



Therapeutic Effects of *Tecomella undulata*- An Overview

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Abstract According to WHO, approximately 80% of the world's population is dependent on herbal medicines for primary healthcare needs and to treat basic ailments. *Tecomella undulata* belongs to the family Bignoniaceae and commonly known as Raktarohida, Roheda, Ragatrohada. It is found in the drier regions of North-west India up to an elevation of 1200 meters, Arabia and Pakistan (Southern parts, Sindh and Baluchistan). Phytochemical constituents isolated from different parts of the plant are radermachol, deoxylapachol, tecoside, quinines, ursolic acid, rutin, quercetin and many more. This plant is used to cure cancer, leucorrhoea, hepatitis, diabetes, urinary disorders, gonorrhoea, leukoderma, syphilis etc. Different parts of the plant and its extracts can be used as herbal medicine to treat various disorders instead of synthetic medicines which are associated with several side-effects. In the present study, an attempt has been made to summarize the therapeutic uses of this plant.

Keywords *Tecomella undulata*, herbal medicines, anti-cancer, analgesic, rohira, rohitak

Introduction

From the time immemorial, herbal plants have been used as a safe and effective source of medicines in both the developed and developing countries [1]. According to WHO, approximately 80% of the world's population is dependent on herbal medicines for primary healthcare needs and to treat basic ailments [2].

Tecomella undulate belongs to the family Bignoniaceae and is locally known asrohira, honey tree, desert teak and marwar teak; and commonly known as Rugtrora (in Hindi), Lohira (in Pakistan), Rakhtroda (in Marathi) and Rohitak, Rohi, Daadimpushpaka, Daadimchhada, Plihaghna and Amoorarohituka (in Sanskrit) [3].

It possesses various pharmacological activities like astringent, antimicrobial, anticancer, hepatoprotective and analgesic [4].

Taxonomical Classification [5]

Kingdom	:	Plantae
Division	:	Angiosperms/Magnoliophyta
Subdivision	:	Eudicots
Class	:	Asterids
Order	:	Lamiales
Family	:	Bignoniaceae
Genus	:	<i>Tecomella</i>
Species	:	<i>Undulate</i>



Vernacular names [6, 7]

Hindi	:	Raktarohida, Roheda, Ragatrohada
Sanskrit	:	Rohitak, Rohi, Plihgna
Panjabi	:	Ruheda
Gujrati	:	Rohido, Ragatarohida, Swetrohido
Tamil	:	Karelchuvarama, vangul
Malayalam	:	Chem
Udiya	:	Pleehasama
Telagu	:	Themmaram
Kannad	:	Padiri, Muttalgid, Mardumala, Muttala
Bangali	:	Rodha, Vihagani, Pittaraj, Tiktaraj, Nayana, Kadar
Marathi	:	Raktarohida, Rohida

Distribution

Tecomella undulata is found in the drier regions of North-west India up to an elevation of 1200 meters, Arabia and Pakistan (Southern parts, Sindh and Baluchistan) [8].

In India, it occurs naturally in Rajasthan, Maharashtra, Gujarat, Punjab and Haryana. In other states of India its population is very rare and scanty. It is mainly distributed in western region of Rajasthan throughout the districts of Ajmer, Pali, Jodhpur, Barmer, Jaisalmer, Nagpur, Bikaner, Churu and Sikar [9].

Morphology [10, 11]**Habit**

Tecomella undulata is a small tree with a height of about 2.5 to 5 metres or large shrub bearing drooping branches and greyish-green leaves.



Figure 1: *Tecomella undulata* plant

Leaves

Leaves of *T. undulata* are simple, narrowly oblong, obtuse and having undulating margins through out. These leaves are about 5 to 12.5cm long and 1 to 3.2cm wide.

Flowers

T. undulate is having very beautiful showy flowers in yellow, orange and red colours. Flowers are odourless and long (about 6.5 to 7.5 cm).

Flowers are arranged in corymbose few flowered racemes, terminating short lateral branches, length of pedicles is about 6 to 13 mm.

Calyx is campanulate having length of 9.5 to 11mm, lobes are 3mm long, broadly ovate, obtuse, mucronate.

Corolla is orangish yellow in colour having length of 3.8 to 6.3cm, campanulate, veined, lobes are 5 subequal and rounded.

Stamens are exerted and filaments are glabrous.

