

A BRIEF REVIEW ON TECOMELLA UNDULATA AND ITS PHARMACOLOGICAL POTENTIAL

Gavhane Rohan Bramhdev¹, Ghule Mangesh Raghunath², Dalvi Sagar S³

^{1,2,3}Dr. Naikwadi College of D Pharmacy, Jamgaon, Sinnar

ABSTRACT

Tecomella undulata, an indigenous tree species found in the arid regions of North-west India, Pakistan, and Arabia, particularly in Rajasthan, is recognized for its significant medicinal and ecological value. The plant is widely used in traditional medicine, with various parts such as the bark, leaves, flowers, and roots utilized to treat ailments like liver diseases, wounds, and digestive disorders. It contains bioactive compounds like iridoid glucosides, flavonoids, and triterpenoids, which enhance its therapeutic properties. In addition to its medicinal uses, *Tecomella undulata* plays an essential role in Ayurvedic formulations, offering potential benefits for treating liver and spleen disorders.

Pharmacologically, *Tecomella undulata* demonstrates a broad range of beneficial activities, including anticancer effects, hepatoprotective properties, anti-inflammatory and analgesic effects, antimicrobial activities, and potential HIV inhibition. The plant's bark, rich in quercetin, has shown significant tumor-suppressing properties. Its extracts have proven effective in alleviating liver damage in rodent models, and methanolic extracts have demonstrated anti-inflammatory and analgesic effect. The plant also exhibits strong antimicrobial activity, particularly against Gram-positive bacteria and fungi, and its ethanolic extract has shown promise in managing diabetes. These diverse pharmacological effects highlight *Tecomella undulata*'s potential as a source for developing novel therapeutic agents for a variety of diseases, further solidifying its value in both natural medicine and ecological systems.

Keyword- *Tecomella undulata*, Medicinal plant, analgesic effect, anti-microbial activity

1. INTRODUCTION

Tecomella undulata, a member of the Bignoniaceae family, is a shrub or small tree commonly found in regions of India such as Punjab, Rajasthan, Gujarat, and Sindh. Known by various names like rugtrora, rohira, and rakhtroda, this plant is recognized for its medicinal properties. It has been traditionally used in Ayurvedic medicine for treating conditions like leucorrhoea, leucoderma, spleen enlargement, and liver diseases. The plant's bark has been used for syphilis, painful swellings, and cancer treatment. It is also noted for its antibacterial, anti-inflammatory, and hepatoprotective activities. *Tecomella undulata*, commonly known as rohida, is a medicinal plant from the Bignoniaceae family, found primarily in arid regions of India. It typically grows as a shrub but can reach up to 12 meters in height when cultivated. The plant is valued for its environmental benefits, such as stabilizing sand dunes and aiding afforestation due to its drought and fire-resistant properties. In traditional Ayurvedic medicine, various parts of the plant, including the heartwood, stem bark, leaves, and seeds, are used to treat conditions like liver and spleen diseases, jaundice, anemia, and leucorrhoea. It contains several bioactive compounds, including lapachol and sitosterol, which contribute to its medicinal properties.

TAXONOMICAL CLASSIFICATION

Kingdom: Plantae

Division: Angiosperms/Magnoliophyta Subdivision: Eudicots

Class: Asterids Order: Lamiales Family: *Bignoniaceae* Genus: *Tecomella* Species: *Undulata* ³

VERNACULAR NAMES

Hindi: Raktarohida, Roheda, Ragatrohada Sanskrit: Rohitak, Rohi, Plihgna Panjabi: Ruheda

Gujrati: Rohido, Ragatarohida, Swetrohido Tamil: Karelchuvarama, vangul Malayalam: Chem

Udiya: Pleehasama Telugu: Themmaram

Kannad: Padiri, Muttalgid, Mardumala, Muttala

Bangali: Rodha, Vihagani, Pittaraj, Tiktaraj, Nayana, Kadar

Marathi: Raktarohida, Rohida ⁴

GEOGRAPHICAL SOURCE

Tecomella undulata is tracked down in the drier areas of North-west India up to a height of 1200 meters, Arabia and Pakistan (Southern parts, Sindh and Baluchistan) ⁵ *Tecomella undulata* is an important indigenous tree species found in the hot desert areas of Rajasthan State in India. Data from 22 sample plots were used to model the dominant height growth of *Tecomella undulata*. It is chiefly disseminated in western locale of Rajasthan all through the areas of Ajmer, Pali, Jodhpur, Barmer, Jaisalmer, Nagpur, Bikaner, Churu and Sikar.

MORPHOLOGY



Fig no.1- Tecomella undulata

LEAVES

Leaves of Tecomella undulata are basic, barely oval, inhumane and having undulating edges all through. These leaves are around 5 to 12.5cm long and 1 to 3.2cm wide.



