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MEDICAL APPLICATION OF FICUS RACEMOSA (GULAR)

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ABSTRACT

Ficus racemosaLinn. (Moraceae) is a popular medicinal plant in India, which has long been used in Ayurveda, the ancient system of Indian medicine, for various diseases/disorders including diabetes, liver disorders, diarrhea, inflammatory conditions, hemorrhoids, respiratory, Ficus species possessed a broad range of biological properties, including antioxidants, antidiabetic, anti-inflammatory, anticancer, antitumor and antiproliferative, antimutagenic, antimicrobial, anti-helminthic, hepatoprotective, wound healing, anticoagulant, immunomo, dulatory activities, antistress, toxicity studies, mosquitocidal effects.and urinary diseases. F. racemosa is pharmacologically studied for various activities including antidiabetic, antipyretic, anti-inflammatory, antitussive, hepatoprotective, and antimicrobial activities. A wide range of phytochemical constituents have hepatoprotective been identified and isolated from various parts of F. racemosa.

KEYWORDS: Fi:cus racemosa, Moraceae family hepatoprotective; haemorrhoids.

Description: Genus *Ficus* consist of over 800 species and they belong to the family Moraceae, *F. racemosa* is commonly known as 'gular', and all parts of this plant are regarded medicinally important in Ayurveda and it has been used extensively in the treatment of biliary disorders, jaundice, dysentery, diabetes, diarrhea and inflammatory conditions *Ficus racemosa* Linn. (Moraceae) is an evergreen, moderate to large-sized spreading, lactiferous, deciduous tree 15-18 m high, without prominent aerial roots.

Classification: Kingdom: Plantae, Planta, Planter, Plants, Vegetal; Sub Kingdom: Tracheobionta, Vascular Plants; Division: *Magnoliophyta*; Superdivision: *Spermatophyta*; Class: *Magnoliopsida*; Subclass: *Hamamelididae*; Order: *Urticales*; Family: *Moraceae;* Genus: Ficus L.

Morphology

Goolar is an attractive fig tree with a crooked trumk and a spreading crown.

Unlike the banyan, it has no aerial roots. The most distinctive aspect of this tree is the red, furry figs in short clusters, which grow directly out of the trunk of the tree. Those looking for the flower of goolar should know that the fig is actually a compartment carrying hundreds of flowers Fig trees have a unique form of fertilization, each species relying on a single, highly specialized species of wasp that is itself totaly dependant upon that fig species in order to breed. The trees produce three types of flower; male, a long-styled female and a short-styled female flower, often called the gall flower. All three types of flower are contained within the structure we usually think of as the fruit. The female fig wasp enters a fig and lays its eggs on the short styled female flowers while pollinating the long styled female flowers. Wingless male fig wasps emerge first, inseminate the emerging females and then bore exit tunnels out of the fig for the winged females. Females emerge, collect pollen from the male flowers and fly off in search of figs whose female flowers are receptive. In order to support a population of its pollinator, individuals of a Ficus spp. Must flower asynchronously. A population must exceed a critical minimum size to ensure that at any time of the year at least some plants have overlap of emmission and reception of fig wasps. Without this temporal overlap the short-lived pollinator wasps will go locally extinct Leaves: The leaves are dark green, 6-10 cm long, glabrous; receptacles small subglobose or piriform, in large clusters from old nodes of main trunk.

Fruits: The fruits receptacles are 3-6 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 fruit of Ficus Racemosa Linn is 3/4inch to 2 inches long, circular and grows directly on the trunk.

Seeds: The seeds are tiny, innumerable and grain-like. Outer surface of the bark consists of easily removable translucent flakes grayish to rusty brown, uniformlyhardandnon-brittle.

Bark: Bark is reddish grey or grayish 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.

Those looking for the flower of goolar should know that the fig is actually a compartment carrying hundreds of flowers. Texture is homogeneously leathery.

Roots: The roots of F.racemosa are long, brownish in colour. It's having characteristic odour and slightly bitter in taste Roots are irregular in shape.

