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Therapeutic Wonders of *Dolichandrone falcata*: A Forgotten Treasure

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Dolichandrone falcata, a deciduous tree of the Bignoniaceae family, is an underexplored species with remarkable pharmacological potential. Native to India's arid regions, it is traditionally used in ethnomedicine for treating ailments such as inflammation, infections, and anxiety. The plant is rich in bioactive compounds, including flavonoids, terpenoids, and alkaloids, which contribute to its therapeutic effects. Recent studies highlight its antioxidant, anti-inflammatory, antimicrobial, and antifertility properties, with promising applications in managing oxidative stress, microbial infections, and pain. This review consolidates current knowledge on *D. falcata*'s phytochemistry and pharmacology, emphasizing the need for deeper scientific inquiry and conservation efforts to realize its full medicinal potential.

Keywords: *Dolichandrone falcata*, ethnomedicine, pharmacology, phytochemistry

Introduction

Dolichandrone falcata (syn. *Markhamia falcata*), a deciduous tree from the Bignoniaceae family, is renowned for its medicinal properties and traditional uses in India and parts of Africa. Known as "Medshingi" in Hindi, it grows in dry, rocky terrains across states like Rajasthan, Maharashtra, Karnataka, and Bihar. The tree, with its fragrant white flowers and distinctive fruits, has been used in Ayurveda to treat various ailments, including diabetes, liver disorders, and wounds. Its bark, leaves, and fruits contain bioactive compounds like alkaloids, flavonoids, and terpenoids, which have antioxidant, anti-inflammatory, and antimicrobial effects. Despite its rich medicinal history, scientific research on *D. falcata* is limited, underscoring the need for further studies and conservation efforts to preserve this valuable resource.

Taxonomic classification

Kingdom: Plantae
Order: Lamiales
Class: Magnoliopsida
Family: Bignoniaceae - bignonias
Genus: *Dolichandrone*
Species: *Dolichandrone alba* (Sim) Sprague
Dolichandrone alternifolia (R. Br) Seem
Dolichandrone arcuata (Wight) C. Bclarke
Dolichandrone Columnaris Samtisque
Dolichandrone Fakata (wall. ex-DC) Seem
Dolichandrone filiformis (DC) fenzl ex.F.muell
Dolichandrone Heterophylla (R.Br) F.Muell
Dolichandrone Occidentalis Jackes
Dolichandrone Spathacea (L.F) Seem

Common names

Tamil - Padhiri
English - Mangrove trumpet tree
Malayalam - Attulottappala
Hindi – Medhshingi
Marathi - Medhshingi
Kannada - Udure Godmu

Botanical Description

D. falcata is a small, deciduous tree belonging to the family Bignoniaceae. It typically grows in dry and rocky terrains, reaching a modest height suitable for small forested areas and cultivated fields. The tree is notable for its bluish-gray bark, which peels away in irregular woody scales, giving it a distinctive textured appearance. Its growth habit and adaptability to harsh conditions make it an important species in both ecological and ethnobotanical contexts.

Leaf : The leaves of *D. falcata* are pinnately compound and measure about 3-6 inches in length. Each leaf consists of 5-7 individual leaflets that are obovate or round-elliptic in shape. Occasionally, the leaflets end in a small, blunt point, adding subtle variation to their form. The blades of the leaflets are approximately 1.2 cm long and wide, contributing to the delicate yet functional structure of the foliage. These leaves play an essential role in photosynthesis and are often utilized in traditional medicine due to their bioactive compounds. The leaves of *D. falcata* are a powerhouse of medicinal compounds. They contain n-hexadecenoic acid, a substance known for its potent anti-inflammatory activity. This compound is present in methanol and chloroform extracts at concentrations of 24 % and 9.24 %, respectively. The leaves also harbour naturally occurring antioxidants, such as vitamin E and tocopherol derivatives, which play a significant role in reducing oxidative stress. Moreover, the presence of long-chain unsaturated fatty acids in the leaves enhances their antibacterial properties, making them effective against microbial infections. These properties also support their potential use as natural antibacterial agents in food preservation. Traditional medicine systems utilize these leaves for their inflammation-reducing and infection-fighting qualities, underscoring their importance in ethnomedicine.

Flower: The flowers of *D. falcata* are visually striking and predominantly white, growing in small clusters called corymbs. Typically, 1-3 flowers are borne together in each cluster, supported by a flower stalk that measures about 1/2 inch in length. The sepal tube, which is 1.2-2 cm long, is uniquely split on one side, extending to the base. The petals are frilly in appearance, adding a delicate charm to the flowers. These blooms appear during the flowering season, which occurs in the months of May and June, filling the surroundings with their subtle beauty.

