

Pharmacological Potential Of Ficus Racemosa

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ABSTRACT

Ficus racemosa Linn. (Family; Moraceae) popularly known as the cluster fig tree or Gular, is famous medicinal plant in India, which is used in traditional system of medicine for a long time, for the treatment of various disorders like diabetes, liver disorders, diarrhoea, inflammatory conditions, haemorrhoids, respiratory and urinary diseases.

Ayurveda, Siddha, Unani and Homeopathy. Various plant parts such as bark, root, leaf, fruits and latex are used as astringent, carminative, vermifuge and anti-dysentery. It is a good remedy for excessive appetite.

The extract of fruit is used in diabetes, leucoderma, refrigerant, antiasthmatic, hepatoprotective, antioxidant, antiulcer and menorrhagia. It is used locally to relieve inflammation of skin wounds, lymphadenitis, in sprains and fibrositis. The present review is therefore, an effort to give a detailed study in Pharmacogonstical, phytochemical & Pharmacological properties.

I. INTRODUCTION

Ficus racemosa (Linn) is a moderate sized avenue plant, belongs to family- Moraceae which is usually known as the Cluster Fig Tree, Indian Fig Tree or Goolar (Gular) Fig. This plant is native to Australia, Malaysia, South-East Asia and the Indian Subcontinent .

Ficus racemosa grows all over India in several forests and hilly areas. It is frequently available around the water streams and is also cultivated.

Found along the river banks and inland forests from plains to 1500 m most frequently in India, Sri Lanka, Pakistan, Queensland and South China to New Guinea.

The plant can be grown by vegetative as well as sexual propagation (using seeds) .

It is unusual in that its figs grow on or close to the tree trunk, termed cauliflory .

In India the tree and its fruit are called 'gular' in the north and 'atti' in the south.

The fruits are a favourite staple of the common Indian macaque. In Kerala it is consider as one

among nalpamara.

It serves as a food plant for the caterpillars of the butterfly the Two-brand Crow (*Euploeasylvester*) of northern Australia .

The Ovambo people call the fruit of the Cluster Fig 'eenghwiyu' and use it to distill 'Ombike', their traditional liquor .

Ficus racemosa Linn (Moraceae) is an evergreen, moderate to large sized spreading, lactiferous, deciduous tree, without much prominent aerial roots.

Tree about 20 m tall often with aerial roots, bark whitish-brown, smooth, Leaves grooved minutely hairy, lamina ovate-lanceolate to elliptic-lanceolate, tri-ribbed, 8-10 pairs of lateral pairs from broad to narrowly cuneate, oblique base, margin entire, acuminate at apex, glabrous on both sides, stipules triangular-ovate, brown, sub-persistent, cystoliths present only on lower side.

Hypanthodia on long peduncles, borne in large clusters from tubercles on the main trunk and main leafless branches, subpyriform-globose, green, subtended by, broadly triangular-ovate brownish brads, bracts, apical orifice sunken, closed by brown bracts without internal bristles.

Male flowers are sessile, ostiolar in 2-3 whorls, united, lobes dentate and stamens. Gall flowers pedicellate, dispersed among female.

Female flowers are sessile or subsessile, ovary substipitate, glabrous style, stigma simple.

Figs depressed subglobose or pyriform, red when ripe usually streaked. Seeds are lenticular 1 mm.

Syconusfruit .Udumbara is considered scared to godDattaguru. All ficus species possess latex-like material within their vasculatures that provide defense and self healing from physical assaults .

This plant is universally used in traditional system of medicine for the treatment of numerous disorders.

It is one of the herbs mentioned in all ancient scriptures of Ayurveda, Siddha, Unani and

Homeopathy.

Various plant parts such as bark, root, leaf, fruits and latex are used as astringent, vermifuge, carminative and anti-dysentery.

It is a good medication for excessive appetite. The

extract of fruit is used in leucoderma, menorrhagia and diabetes.

It is used locally to relieve inflammation of lymphadenitis, fibrositis, skin wounds and in sprains.

Ficus Racemosa



Table 1. Taxonomic position of Ficus Racemosa

Root	<u>Root</u>
Kingdom	<u>Plantae</u>
Phylum	<u>Tracheophyta</u>
Class	<u>Magnoliopsida</u>
Order	<u>Rosales</u>
Family	<u>Moraceae</u>
Genus	<u>Ficus</u>
Species	<u>Ficus racemosa L.</u>

Table 2. vernacular names of ficusrecemos

English	<ul style="list-style-type: none"> • Cluster Fig • Country Fig • Gular fig
Gujarati	<ul style="list-style-type: none"> • Umbaro
Hindi	<ul style="list-style-type: none"> • Goolar • उदुम्बर Udumbara • ऊमरि Umari • गूलर Goolar • जन्तु फल Jantu Phal

