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A Review on Phytochemistry, Medicinal Benefits, Phytopharmacology of Ficus racemosa

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ABSTRACT:

Ficus racemosa is a significant medicinal plant that grows in Southeast Asia, Australia, and India. It's commonly referred to as "gular."Many cultures have acknowledged the wide range of therapeutic benefits of Ficus racemosa, popularly known as the fig tree. Numerous pharmacological activities, such as antidiabetic, antioxidant, antidiarrheal, antipyretic, antifungal, antibacterial, hypolipidemic, antifilarial, and hepatoprotection, were suggested by the literature review. The phytochemistry, pharmacology, toxicity, and traditional uses of this plant are all covered in detail in this review article. The ultimate objective of this review is to offer a thorough summary of Ficus racemosa's potential as a beneficial medicinal agent, stimulating additional study and use in contemporary medicine.

Key words: Ficus racemosa, Taxonomical Classification, Phytochemicals, Pharmacological activity

INTRODUCTION:

Traditional medicine has a long history in India. India's material medica offers a wealth of knowledge regarding the customs and folklore around traditionally used natural remedies. The foundations of Indian traditional medicine include homeopathy, Sidha, Ayurveda, and Unman.Large and devoted, Ficus recemosa Lin is found all over India, especially in evergreen forests and damp areas. The tree's fruit, galls, roots, and bark are all utilized medicinally. Unripe fruit, leaves, and bark have vermicide, stomachic, astringent, and carminative properties. The infusion of the bark, fruit, and leaves is cooling, pleasant, and astringent, as stated in the Ayurvedic Nighanthus.

Chemically, the bark is composed of gluanol acetate, beta-sitosterol, and leucocynedin, while the leaves are composed of beta-amyrin, beta-sitosterol, and tannin.Fruit contains gluanol-OAc, sterol, glucose, and lupeol-OAc chemically. India is referred to as the world's botanical paradise because of its extensive variety of therapeutic plants. Numerous naturally occurring compounds found in valuable plants provide us with novel sources of medications that have been successfully employed in conventional treatment. Racemosa ficus Lin has a number of synonyms, including gular, Cluster Fig tree, Country Fig tree, Udumbara, yajnanga, yajniya, ajnayoga, and yajnyasara. It has been a part of ceremonial offerings. When the leaves are chopped or plucked, latex seeps out, making it one of the ksiri vriksa. It belongs to a group of plants known as pancavalkala, which is named after the thick bark skins of five different herbs: udumbara, vata, asvattha, parisa, and plaksa. Pancavalkala decoction is taken internally or used to administer an enema to treat vaginal and rectum hemorrhage. According to Maharishi Charka, udumbara is an anti-diuretic herb known as mutra sangrahaniya.

Fig:Ficus Racemosa

Taxonomical Classification of Ficus racemosa:

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnolipsida
Order	Urticales
Family	Moraceae
Genus	Ficus
Species	racemosa

Vernacular Names :
Hindi : Gular, Umar
Beng : Dumar, Jagya domar
Mar : Umbar
Guj : Umar, Gular
Tel :Atti bodda, paidi, udumbara
Tamil, Kan, Mal : Athi
Oriya : Dimpri1
Sans : Udumbarah, Sadaphakh
Assam : Janyedumuru, Yagyadimru
English : Cluster Fig, Country fig

Distribution:
The Ficus racemosa, commonly known as the Cluster Fig, Indian Fig Tree, or Gular, has a widespread distribution, particularly in tropical and subtropical regions. Its distribution includes:

1. India and Southeast Asia: Native to the Indian subcontinent, Ficus racemosa is widely found in India, Sri Lanka, Bangladesh, Nepal, and Bhutan. It is also distributed in Southeast Asian countries such as Thailand, Myanmar, Malaysia, and Indonesia.
2. China and Australia: The plant also grows in southern China and some regions of Australia.
3. Other tropical regions: Ficus racemosa can also be found in other tropical areas across the world due to itsadaptability to a variety of climates.

