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Kanchanar Uncovered: from Botanical Identity to Bioactive Potential – A Review Article

Dr. Neha Rani[1] Dr.Garima[2] Dr. Ravina[3] Dr. Naresh Kumar[4] Dr. Amit Sharma[5]

1. P.G. Scholar, Department of Dravyaguna Vigyan, M.S.M. Institute of Ayurveda, B.P.S.M.V. , Khanpur Kalan, Sonepat, Haryana, 131305, India, Email: nehasharma21299@gmail.com,
2. P.G. Scholar, Department of Dravyaguna Vigyan, M.S.M. Institute of Ayurveda, B.P.S.M.V. , Khanpur Kalan, Sonepat, Haryana, 131305, India,
3. P.G. Scholar, Department of Dravyaguna Vigyan, M.S.M. Institute of Ayurveda, B.P.S.M.V. , Khanpur Kalan, Sonepat, Haryana, 131305, India, Email: ravinaarya241@gmail.com,
4. Associate Professor, Department of Dravyaguna Vigyan, M.S.M. Institute of Ayurveda, B.P.S.M.V. , Khanpur Kalan, Sonepat, Haryana, 131305, India
5. Assistant Professor, Department of Dravyaguna Vigyan, M.S.M. Institute of Ayurveda, B.P.S.M.V. , Khanpur Kalan, Sonepat, Haryana, 131305, India

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ABSTRACT -

Ayurveda is distinctive for its holistic approach to disease management, owing to its rich treasury of medicinal plants. *Kanchnar* (*Bauhinia variegata*) is a medium-sized tree belonging to the family Leguminosae (Caesalpiniodeae) and is distributed throughout India, usually at an elevation of 4000 feet [1]. It is well known for its medicinal value in various disorders such as *kapha meda dushti,* including *arbuda*, *granthi roga*, *vridhi roga,* and *gandamala*. Pharmacognostic studies on various parts (stem bark, leaves, root, and seeds) of the *Kanchnar* have reported the presence of phytochemicals, flavonoids, steroids, glycosides, and terpenoids [1]. These phytochemicals have antioxidant, anti-inflammatory, hepatoprotective, wound-healing and antimicrobial actions [2]. This study presents a review of the morphological characteristics and bioactive potential of the *Kanchnar* plant, drawing on classical and contemporary texts.

Keywords – *Kanchnar*, Phytochemical, Hepatoprotective, Antimicrobial.

INTRODUCTION -

Kanchanar (*Bauhinia variegata*) is named so in memory of two famous French botanist brothers of the 16th century, John and Casper Bauhin. It is a plant of high medicinal value and is found throughout India in tropical and subtropical regions.

In classical texts, it is found to be documented in *Vargas* –

Vamnopag (Charak) [11]
Kashyadi Varg (Sushrut) [11]
Guduchyadi Varg (Bhavprakash)
Gandmala nashak (Priya Nighnatu)
Karviradi Varg (Raj Nighnatu)
***Putikaranjaadi Varg (Nighnatu Aadarsh*)**

Classification [10]

Sr. no	Classification	Name
1	Kingdom	Plantae – Plants
2	Alternate-kingdom	Vascular plants - Tracheobionta
3	Distribution	Flowering plants - Magnoliphyta
4	Super distribution	Seed plants – Spermatophyta
5	Category	Dicotyledons - Magnoliospida
6	Alternate category	Rosidae
7	Order	Fables
8.	Family	Pea family - Fabaceae
9	Genus	*Bauhinia* L. – *Bauhinia* P
10	Species	Mountain ebony – *B.variegata L*

Synonyms (पर्याय) –

काञ्चनारः काञ्चनको गण्डारिः शोणपुष्पकः । कोविदारश्च मरिकः कुद्दालो युगपत्रकः ॥
कुण्डली ताम्रपुष्पश्चाश्मन्तकः स्वल्पकेशरी । (भा.प्र. गुडूच्यादि वर्ग 101-102) [12]

Regional name -

Region	Name
Sanskrit name	*Chamarika, Ashmantaka, Chamari, Gandari, Asphota, Girija, Champavidala*
Hindi name	*Bariala, Guriala, Gwiara, Kachnar, Kandana, Kaniara, Khairwala Khawairaala* [2]
English name	Mountain ebony
Punjabi name	*Kanchnar*
Gujrati name	*Champakati, Kanchnar, Kanchnar*
Bengali name	*Kanchana, Rakta Kanchana* [2]
Kashmir name	*Kaladh*
Marathi name	*Kanchan, Raktakanchan, Thaur*
Malayalama name	*Chuvana Mandharama*
Teluguh name	*Devah Kanchnam* [2]
Tamila name	*Sigappu mandarhai, Sihappu mantarhai*
Orissa name	*Kachanah*, *Kaniarah* [2]