	<ul style="list-style-type: none"> • इमर Dumar • धर्म पत्र Dharma Patra • पाणि भुज Pani Bhuj • पुष्पहिना Pushp-hina • यज्ञदुम्बुर Yajnyadumbur
Konkani	<ul style="list-style-type: none"> • ऋम्बड Rhumbud
Marathi	<ul style="list-style-type: none"> • उदुंबर Udumbar • उंबर Umbar
	•
Sanskrit	<ul style="list-style-type: none"> • उडुम्बर Udumbara • औदुम्बर Audumbara • कृमिफलः Krmiphalah • गूलर Gular • जन्तुकाफलः Jantukaphalah

Phytochemical constituents

Linn contains Tannin, Wax, Saponin, gluanol acetate, beta-sitosterol, leucocyanidin -3-o-beta-d-3-o-beta-D-glucopyranoside, leucopelargonidin-3-o-beta-D-glucopyranoside, leucopelargonidin-3-o-alpha-L-rhamnopyranoside, lupeol, ceryl behenate, lupeol, ceryl behenate, lupeol acetate, alpha-amyrin acetate.

Pharmacological action

Anti cancer activity:

Ficus racemosa extract at a dose of 200 and 400 mg kg⁻¹ when given orally a considerable decrease in lipid peroxidation, xanthine oxidase, γ -glutamyl transpeptidase and hydrogen peroxide (H₂O₂) generation with decrease in renal glutathione content and antioxidant enzymes generated by Potassium bromate (KBrO₃), a nephrotoxic agent that induces renal carcinoma in rats .

There was considerable recovery of renal glutathione content and antioxidant enzymes.

These results recommend that Ficus racemosa

extract is a potent chemopreventive agent and suppresses KBrO₃ mediated nephrotoxicity in rats.

Anti-ulcer/Gastro-protective:

Gastro-protective effect of 50% ethanolic extract of Ficus Racemosa Linn known as F. glomerata fruit (FGE) was studied in different gastric ulcer models in rats.

FGE prevents the oxidative damage of gastric mucosa by blocking lipid peroxidation and by considerable decrease in superoxide dismutase, H⁺K⁺ATPase and increase in catalase activity.

The H⁺K⁺ATPase are the dimeric enzyme responsible for H⁺ secretion by the gastric parietal cells. H⁺K⁺ATPase are selectively blocked by the action of ranitidine, an acid blocker used to treat gastric ulcers

Anti-oxidant activity:

Ethanol extract and water extract were subjected to free radical scavenging both by steady state and time resolved methods.

The ethanol extract exhibited significantly higher steady state antioxidant activity.

It also exhibited concentration dependent DPPH, ABTS, hydroxyl radical and superoxide radical scavenging and inhibition of lipid peroxidation when tested with standard compounds.

Antidiuretic:

The decoction of the bark of *F. racemosa* is claimed as an antidiuretic and its potential is evaluated in rats using three doses (250, 500 or 1000 mg kg⁻¹).

It had a rapid onset (within 1 h), peaked at 3 h and lasted throughout the study period (5 h).

It also caused a reduction in urinary Na⁺ level and Na⁺/K⁺ ratio, and an increase in urinary osmolarity indicating multiple mechanisms of action .

Anti bacterial activity:

Different extracts of leaves were tested for antibacterial potential against *Escherichia coli*, *Bacillus pumitis*, *Bacillus subtilis* and *Pseudomonas aureus*.

Out of all extracts tested, petroleum ether extract was the most effective extract against the tested microorganism .

Anti-diarrhoeal:

Ethanol extract of stem bark has shown significant inhibitory activity against castor oil induced diarrhea and PEG2 induced enter pooling in rats and also showed a significant reduction in gastro intestinal motility in charcoal meal test in rats which proves its efficacy as anti-diarrheal agent .

Wound healing:

Ethanol extract of stem bark showed wound healing in excised and incised wound model in rats.

Ethnobotanical uses of *Ficus racemosa*

PLANT PART USE:-

Fruits



Used in leprosy, diarrhoea, circulatory and respiratory disorders and menorrhagia .

Tender fruits are used as astringent, stomachic, refrigerant, in dry cough, loss of voice, diseases of kidney and spleen, astringent to bowel, styptic, tonic, useful in the treatment of leucorrhoea, blood disorder, burning sensation, fatigue, urinary discharges, leprosy, epistaxis, carminative and intestinal worms.

They are also useful in miscarriage, spermatorrhoea, epididymitis, cancer, myalgia, scabies, haemoptysis, intrinsic haemorrhage and

extreme thirst .

Latex

It is administered in haemorrhoids, boils, alleviates the edema in adenitis, parotitis, orchitis, traumatic swelling, toothache, vaginal disorders, diarrhoea particular in childrens and also aphrodisiac.