Figure 1: F.racimosa- Fruits and plant.

Figs are smooth or pubescent and rarely covered with minute soft hairs. When ripe, they are orange, dull reddish or dark crimson with depressed umbilicus (edible but usually full of worms); basal bracts 3, ovate-triangular; male, female, and gall flowers together in one receptacle, the male flowers forming a layer near the walls of the receptacle, and the gall flowers a more internal layer; male flowers sessile; sepals 3-4, membranous, inflated, enveloping the 2 elongate ovate anthers; filaments connate; gall flowers pedicellate; perianth gamophyllous, irregularly toothed, covering only the base of the rough ovoid ovary; style lateral, elongate; stigma clavate; fertile flowers subsessile; perianth gamophyllus, with 4 or 5 long lanceolate teeth enveloping the small minutely tuberculate achene; style sub-terminal; stigma clavateThe fruits, borne in great profusion, mature generally from March to July. When fully ripe, they have a pleasant odor, resembling that of cider apples. Often they are full of maggots of the fertilizing wasp and unfit for eating The bark is astringent, rusty brown with a fairly smooth and soft surface, the thickness varies from 0.5-2 cm according to the age of the trunk or bark, surface with minute separating flakes of whitish tissue, texture homogenous The fruit is an astringent, stomachic, carminative given in menorrhea and hemoptysis Fruits are used as a remedy for visceral obstruction, diarrhea and constipationA bath made of fruit and bark is regarded as a cure for leprosy. The fruit is regarded as a good remedy for diabetes.

Fig. 2: Ficus racimosa Fruit.

Bark: The bark is astringent. An infusion of bark is employed as mouth wash in spongy gum condition, dysentery, menorrhea, hemoptysis, and diabetes It is also used as a wash for wounds, highly efficacious in threatened abortions and also recommended in uropathy. A decoction of bark is given in asthma and piles). The sap extracted from the trunk has been described as valuable medicine in diabetes. Paste of stem bark is used in burns, swelling, leucorrhea dysentery and diarrhea.

Latex The latex is aphrodisiac and is administered in boils, diarrhea, dysentery, and hemorrhoids t is also used to cure stomachache cholera and mumps. It has been reported in the indigenous system of medicine in Sri Lanka in the treatment of skeletal fracture to control severe diarrhea, particularly in children). Latex is used as adhesive.

Chemicals in Ficus racemosa

The leaves contain triterpenoids) tannins, kaempferol, rutin, arabinose, bergapten, psoralenes, flavonoids, ficusin, coumarin, phenolic glycosides and saponins. Fruits are reported to contain sterols, triterpenoids, flavonoids, glycosides, tannins, carbohydrates, β-sitosterol, gluanol acetate, hentriacontane, tiglic acid of taraxasterol, lupeol acetate gallic acid, ellagic acid and α-amyrin acetate. Stem bark contains steroids, alkaloids, tannins gluanol acetate, leucocyanidin-3-*O*-β-D-glucopyrancoside, leucopelargonidin-3-*O*-β-D-glucopyranoside, leucopelargonidin-3-*O*-α-L-rhamnopyranoside, ceryl behenate, lupeol acetate, α-amyrin acetate lupeol, friedelin, behanate, stigmasterol, β-sitosterol, β-sitosterol-D-glucosidegluanol acetate, and quercetin. Bergenin, racemosic acid, β-sitosterol, β-

amyrin, and lupeol acetate have been isolated from the bark of *F. racemosa*.

Phytochemistry

Leaf: Sterols, tannins and flavonoids, triterpenoids (Lanosterol) and alkaloids. A new tetracyclic triterpene glauanol acetate which is characterized as 13α, 14β, 17βH, 20αH-lanosta-8, 22-diene-3β-acetate and racemosic acid were isolated from the leaves.

Fig. 3: Ficus Racimosa.

