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A PHARMACOLOGICAL REVIEW PAPER ON FICUS RACEMOSA

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ABSTRACT

The Present study reports important secondary metabolites present in *Ficus racemosa*. The *Ficus racemosa* belongs to the Moraceae, it is popularly known as Glomerata, Cluster fig tree as well as Udumbara[®] in Marathi. Various plant parts such as bark, root, leaf, fruits are used as astringent, carminative, antidysentery, diabetes, leucoderma, antiasthmatic, hepatoprotective, antioxidant. The powdered Bark was subjected for extraction by using ethanol. These extracts were evaluated for detection of various secondary metabolites, like Glycosides, tannins, Terpenoids, Alkaloids, Flavonoids. The preliminary phytochemical screening was done using various chemical tests. The study shows the presence of Glycosides. The Ayurvedic system of medicine, *Ficus racemosa* is being widely used by the traditional practitioners in the prevention and treatment of diabetes over many centuries in Bangladesh. The fruit, bark, latex, seeds or leaves of *F. racemosa* plant have been reported to decrease blood glucose levels and improve body weight in diabetic animals when administered in different pharmaceutical preparations and is, therefore, imperative to further investigation. The present review summarizes data about phytochemical properties and biological activities of *F. racemosa* plants and provides scientific evidence for further development and utilization as a potential anti-diabetic drug.

KEYWORDS : *Ficus Racemosa*, Physical properties, biological activities, Anti-diabetic potential and Developing countries .

INTRODUCTION:

The genus *Ficus* is an important group of trees which has various chemical constituents of Promisive medicinal value. It is a sacred tree of Hindus and Buddhists. Four species of this Genus constitute the group "Nalpamaram", namely; *F. racemosa*, *F. microcarpa*, *F. benghalensis* and *F. religiosa* (Athi, Ithi, Peral and Arayal respectively). *Ficus racemosa*. It has been used in ritual sacrifice. It is one of the ksiri vriksha – latex oozes out when the leaves are cut or plucked. It is one of the Plants from a group, called pancavalkala, meaning the thick bark skins of five herbs, viz.

Udumbara, vata, asvattha, parisa and plaksa. The decoction of pancavalkala is used internally Or for giving enema in bleeding per rectum and vagina (Raja Nighantu). Maharishi Charaka Has categorized 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 Rakta pitta, burning sensation and obesity, and useful in vaginal disorder .

According to world ethno-botanical information reports, almost 800 Plants may possess anti-diabetic potential (Alarcon-Aguilara et al., 1998). Among them, *Ficus racemosa* is one of the herbs, mentioned in all ancient scriptures of Ayurveda, Siddha, Unani and Homeopathy. All parts of *F. racemosa* plant (leaves,

fruits, bark, latex and sap of the root) are medicinally important. In the traditional system of medicine in India (Ramana et al., 2011). A wide collection of plant-derived Active principles representing numerous bioactive compounds has established its role for possible use in the treatment of diabetes (Rizvi and Mishra, 2013). The present review on *Ficus racemosa*, is aiming To draw attention of the researchers to expand the use of this plant in the ethno-pharmacotherapy and The development of new herbal drugs; as the technology is now extremely more powerful than before.



Pharmacognostical characteristics

Macroscopical (Plant description)

Plant is native to Australia, South East Asia and the Indian Subcontinent. The plant grows all Over India in many forests and hills 2. It is frequently found around the water stream and is Also cultivated in villages for shade and its edible fruits 3. The tree is medium tall (18m) with Quite green foliage that provide good shade. The leaves are dark green, 7.5-10 cm long, ovate elliptic, in large clusters from old nodes of main trunk. The fruit receptacles are 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 4. The seeds are tiny, innumerable, grain-like. The roots are long and brownish in Colour. It's having characteristic odour and slightly bitter in taste. Bark is reddish grey or greyish green, soft surface, uneven and often cracked, 0.5-1.8 cm Thick, on rubbing white papery flakes come out from the outer surface, inner surface light Brown, fracture fibrous, taste mucilaginous without any characteristic odour. Unlike the Banyan, it has no aerial roots 5, 6.

