



## AN OVERVIEW- FICUS BENGALENSIS LINN

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### ABSTRACT

*Ficus bengalensis* Linn is a large evergreen tree found throughout India. It is commonly called Banyan tree. This tree is considered to be sacred in some places. It is used in traditional system of medicine like ayurveda, siddha, unani and homoeopathy. The active compounds isolated from this plant are considered to be very effective in various treatments such as dysentery, diarrhoea, diabetes, leucorrhoea, menorrhagia, nervous disorders, tonic and astringent. According to Ayurvedic system of medicine *Ficus bengalensis* is widely used in diabetes. This paper reports on its traditional, phytochemical and pharmacognostic properties such as antioxidant, anticancer, analgesic, anti-inflammatory and antipyretic activities of *Ficus bengalensis*.

**Keywords:** Bengalenoside, furanocoumarins, flavonoids, astringent, antioxidant, anti tumour, *Ficus bengalensis*.

### INTRODUCTION

Plants have been the major source of drugs in medicine and other ancient systems in the world. Herbalism is a traditional medicine or folk medicine practice based on the use of plants and plant extracts<sup>1</sup>. Charaka Samhita and Sushruta Samhita give extensive description on various medicinal herbs. The genus *Ficus* includes some 750 species of plants occurring in most tropical and subtropical forests throughout the world. The genus is remarkable for the large variation in the habits of its species<sup>2</sup>. Many plants of this genus are used in medicine for the treatment of skin diseases, enlargement of liver and spleen, dysentery, diarrhoea, diabetes, leprosy, lung complaints, leucorrhoea, heart diseases, cough, asthma, piles, ulcers, gonorrhoea and rheumatism<sup>3-4</sup>. Several species belonging to the genera of *Ficus* were reported to contain furanocoumarins which is an important plant phototoxins<sup>5-6</sup>. *Ficus bengalensis* is commonly known as a Banyan tree. This tree is considered to be sacred tree in India. The plant is a large evergreen tree distributed all over India from sub Himalayan region and in the deciduous forest of Deccan and south India. It is a grown in gardens and road sides for shades<sup>7-8</sup>. The bark, leaves and fruits of this group are used as astringent, haemostatic, anti-septic, anti-inflammatory, antioxidant and anticancer agent and also in the treatment of diarrhoea, dysentery and in the treatment of skin diseases, ulcers, vaginal disorders, leucorrhoea, menorrhagia and deficient lactation. In the traditional system of medicine, the plant is used for various health problems and diseases<sup>9-13</sup>. This study was aimed to present an overview of traditional, phyto pharmacological investigations of bioactive compounds present in this plant.

### Habit and Habitat

Present in most tropical and subtropical forests throughout the world and distributed all over India from

sub Himalayan region and in the deciduous forest of Deccan and south India. They are very large, fast growing, evergreen tree up to 3.0 meters, with spreading branches and many aerial roots. Leaves stalked, ovate-cordate, 3-nerved, entire, when young downy on both sides; petiole with a broad smooth greasy gland at the apex, compressed, downy; Bark smooth, light grey-white, 1.27cm thick wood moderately hard, grey or grayish-white. Fruit in axillary pairs, the size of a cherry, round and downy<sup>14-16</sup>.



*Ficus benghalensis*

### Taxonomy:

Kingdom : Plantae

Division : Magnoliophyta

Class : Magnolipsida

Order : Urticales

Family : Moraceae

Genus : *Ficus*

Species : *F. benghalensis*



## TRADITIONAL PROPERTIES

*Ficus benghalensis* is commonly called nyagrodha. Ancient nighantus and modern pharmacopoeias of Indian Medicine contain much valuable information about the pharmacological properties of various parts of *Ficus benghalensis*. The tree is regarded everywhere, as a symbol of peace and harmony. It was planted by emperors of the time, Jain, Sanaatanists and Buddhist in India and outside, along pilgrimage and trade routes, to serve as sources of shelter for pilgrims and distance travellers. Wells and stone shelters were available nearby for rest and refreshment. Small worshipping places were also built alongside for prayer or meditation. Banyan tree providing shade for visitors, cultural activities and community worship.

