Knowledge of the chemical constituents of plants is desirable, not only for the discovery of therapeutic agents, but also because such information may be of value in disclosing new sources of such economic materials as tannins, oils, gums, precursors for the synthesis of complex chemical substances. In addition, the knowledge of the chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies[5]. Chemical constituents may be therapeutically active or inactive. Traditionally, one of the important ethanobotanical plants such as *Gymnosporia montana* has been used in the treatment of Jaundice in tribal area[6]. *Gymnosporia montana,* a plant native in Gujarat, is a relatively insufficiently investigated for its pharmaceutical components and their activity, keeping this in view, the study is being undertaken to evaluate the plant. *Gymnosporia montana*, belonging to the family *Celeastraceae* commonly known as Vikalo is a shrub or tree growing wild in dry areas[7]. The plant has been traditionally useful in treating ulcer, gastro-intestinal disorders, toothache, dysentery[8], antispasmodic[9] and hepatoprotective[10] effect was also reported. In South Africa, leaves are used as a vermifuge for children. In traditional system of medicine the root, stem, and leaves are valued for their medicinal properties. The present study was undertaken to evaluate the Phytopharmacognosy of stem of *Gymnosporia montana.*

## MATERIALS AND METHODS

### Collection and authentification of plant material:

The stem of *Gymnosporia montana* was collected from the Vijapur, Gandhinagar, Gujarat, India during November 2008 and were authenticated by Dr. S.K. Patel, Head of the Botany Department, Government Science College, Gandhinagar. The voucher specimen KB/O8/0011 was deposited in K.B. Institute of pharmaceutical Education and Research, Gandhinagar, Gujarat, India.

### Preparation of different extracts:

The stem part of *G. montana* was separated and dried under sunlight. Dried powdered passed through sieve of 60 mesh (#) size and stored in airtight containers and then used for present work. Shade dried stem powder was extracted successively with petroleum ether (60-80), 70% methanol and water. The extraction was carried out by soxhlet assembly, for 6-8 hours. Then the solvent was filtered and repeat the process for three times in the same manner. The extract was concentrated and dried under controlled temp of $60^0$C on a water bath and reported the % yield respectively. Dried extracts of the stem and leaves were used for further investigation. For microscopical studies free hand section of the stem of *G. montana* was taken, cleared with chloral hydrate solution and studied. The lignified elements were visualized by staining the section with a drop of hydrochloric acid and phloroglucinol in the cut sections. Macerates were prepared by the Schulz maceration method[11] Photomicrographs were shot for histological observation (Labomed). Physicochemical studies[12-14] and phytochemical screening[15,16] of the stem of *G. montana* were carried out by using standard methods. The freshly prepared stem extract of *G. montana* were quantitatively and qualitatively tested for the presence of chemical constituents and these constituents were identified by characteristic color changes as described by the standardized procedures.[17,18]

## RESULTS AND DISCUSSION

Any medicinal plant requires detailed study prior to its use because; the therapeutic efficacy is absolutely dependent on the quality of the plant material used. The original and basic approach towards pharmacognosy includes study of morphological system, study of the cell structures and organization and study of tissue system, which still holds a key in the identification of the correct species of the plant and also to help us to differentiate between closely related species of the same genus. It is also first step to standardize a drug, which is the need of the day. A detailed pharmacognostical investigation of the stem of *Gymnosporia montana* was carried out to establish its correct pharmacognostical identity through morphological and microscopical methods**.** Macroscopical observation of the plant was done according to size, shape, surface and fracture with a naked eye which provided a great deal of information about the drug material under consideration. Organoleptic characters of the powder of stem showed a creamish course powder without any characteristic taste and odour. But, the macroscopical and organoleptic characters of the stem of *G. montana* was usually not sufficient to enable the drug to be identified. Therefore, authentification of stem of *G. montana* was further confirmed by the microscopical studies of the plant material, which consists in an investigation of the natural distribution and relationship between various tissues and tissue components comprising the organ under study. The color of different extracts and % yield of *G. montana* stem showed in table 1.