Morphology:
Goolar is a visually appealing fig tree characterized by its twisted trunk and expansive crown. In contrast to the banyan tree, it does not produce aerial roots. The tree's most notable feature is its clusters of red, fuzzy figs that emerge directly from the trunk. It is important to note that what appears to be the flower of the goolar is actually a structure containing numerous flowers. Fig trees exhibit a distinctive fertilization process, with each species depending on a specific type of wasp that relies entirely on that fig species for reproduction. The trees generate three varieties of flowers: male, long-styled female, and short-styled female, often referred to as gall flowers. All three flower types are housed within what is commonly recognized as the fruit. The female fig wasp enters the fig to lay her eggs on the short-styled female flowers while simultaneously pollinating the long-styled female flowers. The wingless male fig wasps emerge first, mate with the newly emerged females, and then create exit tunnels for the winged females. The females then gather pollen from the male flowers and depart in search of figs with receptive female flowers. To sustain a population of its pollinators, individuals of the Ficus species must flower at different times. A population must reach a critical minimum size to ensure that, throughout the year, some plants have overlapping periods of fig wasp emission and reception. Without this temporal overlap, the short-lived pollinator wasps risk local extinction. The leaves of the goolar are dark green, measuring 6-10 cm in length, and are smooth; the receptacles are small, either subglobose or pear-shaped, and grow in large clusters from the older nodes of the main trunk.

Fruits:

The fruit receptacles measure between 3 to 6 centimeters in diameter and are pear-shaped, forming large clusters that emerge from the main trunk or substantial branches. These fruits bear a resemblance to figs, initially appearing green when unripe and transitioning to shades of orange, dull red, or

dark crimson upon ripening. The fruit of Ficus Racemosa Linn ranges from ¾ inch to 2 inches in length, is circular in shape, and develops directly on the trunk.

Seeds:

The seeds are minuscule, countless, and resemble grains. The outer layer of the bark is composed of easily detachable translucent flakes that vary in color from grayish to rusty brown, and it is uniformly hard and non-brittle.

Bark:

The bark exhibits a reddish-grey or grayish-green hue, characterized by a soft texture that is uneven and frequently cracked, with a thickness ranging from 0.5 to 1.8 cm. When rubbed, it releases white, papery flakes from its outer layer, while the inner surface presents a light brown color. The fracture is fibrous, and the taste is mucilaginous, lacking any distinctive odor. In contrast to the banyan tree, this species does not produce aerial roots. It is important for those interested in the flower of the goolar to understand that the fig is essentially a structure containing numerous flowers. The texture of the bark is uniformly leathery, and it possesses astringent properties. An infusion made from the bark is utilized as a mouthwash for conditions such as spongy gums, dysentery, menorrhagia, hemoptysis, and diabetes. Additionally, it serves as a wash for wounds and is notably effective in cases of threatened abortion, as well as being recommended for uropathy.

Roots:

The roots of F. racemosa are elongated and exhibit a brownish hue. They possess a distinctive aroma and have a mildly bitter flavor. Additionally, the roots are irregularly shaped.

Latex :

The latex possesses aphrodisiac properties and is utilized in the treatment of conditions such as boils, diarrhea, dysentery, and hemorrhoids. Additionally, it is employed to alleviate stomachaches, cholera, and mumps.
In the traditional medicinal practices of Sri Lanka, it has been noted for its application in managing skeletal fractures and controlling severe diarrhea, especially in pediatric cases. Furthermore, latex serves as an adhesive.

Leaves:

Leaves A mixture of leaves powdered with honey is used in bilious infections. A decoction of leaves is used as a douche in dysmenorrhea ,as a wash for wounds and ulcers. Leaf juice is massaged on hair to prevent splitting. Leaf latex is used for boils and blisters and measles.

Phyto-chemicals present in the Ficus racemosa plant parts:

1.Stembark: Leucocyanidin-3-O-β-D-glucopyrancoside, leucopelarogonidin-3-O-α-Lrhamnopyranoside, leucopelargonidin-3-O-β-D-glucopyranoside, unidentified long chain ketone, cerylbehenate, lupeol.