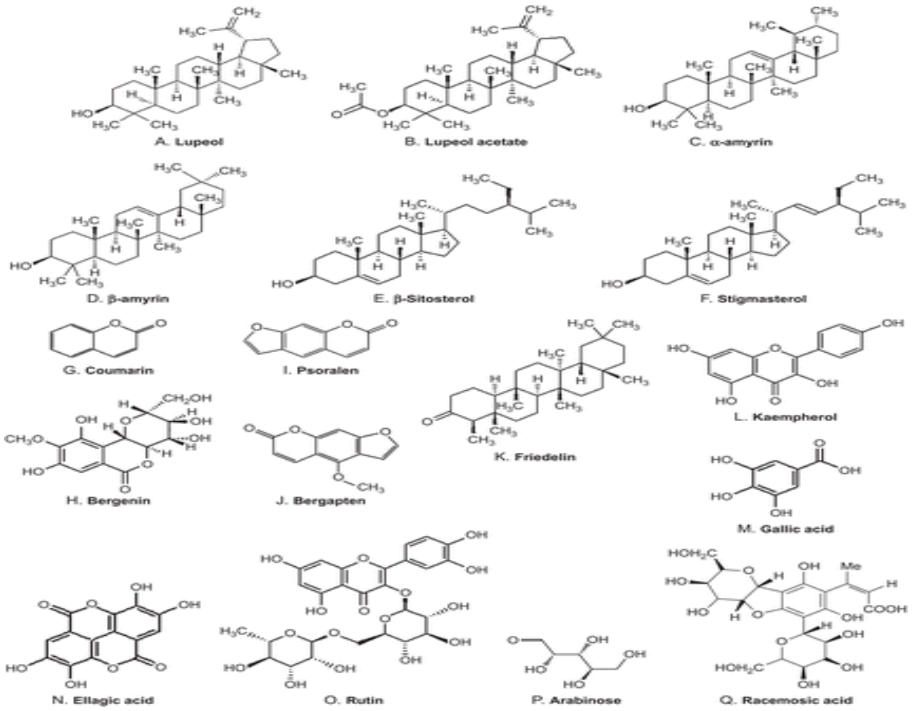
Stem-Bark - Tannin, wax, saponin gluanol acetate, β-sitosterol, leucocyanidin- 3 – O – β – D - glucopyrancoside, leucopelargonidin – 3 – O – β – D - glucopyranoside, leucopelargonidin – 3 – O – α – L - rhamnopyranoside, lupeol, ceryl behenate, lupeol acetate, α-amyrin acetate, leucoanthocyanidin, and leucoanthocyanin from trunk bark, lauanol acetate, lupeol, β-sitosterol and stigmasterol were isolated from stem bark.

Trunk-Bark - Upenol, β-sistosterol and stigmasterol.

Fruit - Glauanol, glauanol acetate, hentriacontane, β sitosterol, glauanolacetate, glucose, tiglic acid, esters of taraxasterol, lupeolacetate, friedelin, higherhydrocarbons and other phytosterol.

Root: Cycloartenol, euphorbol and its hexacosanoate, taraxerone, tinyatoxin; bark euphorbol and its hexacosanate, ingenol and its triacetate, taraxerone.

Latex: - a-amyrin, β-sitosterol, cycloartenol, cycloeuphordenol, 4-deoxyphorbol and its esters, euphol, euphorbinol, isoeuphorbol, palmitic acid, taraxerol, tinyatoxin, tirucallol, trimethyl ellagic acid.



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.

Sap of the root

Sap of the root is given for gonorrhea, diabetes and as a topical application in mumps and other inflammatory

glandular enlargements. Root sap is claimed to cure heat stroke, chronic wounds and malaria in cattle.

Biological Activity

Hypoglycemic/antihyperglycemic activity

Antidiabetic potential of various parts of *F. racemosa* has been evaluated in alloxan/streptozotocin-induced diabetic rats/rabbits. Aqueous extract equivalent to 15 g of *F. racemosa* bark powder decreased blood glucose to an extent of 13.3%; 18.8% at 18 h and 48 h fasting intervals in normoglycemic rabbits and 6%; 17% in diabetic rabbits.

