



A REVIEW ON SPECTRUM OF PHARMACOLOGICAL ACTIVITIES OF FICUS PALMATA FORSSK

A. Negi*¹, K. Dobhal¹ and A. Rawat²

¹Uttaranchal Institute of Pharmaceutical Sciences, Uttaranchal University, Deharadun
Uttarakhand.

²GRD (PG) IMT, Rajpur Road, Dehradun.

Article Received on
05 Jan. 2019,

Revised on 27 Jan. 2019,
Accepted on 17 Feb. 2019,

DOI: 10.20959/wjpps20193-13026

*Corresponding Author

A. Negi

Uttaranchal Institute of
Pharmaceutical Sciences,
Uttaranchal University,
Deharadun Uttarakhand.

ABSTRACT

Ficus palmate Forssk. (Moraceae) called as “Anjiri” is bushy tree found in many parts of India, Nepal, and westwards. The tree and its parts (leaves, fruits etc.) are used traditionally to treat many diseases. The plant possesses antibacterial, antimicrobial, hypoglycaemic, nephroprotective, anticalcinogenic, antiulcer, antiproliferative, antioxidant, antihyperlipidemic activities. The plant has shown the presence of chemical constituents such as psoralene, bergapten, vanillic acid, psoralenoside, β -sitosterol, stigmasterol, α -amyrin, β -amyrin, lupeol acetate, diethyl acetate etc. It also has been used for various remedies such as laxatives, to treat warts, demulcent, emolient.

The fruit and leaves are as used as food for its nutritive values. These spectrums of pharmacological activities and a bunch of phytochemicals indicate a scope for further work to be carried out on *Ficus palmate* Forssk.

KEYWORDS: *Ficus palmate* Forssk, hypoglycaemic, food, amyirin, laxative, phytotochemistry.

INTRODUCTION

Ficus palmate Forssk, belonging to family Moraceae. It is vernacularly known as Anjiri, Bedu, Khemri (Hindi) or Pepri (Gujrati) or Manjimedi (Telegu) or Phagwara (Punjab)^{1, 2, 3} they occur as bushes or a moderate sized trees. The fruits are 3- or 5- lobed and 1/2-1 inch in diameter. Also, the fruits are axillary, pedunculate, sub-globose or pyriform, or tormentose; appear yellow- purple when ripe. These plants are located towards Central and North West of India and the outer Himalayas, from Nepal westwards to Afganistan, extending Egypt and

Abyssinia. In India, they are found to occur in Kumaon region of Uttarakhand upto 6,000ft from sea level, as well as on the hills of Mewar and Orrisa. Since, it is used as fodder for livestock; it is also frequently cultivated.^[1,4]

The wood of this tree (wt: 39lb/cu.ft) appears white and hard. It is said to be useful as timber. The fruits have a plethora of medicinal properties- demulcent, laxative, antibacterial, antioxidant, to name a few; traditionally used in food, also acts as demulcent and laxative. Fruits are used in the treatment of lung and bladder ailments, hypertension. It is widely used in folklore medicine.^[5,6,7,8,9,10] It has also been found to have antidiabetic and hypolipidemic potential.^[11] Phytochemical investigation showed the presence of chemical constituents like steroids, saponins, alkaloids, proteins, sugars, flavonoids, tannins, phenols, amino acids and steroidal glycosides in different plant parts.^[12]

Biological Description

It is a large deciduous shrub or small tree, up to 10 m tall. Trunk and branches are without aerial roots, bark smooth, brownish-grey, young twigs densely hairy. Leaves are broadly ovate to suborbicular or orbicular upper surface scabrid, and soft hairy on lower side to glabrate, Hypanthodia is solitary or sometimes paired, axillary, on c. 1-2.5 cm long, tomentose peduncles, subglobose to pear-shaped, tomentose, subtended by 3, deltoid, acute basal bracts, apical orifice umbonate. The Male flowers: numerous in the upper half, pedicellate; sepals 4-5, free, lanceolate, hairy; stamens 3-6. The Female flowers: basal, numerous; sepals 5, basally united, hairy; ovary ovoid with subterminal, long hairy style. Figs constricted or gradually narrowed at base, 1.5-2.5 cm long, yellow or purple, hairy.^[13,14,15]

