PHYTOPHARMACOLOGICAL PROPERTIES OF FICCUS RACEMOSA LINN
- AN OVERVIEW

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ABSTRACT
Ficus racemosa is a moderate sized avenue tree found throughout India. It is popular in indigenous system of medicine like ayurveda, siddha, unani and homeopathy. In the traditional system of medicine various plant parts such as bark, root, leaves, fruits and latex are used in dysentery, diarrhoea, diabetes, stomachache, piles and as carminative and astringent and also as antioxidant and anticancer agent. The present review is therefore, an effort to give a detailed survey of the literature on its pharmacological properties.

Keywords: Phytopharmacological, antioxidant, antiseptic, antidiuretic, taraxasterol, piperazine citrate, Ficus Racemosa.

INTRODUCTION
Medicinal plants continue to be an important therapeutic aid for alleviating the ailments of human kind. The search for eternal health and longevity and for remedies to relieve pain and discomfort drove early man to explore his immediate natural surroundings and led to the use of many plants, animal products, and minerals, etc. and the development of a variety of therapeutic agents. Today, there is a renewed interest in traditional medicine and an increasing demand for more drugs from plant sources. This revival of interest in plant-derived drugs is mainly due to the current widespread belief that “green medicine” is safe and more dependable than the costly synthetic drugs, many of which have adverse side effects. According to Ventakamaran1, the taxonomy treatment of the Moraceae family constitutes large taxa of over fifty genera and nearly 1400 species, including some important groups like Artocarpus, Morus and Ficus. Several species belonging to the genera of Ficus were reported to contain furanocoumarins which is an important plant phototoxins2. Ventakamaran also claimed that Moraceae family contains phytochemistry related to flavonoids, flavonoids with isoprenoid substituents and stilbenes. Antioxidants from figs can protect lipoproteins in plasma from oxidation and produce a significant increase in plasma antioxidant capacity3.

Ficus racemosa Linn (Moraceae) is an evergreen, moderate to large sized spreading, lactiferous, deciduous tree, without much prominent aerial roots found throughout greater part of India in moist localities and is often cultivated in villages for its edible fruit4. Different parts of F. racemosa are traditionally used as fodder, edible and ceremonial5. All parts of this plant (leaves, fruits, bark, latex, and sap of the root) are medicinally important in the traditional system of medicine in India. The leaves powdered and mixed with honey is given in bilious infections6. Fruits are a good remedy for visceral obstruction and also useful in regulating diarrhea and constipation. The astringent nature of the bark has been employed as a mouth wash in spongy gum and also internally in dysentery, menorrhagia, leucorrhoea, hemoptysis and urinary diseases8. Apart from the usage in traditional medicine, scientific studies indicate F. racemosa to possess various biological effects such as hepatoprotective10, chemopreventive11, antidiabetic12, anti inflammatory13, antipyretic14, antitussive15 and antiidiuretic16. The bark has also been evaluated for cytotoxic effects using IBR3, Hep G2, HL-60 cell lines and found to be safe and less toxic than aspirin, a commonly consumed anti-inflammatory drug17.
Habit and Habitat:
The plant grows all over India in many forests and hills. It is frequently found around the water streams and is also cultivated. The tree is medium tall, growing 10-16 meters in height. The rich green foliage provides a good shade. The bark is reddish grey and often cracked.

MORPHOLOGICAL CHARACTERS
The tree is medium tall with quite rich green foliage that provides good shade. The leaves are dark green, 7.5-10 cm long, ovate or elliptic. The fruit receptacles 2-5 cm in diameter, pyriform, in large clusters, arising from main trunk or large branches. The fruits resemble the figs and are green when raw, turning orange, dull reddish or dark crimson on ripening. The seeds tiny, innumerable, grain-like, the outer surface of the bark consists of easily removable translucent flakes grayish to rusty brown, uniformly hard and non-brittle.