**Table 1:** % yield from extract of leaf & stem powder:

| Type of extract → | Petroleum ether extract | 70% methanol extract | Aqueous extract |
|---|---|---|---|
| | Stem | Stem | Stem |
| Color of extract | Brownish | Brown | Brownish black |
| % yield from extract | 1.4% | 6.5% | 7.5% |

*Gymnosporia montana* occurs naturally in dry regions, common in dry scrub forests throughout India.

Leaf of the *Gymnosporia montana* is simple, alternate or clustered. They are found in the axils of spines or on the small branches. They are sub-sessile, exstipulate, glabrous, and polymorphic. Leaves are lanceonate, margin is entire in the lower half. Leaf apex is acute or emarginate. Leaves are 3 to 8 cm long and 1 to 3 cm broad as shown in figure 1.

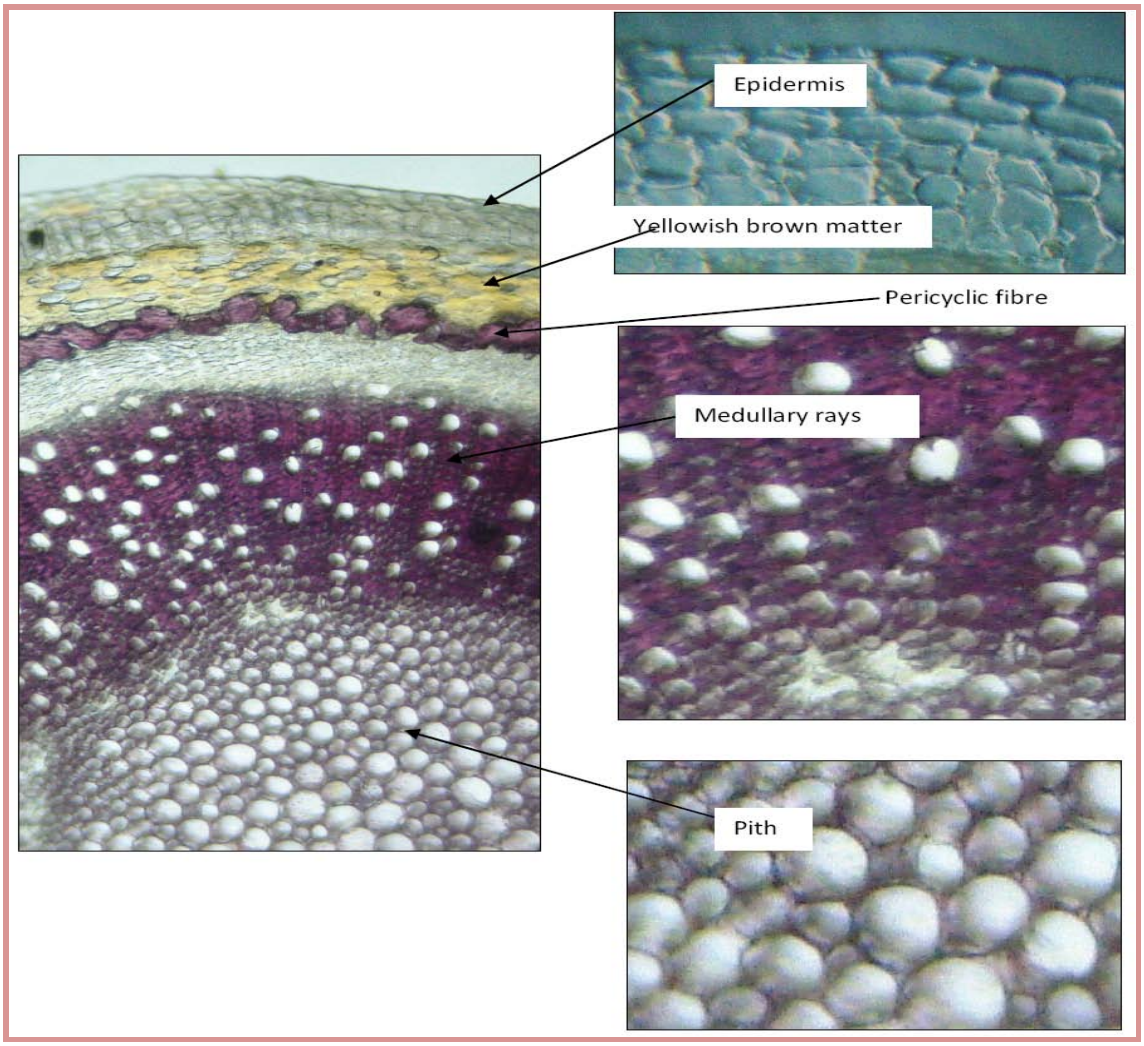
**Figure 1:** *Gymnosporia Montana*

Young stem pieces of *G. montana* are reddish brown as shown in figure 2, round and hard. Its cut end is white and granular. Spines are straight, hard and pointed. They are modified branches and show a single node from which leaves are originates. Flowers are small, white, born in axillary cymes. Bracts are small, acute. Fruits are broadly obovoid, 10-12 mm long and 8-9 mm in diameter. The peak flowering from in the month of October to December while, fruiting between the months of January to April in India.

**Figure 2:** Stem of the *Gymnosporia Montana*

The microscopy study was carried out to authenticate the stem of *G. montana.* Transverse section of young stem of *G. montana* is circular and exhibits epidermis, cortex, phloem, xylem and pith as shown in figure 3. Epidermis is composed with many layers of compact, thin walled square to rectangular cells. Cortex is made up of elongated parenchymatous cells. A band of yellowish colored matter, starch grains and cluster crystal of calcium oxalate. Inner cortex has a broken pericyclic fiber with square to rectangular stone cells. Phloem is consists of sieve tubes, sieve plates, companion cells, phloem parenchyma and fibers, phloem cells with dark matter and calcium oxalate crystals. Xylem vessels are narrow, single and radially arranged. Xylem and phloem are traversed