

An Overview on Ethanomedicinal Plant *Gymnosporia Montana* of *Celastraceae* Family

Bhavita D^{1*}, Lakshmi B² and Maitreyi Z³

¹Department of Pharmacognosy, KB Institute of Pharmaceutical Education and Research, India

²Department of Pharmacognosy, KB Institute of Pharmaceutical Education and Research, India

³Department of Pharmacognosy, KB Institute of Pharmaceutical Education and Research, India

***Corresponding author:** Dhru Bhavita, Department of Pharmacognosy, KB Institute of Pharmaceutical Education and Research, Gujarat, India, E-mail: dhru1909@gmail.com

Research Article

Volume 1 Issue 1

Received Date: March 08, 2017

Published Date: March 24, 2017

Abstract

Ethanomedicinal plant like *Gymnosporia montana* belonging to the family *Celastraceae* commonly known as Vikalo in Gujarat. Ethan medicinally fresh leaves of Vikalo are chewed in tribal regions of Gujarat to cure jaundice. The present review includes ethnomedicinal, pharmacognostical, phytochemical and pharmacological activity of *Gymnosporia montana*.

Keywords: *Gymnosporia Montana*; Vikalo; *Celastraceae*; Ethanomedicinal

Introduction

The use of medicinal plants for the treatment of various diseases is as old as human civilization and has obtained a worldwide significance in the primary healthcare system. In spite of their structural complexity and many unknown chemical constituents, they have been frequently prescribed because of their use and efficacy, contributing to the disclosure of their therapeutic properties.

The *Celastraceae* family, commonly known as the bittersweet family, consists of around 100 genera and 1300 species, mainly in tropical regions. This family contains several ones described to be useful in folk medicine. Many characteristic bioactive compounds have been reported from this family. Polyester sesquiterpene and pyridine-sesquiterpene alkaloids with insect antifeedant or insecticidal properties have been isolated from some species and recently sesquiterpene pyridine alkaloids with immunosuppressive or antitumor activities have also been described. Diterpene triepoxides with

potent antileukemic and immunosuppressive activities and triterpenoid quinonemethides named as "Celastraloids" with antibiotic and cytostatic activities have been isolated from species of the *Celastraceae* family [1].

Family *Celastraceae* contain about 90-100 genera and 1,300 species of vines, shrubs, usually of 1-9 m height with axillary or terminating short branches, glabrous, without latex. The great majority of the genera are tropical, with only *Celastrus* (the stuff vines), *Euonymus* (the spindles) and *Maytenus* widespread in temperate climates [2]. Leaves are alternate or opposite, simple and generally stipulate, flowers are bisexual and normally cymose, and fruit are 1-3 seeded, capsule or berry in *Celastraceae* family.

Taxonomy of *Gymnosporia montana*

Kingdom : Plant
Division : Spermatophyta
Sub-division : Angiospermae

Class	: Dicotyledoneae
Sub Class	: Polypetalae
Group	: Disciflorae
Order	: Celastrales
Family	: Celastraceae
Genus	: <i>Gymnosporia</i> (Wt. & Arn.)
Benth & Hook.	
Species	: <i>montana</i>
Plant's Name	: <i>Gymnosporia montana</i> (Roth.)
Benth.	
Synonym	: <i>Maytenus senegalensis</i>

Regional Names of *G. montana* [2]

Bengal	: Vaichigachha
Bombay	: Hurmacha, Malkangoni, Zekadi.
Gujarati	: Vikalo, Vikro.
Hindi	: Baikal, Kngani,
Tondarsaijhad.	
Marathi	: Bharatti, Bharuli, Vekal, Vekar, Yekkadi.
Punjab	: Dajkar, Kharai, Kingaro,
Mareila, Talkar.	
Tamil	: Kattanji
Sanskrit	: Bahuphala, Dantakashta,
Gopaghantha, Granthila, Himaka,	

Distribution of *G. montana*

G. montana is distributed throughout the arid, dry areas of India like Punjab, Sind, and Gujarat and also in Afghanistan, Arabia, Mediterranean, Tropical Africa, Malaya and Australia [2].

Ecology and Propagation of *G. montana*

The plant grows at elevations from near sea level, on the coastal sand, at forest margins, hillsides and on sea cliffs. The plant grows in moderately fertile, moist but well-drained soil in full sun with midday shade. Long, hot summers are needed for production of flowers and fruits. Flowers appear in October to January, fruiting during January - February and fruit ripens in March to April [3].