Aqueous and ethanol extracts of the stem bark (300 and 400 mg/kg body weight) exhibited prominent long-term antihyperglycemic effect by reducing the blood glucose to an extent of 80% in alloxan-induced diabetic rats. The hypoglycemic effect of ethanol extract was comparable with that of glibenclamide. The extracts significantly increased the plasma insulin levels and inhibited the activity of glucose 6-phosphatase and hexokinase. Ethanol extract of *F. racemosa* bark (300 mg/kg body weight) reduced the blood glucose, serum lipids and lipoproteins to near normal range and these effects were comparable with that of the standard antidiabetic drug-glibenclamide. Similarly, methanol extract of the stem bark at doses of 200 and 400 mg/kg exhibited significant hypoglycemic effect in both normal and alloxan-induced diabetic rats, comparable to that of glibenclamide (10 mg/kg), a standard antidiabetic agent n another study, petroleum ether extract of the fruits (200 mg/kg) exhibited a significant anti-hyperglycemic activity in alloxan-induced diabetic mice and oral doses of petroleum ether extract (250 mg/kg) significantly lowered blood sugar, serum cholesterol, serum urea and serum triglyceride levels in alloxan-induced diabetic treated rats and the hypoglycemic effects were compared with those of glibenclamide. α-Amyrin acetate (100 mg/kg) isolated from the fruits of *F. racemosa* lowered the blood glucose by 18.4% and 17.0% at 5 and 24 h, respectively, in sucrose challenged streptozotocin-induced diabetic rat model.

A compound recipe of medicinal plants containing *F. racemosa* leaves as an ingredient showed a significant hypoglycemic effect and increased serum insulin levels significantly in alloxan-induced diabetic rabbits. The study indicated that the increase in serum insulin levels of diabetic rabbits was due to the regeneration of some of the pancreatic β-cells. The compound recipe did not show acute toxicity nor resulted in any behavioral changes. reported oral feeding of ethanol extract of the root (500 mg/kg) caused a significant decrease in blood glucose in alloxan-induced diabetic rats. The herbal formulation D-400 containing *F. racemosa* as an ingredient showed a significant hypoglycemic activity and effectively decreased renal damage in alloxan-induced diabetic rabbits \. In an acute study petroleum ether extract of the leaves at the levels of 200 and 400 mg/kg decreased blood glucose to an extent of 29% and 35%, respectively, in streptozotocin induced diabetic rats). Similar observations are reportedat a dose of 300 mg/kg. The 95% ethanol extract decreased blood glucose by 50% in streptozotocin induced diabetic rats The petroleum ether extract of stem bark decreased blood glucose by 16% and 62%, fruits by 11% and 20%, and the latex by 7% and 8%, respectively, in normal and diabetic rats. The results suggested that most of the hypoglycemic principles are present in the stem bark of *F. racemosa*. Further, the stem bark extract effectively inhibited glucose 6-phosphatase and arginase *in vitro*.

Antioxidant and radioprotective activity

Herbal radioprotectors have been gaining prime importance in radioprotective drug discovery due to lesser side effects as reviewed extensively by many authors. The damage to DNA and membrane lipids is a critical factor in radiation-induced cellular damage and reproductive cell death. The ethanol extract of *F. racemosa* stem bark showed a significant free radical scavenging activity in a dose-dependent manner. Such free radical scavengers exert a key role in radio-protection, because radiation-induced cytotoxicity is mediated mainly through generation of free radicals in the biological system.

investigated the antioxidant activity of ethyl acetate extract of the root and the results indicate that the extract possesses potent antioxidant activity and is mediated through free radical scavenging, reducing power and hydrogen peroxide scavenging activity. Preliminary phytochemical analysis and β-carotene linoleate oxidation models indicates the presence of polyphenols (tannins, flavonoids) in the extract and the antioxidant potential of the extract may be due to the presence of phenolic compounds. Racemosic acid isolated from the ethanol extract of *F. racemosa* bark exhibited a strong radical scavenging activity comparable to that of Trolox™, a synthetic antioxidant. Aqueous and ethanol extract of *F. racemosa* stem bark exhibited significant antioxidant activity in alloxan-induced diabetic rats and significantly improved the antioxidant status by decreasing TBARS content and increasing GSH levels and other enzymatic antioxidant defense systems.