Latex is applied externally on chronic infected wounds to alleviate edema, pain and to promote the healing .

The latex is reportedly used for treating pile.

Roots



Roots are used in dysentery, pectoral complaints, and diabetes, applied in mumps, other inflammatory glandular enlargements and hydrophobia .

Bark It is highly effective in threatened abortion and also recommended to treat Menorrhagia, leucorrhoea, gonorrhoea, urinary diseases, hemorrhage and skin diseases .

The bark is highly recommended in urological disorders, diabetes, hiccough, leprosy, dysentery and piles .

Leaves The leaves are excellent wash for wounds and ulcers. They are useful in dysentery and diarrhea.

The infusion of bark and leaves is also employed as mouth wash to spongy gums and internally in dysentery, menorrhagia, efficient remedy in glandular swelling, abscess, chronic wounds, cervical adenitis and haemoptysis .

Root Sap



It is used for treating diabetes .

The sap of this plant is a popular remedy for mumps and other inflammatory enlargements .

In Sri Lankan indigenous system of medicine, it is used in the treatment of skeletal fracture.

The Australian aborigines use this plant in the treatment of mumps, smallpox, haematuria, menorrhagia and inflammatory conditions.

In Siddha the bark, fruits and latex are used to treat constipation, anaemia and dysentery .

TRADITIONAL USES

Ficus racemosa Linn has been extensively used in traditional medicine for wide range of ailments. Its bark, fruits, leaves, roots, latex and seeds are medicinally used in different forms, sometimes in combination other herbs²⁴

Bark

Bark is highly efficacious in threatened abortion and also recommended in urological disorders, diabetes, hiccough, leprosy, dysentery and piles ^{25, 26-28}

Leaves

The leaves are good wash for wounds and ulcers. They are useful in dysentery and diarrhoea.

The infusion of bark and leaves is also employed as mouth wash to spongy gums and internally in dysentery, menorrhagia, effective remedy in glandular swelling, abscess, chronic wounds, cervical adenitis and haemoptysis 27-29

Fruits

The fruits are astringent, stomachic, refrigerent, dry cough, loss of voice, disease of kidney and spleen, astringent to bowel, styptic, tonic, useful in the treatment of leucorrhoea, blood disorder, burning sensation, fatigue, urinary discharges, leprosy, intestinal worms and carminative. They are useful in miscarriage, menorrhagia, spermatorrhoea, cancer, scabies, haemoptysis and visceral obstructions 28, 30, 31

Roots

Roots are used in dysentery, pectoral complaints and diabetes, applied in mumps, other inflammatory glandular enlargements and hydrophobia 26, 27, 28

Latex

Latex is aphrodisiac and administered in haemorrhoids, diarrhoea, diabetes, boils, traumatic swelling, toothache and vaginal disorders 32

Root sap is used for treating diabetes 33. The sap of this plant is a popular remedy for mumps and other inflammatory enlargement

Method And Material

1. General

Melting points were recorded in open glass capillaries in Toshniwal apparatus. The IR spectra were recorded on a Shi-madzu 8400S FTIR spectrometer using KBr pellets.

¹H and ¹³C NMR spectra were recorded at 300 MHz and 75 MHz respectively on Jeol AL 300 MHz spectrometer using CDCl₃ and DMSO-d₆ as solvents and TMS as the internal reference.

Mass spectra were recorded on Waters Xevo Q-TOF spectrometer. The fractionation was performed in Chromatographic column using silica gel 60e120 mesh (Merck) and thin layer chromatograms were conducted on Merck silica gel G plates.

In general, spots were visualized under UV light as also spraying ceric ammonium sulfate followed by heating at 100°C.

Their *in vitro* antioxidant activity experiments were monitored by UV visible spectrophotometer

2. Reagents

Silica gel 60–120 mesh (Merck) was used for column chromatography. Silica gel 60 F254 pre-coated aluminium sheets (0.2 mm, Merck) were employed for TLC. DPPH was purchased from Himedia while ascorbic acid, phosphate buffer, potassium ferrocyanide and trichloroacetic acid from Sigma Aldrich (India).

3. Plant material

The botanical material of *F. racemosa* Linn., Moraceae was collected from University of Rajasthan Campus, Jaipur, Rajasthan, India in March 2010 and authenticated by Herbarium of the Department of Botany, University of Rajasthan, Jaipur where a voucher specimen (No. RUBL 19764) is deposited.