by uniseriate medullary rays, the cells of which round and parenchyma in nature, filled with dark colored matter. Pith is composed by parenchymatous with round cells containing many rounds, single starch grains, dark colored matter and few prismatic as well as cluster crystal of calcium oxalate. Cells at the center of pith are larger than those towards the periphery.

**Figure 3:** Transverse section of young stem of *G. montana*




The stem of *G. montana* was evaluated for physico-chemical parameters such as ash content, extractive values in various solvents, moisture content, foreign matter, and microbial contamination were reported in table 2.

**Table 2:** Quality control parameters

| Parameters | % w/w Stem |
|---|---|
| Total ash | 7.94±0.54 |
| Acid insoluble ash | 1.53±0.63 |
| Water insoluble ash | 3.30±0.67 |
| Water soluble extractive values | 9.03±0.51 |
| Alcohol soluble extractive values | 10.35±0.40 |
| Petroleum ether extractive values | 5.06±0.30 |
| Foreign matter | 0.6 |
| Moisture content | 3.2 |
| Microbial contamination | 0.4 |

Standard deviation (SD) = ±SD

Preliminary phytochemical screening of the plant showed the presence of phytoconstituents like phenol, flavonoids, alkaloids and saponins were presented in table 3.

**Table 3:** Test for presence of various Phytoconstituents

| Phytoconstituents | Tests | Positive (+ve) or Negative( -ve) Stem extract |
|---|---|---|
| **Alkaloid** | Dragondroff's test | **+ve** |
| **Flavonoid** | Shinoda test<br>Fluroscence test | **+ve** |
| **Phenolics** | ferric chloride test<br>Folin ciocalteu test | **+ve** |
| **Carbohydrates** | Molish's test<br>Fehling test | **+ve** |
| **Steroids and tritepenoids** | Liberman burchat test<br>Salkowski reaction test | **+ve** |
| **Carotenoids** | Antimony trichloride test<br>Sulphuric acid test<br>Hydrochloric acid | **+ve** |
| **Tannins** | Gelatine test<br>Lead acetate test | **-ve** |
| **Saponins** | Forth test<br>Haemolytic zone test | **+ve** |
| **Coumarins** | ammonia test<br>Hydroxylamine HCl test | **+ve** |
| **Anthraquinone glycoside** | Borntrager's test<br>Modified borntrager's test | **-ve**<br>**-ve** |