Plant

Flowers

Morphological characteristics –

Sr no	Plant parts	Characteristics
1	Habit	A medium-sized deciduous tree or shrub, it mainly grows in the deciduous region [10].
2	*Patra* (Leaf)	Leaves are alternate, simple, and divergent, with a cordate base, and 10-15 cm long Alternative-leaflets are about 11-13 cm, with an ovate or rounded shape, a high length, a rounded apex, and a glabrous upper surface [10].
3	*Chaal* (Bark)	Greyish-brown in colour from the outside and pale pink from the inside. Cracks are present, and the wood is moderately hard.
4	*Puspha* (Flower)	Complete, bisexual, whitish or purplish in colour with an ornamental appearance. There are 5 stamens, 5 petals and 5 sepals present. The topmost calyx is darkish o multicoloured, generally seen before the leaves in a little alary and a conoid [3,10].
5	*Phal* (Fruit)	Oblate, 15-30 cm long with sharp brown capsules, containing 10 to 15 seeds.

Distribution –

Found all over India, at a height of 4000 feet, specifically in the western region.

Varieties (जातियां) –

Two *bheda* – 1. *Kanhnar* 2. *Kovidar (Bhavprakash NIGHANTU)*

Three *bheda* – 1. *Shweta Kanchnar* 2. *Rakt Kanchnar 3. Peet Kanchnar (NIGHANTU RAJ)*

Pharmaceutical properties (Ayurvedic attributes/*guna-karm*) [2]

Guna – *Laghu, Ruksha*
Rasa – *Kashaya*
Vipaka – *Katu*
Veerya – *Sheeta*
Prabhava – *Gandmalanashak*
Karma - *Deepan, Grahi, Tridosahara, Ganavraddihara*

Part used (प्रयोज्यांग)

Stem bark, root, leaves, flowers, seeds.

Chemical composition (रासायनिक संघटन)

Bark – Tannins, sugar and brownish gummy material.

Seed – 16.5% yellow coloured oil carbo-hydrates, proteins, amino-acids, ascorbic acid, flavonoids, alkaloids [11].

Bud – Glutamic acid and other compounds - Bauhinione, tannins, flavanone, fibres, sitosterol, stigmasterol.

Phytochemical studies –

Root bark and root –

Phytochemical analysis of the root bark of *Bauhinia variegata* yielded a new flavanone, (2S)-5, 7-dimethoxy-3, 4- methylene dioxy flavanone and a new dihydrodibenzoxepin, 5, 6 - dihydro - 1, 7 - dihydroxy - 3, 4 - dimethoxy 2 methyldibenzoxepin [14].

Leaves –

Leaves were found to contain compounds hepta-triacontan-12,13-diol and dotetracont-15-en-9-ol, crude protein, calcium, phosphorus, and volatile oil during phytochemical analysis [15].

Buds –

In the early stage of flowering, only four amino acids appeared: α-Alanine, aspartic acid, glycine and glutamic acid. Glutamic acid showed a sharp drop from the initial to the later stages [16].

Stem bark and stem –

The stem bark showed the presence of heptatriacontane, octacosanol, and stigmasterol [17], as well as sterols, glycosides, reducing sugars, and nitrogenous substances, in a preliminary phytochemical screening [18]. Also, the presence of a flavonone glycoside characterized as 5, 7-dihydroxyflavonone-4–o-α-L–rhanmopyranosyl-β–D glucopyranoside were reported [19].

Flowers -

The phytoconstituents isolated from the flowers of the plant *Bauhinia variegate* during phytochemical analysis are as mentioned: Quercitroside. Isoquercitroside, rutoside, taxifoline rhamnoside, kaempferol-3-glucoside, myricetol glycosides [20], apigenin, ascorbic, aspartic, glutamic, octadecanoic acid, keto acids, amino acid, tannins [21], cyanidin-3-glucoside, malvidin-3-glucoside, malvidin-3-diglucoside, peonidin-3-glucoside, peonidin-3-diglucoside, 3-galactoside and 3-rhamnoglucoside of kaempferol [22].

Seed –

On phytochemical analysis, the seeds were found to contain carbohydrates, proteins, amino acids, ascorbic acid, flavonoids, alkaloids, leucoanthocyanines, aspartic acid, glutamic acid, arginine, glycine, alanine, histidine, isoleucine, lysine, methionine, phenylalanine, proline, serine, threonine, tyrosine, valine and 5-hydroxy7,3',4',5'-tetramethoxyflavone5-O-beta-D-xylopyranosyl-alpha-L-rhamnopyranoside [23].