Classification^[16]

Kingdom	Plantae
Subkingdom	<i>Viridiplantae</i>
Infrakingdom	<i>Streptophyta</i>
Superdivision	<i>Embryophyta</i>
Division	<i>Tracheophyta</i>
Subdivision	<i>Spermatophytina</i>
Class	<i>Magnoliopsida</i> Superorder <i>Rosanae</i>
Order	<i>Rosales</i> Family <i>Moraceae</i>
Genus	<i>Ficus</i>
Species	<i>Ficus palmata</i> Forssk

Pharmacological Activity

1. Antibacterial screening

Methanolic extract of its latex has significant antibacterial activity against two test organisms- *Escherichia coli* and *Staphylococcus aureus*. Its zone of inhibition was found to be significantly higher than that of tetracycline. Methanolic extracts are more effective against *Escherichia coli*, but ineffective against *Staphylococcus aureus*. Pure latex is effective for both the microorganisms but more effective against *Escherichia coli*. At the given concentration, it showed more activity than that of tetracycline and other standard antibiotics. Methanolic extract 1:3ml showed zone of inhibition of 7.6mm, whereas, standard tetracycline had zone of inhibition of 7mm.^[17]

2. Antimicrobial activity

The ethanolic bark extract of *Ficus palmata* showed significant antibacterial activity (18mm) against staphylococcus and (15 mm) against E.coli.^[18] Antimicrobial activity of aqueous extract of *Ficus palmata* was evaluated by the agar well diffusion method. *Ficus palmata* aqueous extract possess antibacterial activity within the range of 17-22mm against E.coli, staphylococcus, and pseudomonas. The polarity of the solvent also having important role in showing potential antibacterial activity.^[22]

3. Hypoglycaemic activity

In streptozotocin (STZ) induced diabetes in wistar rats by i.p. (45mg kg^{-1}), oral administration of *F. palmata* at 50, 100 and 200 mg kg^{-1} showed significant decrease in blood glucose levels, significant increase in serum insulin, body weight and glycogen content in liver and skeletal muscle and reduction in levels of serum triglycerides and total cholesterol. It also has anti-lipid peroxidative effect in the pancreas. This could be attributed to presence of β -sitosterol, stigmasterol, α -amyrin, β -amyrin and lupeol acetate.^[38]

4. Antihyperlipidemic activity

F. palmata bark aqueous extracts ($0.61\ \mu\text{g/mL}$) has HMG-CoA reductase activity, which might suggest its role in combating hypercholesterolemia as well as in various oxidative stress-related diseases including atherosclerosis. Its lipid-lowering activity could also be attributed to presence of β -sitosterol, stigmasterol, α -amyrin, β -amyrin and lupeol acetate. β -sitosterol reduce blood level of cholesterol and used in treating hypercholesterolaemia. β -sitosterol inhibits cholesterol absorption in the intestine. α -amyrin and β -amyrin both possesses anti-hyperglycaemic effect and hypolipidemic effects.^[20]

5. Antioxidant activity

It is associated to the presence of phenolic compounds as it is a rich source of poly phenolic compounds, flavonoids which are responsible for strong antioxidant properties that help in the prevention and therapy of various oxidative stress related diseases such as neurodegenerative and hepatic diseases.^[21]

6. Antiproliferative activity

It has shown antiproliferative potential against C33A cells (cervical cancer cell lines) of methanolic extract was 22% and acetone extract was 63%. The extracts did not show cytotoxicity to PBMCs or HeLa.^[22]

7. Antiulcer activity

The antiulcer activity of total extracts of *F. palmata* was studied on rats. The total extract was tested at concentrations 200mg and 400mg kg⁻¹ body weight for antiulcer effect against 80% ethanol induced lesions at doses of 100mg and 200mg kg⁻¹. Antiulcer activity is directly proportional to its dose.^[23]

8. Anticoagulant activity

Anticoagulant activity was studied by determination of whole blood clotting time (CT) of the total extract was done using warfarin as standard. Significant increase in CT was noted from treatment with total extract, petroleum ether, and chloroform extract fraction; time and dose dependent.^[23]

