

www.pharmaerudition.org

ISSN: 2249-3875



International Journal of Pharmaceutical Erudition

Research for Present and Next Generation

AUG 2026

Vol: 16 Issue:02
(1-5)





Review Article

PHARMACOLOGICAL AND MEDICINAL STUDY OF KACHNAR STEM BARK

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Bauhinia variegata L. (Family: Fabaceae), commonly known as Kachnar, is an important medicinal tree extensively used in Ayurveda, Unani, and traditional systems of medicine. Different parts of the plant, particularly the stem bark, flowers, leaves, and roots, possess significant therapeutic value because of the presence of bioactive phytochemicals such as flavonoids, tannins, glycosides, saponins, terpenoids, and steroids. Experimental studies have demonstrated that extracts of *Bauhinia variegata* exhibit anti-inflammatory, antioxidant, antimicrobial, antidiabetic, hepatoprotective, antiulcer, wound healing, and anticancer activities. The bark is a major ingredient of the classical Ayurvedic formulation Kanchanar Guggulu, which is traditionally prescribed for thyroid disorders, lymphadenopathy, cysts, and glandular swellings. Although numerous pharmacological investigations support its medicinal importance, well-designed clinical studies are still limited. Standardization of extracts, isolation of active constituents, and clinical validation are essential for future pharmaceutical development. This review summarizes the botanical profile, phytochemical composition, traditional applications, pharmacological properties, and future prospects of *Bauhinia variegata* based on available scientific literature.

Keywords: *Bauhinia variegata*, Kachnar, Stem Bark, Phytochemistry, Pharmacology, Medicinal Plant, Herbal Medicine.

INTRODUCTION

Medicinal plants have played an essential role in healthcare since ancient times and continue to provide valuable therapeutic agents for modern medicine. According to the World Health Organization (WHO), a major proportion of the global population depends on herbal medicines for primary healthcare. India possesses a rich diversity of medicinal plants that are widely utilized in Ayurveda, Siddha, Unani, and folk medicine. Among these medicinal plants, *Bauhinia variegata* L., commonly known as Kachnar, occupies an important position because of its diverse pharmacological properties and distributed traditional therapeutic applications. The plant

belongs to the family Fabaceae and is widely throughout India and several tropical subtropical countries. Its attractive orchid-like flowers also make it an important ornamental tree.(1)

The stem bark of *Bauhinia variegata* is considered one of the most valuable medicinal parts of the plant. Traditionally, it has been used for the treatment of thyroid enlargement, glandular swellings, ulcers, skin diseases, diarrhea, dysentery, wounds, piles, and inflammatory disorders. Scientific investigations have confirmed the presence of several bioactive phytochemicals including flavonoids, tannins, saponins, alkaloids, glycosides,



steroids, and terpenoids that contribute to its pharmacological activities.

Recent pharmacological studies have demonstrated antioxidant, antimicrobial, anti-inflammatory, hepatoprotective, antidiabetic, anticancer, wound healing, and antiulcer activities of different extracts of *Bauhinia variegata*. These findings indicate its potential as an important source of novel phytopharmaceuticals.(2)

The objective of this review is to critically summarize the available scientific literature regarding the botanical description, phytochemistry, traditional uses, pharmacological activities, safety profile, and future perspectives of *Bauhinia variegata* and to highlight its significance in pharmaceutical research and herbal drug development.

Materials and Methods

The present review was prepared by systematically collecting and analyzing published scientific literature related to *Bauhinia variegata*. Relevant information was obtained from peer-reviewed journals, textbooks, review articles, and recognized scientific databases, including PubMed, Google Scholar, Scopus, ScienceDirect, and SpringerLink. Keywords such as "*Bauhinia variegata*", "Kachnar", "stem bark", "phytochemistry", "pharmacological activities", and "traditional medicinal uses" were used to identify relevant publications. The collected

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literature was critically evaluated and organized to summarize the botanical profile, phytochemical constituents, traditional applications, pharmacological activities, and future prospects of the plant.(3)

Botanical Profile

Taxonomical Classification

Kingdom Plantae

Division Magnoliophyta

Class Magnoliopsida

Order Fabales

Family Fabaceae

Genus *Bauhinia*

Species *Bauhinia variegata* L.

Vernacular Names

- **English:** Orchid Tree, Mountain Ebony
- **Hindi:** Kachnar
- **Sanskrit:** Kanchanara
- **Marathi:** Kanchan
- **Gujarati:** Kanchanar
- **Punjabi:** Kachnar
- **Tamil:** Mandarai
- **Telugu:** Devakanchanam

Geographical Distribution

Bauhinia variegata is widely distributed throughout India, Nepal, Pakistan, Bangladesh, Sri Lanka, China, Myanmar, and Southeast Asian countries. The plant grows well in tropical and subtropical climates and is commonly found in forests, roadsides, gardens, and cultivated landscapes. Due to its adaptability



and ornamental value, it has also been introduced into several other countries.(4)

Morphological Characteristics

Bauhinia variegata is a medium-sized deciduous tree that reaches approximately 10–15 meters in height. The bark is greyish-brown, rough, and slightly fissured. Leaves are simple, alternate, broad, and characteristically bilobed, resembling a camel's hoof. The flowers are large, fragrant, orchid-like, and vary in colour from white to pink or purple. Flowering generally occurs between February and April. Fruits are long, flat pods containing several hard, brown seeds.