Pharmacognosy of *G. montana*

Stem and Leaf of *G. montana*: Much-branched, spinescent shrub or a small tree, occurring throughout the dried parts of India. The wood is reddish brown, hard, heavy, fine-grained and durable. Stems are purplish brown in colour, hard; straight, pointed and hard spines, which are modified branches with single node from which leaf originates. Bark contains fine longitudinal wrinkles on the outer surface and creamy white inner surface [2,4]. Leaves are simple, alternate or clustered, found in the

axils of spines, on the spines or on small branches; subsessile, glabrous and exhibit a vast degree of polymorphism in their shape. Leaves variable in size and shape i.e., polymorphic. Leaves are obovate, oblanceolate, elliptic or orbicular with range of 2.5 -8 cm long and 1.5-4 cm wide. The leaves are usually rounded or emarginate at apex, margins entire or crenulate base rounded, petiole 0.3-1 cm long [5].

Flower of *G. montana*: Flowers are small and white in colour. They are axillary cymes. The length of petiole is 0.3 cm and produce flowers throughout the year. Flowering season is October and December and fruiting between January and April in India. Calyx lobes are broadly elliptic-oblong, rounded to the apex, ciliate petals are 3 mm long.

Fruit of *G. montana*: Fruits are two or three valved, globuse capsule with 10 to 20 mm long and 8-9 mm diameter, purplish or black in colour when ripped. 3-Celled. Seeds are brownish white with green and fleshy cotyledons (Figure 1).

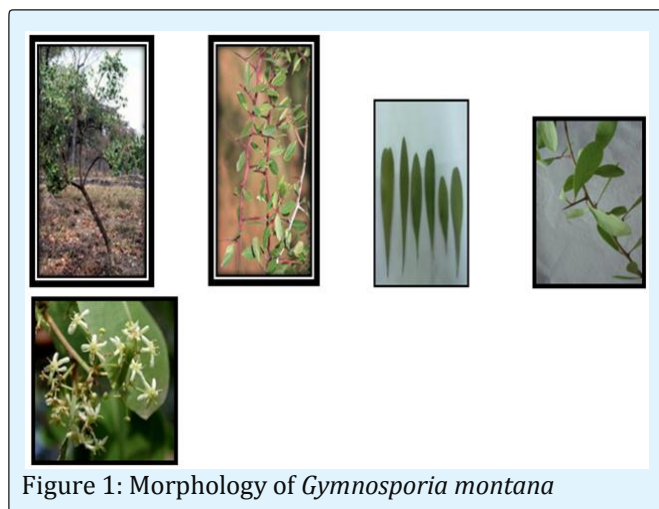


Figure 1: Morphology of *Gymnosporia montana*

Microscopy of *G. montana*: Transverse section of the leaf of *G. montana* through mid-rib shows revealed the presence of biseriate upper and lower epidermis with waxy cuticle and stomata. Mesophyll contains yellowish black colour matter. Transverse section of the leaf of *G. montana* showed 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 [5].

Phytochemical Analysis of *G.montana*

Several sesquiterpene pyridine alkaloids like emarginatine A, B, E, F, G and a sesquiterpene ester, celahin B, have been reported from the family *Celastraceae* [3,6-8]. Numbers of compounds, with varied chemical nature, have been reported by several workers from different parts of *G.montana*. The phytochemical screening of petroleum ether, 70 % methanolic and aqueous extracts of *G.montana* stem and leaf showed the presence of sterols and triterpenoids, flavonoids, phenolic and carotenoids. 70% Methanolic extract of *G.montana* showed the presence of alkaloids and flavonoids. Aqueous extract of *G.montana* was positive for saponins. In *G.montana* aqueous extracts saponins formed persistent and abundant foam. This is due to a lipophilic portion in its chemical structure, called aglycone or saponin, and a hydrophilic portion, formed by one or more sugars which provide the detergent like properties [9,10]. Phytochemical screening of stem and leaf of *G.montana* showed the presence of phytoconstituents like phenol, flavonoids, alkaloids carbohydrates, proteins and saponins [11].