Extracts obtained from various parts of the tree are cooling, alterative and demulcent. The power of astringency, resulting from the presence of tannins, varies from part to part. The latex is said to have an aphrodisiac action. Charaka prescribed aqueous extract of leaf buds of nyagrodha, udumbara and ashvattha mixed with sugar and honey for checking diarrhoea; milk processed with the areal roots or leaf buds of nyagrodha, in haemorrhages and bleeding piles. The paste of codhra with the decoction of nyagrodha bark for leucorrhoea and other vaginal discharges. Leaf bud of Nyagrodha was prescribed for promoting conception. It is also used as a blood purifier in skin diseases; urinary and urinogenital disorders. Ayurvedic Pharmacology, Dravyaguna, indicates a general Piththa hara property for the plant and its parts because of the predominant kashaaya rasa (astringent components) and sheetha veerya (cooling anabolic activity) of the drug. *Nalpamaram* is an important group of ayurvedic formulation that constitutes the barks of *Ficus benghalensis* used in the treatment of skin diseases and other ailments<sup>17-18</sup>.

## PHYTOCHEMICAL PROPERTIES

The bark contains leucopelargonidin-3-O- $\alpha$ -L rhamnoside and leuco cynidin 3-O- $\alpha$ -D galactosyl cellobioside, glucoside, beta glucoside, pentatriacontan-5-one, beta sitosterolalpha- Dglucose<sup>19-20</sup>. A glycoside of leucopelargonidin was also isolated from the bark and it has antidiabetic effects<sup>21</sup>. The leaves contain, crude protein, crude fibres, CaO, phosphorous, rutin, friedelin, taraxosterol, lupeol,  $\beta$ -amyrin along with psoralen, bergapten and  $\beta$ -sisterol, quercetin-3-galactoside<sup>22</sup>. Leucodelphinidin derivative<sup>23</sup>, bengalenside, Aglucoside<sup>24</sup>, Leucopelargonin and leucocynidin derivatives. The latex contains caoytchoue, resin, albumin, cerin, sugar, and malic acid<sup>25,26</sup>.

## PHARMACOGNOSTIC PROPERTIES

### Anti-inflammatory activity

The ethanolic (300 mg) and petroleum ether extracts (600 mg/kg/day) of *Ficus benghalensis*, significantly reduced ( $P < 0.05$ ) carrageenan-induced paw edema in rats. The ethanolic and petroleum ether extracts showed a greater

anti-inflammatory effect compared with the standard drug Indomethacin. The results indicated the ethanolic extract of *Ficus benghalensis* exhibited more significant activity than petroleum ether in the treatment of inflammation<sup>27</sup>.

### Antihelmintic activity

The extracts from *Ficus benghalensis* were found not only to paralyze but also to kill the earthworms. The aqueous and methanolic extract was found to be more effective to execute the earthworm when compared to anti helminthic drugs<sup>28</sup>.

### Antidiabetic and ameliorative activity

Oral administration of aqueous extract to fed, fasted and glucose loaded diabetic rats significantly decreased the blood glucose level at 5 hrs and restored the levels of serum electrolytes, glycolytic enzymes and hepatic cytochrome P-450 dependent enzyme systems and decreased the formation of liver and kidney lipid peroxides at the end of 12 weeks. The aqueous extract of *Ficus benghalensis* at a dose of 500mg/kg/day exhibits significant antidiabetic and ameliorative activity shown by histological studies in normal and streptozotocin induced diabetic rats<sup>29</sup>.

### Analgesic and antipyretic activity

The antipyretic activity of bark of *Ficus benghalensis* was studied in Brewer's yeast-induced pyrexia in rats. The extract at all the doses used and the Aspirin significantly inhibited both the analgesic activity for hot plate and tail immersion method also in the antipyretic activity for the method of Brewer's yeast-induced pyrexia in rats inflammation in a manner that was not dose dependent. The higher analgesic effects of various extracts tested might back to the presence of flavonoids and phenolic compounds. These data suggest that the different extracts of the bark of *Ficus benghalensis* produce analgesic and antipyretic activities that could be due to the effects of bio active components in the extract<sup>30</sup>.

