



Review Article

PHYTOCHEMICAL AND PHARMACOLOGICAL REVIEW OF *GREWIA TILIAEFOLIA* (VAHL)

Dharmasoth Rama Devi, Ganga Rao Battu *

AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam, Andhra Pradesh, India

*Corresponding Author Email: Email:ramajoy90@gmail.com

Article Received on: 05/05/19 Approved for publication: 02/08/19

DOI: 10.7897/2230-8407.1009258

ABSTRACT

The present study is to review the work done on the plant named *Grewia tiliaefolia* (Vahl). We consider the consolidated analysis of *Grewia tiliaefolia* (Vahl). It is a subtropical, medium-sized tree which belongs to the family of Tiliaceae according to Bentham and hooker classification and commonly found in many eastern parts of India, China, and Australia. Different parts of this plant have been used to treat several human illnesses like jaundice, throat pain, wound healing, urinary infection, dysentery. Some of its medicinal properties have been mentioned in Siddha, Ayurveda and Unani system of medicine. This review attempts to encompass the adequate information to develop suitable therapeutics and bioactive molecules isolated from the plant, together with an up to date review on phytochemical analysis and pharmacological activity done on the plant, and its utility has been discussed to invite the attention of the scientific community and researchers to consider further study on *Grewia tiliaefolia*.

Keywords: *Grewia tiliaefolia*, Traditional medicinal uses, Phytochemical, Pharmacological, Leaves, stem, Fruit.

INTRODUCTION

Grewia tiliaefolia is a medium-scrutinized tree to 20 m in stature, with an unmistakable bole length of 8 m and 65 cm in distance across and dim to blackish dark coloured unpleasant sinewy bark stripping off in meagre drops; leaves are basic, interchange. The blooms are yellow, little on thick axillary peduncles and natural products are globose drupes of the size of a pea, 2-4 lobed, dark when ready, seeds 1-2. It is normally known as Dhamani, Dhaman. It is a notable herb in Ayurvedic arrangement of drug and has been utilized in vitiated states of pita and Kapha, consuming sensation, hyperdipsia, rhinopathy, pharyngopathy, hack, skin ailments, pruritus, wounds, ulcers, hematemesis, and general debility, malignancy. *Grewia tiliaefolia* have a place with the family Tiliaceae. It is found in India, particularly in Punjab, Uttar Pradesh, Chennai, Andhra Pradesh, Mumbai, Pakistan, Southeast Asia, Burma, and the USA. The leaves are stipulate, applaud with angled base, taper, crenate-dentate; blooms little, borne on thick axillary peduncles; drupe globose and of the size of a pea, 2-4 lobed, dark and eatable. Dhaman is a nearby cousin of Phalsa. The yellow bloom takes after the genuine phalsa blossom without question. The principle distinction is in the leaves. The leaves of Dhaman are angled heart-formed, a trademark shared by the Linden trees, which have a place with the family Tilia. The natural name tiliifolia implies, leaves looking like Tilia. The leaves are connected on skin ejections and they are known to have anti-infection activity. The new leaves are esteemed as grain. The ether concentrate of the leaves has anti-toxin action. Aside from these examinations, so further physicochemical and phytochemical examinations have been done on this plant. The adsorptive property has increased more significance these days on account of its inclusion in the adsorption of the numerous constituents of these leaves¹.

Introduction to family

The Tiliaceae are trees, bushes, or infrequently herbs containing around 50 genera and 450 species that are additionally described by the nearness of spread or stellate hairs. The leaves are basic and almost constantly substitute, stipules are available. The blooms are actinomorphic and almost constantly indiscriminate. The perianth comprises of a valvate calyx with more often than not 5 unmistakable or basally connate sepals and a corolla of an equivalent number of petals or in some cases the corolla is sepaloid or missing. The androecium comprises of typically numerous stamens that are unmistakable or basally connate or in fascicles. The gynoecium is a solitary compound pistil of 2-10 carpels, an equivalent number of marks of shame, and a 2-10-loculed prevalent ovary with 1-a few axile ovules in every locule. The natural product fruit is variable².

