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Therapeutic Potential of *Gmelina arborea*: An Ayurvedic Dashamoola Herb with Diverse Bioactive Compounds

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Abstract: ***In the Verbenaceae family, Gmelina arborea is a significant medicinal herb that is extensively propagated and grown. The term "Gambhari" has broad usage and comes from the Bihar tribal community. It is referred to as "Kashmarya" and is one of the herbs that are included in all of the Ayurvedic old texts. It's a gorgeous avenue tree that grows quickly all over India. Because of its many therapeutic benefits, this plant has long been prized for its medical qualities. One of the most important parts of Dashamoola is Gambhari. Its edible fruit have been linked to the benefits of Rasayana (rejuvenative), Medhya (memory enhancer) and Vrishya (aphrodisiac) in traditional medicine. Phytochemical screening revealed the presence of tannins, coumarins, steroids, alkaloids, and polysaccharides. Gambhari has been utilized historically as an antihelmintic, antibacterial, antidiabetic, diuretic, hepatoprotective, and antiepileptic drug due to its many beneficial medical properties.***

Keywords: Kashmarya, Dashmoola**,** Gambhari**,** *Gmelina arborea*, Verbenaceae

1. Introduction

Gambhari belongs to the Verbenaceae family. It can be found particularly in the Western Ghats, Himalayan foothills, Chittagong, and the Deccan Peninsula. The plant grows in gardens and as an avenue tree. The plant *Gmelina arborea* is a vital element in some of the most famous Dashamoola and panchmula.[1] *Gmelina arborea* is an unidentified, big deciduous tree with a height of 30 m or more and a diameter of up to 4.5 m. J.C.Gmelin, an 18th-century German botanist, gave his name to the plant.[2] Gambhari is synonymous with many other terms in Ayurvedic texts: pita-rohini (meaning yellow blossoms), madhuparnika (meaning leaves with a pleasant taste), sriparni (meaning beautiful leaves), and kasmiri (meaning lovely tree) [2]

There are 2,600 species in the Verbinaceae family. 107 of which are located in India [1]. Dashamoola is one of the most important listed raw medication formulations among Ayurvedic preparations, with an annual turnover of more than 1000 MT for an Associate in Nursing. [2] The entire plant is very significant medicinally. It also acts as an antidote to scorpion stings and snake bites, strengthening the digestive system, enhancing memory and getting rid of giddiness. [3]

Botanical Description:

Plant Taxonomy of *Gmelina arborea* [3]

Kingdom	Plantae
Subkingdom	Vascular plants, Tracheobionata
Class	Dicotyledons, Magnoliopsida
Division	Flowering plants, Magnoliophyta
Family	Verbenaceae
Species	*Gmelina arborea*
Order	Lamiales
Genus	Gmelina

Vernacular Names [3]
Marathi: Shiwan, Shewan, Gamar
Hindi: Gambhar, Gambhari, Khambhari, Khammara, kambar, Kumbhar Sewan, Kumar Shewan.
Kannada: Shivanigida, Shivani, Kashmiri
English: Gamari, Coomb teak, Candhar tree, Cashmeri teak
Sanskrit: Gandhari, Sindhuparni, Shriparni, Madhuparanika Kashmiri: Kashmari
Punjabi: Gumhar
Tamil: Kumizhen, Gumadi
German: Gumar-Teak
Malayalam: Kumil, Kumbili
Bengali: Gamari, Gumar
Telugu: Peggummudu, Peggummadi Gujrati: Shivan, Savan.

Description [4]
A medium in size evergreen tree with arms that reaches a height of 18 meters. Its youthful parts are densely covered with velvety tomentose hairs. Bark is corky and greyish yellow. White, mealy pubescence covering branchlets. The adult leaves measure 10-20 cm by 7.5-15 cm, with a broad oval shape, acuminate tip, and glabrous surface on top. The underside is stellately fulvous- tomentose, with a cordate base that can occasionally be truncate and cuneate. Cylindrical, puberulous, glandular at the top, petioles are 5-7.5cm long, blooms often occur in little cymes of three or more blooms clustered along the branches of a hairy, highly fulvous panicle that can reach a length of 30 cm. Flowers can occasionally appear before or alongside developing leaves. Claviform and pointed buds. Long, linear lanceolate bracts measure 8 mm. Long, widely campanulate and thickly fulvous-hairy calyx measuring 5 mm. Brownish yellow corolla with two lips and five lobed leaves that are 3.8 cm long and very hairy on the outside, upper lip more than 1cm long.