### Anti bacterial activity

Extract from fruits exhibits antitumor activity in the potato disc bioassay. None of the tested extracts showed any marked inhibition on the uptake of calcium into rat pituitary cells GH4C1. The extracts of the four tested *Ficus* species had significant antibacterial activity<sup>31</sup>.

### Antioxidant activity

The extract was investigated for its antioxidant activity by 1,1-diphenyl, 2-picryl hydrazyl (DPPH) radical scavenging activity, hydroxyl radical scavenging activity, reducing capacity, hydrogen peroxide activity, total phenolic content using Folin-Ciocalteu's phenolic reagent. The extract showed maximum scavenging of DPPH radical (96.07%) at 250  $\mu\text{g mL}^{-1}$  concentration and hydrogen peroxide (69.23%) at 1000  $\mu\text{g mL}^{-1}$  concentration. The extract shows good results when compared with other



compounds. This shows the scavenging activity of the extract<sup>32</sup>.

### Antitumor activity

The extract from fruit exhibited anti-tumor activity in the potato disc bioassay. The other tested extracts showed no marked inhibition on the uptake of calcium in to rat pituitary cells GH4C1. The extracts of the four tested *Ficus* species had no significant antifungal activity. The results support the traditional use of these plants in folk medicine for respiratory disorders and certain skin diseases<sup>33</sup>.

### Hypolipidaemic activity

Three groups of rabbits were fed with cholesterol suspended in ground nut oil to make hyper cholesterol condition (100mg/kg/day), Another group is fed with bark extract of *Ficus bengalensis* at a dose of 50mg/kg/day. Treatment with bark extract decreased the serum cholesterol level by 59%, triacylglycerol by 54% and a decrease in lipid peroxidation. Significant increase in the activities of antioxidant enzymes; superoxide dismutase, catalase, glutathione peroxidase which were depressed in other groups after cholesterol feeding. This results shows that the water extract of the bark of *Ficus bengalensis* has significant hypolipidaemic effects.<sup>34</sup>

## CONCLUSION

The various extracts of *Ficus bengalensis* showed antiinflammatory effects similar to standard drugs. The presence of flavonoids may be responsible for the anti-inflammatory activity. The water extract of the bark of *Ficus bengalensis* has significant hypolipidaemic effect. Fruit exhibit anti-tumor activity in the potato disc bioassay. It is widely used in the treatment of skin diseases with *pitta* and *rakta* predominance and also used in various ailments. Further investigations are processed to isolate and characterize the specific active components of this plant.