Genus: *Grewia*

The class contains around 150 species, little trees or bushes, circulated in subtropical, tropical and locales, including tropical Africa, Arabia, Madagascar, the Himalaya, India, Pakistan, China, Bangladesh, Myanmar, Thailand, Malaysia, the Pacific islands and Northern Australia. In Pakistan, 10 types of family *Grewia* are recognized³. *Grewia*, (Family: Tiliaceae) is a basic therapeutic plant. Ayurveda, the old Indian treatise on medication, specifies the utilization of various plant portions of *Grewia* to fix irritation, consuming sensation, fever, blood issue, wound mending, ulcerative colitis, overwhelming menstrual stream and diabetes⁴⁻⁶. Various types of sort *Grewia* have been utilized as restorative operators to treat a few illnesses. This survey dependent on 45 artistic sources examines the present information of conventional uses, science, organic impacts, and harmfulness of various types of this family. Triterpenoids, steroids, glycosides, flavones, lignans, phenolics, alkaloids, lactones, anthocyanins, flavones and natural acids have been

disengaged from different types of this variety. The concentrates and preparations from the different plants, which are eagerly sheltered, displayed different natural impacts, for example hostile

to oxidant, antibacterial, hepatoprotective, against inflammatory, against emetic, hostile to malarial and pain relieving.

Table 1: List of species present in *Grewia* Genus

<i>Grewia asiatica</i> L.	<i>Grewia kakothamnus</i> K. Schum.
<i>Grewia bakeriana</i> Bill.	<i>Grewia lutea</i> Exell.
<i>Grewia cyclopetala</i> Wawra & Peyr.	<i>Grewia nitida</i> Juss.
<i>Grewia diversipes</i> Capuron.	<i>Grewia orbiculata</i> Rottler
<i>Grewia eriocarpa</i> Juss.	<i>Grewia palodensis</i> E.S.S.Kumar & al.
<i>Grewia flava</i> DC.	<i>Grewia rolfei</i> Merr.
<i>Grewia grandidieri</i> Baill.	<i>Grewia suffruticosa</i> K.Schum
<i>Grewia humbertii</i> Capuron.	<i>Grewia triflora</i> (Bojer) Walp.
<i>Grewia immac</i> Guillaumin.	<i>Grewia ugandensis</i> Sprague
<i>Grewia I sochroa</i> Burret.	<i>Grewia villosa</i> Wild.
<i>Grewia woodiana</i> K. Schum.	<i>Grewia xanthopetala</i> F.Muell. ex Benth.
<i>Grewia yinkiangensis</i> Y.C.Hsu & R. Zhuge	<i>Grewia zizyphifolia</i> Bill. ⁷

Table 2: Taxonomical Classification

Kingdom	–	Plantae
Sub Kingdom		Spermatophyta
Division		Angiospermae
Class	–	Dicotyledonae
Subclass	–	Polypetalae
Order		Malvales
Family		Tiliaceae, Malvaceae
Genus		<i>Grewia</i>
Species	–	<i>Tiliaefolia</i> ⁷⁻⁸

Table 3: Vernacular names

Hindi and Bengali	: Dhamni, Dhamin, Pharsa
Marathi	: Daman, Daman
Gujarati	: Dalmon, Dhamana
Telugu	: Charachi, Ettatada
Tamil	: Sadachi, Unnu
Kannada	: Thadsal, Butale
Malyalam	: Chadicha
Oriya:	Dhaman, Dhamuso ⁹

Synonyms of *Grewia tiliaefolia*

Grewia tiliifolia var. *argentea* Burret
Grewia tiliifolia var. *leptopetala* (Braudis) T. Cooke
Grewia variabilis Wall.
Microcos lateriflora L
Grewia arborea
Grewia rotunda
*Grewia inaequalis*⁸⁻⁹

Classical therapeutic uses of dhanvana *Grewia tiliaefolia*

Fever – Dhanvana is one of the ingredients of Chandanadi taila which is useful in fever with burning sensation. Kaphaja Prameha – Decoction of patha, vidanga, Arjuna and dhanvana mixed with honey is prescribed. Hemorrhage – In case of excessive hemorrhage (bleeding conditions), powder of the barks of the shala, sarja, armed, meshashringi, dhava, and dhanvana should be applied and the spot is firmly bandaged. Abdominal pain – In

colic caused by pitta, soup of palasha or dhanvana mixed with sugar should be given.¹⁰