Fig. 2 Leave Tecomella undulata

FLOWER

Tecomella undulata is having extremely gorgeous conspicuous blossoms in yellow, orange and red tones. Blossoms are scentless and long (around 6.5 to 7.5 cm). Blossoms are organized in corymbose few bloomed racemes, ending short sidelong branches, length of pedicles is around 6 to 13 mm. Calyx is campanulate having length of 9.5 to 11mm, curves are 3mm long, extensively applaud, inhumane, mucronate. Corolla is orangish yellow in variety having length of 3.8 to 6.3cm, campanulate, veined, curves are 5 subequal and adjusted. Stamens are applied and fibers are glabrous. Disgrace are 2 lamellate, curves are spatulate-elongated and adjusted



Fig. 3 yellow flower Tecomella undulata



Fig. 4 red flower *Tecomella undulata*



Fig. 5 orange flower *Tecomella undulata*

FRUIT

The tree sprouts in the long stretch of April or May and bears natural products, from there on. Organic product is case, somewhat bended, linearoblong, intense and smooth. Valves are flimsy and seeds are winged, 2 cm long and 1 cm wide

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Fig. 6 fruit

BARK:-

Tecomella undulata bark is utilized for therapeutic reason, remotely as well as inside. Remotely, the glue of its bark skin is applied on awful injuries, related with haematoma. It additionally advances wound recuperating. In conjunctivitis, the juice is imparted into eyes, with extraordinary advantage. Inside, the powder of bark skin is given alongside ghee in gaematoma. It is extraordinarily suggested in ascites with hepatosplenomegaly. It is a brilliant blood purifier and choleagogue, consequently, remunerating in hepatitis. It is likewise utilized in restoring urinary confusion, expansion of spleen, gonorrhea, leucoderma, liver sicknesses and solution for syphilis. Youthful plant of Tecomella undulata bears delicate and greenish-earthly colored bark however it turns out to be hard and becomes a brilliant shade of brown in variety as the plant becomes and ages significantly. Thickness of bark is around 8 mm in a completely developed plant.



Fig. 7 bark

ROOT

The paste of Tecomella undulata root is given internally in leucorrhoea some times pulp is given along with rice water. ⁸

SEEDS

Tecomella undulata seeds squashed with pinus leaf remove are taken to fix hemorrhoids. It is likewise utilized against boil.

2. AYURVEDIC FORMULATIONS

ROHITAKAARISHTA

Different definition of Tecomella undulata is accessible in market. Rohitakaarishta is the main traditional compound available without a prescription and is being endorsed in liver and spleen illnesses, oedema and frailty. ⁹

PHYTOCHEMISTRY

phytochemical studies were performed to explore the structure of various plant removes, prompting the seclusion and recognizable proof of pharmacologically significant mixtures, for example, unsaturated fat, iridoid glucoside, naphthoquinone, ¹⁰ phytosterols, greasy liquor, flavonoid glycoside, flavonol, and triterpenoids.

Phytochemical constituents isolated from different parts of the plant are as below:

HEARTWOOD

- Radermachol
- 2-Isopropenylnaphtho [2,3-b] furan-4,9-quinone
- Tecomaquinone-I
- α -Lapachone
- β -Lapachone
- Dehydro- α -Lapachone
- Cluytlyferulate
- Undulatin
- Tectoquinone
- Deoxylapachol
- Octacosanylferulate

BARK

- β -sitosterols
- Ester glucoside
- Tecomin
- Alkanols
- Alkenes
- Undulatoside A And B
- Chromone glycosides
- Iridoid glucosides
- Tecoside
- Lapachol
- Veratric acid

ROOT

- Lapacol
- Tricontanol-1
- β -sitosterol
- Tectol
- Veratric acid
- 6-O-veratryl catalposide
- Quinines

LEAVES

- Deterpene
- Aphanamixol
- Triacontanol
- Betulinic acid
- Oleanolic acid
- Ursolic acid

FLOWERS

- Rutin
- Quercetin
- Luteolin-7-glucoside

SEED

- Alimonoid
- Rohitukin
- Linoleic acid
- Oleic acid
- Stearic acid
- Palmitic acid ¹²⁻¹⁶

PHARMACOLOGY ACTIVITY

Various pharmacological activities are mentioned below:

ANTICANCER ACTIVITY

The bark of the plant *Tecomella undulata* has antitumor movement. Quercetin, present in rose of plant is likewise known to have hostile to malignant growth action ¹⁷ As of late assessed enemy of malignant growth capability of a polyherbal definition arranged from concentrates of stem bark of *Tecomella undulata* ¹⁸ Results obviously showed critical restraint of development by TU in K562, COLO-205, MDA-MB231, HepG2 cells in a portion scope of 10-100 mg/ml. Further, the impact was viewed as portion subordinate. ¹⁹