CHEMICAL COMPOSITION

Root: cycloartenol, euphorbol and its hexacosanolate, taxarenol, tinatyoixin; Bark euphorbol and its hexacosanolate, ingenol and its triacetate, taxarenol.

Stem: campesterol, hentriacontane, hentriacontanol, kaempferol, stigmasterol, methyl ellaglic acid.

Leaves: Tetra triterpene, glauanol acetate, racemosic acid.

Fruit: glauanol, hentriacontane, β sitosterol, glauanolacetate, glucose, tiglic acid, esters of taraxasterol, lupeolacetate, friedelin, higher hydrocarbons and other phytosterol.

Latex: a-amyrin, β-sitosterol, cycloartenol, cycloeuphordenol, 4-deoxyβphorbol and its esters, euphol, euphorbinol, isoeuphorbol, palmitic acid, taxarxerol, tinatyoixin, tirucallol, trimethyl ellagic acid.

Traditional Uses:
The roots, bark-skin, fruits, latex and leaves have great medicinal value. It is a one of the herbs mentioned in all ancient scriptures of Ayurveda. Udumbara is considered sacred to God Dattaguru. It is otherwise called Udumbara. Udumbara has various synonyms like yajnang, yajniya, yajnyoga, yajnyasara etc. suggesting its use in ritual sacrifice. It is one of the kṣiri viksa – on cutting or plunging the leaf, lates oozes out. It is one of the plants from a group, called pancavalkala, meaning the thick bark skins of five herbs, viz. udumbara, vata, asvatha, parisa and plakasa. The decoction of pancavalkala is used internally or for giving enema in bleeding per rectum and vagina (Raja Nighantu). Maharishi Charka has categorized udumbara as mutra sangrahaniya anti-udumbara as mutra sangrahaniya – anti-diuretic herb. Susruta has described the properties of the plant, like astringent, promotes callus healing in fractures (bhagna sandhaniya), alleviates Raka pitta, burning sensation and obesity, and useful in vaginal disorders. The roots, bark-skin, fruits, latex and leaves of udumbara have great medicinal value. Udumbara is used both, internally as well externally, externally; the latex is applied on chronic infected wounds to alleviate edema, pain and to promote the healing. The tender leaf buds are applied on the skin, in the form of paste, to improve the complexion; the decoction of leaves is salutary in washing the wounds for better cleansing and healing. The decoction of its bark-skin is an effective gargle in stomatitis and sore throat. Application of latex alleviates the edema in adenitis, parotitis, orchitis, traumatic swelling and toothache. Internally, udumbara is used in vast range of maladies. The decoction of bark skin is extremely useful in diarrhea, dysentery and ulcerative colitis. In children, the latex is given along with sugar to combat diarrhea and dysentery. The cold infusion of ripened fruits mixed with sugar, is salutary in Rakta pitta is effectively controlled with the decoction of bark-skin. In diabetes, the ripe fruits or bark-skin decoction is beneficial, as it works well as anti-diuretic. The decoction of leaves is an effective remedy in glandular swelling, abscess, chronic wounds, cervical adenitis etc. In uterine bleeding, abortion, leucorrhoea and vaginal bleeding the decoction of its bark-skin is given orally, as well as in a form of basti (enema). The latex mixed with sugar is benevolent in sexual debility in males. The juice of its fruit is a panacea for hiccup. The powder of the bark-skin works well as an anorexient, hence, beneficial in hyperphagia-bhamsaka. According to Ayurveda, roots are useful in hydrophobia whereas bark is acrid, cooling, galactagogue and good for gynaecological disorders. Fruits are astringent to bowels, stptic, tonic and useful in the treatment of leucorrhoea, blood disorders, burning sensation, fatigue, urinary discharges, leprosy, menorrhagia, epistaxis and intestinal worms. According to Unani system of medicine, leaves are astringent to bowels and good in case of bronchitis whereas fruits are useful in treatment of dry cough, loss of voice, diseases of kidney and spleen. Bark is useful in Asthma and piles. Latex is applied externally on chronic infected wounds to alleviate edema, pain and to promote the healing. The tender leaf buds are applied on the skin, in the form of paste, to improve the complexion18,19.