Traditional uses

It is useful in vitiated conditions of pitta and kapha, burning sensation, hyperdipsia, rhinopathy, ulcers, skin diseases, haematemesis, and general debility. Snake bite antidote. Leaves are used in cooking to prevent secondary poisoning. Livestock bitten by snakes is drenched with a leaf, bark decoction, infusion¹¹. The paste of the fresh leaves is used to treat burns, Bark powder is used as an aphrodisiac¹². Ripen fruits of *Grewia tiliaefolia* are eaten¹³. Dixit and Geevan¹² mentioned that *Grewia tiliaefolia* was used as agricultural implements and also as a food. The crushed bark of *Grewia tiliaefolia* is used for washing the hairs to prevent the hair fall proved by Yashodharan and Sujana¹⁴. Patil and Bhaskar described the uses of plants used by the tribal people of the Nandurbar district; *Grewia tiliaefolia* is one of them. They mentioned that root powder of *Grewia tiliaefolia* is

mixed with equal water and this preparation is used at night for curing the sprain¹⁵.

Macroscopy of *Grewia tiliaefolia*

Grewia tiliaefolia (Dhanu vriksha in Sanskrit), belongs to the family Tiliaceae and it is a medium sized tree, up to 20 m in

height, with a clear bole and grey to blackish brown rough fibrous bark peeling off in thin flakes; leaves simple, alternate¹⁶. The flowers are yellow, small on thick axillary peduncles and fruits are globose drupes of the size of a pea, 2-4 lobed, black when ripe, seeds 1-2¹⁷.



Figure 1: Leaf, fruit and bark of *Grewia tiliaefolia*

Microscopy of *Grewia tiliaefolia*

Assessment of powder microscopical studies of *Grewia tiliaefolia* Vahl leaves¹⁸.

Phytochemical work on *Grewia tiliaefolia*

There was a very little work carried out on phytochemistry of *Grewia tiliaefolia*. It was reported that betulin isolated from the chloroform extract of bark in *Grewia tiliaefolia* by HPTLC¹⁹. The bark of the *Grewia tiliaefolia* showed the presence of three triterpenoids, viz. Betulin, Friedelin, and Lupeol. Roots showed the presence of Friedelin and Lupeol²⁰. Tri-terpenoids isolated from *G. tiliaefolia* bark at higher concentrations exhibited cytotoxic activity against LEUK-L1210 cells²¹. *Grewia tiliaefolia* contain chemicals like D-erythro-2-hexenoic acid γ -lactone, Gulonic acid γ lactone, Betulin, Friedelin, Lupeol, Tannins, Flavonoids, Hemicelluloses, Phenolics, Lupeol, and Lignin¹⁸⁻²². Isolation of Bactericidal Constituents, β -Sitosterol, stigmasterol and a triterpenoid lupeol from the Stem Bark of petroleum Extract²³.

In vitro work done on *Grewia tiliaefolia*

Valvi and Rathod they reported the highest values of nitrogen, phosphorus and magnesium were observed in a *Grewia tiliaefolia* fruits²⁴.

Anticancer activity

In vitro cytotoxic properties of *Grewia tiliaefolia* bark was reported²¹ by Badami *et al.*

Antioxidant activity

Antioxidant properties of the methanolic extract from *Grewia tiliaefolia* barks was studied by Yadav *et al*²⁶. Antioxidant and anti proliferative activity of methanolic extract of *Grewia tiliaefolia* (Vahl) bark in different cancer cell lines, MCF-7, HepG2, A549 (lung cancer cell line) was reported by selvam²⁵. *In vitro* antioxidant and *in vivo* prophylactic effects of two gamma-lactones isolated from *Grewia tiliaefolia* bark against hepatotoxicity in carbon tetrachloride intoxicated rats²⁷.

Pharmacological work done

The stem bark of *Grewia tiliaefolia* showed the semen coagulant and cardiovascular effects²⁸. Analgesic and antipyretic activity of aqueous extract of *Grewia tiliaefolia* Vahl leaves were

reported²⁹. *Grewia tiliaefolia* Vahl. the bark is exploited in treating burning sensation, cough, skin diseases, wounds, ulcers, diarrhea, hemorrhage, seminal weakness, general debility, cardiac diseases, disorders of the blood, and diseases of the nose, in opium poisoning and as an aphrodisiac as well as tonic³⁰. *In vivo* wound healing activity of the methanolic extract and its isolated constituent, gulonic acid gamma-lactone, obtained from *Grewia tiliaefolia*³¹. Adhikari reported that its flowers fruits, bark, and leaves are used for the Syphilis³². Cholinesterase inhibitory, the anti-amyloidogenic and neuroprotective effect of the medicinal plant *Grewia tiliaefolia* – An *in vitro* and *in silico* study³³.