HEPATOPROTECTIVE ACTIVITY

assessed hepatoprotective possibilities of chloroform, CH_3CO and methanol solvent parts and, methanol insoluble part of ethanolic concentrate of *TUBark* involving paracetamol prompted hepatotoxicity in rodents. That's what results portrayed, methanol solvent division showed critical hepatoprotective movement against paracetamol incited hepatic harm as proven by standardization of significantly raised degrees of AST, ALT, High mountain and complete bilirubin, diminished degree of absolute protein, expanded wet liver weight and volume, expanded thiopentone sodium initiated resting time and close to typical histopathology. First report on hepatoprotective capability of *TU* leaves utilizing a methanolic remove was by Singh and Gupta, 2011²⁰ *Tecomella undulata* was successful against thioacetamide instigated hepatotoxicity. Histology of the liver areas of the creatures treated with the concentrates likewise showed portion subordinate decrease of rats.²¹

ANTI-INFLAMMATORY ACTIVITY

Methanolic concentrate of entire plant is known to display anti-inflammatory potential. *Tecomella undulata* entire plant methanolic remove utilizing carrageenan-actuated rodent paw edema as a trial model. Creators revealed that oral organization of *TU* remove at portions of 300, 500 or 1000 mg/kg bodyweight fundamentally diminished paw edema volume in a portion subordinate way. These outcomes were similar to that of acetylsalicylic corrosive treated rodents.

ANALGESIC ACTIVITY

Methanolic concentrate of entire plant was found to have pain relieving action when it was tried in mice utilizing high temp water tail drenching test. Results showed that oral organization of *TU* separate (300, 500 or 1000 mg/kg) kept critical decrement in tail flick reaction. were equivalent to that of standard medication, acetylsalicylic corrosive. In any case, further examinations are expected on portrayal of dynamic standard from *Tecomella undulata* separate and its ensuing use as a pain relieving specialist.²²

ANTI-HIV ACTIVITY

Tecomella undulata leaves have oleanolic corrosive, ursolic corrosive and betulinic corrosive, intensifies that are solid HIV prohibitors. Octadimethyl succinate subsidiaries of oleanolic corrosive and betulinic corrosive have hostile to HIV action further examinations are expected to lay out the basic system of *Tecomella undulata* in relieving Helps in order to foster a clever treatment of homegrown beginning.²³

Tecomella undulata is viewed as multiple times more dynamic than azidothymidine (AZT) which is an antiretroviral drug used to forestall and treat HIV/Helps is viewed as multiple times more dynamic than azidothymidine (AZT) which is an antiretroviral drug used to forestall and treat HIV/AIDS.²⁴

ANTIMICROBIAL ACTIVITY

It has additionally shown huge enemy of microbial impact on bacterial strains like *Salmonella paratyphi*, *Salmonella paratyphia*, *Bacillus subtilis*, *Bacillus thuringiensis* and parasitic strains like *Aspergillus niger* and *Aspergillus flavus*.²⁵ *Tecomella undulata* separates were more dynamic against Gram-positive microorganisms than against Gram-negative microscopic organisms. The most vulnerable microbes were *B. subtilis*, trailed by *S. epidermidis*, while the most safe microscopic organisms were *P. vulgaris*, trailed by *S. typhimurium*. The antibacterial action of watery and methanol still up in the air by agar circledissemination and agar well dispersion technique.

3. ANTIDIABETIC ACTIVITY

Ethanolic concentrate of the plant is known to show the antidiabetic properties when it was analyzed by streptozotocin nicotinamide induced type 2 diabetic rodents.²⁷

3.1 MACROSCOPIC CHARACTERISTICS OF TECOMELLA UNDULATA

Macroscopic Characteristics Of Stem Bark Of *Tecomella Undulata*:-

- Shape- Curved
- Size- 13–14 cm
- Surface- Longitudinally irregularly fissured, attached rhytidoma
- Color- Outer surface - blackish, inner surface - blackish brown
- Taste -Bitter
- Odour -Not characteristics
- Fracture- Outer splintery, inner fibrous
- Texture- Rough²

4. CONCLUSION

Tecomella undulata is an important medicinal plant found in arid regions of North-west India, Pakistan, and Arabia. It is used in traditional medicine to treat liver diseases, skin conditions, and digestive disorders. Rich in bioactive compounds, the plant exhibits various pharmacological properties, including antitumor, hepatoprotective, anti-inflammatory, analgesic, antidiabetic, antimicrobial, and anti-HIV activities. These findings support its traditional uses and highlight its potential for developing new treatments for cancer, liver disorders, infections, and chronic diseases like diabetes.

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