9. Hepatoprotective activity

Treatment of male wistar rats with induced hepatotoxicity with total extract showed dose dependent reduction in aspartate aminotransferase, alanine aminotransferase, gamma glutamyl transpeptidase, alkaline phosphatase, and total bilirubin (27.36, 39.85, 29.72, 20.69, and 51.61% respectively) indicating good protection against liver damage induced by CCl₄.^[23]

10. Nephroprotective activity

Animal treated with *Ficus palmate* showed highly significant reduction in the levels of serum urea, serum creatinine, sodium and potassium levels (50.56, 34.28, and 28.94) indicating a good protection against CCl₄ induced nephrotoxicity.^[23]

11. Anti – calcinogenic activity

Aqueous extract of *Ficus palmate* on in homogeneous system of initial mineral phase formation of calcium phosphate, its subsequent growth and demineralization. The aqueous extract shows does dependent anti- calcinogenic action in demineralization of calcium phosphate. As the dose increases the anti- calcinogenic effect also incereses.^[24]

12. Anti- diabetic activity

Hydro alcoholic extract of *Ficus palmate* leaves extract showed significant diabetic activity at dose of 50,100,200 mg/kg reduced blood glucose level in STZ induced diabetic rats. Antidiabetic effect of *Ficus palmata* may be due to potentiating the pancreatic secretions of insulin from beta cells of islets of Langerhans of pancreas, hence the insulin level significantly increased in extract treated animals. Antidiabetic property of *Ficus palmata* may be due to presence of beta- sitosterol, sigmasterol, alphaamyrin, beta-amyrin and lupeol acetate. Stigmasterol is an potent antioxidant and possess hypoglycemic properties. Alpha and beta amyrin have antihyperglycemic effect.^[25]

13. Anti-hypercholesterolemia and antihypertriglyceridemia property

Ficus palmata bark aqueous extract showed significant inhibition of HMG-CoA reductive activity which suggests its role in various oxidative stress related diseases such as atherosclerosis. The enzymetic activity of HMG-CoA reductase, which might suggest its role in combating hypercholesterolemia as well as in various oxidative stress- related diseases including atherosclerosis.^[26]

14. Anti-lipid per oxidative activity

Tissue damage takes place by free radicals which attack membranes through peroxidation of lipid or unsaturated fatty acid present in membranes.^[27] Lipid peroxidation leads to membrane damage and dysfunction.^[28] Improved antioxidant level may contribute to decreased lipid peroxidation.^[29] *Ficus palmata* extract significantly reduce lipid peroxidation. This may be due to antioxidant effect of flavonoids and triterpenoids present in the *Ficus palmate* leaves extract. Flavonoids have free radicals scavenging activity and act as antioxidants thus may be helpful in oxidative stress induced diseases.^[30] Lipid peroxidation eventually leads to increased level of thiobarbituric acid reactive substances and hyper oxides. These are the end products of lipid peroxidation. Antioxidants like flavonoids reduce thiobarbituric acid reactive substance and hydro peroxides levels.^[31]

15. Coagulation effect of *Ficus palmata* in yoghurt production

The concentration of the latex of *Ficus palmata* increases in raw milk, the time needed for the coagulation effect decreases. The result also showed that as the temperature increases the coagulation time decreases because bacteria found in milk are activated or initiated for coagulation within the temperature increase. The effect of yoghurt coagulated by the plant latex on health of human being is not known so further study should be conducted.^[32]

Phytochemistry

The stem bark is reported to contain Ceryl behenate, Lupeol α -amyirin acetate β -amyirin, β -sitosterol alkaloids, Steroids Flavonoids,^[33] Tannins. Leaves contain β -sitosterol, Triterpene glauinol acetate, Gallic acid, Ellagic acid,^[34] Sigmasterol, Rutin,^[35] Vanillic acid and the fruits contain Carbohydrate β - sitosterol, Polyphenols Psoralene and Bergapten.^[36]

CONCLUSION

Ficus palmate Forsk has been used in indigenous medicine, as food and fodder for its various benefits and wide availability. Preliminary studies have shown a spectrum of pharmacological potential which could be further harnessed. Its history of traditional use will make the treatment widely available and acceptable. Though *Ficus palmate Forsk* appears to be a promising therapeutic agent, more elaborate work is required to characterize the exact active principles responsible for its dynamics. Additional investigations are needed to confirm the potential of this plant in humans.

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