Taxonomy

Kingdom : Plantae

Division : Magnoliophyta.

Class : Magnolipsida.

Order : Urticales

Family : Moraceae

Genus : *Ficus*

Species : *racemosa*

Synonym : *F. glomerata* Roxb



Pharmacological investigation

Antidiuretic

The decoction (D) of the bark of *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 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 osmolarity Indicating multiple mechanisms of action. This proves its efficacy as antidiuretic agent.

Diabetic Activity

He studied protective effects of tannins from *Ficus racemosa* on the lipid profile and Antioxidant parameters in high fat meal and streptozotocin induced hypercholesteremia Associated diabetes model in rats. The administration of tannin fraction from *Ficus racemosa* Significantly reversed the increased blood glucose, total cholesterol, triglycerides, low density Lipoprotein and also significantly restored the insulin and high density lipoprotein in the Serum. In addition, tannins significantly restored the activity of antioxidant enzymes such as Superoxide dismutase, catalase, and decreased the, glutathione peroxidase, and glutathione, Thereby restoring the antioxidant status of the organs to normal levels.

Antioxidant and a probable radioprotector

Ethanol extract (FRE) and water extract (FRW) of *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, hydroxyl radical and superoxide radical scavenging and inhibition of lipid Peroxidation with IC₅₀ comparable with tested standard compounds. In vitro radioprotectivePotential 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 *F. racemosa* acts As a potent antioxidant and a probable radioprotector.

Hypoglycemic

The glucose – lowering efficacy of methanol extract of the stem bark was evaluated both in Normal and alloxan – induced diabetic rats at the doses of 200 and 400 mg/kg p.o. The activity was also comparable to that of the effect produced by a standard antidiabetic agent, glibenclamide (10 mg/kg) proving its folklore claim as antidiabetic agent The relationship of the post absorptivestate to the hypoglycemic studies on *F. racemosa* showed that the absorption of the drug leads to a better hypoglycemic activity. The ethanol extract (250 mg/kg/day, p.o.) lowered blood glucose level within 2 weeks in the alloxan diabetic albino rats confirming its hypoglycemic activity βsitosterol isolated from the stem bark was found to possess potent hypoglycemic activity when compared to other isolated compounds Methanol extract of powered fruits at the dose 1, 2, 3, and 4 g/kg reduced the blood glucose level in normal and alloxan induced diabetic rabbits.

Ethanol extract of leaves lowered the blood glucose levels by 18.4 and 17.0% at 5 and 24 h, respectively, in sucrose challenged streptozotocin induced diabetic rat model at the dose of 100 mg/kg body weight.

Anti-inflammatory

The anti-inflammatory activity of *F. racemosa* extract was evaluated on carrageenin, serotonin, histamine and dextran-induced rat hind paw edema models. The extract (400 mg/kg) exhibited maximum anti-inflammatory effect of 30.4, 32.2, 33.9 and 32.0% with carrageenin, serotonin, histamine, dextran-induced rat paw oedema, respectively. In a chronic test, the extract (400 mg/kg) showed 41.5% reduction in granuloma weight, which was comparable to that of phenylbutazone 45. Bioassay-guided fractionation of the ethanol extract of leaves isolated racemosic acid. It showed potent inhibitory activity against COX-1 and 5-LOX in vitro with IC₅₀ values of 90 and 18 μ M, respectively 46. Ethanol extract of stem bark also inhibited COX-1 with IC₅₀ value of 100 ng/ml proves that the drug is used in the treatment of inflammatory conditions.

Hypolipidemic:

Pronounced hypocholesterolemic effect was induced when Dietary fibre content of fruits were fed to rats in diet, as it increased fecal excretion of cholesterol as well as bile acids. Hypolipidemic activities of ethanolic extract of bark were studied at the doses of 100-500 mg/kg body weight to alloxan-induced diabetic rats. Investigation showed that extract had potent antidiabetic and hypolipidemic effects when compared to that of the standard reference drug, glibenclamide.