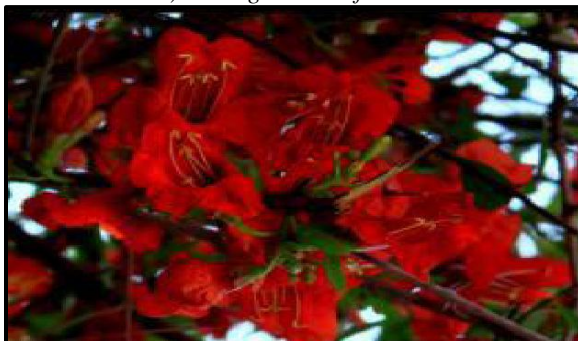
Stigma are 2 lamellate, lobes are spatulate-oblong and rounded.



a). Yellow colour flowers



b). Orange colour flowers



c). Red colour flowers

Figure 2: Flowers of *Tecomella undulata*

Fruit

The tree blooms in the month of April or May and bears fruits, thereafter. Fruit is capsule, slightly curved, linear-oblong, acute and smooth. Valves are thin and seeds are winged, 2 cm long and 1 cm broad.

Bark

Young plant of *Tecomella undulata* bears soft and greenish-brown bark but it becomes hard and turns dark brown in colour as the plant grows and becomes old. Thickness of bark is about 8 mm in a fully mature plant.

Phytochemical Constituents [12-15]

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

Heartwood:

- Radermachol
- 2-Isopropenyl naphtho [2,3-b] furan-4,9-quinone
- Tecomaquinone-I
- α -Lapachone
- β -Lapachone
- Dehydro- α -Lapachone
- Cluytylferulate
- 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
- Tricentanol-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

Different parts of plant having medicinal properties**Bark**

Bark of the plant is having great medicinal values and is used both internally as well as externally. It is used as abortifacient and in the treatment of diabetes, urinary disorders, gonorrhoea, leukoderma, syphilis, various liver diseases, etc [16].

Seeds

Crushed seeds of Rohira with extract of *Pinus* leaves are used to treat haemorrhoids. It is also used against abscesses when applied in combination with ghee [17].

Root

Paste of the roots are used to treat leucorrhoea when administered internally [18].

Flower

Tea made up of *T. undulata* flowers are useful for sterile women [19].

Pharmacology

The various pharmacological activities reported by indigenous healers and herbalists are mentioned below:

Anticancer activity:

The bark of the plant *T. Undulate* was inspected for potential antitumor activity, there by validating the traditional claim. Quercetin, present in flower of plant is also known to have anti-cancer activity [20].

Analgesic activity:

Methanolic extract of whole plant was found to have analgesic activity when it was tested in mice using hot water tail immersion test [21].



Anti-inflammatory Activity:

Methanolic extract of whole plant is known to exhibit anti-inflammatory potential when it was evaluated in Carrageenan-induced rat paw oedema [21].

Antidiabetic activity:

Ethanol extract of the plant is known to exhibit the antidiabetic properties when it was examined by streptozotocin-nicotinamide-induced type-2 diabetic rats [22].

Antioxidant activity:

The methanolic extract of the plant parts like leaves, stem, bark and roots exhibited significant antioxidant activity when evaluated [22].

Antimicrobial activity:

Studies reveal that extracts of leaf and stem of the *Tecomella* plant is effective against *Salmonella typhi*, which is the causative agent of typhoid fever. It was also found that alcoholic extract of the plant was effective against both *B. subtilis* and *S. aureus*.

It has also shown significant anti-microbial effect on bacterial strains like *Salmonella paratyphi*, *Salmonella paratyphia*, *Bacillus subtilis*, *Bacillus thuringiensis* and fungal strains like *Aspergillus niger* and *Aspergillus flavus* [23-24].

Hepatoprotective activity:

Studies revealed that methanolic extract of bark of *T. Undulate* was effective against thioacetamide induced hepatotoxicity. Histology of the liver sections of the animals treated with the extracts also showed dose-dependent reduction of necrosis [4].

Anti-HIV activity:

It was revealed in study that leaves of the plant *T. Undulate* contains some phytoconstituents, which are having strong anti-HIV potential. It was also reported in some study that *Tecomella* is found to be 24 times more active than azidothymidine (AZT) which is an antiretroviral medication used to prevent and treat HIV/AIDS [25-26].

Conclusion

It is revealed from the present study that *Tecomella undulate* is a great source of pharmacologically and medicinally important chemicals which are or can be used to treat various diseases. Its extract has been used in various animal models to exhibit its different therapeutic activities like; anticancer, analgesic, anti-inflammatory etc. Hence, different parts of *Tecomella undulate* and its extracts can be used as herbal medicine to treat various disorders instead of synthetic medicines which are associated with several side-effects. It is also believed that the phytoconstituents and pharmacological activities compiled in this work can help researchers in further studies of the plant. Its medicinal properties can be explored to further extent by pharmaceutical industries to treat various ailments.

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