Methanol and 70% acetone extracts of *F. racemosa* stem bark exhibited dose-dependent reducing power activity and the methanol extract exhibited more hydrogen donating ability. Similar dose-dependent activity was seen in DPPH• and •OH scavenging systems. Both the extracts exhibited antioxidant activity against the linoleic acid emulsion system and the potential of multiple antioxidant activity was evident as it possessed antihemolytic activity and metal ion chelating potency reported the methanol extract of the bark to exhibit potent antioxidant activity *in vitro*.

Hepatoprotective activity

The hepatoprotective activity of petroleum ether extract of *F. racemosa* leaves was evaluated in carbon

tetrachloride/paracetamol-induced chronic liver damage. Oral administration of the leaf extract (400 mg/kg) exhibited a significant reduction in the levels of SGOT, SGPT, alkaline phosphatase and serum bilirubin. The activity of the extract was comparable with that of Neutrosec (a standard liver tonic). Further, 3.95% mortality was observed in the CCl_4 treated group and autopsy showed congested and enlarged liver, sometimes associated with intestinal bleeding and inflammation. However, no mortality was observed in extract-treated groupsThe extract also exhibited a significant hepatoprotective effect comparable to that of Neutrosec in paracetamol-induced hepatotoxity.

The methanol extract of the bark when given orally along with CCl_4 at the doses of 250 and 500 mg/kg body weight (bw) showed a significant hepatoprotection as evident by the reversal of increased serum transaminases comparable to that of silymarin histological changes.

Chemopreventive activity

Treatment of rats orally with *F. racemosa* extract (200 and 400 mg/kg bw) resulted in significant decrease in γ-glutamyl transpeptidase, lipid peroxidation, xanthine oxidase, H_2O_2 generation, blood urea nitrogen, serum creatinine, renal ODC activity, DNA synthesis (Pb 0.001) and incidence of tumors in ferric nitrilotriacetate (Fe-NTA)-induced chemotoxicity in rats. Renal glutathione content, glutathione metabolizing enzymes and antioxidant enzymes were also restored suggesting *F. racemosa* extract to be a potent chemopreventive agent Oral treatment of rats with *F. racemosa* extract (200 and 400 mg/kg BW) resulted in a significant decrease in xanthine oxidase, γ-glutamyl transpeptidase activities, lipid peroxidation and H_2O_2. A significant recovery of renal glutathione and antioxidant enzymes was also reported. There was also reversal in the enhancement of renal ornithine decarboxylase activity, DNA synthesis, blood urea nitrogen and serum creatinine indicating *F. racemosa* extract to be a potent chemopreventive agent and suppressing potassium bromate-induced nephrotoxicity in rats.

Anti-inflammatory activity

Anti-inflammatory activity of *F. racemosa* has been evaluated in several studies. The petroleum ether extract of the leaves effectively suppressed the inflammation produced by histamine and serotonin and the anti-inflammatory activity was attributed for the anti-serotonin activity of the extract. The extract also reduced the edema, produced by dextran which is known to be mediated both by histamine and serotonin. The extract exhibited significant anti-inflammatory activity in the cotton pellet test reflecting its efficacy to reduce an increase in the number of fibroblasts and synthesis of collagen and mucopolysaccharide which are natural proliferative events of granulation tissue formation.

The ethanol extract of the bark, frozen fruits and the milky sap as such exhibited significant anti-inflammatory activity *in vitro* as reflected by the inhibition of COX-1 to an extent of 89%, 71%, and 41%, respectively, at 3.4 mg/mL concentration. In another study, the ethanol extract of the bark showed a significant inhibition of COX-1, 5LOX and phospholipase A_2 (PA_2). The extract effectively inhibited the biosynthesis of PGE_2, PGD_2 in COX-1 assay and the formation of 5HETE in 5LOX assay.