Therapeutical uses of *G.montana*:

In several Ayurvedic literatures like Nighantu Adarsh [12], Vanaspati Shashtra [13,14], Aryabhishek [14], Vasundhrani vanaspatio [15] the plant has been mentioned for the various uses. It is claimed to be use for curing jaundice [2,12], inflammation and rheumatic pain [2,12,14], corneal opacity [12-14], ulcers, gastrointestinal disorders, dysentery, toothache and also as a vermifuge [2,16,17,4]. According to Thakar, 1998 (Vanaspati shashtra) it is used in jaundice, inflammation and to cure blood disorders. Nighantu Adarsh mentions its use in kamla (jaundice). In Vanaspati Srusti the use of ripe fruit of *G.montana* has been mentioned as blood purifier and as an anti-inflammatory agent. Bark of *G.montana* is used to kill lice and other infections on the head [4]. The use of leaf juice in eye diseases particularly in opacity of cornea, inflammation and burning sensation has been mentioned in Aryabhishek. Kirtikar and Basu mentioned the fruit of *G.montana* as appetizing and digestive and its use in treating jaundice and enlarged spleen. Ground seeds with turmeric are recommended to be rubbed all over the body to prevent rheumatic pain from exposure to damp winds. The external application of dry powdered leaves with a little mustered oil has shown encouraging result in rickets [13]. According to Indian Materia Medica [18] bark of *G.montana* is applied to destroy pediculi.

Pharmacology of *Gymnosporia* Species

Number of bioactive compounds with varied pharmacological activity has been reported from different species of the *Celastraceae* family e.g: diterpene triepoxides with potent antileukemic and immunosuppressive activities, triterpenoid quinonemethides (known as celastrols) with antibiotic and cytostatic activities and sesquiterpene pyridine alkaloids with immunosuppressive or antitumor activities. Presence of two anticancer compounds namely diterpenoid epoxide triptolide and quinine triterpene celastrol have been reported [20]. An anticancerous principle has also been isolated from this plant which, in addition to exhibiting good anticancer activities, prolongs the "S" phase of cell cycle [21,22]. In Saurashtra region of Gujarat, India, the leaf juice is well known for curing jaundice [23]. Extract of leaves of *G. montana* mixed with cow milk is taken in the morning for 3 days by the local people of Bhadra (Karnataka, India) for curing jaundice [24]. The bark of root of *G. montana* is reported to be useful in dysentery [25] BhavitaDhru reported the significant anti-inflammatory activity and analgesic activity of methanolic extract of leaf of *G. montana* in experimental animals. The antibacterial activity of petroleum ether, 70% methanol and aqueous extracts of *G.montana* leaf and stem were studied and leaf aqueous extract showed maximum activity against *E coli* [26]. *G.montana* showed significant antioxidant activity in hydroalcoholic extract of leaf and stem [27]. Recently NI Kochar, et al. [28] reported that scopolamine-induced learning and memory impairment was reversed or prevented by administration of *G. montana* in rats.

Conclusion

Hence, it can be concluded that, the present review is about the one of the ethanomedicinal plant, *G. montana* belonging to the family, *Celastraceae*. This review provides the phytoconstituents isolated from various parts of plant *G. montana* which may be helpful in bioinformatics to design novel drug against various diseases. So, there is good scope to investigate and characterize active phytocostituents, their mode of action and the effective dose of plant extracts for development of polyherbal formulation. Therefore, the information summarized in this review is intended to serve as reference to many researchers. There is enormous scope for the future research to be carried *G.montana* on considering its wide pharmacological profile.