## CONCLUSION

The stem of *G. montana* was evaluated for pharmacognostical parameters such as macroscopy, microscopy, ash values, extractive values, loss on drying, etc. Transverse section of stem of *G. montana* confirms authenticity of the plant as per previous reports. Preliminary phytochemical screening indicated that the stem of *G. montana* was rich in phenol. The pharmacognostical and phytochemical studies carried out on the stem of *G. montana,* used in the traditional system of medicine will be of immense use in carrying out further research of its use medicinal plant.

## REFERENCES


1. Karnath L The new paradigm of botanical drugs. Eur. Pharm. Rev.2002, 7:19-20
2. Abraham, Z. Glimpses of Indian Ethno botany, Oxford & Publishing Co., New Delhi, 1981,pp 308-320
3. Holiman, A. Plants in Medicine. Chelsea Physic Garden. The Chelsea Physic Garden Co Ltd Publishing Co., New Delhi, 1989, pp 308-320.
4. Duraipandiyan, V. Ayyanar, M., Ignacimuthu, S., Antimicrobial Activity of Some Ethnomedical Plants Used by Paliyar Tribe from TamilNadu, India. BMC complementary and alternative medicine. 2006, pp 635.
5. Mojab, F., Kamalinejad, M., Ghaderi, N., Vahidipour, H. Phytochemical Screening of Some Iranian Plants. Iranian Journal of Pharmaceutical Research.2003, pp 77-82.
6. Anonymous, Ayurvedic Pharmacopoeia of India. Government of India, Ministry of health and family welfare department of Indian system of medicine and Homeopathy, New Delhi, 1986, 3: pp. 209-210.
7. Kirtikar and Basu B.D. Indian Medicinal Plants International book distributors, Book seller and publisher, Rajpur road, Dehradun, India. 1993, 1: 577.
8. Trease, G.E., Evans, W.C. Pharmacognosy. 11 th edn. Braillar Tiridel Cannada, Macmillian publishers. 1989, pp 222.
9. Dhar, M.L., M.M. Dhar, B.N. Dhawan, B.N. Mehrotra, C. Ray. Screening of Indian plants for biological activity. Indian J. Exp. Biol., 1968, 16: 232-247.
10. De S., Dave K.K., Bhavsar G.C. Phytochemical study of *Gymnosporia montana.* Indian J.Pharma.Sci. 1993, 55:110-112.
11. Evans WC. Trease and Evan's Pharmacognosy. ELBS printing, Oxford, London, 14th edition Balliere, Tindall London, (WB Suunders Company, A division of Harcourt brace and company, UK, 1997, pp 568-578.
12. Sim SK. Medicinal plant alkaloids. University of Toronto Press, 1969, pp 9.
13. Geissman A. In: Modern methods of plant analysis. Peach K, Tracey MV, editors. Springer Verlag Vol. 3. Berlin, Gottingen, Heidelberg, 1955, pp 471-473.
14. Fischer R. Praktikum der pharmakognosic. Springer-verlag 3rd edition. Berlin, 1952, pp 362.
15. Griffin VJ, Owen WR, and Perkin JE. A phytochemical survey of eastern Australian plants for Saponins. Planta Medica 16: 1968, 75-81.
16. Robinson T. The organic constituents of higher plants, their chemistry and interrelationships. Burgess Publishing Company. 26, South 6th street, Minneapolis.15, Minn, 1964, pp 64.
17. Harborne, J.B. Phytochemical methods, London. Chapman and Hall, Ltd. 1973, pp 49-188.
18. Sofowarw.A. Medicinal plants and traditional medicine in Africa. 1993, pp 11-13.


**********