PHYTOCHEMICAL PROPERTIES
The stem bark of Ficus racemosa contains tannin, wax, saponin glauanol acetate, β-sitosterol, leucocyanidin- 3 – O – D - glucopyranoside, leucopelargonidin – 3 – O – β – D - glucopyranoside, leucopelargonidin – 3 – O – α – L - rhamnopyranoside, lupeol, ceryl behenate, lupeol acetate, α-amyrin acetate, leucoanthocyanidin, and leucoanthocyanin from trunk bark,lupeol, β-sitosterol and stigmastomer were isolated20. Fruit contains glauanol, hentriacontane,β sitosterol, glauanolacetate, glucose, tiglic acid, esters of taraxasterol, lupeolacetate, friedelin, higherhydrocarbons and other phytosterol21. A new tetra triterpene glauanol acetate which is characterized as 13α,14β,17βH, 20α, β-hydroxymethyl glauanol acetate was isolated from latex of the plant. The stem bark and fruit showed the presence of glauanol acetate22.

PHARMACOLOGICAL PROPERTIES

Hypoglycemic activity:
The ethanol extract (250mg/kg/day) lowered blood glucose level within 2 weeks in the alloxan diabetic albino...
rats confirming its hypoglycemic activity\textsuperscript{23}. βsitosterol isolated from the stem bark was found to posses potent hypoglycemic activity when compared to other isolated compound\textsuperscript{2}

### Hypolipidemic activity:

Fruits when fed to rats in diet induced hypocholesterolemic effect, as it increased faecal excretion of cholesterol\textsuperscript{25}.

### Renal anti carcinogenic:

\textit{Ficus racemosa} extract at a dose of 200 and 400 mg/kg when given orally a significant decrease in lipid peroxidation, xanthine oxidase, γ-glutamyl transeptidase and hydrogen peroxide (\textit{H}_2\textit{O}_2) generation with reduction in renal glutathione content and antioxidant enzymes generated by Potassium bromate (KBrO\textsubscript{3}), a potent nephrotoxic agent that induces renal carcinogenesis in rats. There was significant recovery of renal glutathione content and antioxidant enzymes. There was also reversal in the enhancement of renal ornithine decarboxylase activity, DNA synthesis, blood urea nitrogen and serum creatinine\textsuperscript{26}. This result suggests that \textit{Ficus racemosa} extract is a potent chemopreventive agent and suppresses KBrO\textsubscript{3}-mediated nephrotoxicity in rats.

### Wound healing:

Ethanol extracts of stem bark show a potent wound healing in excised and incised wound model in rats\textsuperscript{27}.

### Antioxidant and a probable radioprotector:

Ethanol extract (FRE) and water extract (FRW) of \textit{Ficus racemosa} were subjected to free radical scavenging both by steady state and time resolved methods such as nanosecond pulse radiolysis and stopped-flow spectrophotometric analyses. FRE exhibited significantly higher steady state antioxidant activity than FRW. FRE exhibited concentration dependent DPPH, ABTS, hydroxy radical and superoxide radical scavenging and inhibition of lipid peroxidation with IC\textsubscript{50} comparable with tested standard compounds. \textit{In vitro} radioprotective potential of FRE was studied using micronucleus assay in irradiated Chinese hamster lung fibroblast cells (V79). Maximum radioprotection was observed at 20 μg/ml of FRE. The cytokinesis-block proliferative index indicated that FRE does not alter radiation induced cell cycle delay. Based on these results it is evident that the ethanol extracts of \textit{F. racemosa} acts as a potent antioxidant and a probable radioprotector\textsuperscript{28}.