The petroleum ether extract of *F. racemosa* leaves at doses of 200-400 mg/kg bw exhibited significant anti-inflammatory activity in carrageenan-, serotonin-, histamine- and dextran-induced rat hind limb paw edema. A maximum effect was observed at 400 mg/kg dose. In chronic tests, at 400 mg/kg the effect was comparable with that of phenylbutazone, a non-steroidal anti-inflammatory agent.

Analgesic activity

Analgesic activities of ethanol extracts of the bark and leaves were evaluated using hot-plate and tail-immersion methods. At 300 mg/kg, i.p., *F. racemosa* leaf extract increased the latency time significantly, giving about 40.1% protection; the bark extract increased the reaction time significantly providing 35% protection. The observed analgesic effect was attributed to the presence of friedelin, behanate, bergenin, lupeol and lupeol acetate.

The decoction of *F. racemosa* leaves produced a significant decrease in the number of writhes in the acetic acid writhing test in mouse. A similar effect was seen in the hot-plate test where a significant analgesic activity was observed which continued until 3 h after the administration of the decoction in mice. A significant anti-edemic effect was exhibited by the petroleum ether extract in carrageenan-induced paw edema in mice.

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. 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 and the methanol extract exhibited significant antibacterial activity against *Bacillus subtilis* evaluated various extracts of *F. racemosa* leaves for antibacterial potential against *Escherichia coli*, *Bacillus pumilus*, *Bacillus subtilis*, *Pseudomonas 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 cassiicola*, and *Fusarium* sp.

Gastroprotective activity

Ethanol extract (50%) of the fruits showed dose-dependent inhibition of ulcer index in pylorus ligation, ethanol and cold resistant stress-induced ulcers. The extract also protected the gastric mucosa by inhibiting lipid peroxidation and superoxide dismutase, H^+ K^+ ATPase and increased the activity of catalase.

The ethanol extracts of *F. racemosa* bark and leaves attenuated the gastric volume free acidity total acidity ulcer index in aspirin plus pylorus ligation-induced gastric ulcer in rats and also reduced the gastric lesion induced by HCl-ethanol mixture and showed protection against water immersion stress-induced ulcers. (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.

Antidiarrheal activity

Methanol extract of the bark has shown a significant antidiarrheal effect in castor oil-induced diarrhea and PGE2-induced enteropooling in rats. The extract also exhibited a significant reduction in gastrointestinal motility in charcoal meal test in ratsreported similar observations by the petroleum ether extract of *F. racemosa* leaves in rats. The latex exhibited significant inhibitory activity against castor oil-induced diarrhea and enteropooling in latex-treated rats and also reduced gastrointestinal motility following charcoal meal in rats.

Antifilarial activity

Alcoholic and aqueous extracts of the fruits of *F. racemosa* caused inhibition of spontaneous motility of whole worm and nerve muscle preparation of *Setaria cervi* characterized by increase in amplitude and tone of contractions. The concentrations required to inhibit the movement of the whole worm and nerve muscle preparation for alcohol extract were 250 and 50 µg/mL, respectively, while, for aqueous extract it was 350 and 150 µg/mL, respectively. Both alcohol and aqueous extracts caused death of microfilariae *in vitro*. LC_{50} was 21 and 27 ng/mL and LC_{90} was 35 and 42 ng/mL, respectively, for alcohol and aqueous extracts.

Larvicida it is evaluated the larvicidal activity of hexane, ethyl acetate, petroleum ether, acetone, and methanol extracts of the leaf and bark of *F. racemosa* against the early fourth instar larvae of *Culex quinquefasciatus*. The larval mortality was observed after 24 h exposure and all the extracts showed moderate larvicidal effects but the acetone extract of the bark showed highest larval mortality. The larvicidal activity of *F. racemosa* was attributed to the presence of gluanol acetate which was also found to be very potent against fourth instar larvae of *Aedes aegypti* L.and *Anopheles stephensi* L.