CONCLUSION

An extensive literature Survey was carried out with the selected plant *Grewia tiliaefolia* (Vahl). The genus *Grewia* is known to exhibit very good pharmacological activities. *Grewia tiliaefolia* is claiming the folklore and traditional medicinal usage. There were very few phytochemical and pharmacological work reported on *Grewia tiliaefolia* (leaf). So initiated to investigate the phytochemical and biological activities of leaf of *Grewia tiliaefolia*. For plant mediated green synthesis of nanoparticles can also be used as it contains good antioxidant property. Novel phyto constituents can be isolated as there was only little work done on the phytochemistry. Novel pharmaceutical drugs can be developed by structural modification for biomedical application.

REFERENCES

1. Dicson SM, Samuthirapandi M, Govindaraju A, Kasi PD. Evaluation of *in vitro* and *in vivo* safety profile of the Indian traditional medicinal plant *Grewia tiliaefolia*. *Regulatory Toxicology and Pharmacology* 2015; 73(1): 241-7.
2. Arya VS, Indian Medicinal plants, 1st Ed., Vol.-III, Orient Longman Ltd. Publication, Hyderabad; 1995. p. 104-106.
3. Ullah W, Uddin G, Siddiqui BS. Ethnic uses, pharmacological and phytochemical profile of genus *Grewia*. *Journal of Asian natural products research* 2012; 14(2): 186-95.
4. Lavekar GS, Padhi MM, Mangal AK, Joseph GV, Raman KG, Selvarajan S, Sharma PC, Yelne MB, Dennis TJ. Database on medicinal plants used in Ayurveda and Siddha. Volume 5. New Delhi: Central Council for Research in Ayurveda and Sidha; 2008.
5. Zia-Ul-Haq M, Stanković M, Rizwan K, Feo V. *Grewia asiatica* L., a food plant with multiple uses. *Molecules* 2013; 18(3): 2663-82.