4. Extraction and isolation of constituents

The root bark were shade dried (3.8 kg), powdered and exhaustively extracted with ethanol (95%) on a steam bath for 8 h thrice. The extract was concentrated under reduced pressure and left overnight at room temperature when a light brown solid deposited at the bottom of the flask. This ethanolic extract residue (4.5 g) was dried and the mother liquor on concentration in vacuum using rotary flash evaporator afforded a dark brown semi-solid (104.5 g) which was successively re-extracted with pet. ether (60–80%) followed by dichloromethane which on concentration afforded dark brown solids (2.4 g and 5.3 g respectively). Since the pet. ether and dichloromethane fractions exhibited a similar TLC profile (benzene:ethyl acetate, 1:1), they were mixed together for further studies. The ethanolic extract residue was chromatographed on an open normal silica column (h × Ø = 40 × 2 cm) eluted with pet. ether with increasing amount of EtOAc affording n-hexacosane (0.198 g), polypodatetraene (semi-solid), α-amyrin acetate (0.159 g), gluanol acetate (0.356 g), lupeol acetate (0.216 g), β-amyrin acetate (0.198 g) and bergenin (0.251 g). The pet. ether and dichloromethane fractions on column chromatography yielded 24,25-dihydroparkeol acetate (0.224 g), lanost-22-en-3β-acetate (0.175 g), gluanol acetate (0.229 g), lupeol acetate (0.140 g), α-amyrin octacosanoate (0.162 g), β-sitosterol (0.128 g) and β-sitosterol-β-D-glucoside (0.056 g) (

2.5. Antioxidant activity 2.5.1. DPPH radical scavenging activity

The DPPH radical scavenging activity was determined by the method of Fogliano et al.⁹ A solution (2.5 ml) of 2×10^{-3} µg/ml of 2,2-diphenyl-1-picrylhydrazyl (DPPH) in methanol was mixed with equal volume (2.5 ml) of extract/test compound/ascorbic acid (standard) at different concentrations (10, 20, 40, 60, 80 µg/ml) in methanol. The mixture was shaken vigorously, and then kept in dark for 30 min. The absorbance was monitored at 517 nm using UV-Vis spectrophotometer. Blank was also carried out to determine the absorbance of DPPH, before interacting with the sample.

The IC₅₀ is the concentration of an antioxidant at which 50% inhibition of free radical activity is observed. The decoloration i.e. DPPH scavenging effect (% inhibition) was plotted against the sample extract concentration and a logarithmic regression curve was established in order to calculate the IC₅₀.

2.5.2. FRAP total reduction capability

Fe³⁺ – Fe²⁺ transformation assay was carried out by Oyaizu's method.¹⁰ To 1 ml of extract/test compound/ascorbic acid (standard) at different concentrations (62.5, 125, 250, 500, 1000 µg/ml) in ethanol was added 1 ml of distilled water, 2.5 ml phosphate buffer (0.2 M, pH 6.6) and 2.5 ml potassium ferricyanide (1%). The mixture was incubated at 50 °C for 20 min. Trichloroacetic acid (2.5 ml, 10%) was added to the mixture, which was then centrifuged for 10 min. The upper layer of solution (2.5 ml) was mixed with distilled water (2.5 ml) and FeCl₃ (0.5 ml, 0.1%) and the absorbance was measured at 700 nm using UV-Vis spectrophotometer. A greater absorbance value indicates greater reducing power.

2.6. Statistical analysis

The data are presented as mean ± standard deviation of three determinations. Statistical analyses were performed using a one-way analysis of variance. Results were calculated by employing the statistical software (SPSS). Data are expressed as mean ± standard deviation (n = 3). P values: P < 0.05 (a); P < 0.01 (b); P < 0.001 (c) compared to the control value, respectively.

II. CONCLUSIONS

The genus *Ficus* constitutes an important group of trees with immense medicinal value.

The medicinal plants are widely used by the traditional medical practitioners for curing various diseases in their day to day practice.

In traditional system of medicine, different parts such as root, fruit, leaves, stem, seeds, latex and even whole plant of *Ficus racemosa* (Linn) have been recommended for the treatment of gastric ulcer, diarrhea, wound healing, diabetes, hyper tension etc.

It is one of the popular plant in Indigenous system of medicine such as Ayurveda, Siddha, Unani and also homeopathy system of medicine.

Ficus Racemosa Linn. showed a wide range of pharmacological actions like hypoglycemic, hypolipidemic, anticarcinogenic, anti-diuretic, hepatoprotective, anti-ulcer, anti-inflammatory, anti-fungal etc.

Bio active constituents like β-sitosterol, glauanol acetate in *Ficus Racemosa* L., has been found to be largely responsible for the therapeutic potentials as a boon for ailments of human kind.

Hence, the present study shows the therapeutic potential, pharmacological and phytochemical properties of various bioactive compounds present in the *Ficus racemosa* (Linn).

However, more Clinical and Pathological studies should be conducted to investigate the active potentials of bioactive compounds present in this plant. All compounds except β-sitosterol are being reported for the first time from the root bark of this species. Root heartwood was found to be a more effective antioxidant agent.

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