2 Trunk bark: Lupeol, β-sitosterol, stigmasterol.

3 Root bark: Glycosides, β-sitosterol, lupeol, tannins, psoralens .

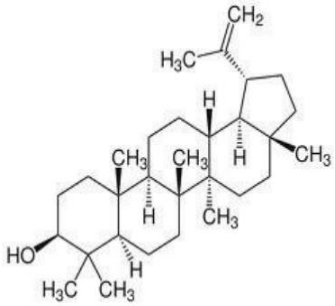
4 Fruit: Glauanol, hentriacontane, β-sitosterol, gluanol acetate, esters of taraxasterol, lupeol acetate, friedelin,glucose, tiglic acid, higher hydrocarbons, other phytosterol , tannins, gums, steroids, flavonoids, alkaloids.

5 Leaves: Alkaloids, glycosides, flavonoids, phenolic compound, tannins,sterols, triterpenoids (lanosterol), tetracyclic triterpene, glauanol acetate, racemosic acid.

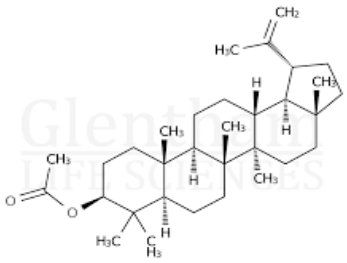
6 Latex: Aspartic protease.

7 Root: Flavanoids ,tannins ,saponins, alkaloids,carbohydrates, steroids.

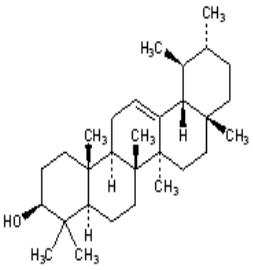
Structures of phytochemicals identified and isolated from various parts of Ficus racemosa:



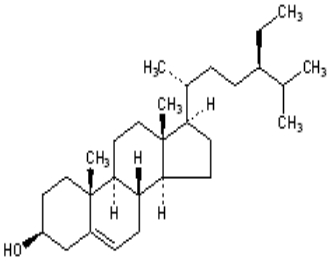
A.Lupeol



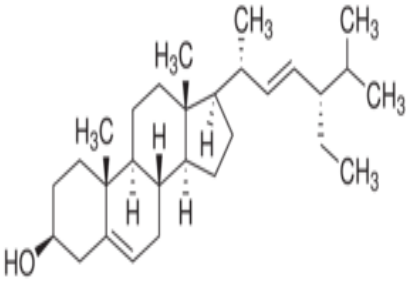
B. Lupeol Acetate



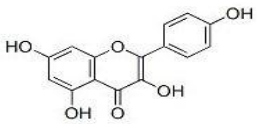
C.α-amyrin



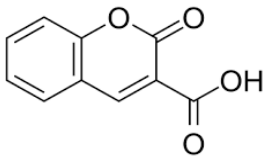
D. β-Sitosterol



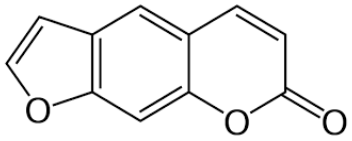
E.Stigmasterol



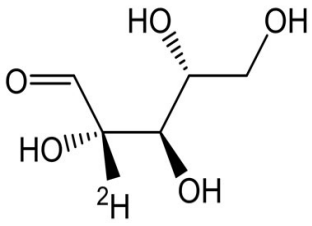
F.Kaempherol



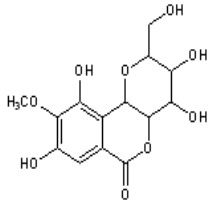
G. Coumarin



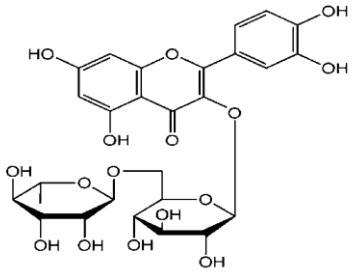
H. Psoralen



I. Arabinose



J.Bergenin



K. Rutin

Traditional Uses:

Plant Parts	Uses
Fruits	Leprosy,Diarrheoa,Circulatory and Respiratory Disorders , Dry Cough ,Stomachic.
Root	Dysentery,Diabetes, Hydrophobia,
Bark	Threatened Abortion,Menorrhagia, Leucorrhoea ,Diabetes,Piles,Urinay Diseases, Skin Diseases,Hemorrhage
Leaves	Ulcer,Wounds, Diarrheoa, Dysentery,
Latex	Haemorrhoids,Boils,Parotids,Orchitis,Toothache,Piles,Edema,Diarrheoa
Root Sap	Diabetes,Skeletal Fracture,Small Pox ,Inflammatory Disorder,