***Gmelina arborea* Flowers**

***Gmelina arborea* Fruits**

***Gmelina arborea* Plant**

Chemical Constituents:
Sesquiterpene, ceryl alcohol, apigenin, gmelo furan-a furanosesquiterpenoid (1-6, (1.0.7) -β- Dglucopyranosyl-umbelliferone, quercetin, paulownin, gmelinol, arboreal, β-sitosterol, luteolin, stigmasterol, oleic acid , linoleic acid, lignans, alkaloids [4].

Pharmacological Activity:

Anthelmintic activity
Ambujakshi et al (2009)., when the anthelmintic activity of *Gmelina arborea*'s alcoholic and aqueous leaf extracts was examined, it was found that the extracts, when compared to piperazine citrate, gave shorter times for paralysis and death in Pheretima posthuma and Ascardia galii worms. The worms' muscle membrane's chloride ion conduction was enhanced by the extracts, which led to hyperpolarization and decreased excitability, which in turn caused muscle relaxation and flaccid paralysis.

Immunomodulatory activity

Shukla et al (2010)., the total WBC count was observed to be increased by the ethylacetate fraction and the methanolic extract of *Gmelina arborea*, while the cytotoxic medication cyclophosphamide decreased the count. Neutrophils and lymphocytes can also be brought back to normal by the medication. It appears from the data that *Gmelina arborea* has the ability to increase bone marrow function. Because the medication can lessen the toxicity caused by cyclophosphamide, it may also be helpful in the treatment of cancer.

Antimicrobial activity

Mahmood et al (2010)., the antimicrobial activity of *Gmelina arborea* leaves and bark extract was examined against pathogenic bacterial strains, including Salmonella typhi, E. coli. Separate samples of dried powdered plant material were soaked in 100 milliliters of ethanol, hexane, chloroform, acetone, and distilled water, respectively. Tetracycline, a common antibiotic, was used in the agar diffusion method to measure the in vitro antibacterial activity. The plant's leaf and stem bark crude extracts prevented the employed bacteria from growing.

Antifungal activity

Kawamura et al (2004)., The antifungal activity of components found in *Gmelina arborea* heartwood against Trametes versicolor and Fomitopsis palustris was studied and reported. Homogenized hyphae were spread in a medium to create a sensitive bioassay method for antifungal activity against basidiomycetes. Heartwood solubles in ethyl acetate exhibited the strongest effectiveness against both fungus.

Antioxidant activity

Patil et al (2009), Using a variety of in vitro tests *Gmelina arborea* (MEGA) stem bark methanol extract was extracted and fractionated, and its antioxidant effect and free radical scavenging activities were evaluated. As a standard antioxidant, ascorbic acid was employed. By measuring the total phenolic content with the Folin-Ciocalteu phenol reagent, 1 mg of the extract had 85.95 µg/mL total phenolics, which is equal to gallic acid. The study suggest that MEGA may have natural antioxidant properties and its probable source of antioxidant activity may be determined by the presence of phenolics.

Medicinal Uses [5]:
- **Classical - Bahya prayoga:** Cooling and calming properties of the leaves. In such circumstances, leaves are attached to the damaged area. To treat fever-induced headaches, apply a paste made from leaves to the forehead to treat gout, pulverized root is applied topically.
- **Abhyantara prayoga:** Treatments for brain impairment, vata disorders and vertigo include the central nervous system. It is also a tonic for the brain.

- **Digestive system:** Root improves metabolism and hunger, while fruit reduces thirst, making it useful for hemorrhoids, constipation, and diarrhea.
- **Cardiotonic:** Its juice helps treat heart conditions. A good galactagogue is a mixture of sugar in milk, yashtimadhu, gunja leaves and Gambhari roots.

Fruits and leaves are diuretics for the urinary system. Gonorrhea, cystitis, and dysuria are all treated with the juice. In these situations, mixing the juice with sugar and cow's milk encourages urination while also reducing oedema and discomfort.
The bark of the root can reduce oedema caused by several factors.

Ripe fruit is beneficial for the respiratory system and can help with tuberculosis and cachexia. The fruit has both galactagogue and aphrodisiac properties. Fruits are used to treat semen deficiency and avoid miscarriages. In postpartum problems, a decoction of root bark is used.