Fruit: The fruits of *D. falcata* are particularly distinctive and are one of its most recognizable features. They are nearly quadrangular capsules that curve gracefully like a sickle. This curved shape has led to the plant's local name, "medhshingi," as the fruits resemble the horns of a sheep. These capsules serve as an important reproductive structure, housing seeds that are dispersed to sustain the species in its natural habitat. The fruiting stage aligns with the flowering period, providing a unique visual contrast as the capsules from the previous year persist on the tree alongside new blooms. The fruits of *D. falcata* are equally valuable, showcasing diverse anti-inflammatory and antinociceptive effects. Phytochemical studies reveal the presence of compounds like flavonoids, tannins, glycosides, and steroids, all of which contribute to the fruits' pharmacological activities. These bioactive substances work in synergy, enhancing the therapeutic potential of the fruits. Traditionally, they are believed to address a wide range of ailments, including pain and inflammation. Modern research supports these uses, emphasizing the fruits' capability to serve as natural remedies for various diseases. The compounds in the fruits hold promise for further exploration in drug development, particularly in addressing inflammatory and nociceptive conditions.

Flowering: *D. falcata* follows a specific phenological pattern. During the dry season, the tree sheds its leaves, conserving resources in preparation for the blooming period. Flowering occurs during the late spring to early summer months of May and June, with the white blooms adding a vibrant touch to the otherwise arid landscapes. The capsules, which mature and persist on the tree, can often be seen alongside the fresh flowers, making the tree visually distinctive throughout its active growing phases.

Bark: The bark of *D. falcata* is bluish-gray, rough, and peeling in irregular woody scales, giving it a distinctive appearance. It is moderately thick and hard, with an irregularly fissured surface that becomes more pronounced as the tree ages. The bark consists of several layers,

including a dry, scaly outer layer and a softer inner bark that facilitates nutrient transport. The bark may exude a gum-like substance when damaged, contributing to its protective role. This unique morphology not only helps the tree withstand environmental stress but also plays a key role in its medicinal properties, including anti-inflammatory and wound-healing effects.

Therapeutic Effects

Anxiolytic: Extracts from the leaves and bark of *D. falcata* have been shown to possess antioxidant and free radical scavenging properties, as evidenced by various laboratory tests such as DPPH scavenging and reducing power assays. These findings suggest that the plant may have anxiolytic effects, with chrysin, a key compound in the plant, being implicated in its potential to alleviate anxiety in animal models.

Antioxidant: The aqueous extract of *D. falcata* has demonstrated significant antioxidant activity in studies using DPPH scavenging and reducing power tests. This activity is likely due to the presence of chrysin, a natural flavonoid found in the plant, which is known for its antioxidant effects and its ability to reduce oxidative stress in the body.

Anti-inflammatory: Animal studies investigating the anti-inflammatory effects of *D. falcata* fruit extracts, prepared in methanol and ethyl acetate, showed a marked reduction in inflammation. When the extracts were tested at doses of 100, 200, and 400 mg/kg, they significantly alleviated inflammation induced by carrageenan, supporting the plant's anti-inflammatory properties.

Anti-fertility: Research on the antifertility effects of *D. falcata* leaves revealed that both alcoholic and aqueous extracts, when administered at doses of 200 mg/kg and 400 mg/kg body weight, exhibited abortifacient properties. Additionally, the oestrous cycle in treated animals was prolonged, especially during the di oestrous phase, suggesting that the plant may affect reproductive function.

Antimicrobial: The antimicrobial properties of *D. falcata* were tested using extracts from its bark, fruit, and leaves against pathogens like *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Candida albicans*, *Vibrio cholerae*, and *Salmonella typhi*. The fruit extract was effective against *Vibrio cholerae*, *Candida albicans*, and *Pseudomonas aeruginosa*, while the bark extract exhibited broad-spectrum antimicrobial activity against all tested pathogens except *Bacillus subtilis*. The leaf extract showed weaker activity, particularly against *Salmonella typhi* and *Candida albicans*.

Conclusion

D. falcata is a valuable medicinal plant with a rich history of traditional use and diverse pharmacological properties. Its leaves, bark, fruits, and other parts exhibit significant therapeutic potential, including antioxidant, anti-inflammatory, antimicrobial, and anxiolytic effects. The plant's bioactive compounds, such as flavonoids, saponins, and alkaloids, contribute to its effectiveness in treating various ailments, from inflammation to infections and pain management. Despite its promising therapeutic qualities, scientific research remains limited, highlighting the need for further investigation into its pharmacological applications. Efforts to conserve and promote the cultivation of *D. falcata* are crucial for preserving this medicinal resource for future generations.