References

- De Almeida MT, Ríos LC, Padrón JM, Palermo JA (2010) Antiproliferative terpenoids and alkaloids from the roots of *Maytenus vitis-idaea* and *Maytenus spinosa*, *Phytochemistry* 71(14-15): 1741-1748.
- Kirtikar KR, Basu BD (1933) *Celastraceae* In: *Indian Medicinal Plants 2nd (Edn)*, (1) International book Distributors, Deharadun, India, pp: 577.
- Sagwan S, Rao DV, Sharma RA (2011) *Maytenus marginata* (WILLD): a promising drug for cancer therapy. *Asian J Pharm Clin Res* 4(3): 9-12.
- The Wealth of India (Raw materials) (1956) vol. V: Council for Scientific and Industrial Research. New Delhi, India, pp: 277.
- Dhru Bhavita, Zaveri Maitreyi, Lakshmi B (2010) Phytopharmacognostical study of stem of *Gymnosporiamontana*: A Native of Gujarat. *International Journal of Pharmaceutical Sciences Review and Research* 5(3): 1-4.
- Kuo YH, Chen CH, King ML, Wu TS, Lee KH (1994) Sesquiterpene pyridine alkaloids from *Maytenus marginata*: Emarginatine-C and -D and cytotoxic emarginatine-E and emarginatinine. *Phytochemistry* 35(3): 803-807.
- Ujita K, Fujita T, Takaishi Y, Tokuda H, Nishino S, et al. (1992) Euonydin A-1 and A-5, sesquiterpene esters from *Euonymus sieboldianus*. *Phytochemistry* 31(4): 1289-1292.
- Kuo YH, Chou CJ, Kuo LMY, Hu YY, Chen YC et al. (1996) A Sesquiterpene ester from *Celastrus hindsii*. *Phytochemistry* 41(2): 549-551.
- Farnsworth NR (1966) Biological and phytochemical screening of plants. *J Pharm Sci* 55(3): 225-276.
- Nguessan K, Tiébré MS, Aké AE, Zirihi GN (2009) Ethnobotanical study of plants used to treat arterial hypertension, in traditional medicine, by Abbey and Krobou Populations of Agboville (Côte d'Ivoire). *Eur J Sci Res* 35: 85-98.
- Dhru Bhavita, Zaveri Maitreyi, Lakshmi B (2011) Pharmacognostical and phytochemical study of leaf of *Gymnosporiamontana* (Vikalo). *Journal of Global Pharma Technology* 3(1): 22-27.
- Vaidya BG (1965) *Vikantat* In: *Nighantu Adarsh Part-I* Chaukhambha Bharti Academy. Varanasi, India, pp: 298-299.
- Thakare J (1998) *Celastraceae* In: *Vanaspatishastra 2nd (Edn)* Pravin Prakashan Pvt. Lit, Rajkot, Gujarat, pp: 147-149.
- Thakar JI (1956) *Celastraceae*. In: *Vanaspati Varanan-Flora of Baroda Mountain*. Sastu Sahitya Vardhaka Karyalaya Ahmedabad 147-148.
- Pade SD (1966) *Vikalo* In: *Shree Aryabhishek (India's Ayurvedic Treatise)*, 3rd (Edn.) Sastu Sahitya Press, Ahmedabad, pp: 636.
- Ashok Sheth (2007) *Vikalo* In: *Vasundhrani Vanaspatio (Ayurvedayamrutanam)*, 2nd (Edn.) Navbharatsahityamandir Ahmedabad. 159-160.
- Pullai T (2006) *Celastraceae* In: *Encyclopedia of world medicinal plants*. (1) Regency publications, New Delhi, pp: 1316.
- Ambasta SP, Kamala Ramchandarn, Kashyap K, Ramesh Chand (1994) *Celastraceae* In: *CSIR 3rd (Edn.) The useful plants of India* Publication and Information directorate, New Delhi, pp: 252.
- Nadkarni KM (1982) *Gymnosporiamontana* In: *Indian Materia Medica 3rd (Edn.)*, Bombay popular prakashan, Bombay, pp: 606.
- Liu Z, Ma L, Zhou GB (2011) The main anticancer bullets of the Chinese medicinal herb, thunder god vine. *Molecules* 16(6): 5283-5297.
- Alate AD, Khandalekar DD (1978) A new anti cancer principle isolated from *Gymnosporiarothiana* and its use in attaining cures in L1210 Leukaemia in combination with "S" phase sensitive drugs. *Biomedicine* 28(5): 270-273.
- Chapekar MS, Sahasrabudhe MB (1981) Mode of action of GCE: an active anticancer principle isolated from an indigenous plant *Gymnosporia Rothiana* Laws. *Indian J Exp Biol* 19(4): 333-336.
- De subrata, Bhavsar GC (1993) Pharmacognostical study of *Gymnosporiamontana*. *International journal of pharmaceutical science* 55: 21-25.
- Parinitha M, Harish GU, Vivek NC, Mahesh T, Shivanna MB (2004) Ethno-botanical Wealth of Bhadra a Wild life sanctuary in Karnataka. *Indian J of Traditional Knowledg* 3(1): 37-50.

25. Bhavita Dhru, Brijesh Patel, Maitreyi Zaveri, Lakshmi B (2011) To evaluate anti-inflammatory and analgesic activity of leaf of *Gymnosporiamontana* A native of Gujarat. *American Journal of Pharm Tech Research* 1(3): 227-237.
26. Bhavita Dhru, Partiksha Jayswal, Sharma M, Maitreyi Zaveri, Lakshmi B (2011) In-vitro antibacterial activity *Gymnosporiamontana* against some bacterial strains. *International Journal of Universal Pharmacy and Life Sciences* 2(1): 12-20.
27. Dhru Bhavita, Zaveri Maitreyi, Lakshmi B (2012) To evaluate in-vitro antioxidant potential of stem and leaf extracts of *Gymnosporiamontana* a native of Gujarat. *International Journal of Pharmaceutical Sciences Review and Research* 13(2): 24-27.
28. NI Kochar, TripathiA, Naved Khan, Chandewar AV (2016) Bioevaluation of *Gymnosporia Montana* Benth in the treatment of Alzheimer's disease. *International Journal of Research in Pharmaceutical Technology* 1(2): 1-7.