### Hepato protective:

Methanol extract of \textit{Ficus racemosa} stem bark were studied using the model of hepatotoxicity induced by carbon tetrachloride (CCL\textsubscript{4}) in rats. CCL\textsubscript{4} administration induced a significant increase in total bilirubin associated with a marked elevation in the activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) as compared to control rats. Pretreatment with methanol extract resulted in significant decreases in the activities of AST, ALT and ALP, compared to CCL\textsubscript{4}-treated rats. The results indicate that \textit{F. racemosa} possesses potent hepatoprotective effects against CCL\textsubscript{4}-induced hepatic damage in rats\textsuperscript{29}.

### Anti bacterial activity:

Different extracts of leaves were tested for antibacterial potential against Escherichia coli, Bacillus pumitis, Bacillus subtilis, Pseudomonas aeruginosa. Out of all extracts tested, petroleum ether extract was the most effective extract against the tested microorganism\textsuperscript{30}.

### Antifungal activity of \textit{Ficus racemosa}:

The 50% methylene chloride in hexane flash column fraction of the extract of the leaves of \textit{Ficus racemosa} was found to have antifungal activity. The extract inhibited the growth of several plant pathogens (\textit{Curvularia} sp, \textit{Colletotrichum} gloeosporioides, \textit{Alternaria} sp, \textit{Corynespora} cassiicola and \textit{Fusarium} sp). Psoralen was identified as the active compound and was shown to be biodegradable, having the potential to be developed as a fungicide against pathogens causing diseases on crops of economic importance\textsuperscript{31}.

### Antidiarrhoeal:

Ethanol extract of stem bark has shown significant inhibitory activity against castor oil induced diarrhea and PEG2 induced enteropooling in rats and also showed a significant reduction in gastro intestinal motility in charcoal meal test in rats which proves its efficacy as antidiarrhoeal agent\textsuperscript{32}.

### Antihelmintic:

The bark extract were evaluated for anthelmintic activity using adult earthworms, which exhibited a spontaneous motility (paralysis) With 50 mg/mL of aqueous extract the effects were compared with 3% piperazine citrate. There was no final recovery in the case of worms treated with aqueous extract in contrast to piperazine citrate, the worms recovered completely within 5 h. This result shows the anthelmintic nature of the extract\textsuperscript{33}.

### Antidiuretic:

The decoction (D) of the bark of \textit{Ficus racemosa} at a dose of 250, 500 or 1000 mg/kg induced antidiuresis, had a rapid onset (within 1 h), peaked at 3 h and lasted throughout the study period (5 h). However, antidiuretic potential of D was about 50% lower than that of ADH. The D was well tolerated even with subchronic administration. The D caused a reduction in urinary Na+ level and Na+/K+ ratio, and an increase in urinary osmolality indicating multiple mechanisms of action. This proves its efficacy as antidiuretic agent\textsuperscript{34}.

### Antialgesic:

The ethanol extract of bark and leaves evaluated for analgestic activity by analgesiometer at 100, 300 and 500mg/kg was found to posses dose dependent analgestic activity\textsuperscript{35}.
CONCLUSION

The present study shows the pharmacological properties of various bioactive compounds present in the plant. The stem bark and fruits are used in India for the treatment of various diseases. Methanol extracts of Ficus racemosa contained relatively higher levels of total phenolics than the other extract. Antioxidants from figs can protect lipoproteins in plasma from oxidation and produce a significant increase in plasma antioxidant capacity. The antioxidant potential of the extracts can be assessed by employing different in vitro assays. The ethanolic extract showed a greater effect against pathogens, worms and renal carcinoma in rat compared with the standard drugs. Ficus racemosa possesses various phytochemical and pharmacological properties as discussed in present paper. However, more Clinical and Pathological studies should be conducted to investigate the active potentials of bioactive compounds present in this plant.

REFERENCES


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