Pharmacological Activities of Ficus racemosa :

Antidiabetic Activity :

This study demonstrates both the qualitative and quantitative analysis of phytochemicals found in the methanolic extract of Ficus racemosa leaves. Additionally, it examines the antioxidant properties, glucose diffusion, glucose uptake, and α-Amylase inhibition assays of the leaf samples. The findings indicate that F. racemosa possesses significant antidiabetic properties. Given its potent pharmacological effects, it may serve as a therapeutic option for various conditions, including diabetes, in the future.

Antifungal Activity:

Antifungal Activity of the Leaf Extract: The initial assessment of the flash column fractions for antifungal properties was conducted using the TLC plate bioassay method with Cladosporium cladosporioides. Among the fractions, two (1:1 methylene chloride: hexane and 4:1 hexane: methylene chloride) exhibited zones of inhibition in the bioassay. The 1:1 methylene chloride: hexane fraction was selected for further investigation of its inhibitory effects on plant pathogens due to its superior inhibition and a higher residue weight of 5.3 g. This fraction effectively inhibited the growth of all tested fungi. The percentage inhibition of each fungus by the 1:1 methylene chloride: hexane fraction of F. racemosa leaf extract, determined through agar plate bioassay, is presented in Table 1. The most significant inhibition was observed against Curvularia sp. Additionally, the inhibitory activity of the test samples was found to increase with higher concentrations, with the exception of C.

Antitussive activity :

The antitussive efficacy of the methanol extract derived from the bark was assessed in a model of cough induced by sulfur dioxide gas in mice. The extract exhibited notable antitussive activity, comparable to that of codeine phosphate (10 mg), which is recognized as a standard antitussive agent.

Antipyretic activity :

The methanol extract derived from the bark, administered at doses of 200 and 300 mg/kg body weight, demonstrated a notable dose-dependent decrease in body temperature in both normal conditions and in cases of yeast-induced fever in albino rats. The antipyretic effect observed from the extract was found to be comparable to that of paracetamol, which is a standard antipyretic medication administered at a dose of 150 mg/kg body weight.

Gastroprotective Activity :

Anti-ulcerogenic effect of 50% ethanol extract of unripe fruits of F. racemosa (100, 200, and 300 mg/kg) was studied in ethanol 4 h pylorus ligation-induced gastric ulcer in rats. The extract produced significant antiulcer activity at all the doses studied and the effect at 300 mg/kg dosage was comparable with that of sucralfate (250 mg/kg). Similar antiulcer effect comparable with that of sucralfate was exhibited by the methanol extract of unripe fruits of F. racemosa (100, 200, and 400 mg/kg) in gastric ulcer models induced by aspirin and cold restraint stress.

Hepatoprotective activity:

The hepatoprotective effects of the petroleum ether extract from the leaves of F. racemosa were assessed in a model of chronic liver damage induced by carbon tetrachloride and paracetamol. Administration of the leaf extract at a dosage of 400 mg/kg resulted in a notable decrease in the levels of SGOT, SGPT, alkaline phosphatase, and serum bilirubin. The efficacy of the extract was found to be similar to that of Neutrosec.
Additionally, the methanol extract of the bark, when administered orally in conjunction with CCl_4 at doses of 250 and 500 mg/kg body weight, demonstrated significant hepatoprotective properties, as indicated by the normalization of elevated serum transaminases, comparable to the effects observed with silymarin, along with corresponding histological improvements.

Analgesic activity:

The analgesic properties of ethanol extracts derived from the bark and leaves were assessed through hot-plate and tail-immersion techniques. At a dosage of 300 mg/kg, administered intraperitoneally, the leaf extract of F. racemosa significantly prolonged the latency time, resulting in approximately 40.1% protection, while the bark extract also significantly enhanced the reaction time, yielding 35% protection. The analgesic effects observed were linked to the presence of compounds such as friedelin, behanate, bergenin, lupeol, and lupeol acetate. Furthermore, a decoction of F. racemosa leaves led to a notable reduction in the frequency of writhing in the acetic acid writhing test conducted on mice. A comparable analgesic effect was recorded in the hot-plate test, where significant activity persisted for up to 3 hours following the administration of the decoction. Additionally, the petroleum ether extract demonstrated a significant anti-edemic effect in the carrageenan-induced paw edema model in mice.