Seeds

Fruit

Leaves

Properties and actions –

काञ्चनारो हिमो ग्राही तुवरः श्लेष्मपित्तनुत् । कृमिकुष्ठगुदभ्रंश गण्डमाला व्रणापहः ॥

कोविदारोऽपि तद्वत्तस्यात्तयोः पुष्पं लघु स्मृत्तम् । रूक्षं संग्राहि पित्तास्त्रप्रदरक्षयकासनुत् ॥
(भा.प्र. गूडूच्यादि वर्ग 103-104) [12]

कोविदारः कषायस्तु संग्राही व्रणरोपणः । गण्डमाला गुदभ्रंश शमनः कुष्ठकेशहा ॥ (ध.नि.गुडूच्यादि वर्ग 195) [13]

Pharmacological studies [6,7,8,9]

Antioxidant - The water and ethanolic extracts have shown major antioxidant activity.

Anti-inflammatory - The direction of ethyl acetate soluble division produced mild anti-inflammatory activity on albino rats.

Anti-carcinogenic & Anti-mutagenic - Extract was evaluated in "Swiss albino" mouse skin, showing activity against carcinogenicity and melanoma tumour after breaking the primary cancer cells, with micronucleus and chromosomal aberration tests in the pharmacological aspects.

Antimicrobial - Plant species from Nepal show activity against B. subtilis, S. typhi, P. aeruginosa, S. aureus, and V. cholerae.

Antihyperlipidemic - In initial studies, the aqueous & ethanolic extracts showed favourable antihyperlipidemic activity.

Hepatoprotective - Alcoholic S. Bark extract shows important activity in Carbon tetrachloride inebriate "Sprague Dawley rats".

Antibacterial - The bark of this plant also shows antibacterial activity across three concentrations in various solvents of increasing polarity, as determined by the agar well diffusion method.

Nephro-protective - Ethanolic extract of the stem shows action opposed to cisplatin-induced "nephropathy" observed in vivo in rats.

Anti-ulcer – Effects on ulcers induced by aspirin in rats. The ethanolic extract helps reduce gastric discharge, total free acidity, and the ulcer index.

Uses of *Kanchnar* as per classical texts –

***Acharya Charak* -**

• It *chaal* along with "*Triphala churna*" and "*Pippali churna*" is used in "*Gandamala*" and "*Galganda"* (Goitre).

• *Chaal* macerated in bran water helps in treating "*Gandam*ala".

• *Kanchnar guggulu* is effective in curing '*Galaganda*', '*Gandamala*', and '*Granthi*'.

***Acharya Sushrut* -**

• *Kwath* of the *chaal*, along with churna of Sunthi, included with part of nectar, can treat acute "*Gandamala"*.

• Dried buds are used for the looseness of the bowels, worms and diarrhoea.

Medicines –

In Ayurveda, *Kanchnar* is conventionally practised for *Arbuda*, *Galaganda*, *Ashthila*, and *Kapha-Meda*-dominant diseases. Leaves are widely used to reduce sugar and provide the best nutritional value. *Mools* are flatus-relieving and used in indigestion [5]. *Chaal* is *kshaya* in *rasa*, so it works as an antihelmintic and is used in *gandmala* and *charamroga* treatment. *Pushpa* and *Pushpa Kali* are used as a *rechak*. *Swarasa* of *pushpa* is used to cure *atisara, pechish, krimiroga, arshroga* and tumours [1].

Formulations (विशिष्ट योग) –

- *Kanchnar gugglu*
- *Kanchnaradi kwath*
- *Kanchnar gudika.*

Research updates -

Kanchnar is mentioned for *gandmala-nashak* action in classical *Nighnatu*-s. But, the recent research focus on distinction of plants through their morphological characteristics and their quantitative and qualitative chemical makeup, that they constitute. So, the recent research explore the different bioactive constituents present in different parts of of *Kanchnar* involving quantitative and qualitative analysis through modern evolved techniques.

1.Quantification of biochemical compounds in *Bauhinia Variegata* Linn flower extract and its hepatoprotective effect [27].

2. Comparative pharmacognostical evaluation and hptlc analysis of stem bark of K*anchnar* (B*auhinia variegata* linn.) and K*ovidar* (B*auhinia purpurea linn*) [28].

3. Recovery of high-value components from *Bauhinia variegata* leaves using ultrasound-microwave-assisted extraction technique [29].

4. Bioactive secondary metabolites from B*auhinia variegata linn*. Roots: isolation, characterization, and cytotoxic evaluation [30].

5. In vitro analysis of antioxidant capacity of *Bauhinia variegata (*L.) Benth leaf extract [31].

Conclusion –

In essence, *Bauhinia variegata* is an important medicinal plant in traditional medicine. It various parts like stem bark, root bark, seeds, leaves are rich in phytochemicals such as flavonoids, phenols, alkaloids, terpenoids, and sterols. It has classical as well as proven action in many disorders such as *gandmala*, *kustha*, *kasa*, *shwasa*, *atisara*, *apachi*, *pradar*, *raktpitta*, and *varnvikara.* Thus, it has high medicinal and therapeutic value. But, it is necessary to make traditional medicine evidence-based. So, there is a need to explore its properties and actions through clinical studies.

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