Antibacterial/antifungal activity

A number of studies have reported the antibacterial potential of *F. racemosa* against different bacterial strains. Stem bark ethanol extract was found to be very effective against *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Staphylococcus aureus*, *Bacillus cereus*, *Alcaligenes faecalis*, and *Salmonella typhimurium* bacterial strains, indicating the scope to discover bioactive natural products that may serve as leads in the development of new pharmaceuticals in order to address unmet therapeutic needs (Nair & Chanda, 2007). In discover bioactive natural products that may serve as leads in the development of new pharmaceuticals in order to address unmet therapeutic needs (Nair & Chanda, 2007). In another study the same authors reported that the ethanol extract of stem bark exhibited significant antibacterial activity against *Pseudomonas aeruginosa*, *Proteus mirabilis*, and *Bacillus cereus* bacterial strains, while the aqueous extract inhibited *Streptococcus faecalis* significantly (Nair & Chanda, 2006) and the methanol extract exhibited significant antibacterial activity against *Bacillus subtilis* (Mahato & Chaudhary, 2005). Mandal et al. (2000) evaluated various extracts of *F. racemosa* leaves for antibacterial potential against *Escherichia coli*, *Bacillus pumilus*, *Bacillus subtilis*, *seudomonas aeruginosa*, and *Staphylococcus aureus*. It was found that the petroleum ether extract was most effective against the tested organisms and the effect produced was significant and was compared with chloramphenicol, a known antibiotic, supporting the use of *F. racemosa* for treating dysentery and diarrhea in the traditional system of medicine. The 50% methylene chloride in hexane flash column fraction of the extract of the leaves of *F. racemosa* effectively inhibited the growth of *Curvularia sp.*, *Colletotrichum gloeosporioides*, *Alternaria sp.*, *Corynespora cassicola*, and *Fusarium sp.* (Deraniyagala et al., 1998). [another study the same authors reported that the ethanol extract of stem bark exhibited significant antibacterial activity against *Pseudomonas aeruginosa*, *Proteus mirabilis*, and *Bacillus cereus* bacterial strains, while the aqueous extract inhibited *Streptococcus faecalis* significantly (Nair & Chanda, 2006) and the methanol extract exhibited significant antibacterial activity against *Bacillus subtilis* (Mahato & Chaudhary, 2005). Mandal et al. (2000) evaluated various extracts of *F. racemosa* leaves for antibacterial potential against *Escherichia coli*, *Bacillus pumilus*, *Bacillus subtilis*, *seudomonas aeruginosa*, and *Staphylococcus aureus*. It was found that the petroleum ether extract was most effective against the tested organisms and the effect produced was significant and was compared with chloramphenicol, a known antibiotic, supporting the use of *F. racemosa* for treating dysentery and diarrhea in the traditional system medicine. The 50% methylene chloride in hexane flash column fraction of the extract of the leaves

of *F. racemosa* effectively inhibited the growth of *Curvularia* sp., *Colletotrichum gloeosporioides*, *Alternaria* sp., *Corynespora cassicola*, and *Fusarium* sp. (Deraniyagala et al., 1998).

Hepatoprotective Activity

(Ahmed et al., 2010) investigated hepatoprotective effects of petroleum ether and methanol Extract of *Ficus racemosa* Linn. (Moraceae) stem bark. CCl₄ administration induced a Significant decrease in serum total protein, albumin, urea and significantly increase in total Bilirubin associated with a marked elevation in the activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP). Pretreatment with *Ficus racemosa* petroleum ether extract and *Ficus racemosa* methanolic extract showed Significant restoration of total protein and albumin to near normal rats.

Memory Enhancing Activity (Ahmed et al, 2011) investigated the potency of *Ficus racemosa* bark. It found out that *F.racemosa* had a potential in management of Alzheimer disease.

Analgesic activity

The ethanol extract of bark and leaves evaluated for analgesic activity by analgesiometer at 100, 300 and 500 mg/kg was found to possess dose dependent analgesic activity.

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, anti-carcinogenic, anti-diuretic, hepatoprotective, anti-ulcer, anti-inflammatory, anti-fungal etc. Bio active constituents like β -sitosterol, glaucanol 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 which can help in proving it to be a promising source in nutraceutical as well as pharmaceutical industry.

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