Phytochemical Constituents

Phytochemical investigations have revealed that *Bauhinia variegata* contains numerous biologically active compounds responsible for its medicinal properties. Major phytochemicals include flavonoids, tannins, alkaloids, glycosides, saponins, steroids, terpenoids, phenolic compounds, and carbohydrates. Important isolated constituents such as quercetin, kaempferol, lupeol, and β -sitosterol exhibit antioxidant, anti-inflammatory, antimicrobial, and antidiabetic activities. These secondary metabolites contribute significantly to the therapeutic potential of the plant and make it an important source for herbal drug development.(5)

Pharmacological Activities

The therapeutic potential of *Bauhinia variegata*

has been extensively investigated in experimental pharmacological studies. Various plant parts, particularly the stem bark, possess multiple biological activities due to the presence of flavonoids, tannins, phenolic compounds, terpenoids, and glycosides.

1. Anti-inflammatory Activity

Extracts of *Bauhinia variegata* exhibit significant anti-inflammatory activity by inhibiting the production of inflammatory mediators such as prostaglandins and cytokines. Flavonoids and tannins present in the bark help reduce edema, swelling, and pain. These findings support its traditional use in arthritis, glandular swelling, and inflammatory disorders.(6)

2. Antioxidant Activity

The plant possesses remarkable antioxidant properties because of its high concentration of phenolic compounds and flavonoids. These compounds scavenge free radicals, reduce oxidative stress, and protect cellular components from damage. Antioxidant activity may contribute to the prevention of chronic diseases such as diabetes, cardiovascular disorders, and cancer.(7)

3. Antimicrobial Activity

Several in-vitro studies have demonstrated that extracts of *Bauhinia variegata* inhibit the growth of both Gram-positive and Gram-negative bacteria, as well as certain pathogenic fungi. These antimicrobial effects support its



traditional use in wound management, skin infections, ulcers, and gastrointestinal infections.

4. Antidiabetic Activity

Experimental studies indicate that stem bark extracts reduce blood glucose levels and improve glucose metabolism. The antidiabetic activity is attributed to flavonoids and other bioactive compounds that may enhance insulin sensitivity and decrease oxidative stress associated with diabetes mellitus.(8)

5. Hepatoprotective Activity

The hepatoprotective effect of *Bauhinia variegata* has been demonstrated in animal studies. Plant extracts protect liver tissues from chemically induced toxicity by reducing lipid peroxidation and improving antioxidant defense mechanisms.

6. Anti-ulcer Activity

The bark exhibits gastroprotective properties by reducing gastric acid secretion, enhancing mucosal defense, and promoting ulcer healing. These effects make it useful in managing gastric ulcers and other gastrointestinal disorders.(9)

7. Anticancer Activity

Preclinical investigations suggest that phytochemicals present in *Bauhinia variegata* possess cytotoxic and antiproliferative properties against selected cancer cell lines. Although the findings are promising, additional clinical research is required before therapeutic

application.

Traditional Medicinal Uses

In Ayurveda, *Bauhinia variegata* is regarded as an important medicinal plant and is widely used in the classical formulation Kanchanar Guggulu. Traditionally, the stem bark is prescribed for thyroid enlargement, lymphadenopathy, cysts, glandular swellings, hemorrhoids, diarrhea, dysentery, skin diseases, ulcers, wound healing, and inflammatory conditions. The flower buds are also consumed as a vegetable in several parts of India because of their nutritional value and health benefits.

Summary and Conclusion

Bauhinia variegata (Kachnar) is an important medicinal plant with significant ethnopharmacological and pharmaceutical value. The stem bark contains several bioactive constituents, including flavonoids, tannins, glycosides, saponins, alkaloids, steroids, and terpenoids, which contribute to its diverse pharmacological activities. Scientific investigations have demonstrated anti-inflammatory, antioxidant, antimicrobial, antidiabetic, hepatoprotective, anti-ulcer, wound-healing, and anticancer properties, supporting many of its traditional medicinal uses.

Despite encouraging pharmacological evidence, the majority of studies have been limited to in vitro experiments and animal



models. Therefore, further clinical investigations, standardization of herbal preparations, toxicity evaluation, and regulatory validation are required before routine therapeutic use can be recommended. Overall, *Bauhinia variegata* represents a valuable source of natural bioactive compounds and holds considerable promise for the development of novel herbal medicines and phytopharmaceutical products.

Acknowledgement

The author expresses sincere gratitude to the faculty members of Bhupal Nobles College of Pharmacy, Bhupal Nobles University, Udaipur, Rajasthan, for their continuous guidance and encouragement. The author also acknowledges the researchers whose published work contributed to the preparation of this review article.

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Conflict of Interest

The authors declare that they have no conflict of interest