6. Mishra RK, Patel SP, Srivastava A, Vashistha RK, Singh A, Puskar AK. Ethno medicinally important plants of Pachmarhi region. *Nat. Sci: Madhya Pradesh, India* 2012; 10: 22–26.
7. Heywood VH, Brummitt RK, Culham A, Seberg O. Flowering plant families of the world. Ontario: Firefly Books; 2007.
8. Brown D. Angiosperm Families Containing Beta-Carbolines. Version of 2001.
9. <http://www.flowersofindia.net/catalog/slides/Dhaman>.
10. Manish Tomar, Introduction on Medicinal Plants *Grewia tiliifolia* Ayur vote wellness; 2016.
11. Owuor BO, Kisangau DP. Kenyan medicinal plants used as antivenin: a comparison of plant usage. *Journal of ethno biology and ethno medicine* 2006; 2(1): 7.
12. Bandyopadhyay S, Mukherjee SK. Wild edible plants of Koch Bihar district, West Bengal. *Natural Product Radiance* 2009; 8(1): 64-72.
13. Ahmad Z, Khan SS, Wani AA, Khan F. Ethno medicinal plants used for different ailments by the tribals of district Raisen (MP), India. *Journal of Medicinal Plants Research* 2013; 7(7): 298-303.
14. Dixit AM, Geevan CP. A quantitative analysis of plant use as a component of EIA: Case of Narmada Sagar hydroelectric project in Central India. *Current Science*; 2000. p. 202-10.
15. Yesodharan K, Sujana KA. Wild edible plants traditionally used by the tribes in the Parambikulam Wildlife Sanctuary, Kerala, India. *Natural Product Radiance* 2007; 6(1): 74-80.
16. Boydem MR. The NCI *in vitro* anticancer drug discovery screen. In Teicher, B. (Ed.). *Anticancer drug development guide; preclinical screening, clinical trials and approval*, Humana Press, Totowa; 1997. p. 30.
17. Brand-Williams W, Cuvelier ME, Berset CL. Use of a free radical method to evaluate antioxidant activity. *LWT-Food science and Technology* 1995; 28(1): 25-30.
18. Rajesh Kumar V and V V Venkatachalam. Assessment of powder microscopical studies of *Grewia tiliifolia* Vahl leaves. *Int. Res. J. Pharm* 2017; 8(9): 84-87.
19. Badami S, Gupta MK, Ramaswamy S, Rai SR, Nanjani M, Bendell DJ, Subban R, Bhojaraj S. Determination of betulin in *Grewia tiliifolia* by HPTLC. *Journal of separation science* 2004; 27(1-2): 129-31.
20. Anjaneyulu B, Rao VB, Ganguly AK, Govindachari TR, Joshi BS, Kamat VN, Manmade AH, Mohamed PA, Rahimtula AD, Saksena AK, Varde DS. Chemical investigation of some Indian plants. *Indian Journal of Chemistry* 1965; 3(5): 237-+.
21. Badami S, Vijayan P, Mathew N, Chandrashekhar R, Godavarthi A, Dhanaraj SA, Suresh B. *In vitro* cytotoxic properties of *Grewia tiliifolia* bark and lupeol. *Indian Journal of Pharmacology* 2003; 35(4): 250-1.
22. Goyal PK. Phytochemical and pharmacological properties of the genus *Grewia*: a review. *International Journal of Pharmacy and Pharmaceutical Sciences* 2012; 4(4): 72-8.
23. Mohamed Khadeer Ahamed, Grewia diversipes V. Krishna, Harish B. Gowdru, H. Rajanaika, HM Kumaraswamy, Sharath Rajshekarappa, Chethan J Dandin, and KM Mahadevan, Isolation of Bactericidal Constituents from the Stem Bark Extract of *Grewia tiliifolia* Vahl. *Research Journal of Medicinal Plants* 2007; 1: 72-82.
24. Valvi SR, Rathod VS. Mineral composition of some wild edible fruits from Kolhapur district. *International Journal of applied biology and Pharmaceutical technology* 2011; 2(1): 392-6.
25. Selvam N, Thamizh, Vengatakrishnan V, Murugesan S, Kumar S, Damodar. Antioxidant and anti proliferative activity of methanolic extract of *Grewia tiliifolia* (Vahl) bark in different cancer cell lines. *International Journal of Pharmacy and Life Sciences* 2010; 1(2): 54-60.
26. Yadav Vivek Ramshankar, Pandit Vinay, P. Vijayan. Antioxidant, antimicrobial and cytotoxicity properties of the methanolic extract from *Grewia tiliifolia* Vahl. *Pharmacognosy Magazine* 2008; 4(16): 329-334
27. Ahamed MB, Krishna V, Dandin CJ. *In vitro* antioxidant and *in vivo* prophylactic effects of two γ -lactones isolated from *Grewia tiliifolia* against hepatotoxicity in carbon tetrachloride intoxicated rats. *European Journal of Pharmacology* 2010; 631(1-3): 42-52.
28. Dhawan BN, Patnaik GK, Rastogi RP, Singh KK and Tandon JS, Screening of Indian Plants for Biological Activity, *Indian J. Expt. Biol* 1977; 15: 208-219.
29. Sakat SS, Juvekar AR. Analgesic and antipyretic activity of aqueous extract of *Grewia tiliifolia* Vahl leaves. *Journal of Pharmacy Research* 2009; 2(9): 1475-8.
30. Chopra RN. *Indigenous Drugs of India. Their Medical and Economic Aspects. Indigenous Drugs of India. Their Medical and Economic Aspects*; 1933.
31. Ahamed BM, Krishna V, Malleshappa KH. *In vivo* wound healing activity of the methanolic extract and its isolated constituent, gulonic acid γ -lactone, obtained from *Grewia tiliifolia*. *Planta medica* 2009; 75(05): 478-82.
32. Adhikari BS, Babu MM, Saklani PL, Rawat GS. Medicinal plants diversity and their conservation status in Wildlife Institute of India (WII) campus, Dehradun. *Ethno botanical Leaflets* 2010; 2010(1): 6.
33. Dickson Sheeja Malar, Rajamohamed Beema Shafreen, Shunmugiah Karutha Pandian and Kasi Pandima Devi. Cholinesterase inhibitory, the anti-amyloidogenic and neuroprotective effect of the medicinal plant *Grewia tiliifolia* – An *in vitro* and *in silico* study, *Pharmaceutical Biology* 2017; 55(1): 381-393.

Cite this article as:

Dharmasoth Rama and Ganga Rao. Phytochemical and Pharmacological review of *Grewia tiliifolia* (Vahl). *Int. Res. J. Pharm.* 2019;10(9):39-42 <http://dx.doi.org/10.7897/2230-8407.1009258>

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IRJP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IRJP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IRJP editor or editorial board members.