Wound healing property:

The wound healing capabilities of F. racemosa are documented in various Ayurvedic literature. A research study demonstrated that an ointment formulated from the powdered leaves combined with petroleum jelly (15% w/w) applied to an 8 mm full-thickness punch wound model in rats resulted

in a markedly significant increase in tissue DNA (1.73 mg/g), RNA (1.17 mg/g), and total protein (16.62 mg/g) during the healing process, when compared to untreated control rats.

Antidiarrheal activity:

The methanol extract derived from the bark has demonstrated a notable antidiarrheal effect in rats subjected to castor oil-induced diarrhea and PGE2-induced enteropooling. Additionally, this extract resulted in a significant decrease in gastrointestinal motility as evidenced by the charcoal meal test in rats. Similar findings were reported with the petroleum ether extract of F. racemosa leaves in rat studies. Furthermore, the latex displayed considerable inhibitory activity against both castor oil-induced diarrhea and enteropooling in rats treated with the latex, as well as a reduction in gastrointestinal motility following the charcoal meal test.

CONCLUSION :

F. racemosa is a multifaceted medicinal plant known for its abundance of phytochemicals that exhibit a wide range of biological activities and health advantages. Traditional healers utilize various parts of F. racemosa, including the root, fruit, leaves, stem, seeds, latex, and the entire plant, to address numerous health conditions. The plant's bioactive components, such as β-sitosterol and glauanol acetate, have demonstrated therapeutic efficacy for several disorders. Extracts and isolated phytoconstituents from this plant have been found to elicit diverse pharmacological effects, including hypoglycemic, analgesic, anti-inflammatory, hypolipidemic, antidiuretic, and renal anticarcinogenic properties. The extensive traditional applications and pharmacological effects of F. racemosa have prompted the creation of this review article, which aims to present comprehensive scientific information in a succinct format for the scientific community.

REFERENCES:

1. Akerele O Nature˝s medicinal bounty: don˝t throw it way. World Health Forum, 1993; 14: 390–395. [PubMed], [Google Scholar]
2. Bheemachari J, Ashok K, Joshi NH, Suresh DK, Gu pta VRM: Antidiarrheal evaluation of Ficus racemosa Linn. latex. Acta Pharm Sci, 2007; 49: 133–138. [Google Scholar]
3. Biswas TK, Mukherjee B: Plant medicines of Indian origin for wound healing activity: A review. Intl J Lower Extremity Wounds, 2003; 2: 25–39.
4. Breen AP, Murphy JA Reactions of oxyradicals with DNA. Free Rad Biol Med, 18: 1033–1077. [Crossref], [PubMed], [Web of Science ®], [Google Scholar], 1995.
5. Chandra S, Lal J, Sabir M Chemical examination of fruits of Ficus glomerata Roxb. J Indian Chem Soc, 1979; 56: 1269–1270. [Google Scholar]
6. Atal CK, Kapur BM. Cultivation and Utilization of medicinal plants. Jammu-Tawi, India: Regional Research laboratory CSIR; 1982. p. 514-9.
7. Kamboj A, Saluja AK. Isolation of stigmasterol and β sitosterol from petroleum ether extract of aerial parts of Ageratum conyzoides (asteraceae). Int J Pharmacy Pharma Sci 2011;3:94-6.
8. Rajput AP, Rajput TA. Isolation of stigmasterol and β sitosterol from Chloroform extract of leaves of Corchorus fasciculari. Int J Bio Chem 2012;6:130-5.
9. Jamal AK, Yaacob WA, Din LB. A Chemical Study on Phyllanthus reticulates. J Phys Sci 2008;19:45-50.
10. Abdullahi SM, Musa AM, Abdullahi MI, Sule MI, Sani YM, Isolation of Lupeol from the Stem-bark of Lonchocarpus sericeus (Papilionaceae). Sch Acad J Biosci 2013;1:18-9.
11. Vedavathy S, Mrudula V, Sudhakar A. A Tribal Medicine in Chittoor district, Andhra Pradesh, India. Vedams E Books (P) Ltd. New Delhi, 1997.
12. The Ayurvedic Pharmacopoeia of India, Government of India, Ministry of Health and Family Welfare, Department of Indian System of Medicine and Homeopathy, New Delhi.Ist Edition, Part I, 1990; I: 117-118.
13. Nadkarni KM, revised by Nadkarni AK, Indian Materia Medica, Bombay Popular Prakashan, Mumbai, IInd reprint IIIrd re ed., 2000; 548-550.
14. Khare CP, Indian Medicinal Plants An Illustrated Dictionary, Springer (India) Private Limited, New Delhi, Ist Indian reprint, 2007; 266-267.
15. The Wealth Of India, A Dictionary Of Indian Raw Materials and Industrial Products (Raw Materials) National Institute Of Science Communication, Council of Scientific and Industrial Research, New Delhi, Ist Supp. Set., 2002; III: 130.
16. Sharma H, Pathak R, Jain S, Bhandari M, Mishra R, Reena K, Varshney P. Ficus racemosa L: A review on its important medicinal uses, phytochemicals and biological activities. Journal of Population Therapeutics and Clinical Pharmacology. 2023 Jul 15;30(17):213-27.
17. Bhalerao SA, Verma DR, Teli NC, Didwana VS, Thakur SS. Ficus racemosa Linn.: a comprehensive review. Journal of Applicable Chemistry. 2014 Jun;3(4):1423-31.
18. Chaware GK, Kumar V, Kumar S, Kumar P. Bioactive compounds, pharmacological activity and food application of Ficus racemosa: a critical review. International journal of fruit science. 2020 Sep 14;20(sup2):S969-86.
19. Sharma S, Gupta V. In vitro antioxidant studies of Ficus racemosa Linn. root. Pharmacognosy Magazine. 2008;4(13):70-6.
20. Ratnasooriya WD, Jayakody JR, Nadarajah T. Antidiuretic activity of aqueous bark extract of Sri Lankan Ficus racemosa in rats. Acta Biologica Hungarica. 2003 Sep;54:357-63.

21. Hosain SB, Sultana S, Haque A. Studies on antibacterial, cytotoxic and antioxidant properties of the seeds and leaves of Ficus racemosa. International Journal of Pharmaceutical Sciences and Research. 2011 Apr 1;2(4):1040.
22. Ferdous M, Rouf R, Shilpi JA, Uddin SJ. Antinociceptive activity of the ethanolic extract of Ficus racemosa Lin.(Moraceae). Advances in Traditional Medicine. 2008;8(1):93-6.
23. Sophia D, Manoharan S. Hypolipidemic activities of Ficus racemosa Linn. bark in alloxan induced diabetic rats. African Journal of Traditional, Complementary and Alternative Medicines. 2007;4(3):279-88.
24. Khan N, Sultana S. Chemomodulatory effect of Ficus racemosa extract against chemically induced renal carcinogenesis and oxidative damage response in Wistar rats. Life sciences. 2005 Jul 29;77(11):1194-210.
25. Joseph B, Raj SJ, phytopharmacological properties of ficcus racemosa linn – an overview, International Journal of Pharmaceutical Sciences Review and Research, 2010; 3(2): 134-138.
26. Ahmed F, Urooj A. Traditional uses, medicinal properties, and phytopharmacology of Ficus racemosa: A review, Pharmaceutical Biology, 2010; 48(6): 672–681.
27. Joseph B., Raj S. J, Phytopharmacological and phytochemical properties of three Ficus species - an overview, Int J Pharma Bio Sci, 2010; 1: 246-253.
28. Nadkarni AK, Indian Materia Medica, Popular Book Depot: Bombay; 3rd ed, 1954; 2571-2575.
29. Sharma SK, Gupta VK, In vitro antioxidant studies of Ficus racemosa Linn. root. Pharmacognosy Magazine, 2008; 4: 70-74.
30. Prabhakar YS, Suresh KD, A survey of cardioactive drug formulations from Ayurveda II: porridges, oils, clarified butters, electuaries, pastes, ash preparations and calcined powders. Fitoterapia, 1990; 61: 395- 416.