The crude extracts of *Ficus racemosa* bark (petroleum ether, chloroform, ethanol and water) evaluated for anthelmintic activity using adult earthworms exhibited a dose-dependent inhibition of spontaneous motility (paralysis) and evoked responses to pin-prick. Higher doses of aqueous extract (50 mg/mL) caused irreversible paralysis indicating the wormicidal activity of the extract.

Antipyretic activity

The methanol extract of the bark given at a dose of 200 and 300 mg/kg bw showed a significant dose-dependent reduction in body temperature in both normal and yeast-induced pyrexia in albino rats. The antipyretic effect of the extract was comparable to that of paracetamol (150 mg/kg bw) a standard antipyretic drug. The decoction and petroleum ether extract of the leaves manifested a significant antipyretic effect comparable to that of indomethacin against yeast-induced pyrexia in rats.

Antitussive activity

The antitussive potential of the methanol extract of the bark was evaluated in sulfur dioxide gas-induced cough in mice. The extract demonstrated significant antitussive activity comparable to that of codeine phosphate (10 mg) a standard antitussive agent. Maximum activity was attained at 200 mg/kg bw at 90 min after administration of the extract.

Hypotensive activity

The leaves of *F. racemosa* extracted with various solvents and the fraction rich in glycosides exhibited significant hypotensive and vasodilator effect on anesthetized dogs and direct cardiac depressant action on isolated hearts of frog and rabbit. The extract did not affect the behavioral activity and did not show signs of acute toxicity in rats.

Wound healing property

The wound healing property of *F. racemosa* is mentioned in different *Ayurvedic* texts and in a research study the ointment prepared from the powder of the leaves with petroleum jelly (15% w/w) in an 8 mm full-thickness punch wound rat model showed highly

significant generation of tissue DNA (1.73 mg/g), RNA (1.17 mg/g), and total protein (16.62 mg/g) during the healing process in comparison with untreated control rats.

Toxicity studies

the cytotoxic effect isexamined of ethanol extracts of *F. racemosa* bark using ATP-based luminescence assay in human skin fibroblasts (1BR3), human hepatocytes carcinoma (HEPG2) and human promyelocytic leukemia (HL-60) of cell density 1×10^4 cells/mL. The extract showed IC_{50} values of 1.79, 0.098, and 1.69 mg/mL, respectively, which were significantly lower than that of aspirin and mercuric chloride. The extract was significantly less toxic than aspirin and mercuric chloride after 48 h of exposure of the cell lines tested.

CONCLUSIONS

The study of herbal medicine spans the breadth of pharmacology including the study of the history, source, physical, and chemical properties, mechanisms of action, absorption, distribution, biotransformation, excretion and therapeutic uses of "drugs". In many respects, the pharmacological investigation of herbal medicine is just beginning. This review leaves no doubt that *F. racemosa*, a versatile medicinal plant, is investigated for many biological activities. Quite a significant amount of research has already been carried out during the past few decades in exploring the phytochemistry and biological activities of different parts of *F. racemosa*. *F. racemosa* is a unique source of various types of compounds having diverse chemical structures. Very little work has been done on the biological activity and plausible medicinal applications of these compounds and hence extensive investigation is needed to exploit their therapeutic utility to combat diseases. The aqueous extract has also been marketed, which generates enough encouragement among the scientists in exploring more information about this medicinal plant in order to exploit its commercial potential. An extensive research and development work should be undertaken on *F. racemosa* for its better economic and therapeutic utilization. F. racemosa is the well-known fig plant in the Indian Traditional System of Medicine, with multiple pharmacological actions. The extracts and phytoconstituents isolated from this plant have been shown to produce different pharmacological responses, which include hypoglycemic, analgesic, anti-inflammatory, hypolipidemic, antidiuretic, and renal anticarcinogenic activities. The tree is harvested from the wild for local use as a food and medicine. It is often cultivated, both for its fruit and also as a shade tree in plantations and an ornamental tree in parks, large gardens etc

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