Traditional uses of *Gmelina arborea* [5]:

- **Padam (Adis) tribe:** Used to purify blood and alleviate stomach issues.
- **Kondh and Santal tribes:** Used to cure septic wounds.
- **Debbarma Tribes:** Fruit decoction used to treat major wounds
- **Garo, Magh, Hajang Tribes:** Use of bark to treat vomiting and diarrhoea
- **Kurichia, Kuruma, Tribes:** Boiling bark with water and applying to tumours.
- **Pedabayalu Mandalam tribes:** A paste made from root and cloves is used to treat toothaches.
- **Ethnic communities of Godavar:** Inhaling leaf powder vapours relieves headaches.
- **Tharu Tribes:** An oral solution of 250ml is used to treat fever.
- **Gangaraju Madugula Mandal tribes:** Paste is used on the scalps to alleviate dandruff.

Use of *Gmelina arborea* in various formulations available in the market and their applications [5]:

- **Sriparnyadikvatha:** Obesity, dyspnoea
- **Chyawanprashalehya:** Tonic, immunomodulator
- **Diabecon / Gluco Care:** Anti-diabetic
- **Brhat pancamulakvath:** Obesity, dyspnoea
- **Kutajarista:** Sprue, dysentery

2. Conclusion

In conclusion, the review above highlights the significance of *Gmelina arborea* as a traditional medicinal herb. The review of *Gmelina arborea* is a recently published research articles that covers a wide range of medicinal uses. A variety of studies have demonstrated the pharmacological properties of *Gmelina arborea*, which have been used since ancient times to treat a wide range of diseases in traditional medicine. These properties include cognitive, antidiuretic, anti-diarrheal, anti-pyretic, analgesic, antioxidant activity, anti-diabetic, anti-bacterial, anti-fungal, anti-ulcer, gastroprotective, anti-hyperlipidaemic and wound healing properties.

References

[1] Pathala D, Harini A, Hegde PL. A review on gambhari (Gmelina arborea Roxb.). Journal of Pharmacognosy and Phytochemistry. 2015;4(2):127-32.
[2] Waghchaure AG, Jadhav RS, Vikhe DN, Ghule YL. A Review on Pharmacognostic, Phytochemical and Biological Potential of Gmelina Arborea Roxb (Shivan Plant).
[3] Sangeeta K, Singh DC, Safina KA. A precious herb-Gmelina arborea Linn. Wsr t o its medicinal uses and pharmacological activity. Int. J. Ayurveda Pharma Res. 2017;5(5).
[4] Warrier RR, Priya SM, Kalaiselvi R. Gmelina arborea–an indigenous timber species of India with high medicinal value: A review on its pharmacology, pharmacognosy and phytochemistry. Journal of Ethnopharmacology. 2021 Mar 1; 267: 113593.
[5] Munira B, Gururaja GM, Deepak M, Roopashree TS, Shashidhara S. An overview on phytochemistry and pharmacological properties of Gmelina arborea. Journal of Natural Product and Plant Resources. 2013;3(4):62-71.
[6] Maurya PR, Dhande SR, Joshi YM, Kadam VJ. A review on Gmelina arborea Roxb. Research Journal of Pharmacognosy and Phytochemistry. 2013;5(2):69-76.
[7] Ambujakshi HR, Thakkar H, Shyamnanda. Ind J Pharma Res Devpt **2009**; 1(9):1-5.
[8] Shukla SH, Saluja AK, Pandya SS. Pharmacog Res **2010**; 2(6):359–63.
[9] El-Mahmood AM, Doughari JH, Kiman HS. Afr J Pharm Pharmacol **2010**;4(6):355-61.
[10] Kaswala Rohith, Patel Vaibhav, Chakraborty Manodeep, Kamath Jagadish V. Phytochemical and Pharmacological profile of Gmelina arborea: An overview. International research journal of pharmacy 2012; 3(2):61-64.
[11] Sahu Rohit; Divakar Goli; Divakar Kalyani. Journal of advanced pharmaceutical technology & research **2010**; 1(1):22-9.
[12] Sravani P, Murali CM, Syed S, Sadik BS, Soubia SN, et al. Int J Adv Pharma Res **2011**; 2(4):157-161.
[13] Vijay T, Dhana MS, Sarumathy K, Palani S, Sakthivel K. J App Pharm Sci **2011**;1(05):198-204.
[14] Pattanayak P, Parhi PK, Mishra SK, Khandei PK. Int J Pharm Sci Rev Res **2011**; 8(2):130-132.
[15] Pravat KP, Priyabrata P, Paresh M, Manoj KP. Int J Pharm Sci Rev Res **2011**; 10(2):78-81.
[16] Chowdhary Y. Chemical composition of Gmelina arborea: A review. Asian Journal of Pharmaceutical Research. 2021;11(4):269-77.