## REFERENCES

- Acharya D. and Shrivastava A. Indigenous herbal medicine: tribal formulations and traditional herbal practices 1st Edn, Avishkar publishers, Distributors, Jaipur, India, 2008, ISBN-13.
- Kirtikar KR and Basu BD Indian medicinal plants Eds. E Blatter, Caius J. F., Lalit Maohan Basu, Allahabad, 2nd edn vol. II, 1989, 2389.
- The Wealth of India, Volume-(F-G).In: A Dictionary of Indian Raw Materials and industrial products. New Delhi: Council of Scientific and Industrial Research; IV, 1999, 24- 26.
- Chopra, RN, Nayar SL, Chopra IC Glossary of Indian Medicinal Plants (CSIR NEW DELHI), 1956, p. II
- Swain LE, Downum KR, Light-activated toxins of the Moraceae. Biochem. Sys. Ecol, 18, 1990, 153-156.
- Anonymous. The Wealth of India. Council of Scientific and Industrial Research, New Delhi, India, 1952, pp. 35-36.
- The Wealth of India, Volume-(F-G). In: A Dictionary of Indian Raw Materials and industrial products. Vol. 4. New Delhi: Council of Scientific and Industrial Research: 1999, 24- 26.
- Parrotta John A, Healing Plants of Peninsular India. USA: CABI publishing; 2001, 517
- Chopra R. N., Chopra I.C. Handa K.L. and Kapur L.D. Indigenous drugs of India, U.N. Dhur and sons Pvt. Ltd. Calcutta: 1958 ,673- 675.
- Medicinal plants of India, ICMR, New Delhi, vol.I, 1956, 415-416.
- V.V. Shivrajan Ayurvedic drugs and their Plant sources, oxford and IBH Publishing company Pvt. Ltd. New Delhi, 2002, 333.
- <http://www.herbalcureindia.com/herbs/ficusbengalensis.htm>
- C.P. Khare Encyclopedia of Indian Medicinal Plants Springer publication; 2004, 216-217.
- V.V. Shivrajan Ayurvedic drugs and their Plant sources, oxford and IBH Publishing company Pvt. Ltd. New Delhi, 2002, 333.
- Prajapati, Purohit, Sharma and Kumar A handbook of Indian medicinal plants a complete source book, 2005, 237.
- A.Chatterjee The treaties of Indian medicinal plants: Vol.I, 1997, 39.
- Sivarajan VV & Balachandran I. Ayurvedic Drugs and Their Sources, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 1994.
- Joy PP, Thomas J, Mathew S & Skaria BP. Medicinal Plants In: Bose TK, Kabir J, Das P & Joy PP (ed.) Tropical Horticulture - Vol.2. pp. 449-632. (2001).
- The Wealth of India, Volume-(F-G). In: A Dictionary of Indian Raw Materials and industrial products. New Delhi: Council of Scientific and Industrial Research, (4), 1999, 24-6.
- Subramanian PM, Misra GS. Chemical constituents of *Ficus bengalensis*. Pol J Pharmacol Pharm; (30): 1978, 559-62.
- Cherian S, Sheela and Augusti K T Insulin sparing action of Leucopelargonin derivative isolated from *Ficus bengalensis* Linn Indian Journal of Experimental Biology; 33, 1995, 608- 611.
- A.Chatterjee The treaties of Indian medicinal plants: Vol.I, 1997, pp. 39.
- Geetha BS, Mathew BC, Augusti KT, Hypoglycemic effects of Leucodelphinidin derivative isolated from



- Ficus bengalensis Indian J Physiol. Pharmacol.: 38(3):1994, 220.
24. Augusti KT Hypoglycemic action of bengalenside: Aglucoiside isolated from Ficus Bengalensis Linn, in normal and Alloxan diabetic rabbits. Indian J Physiol Pharmacol: 19:1975, 218-20.
25. Augusti K T, Daniel RS, Cherian S, Sheela CG, Nair CR Effect of Leucopelargonin derivative from Ficus bengalensis Linn on diabetic dogs Indian J Med Res:1994,82-86.
26. Kumar RV, Augusti KT, Insulin sparing action of a leucocynidin derivative isolated from Ficus bengalensis Linn Indian Journal of Biochemistry and Biophysics:31:1994, 73-76
27. VV Patil, RB Pimprikar, VR Patil, Pharmacognostical studies and evaluation of anti-inflammatory activity of Ficus bengalensis linn, Pharmacognosy 2009 (1)1,p:49-53.
28. Aswar M, Aswar U, Watkar B, Vyas M, Wagh A., Gujar KN Anthelmintic activity of Ficus bengalensis IJGP;2:3,2008.
29. Mahalingam Gayathri and Krishnan Kannabiran. Antidiabetic and ameliorative potential of ficus bengalensis bark extract in streptozotocin induced diabetic rats, Indian Journal of Clinical Biochemistry, 23 (4) , 2008 , 394-400.
30. Vikas V. Patil, Bhangale S.C., Narkhede S.B., Jawle N. M., Patil V. R. Analgesic and Antipyretic Activities of Ficus Bengalensis Bark, International Journal of Pharmaceutical Research, 2(2), 2010.
31. Mousa O, Vuorela P, Kiviranta J, Wahab ,SA, Hiltohen R, Vuorela H Bioactivity of certain Egyptian Ficus species J Ethnopharmacol:41, 1994, 71- 6.
32. Gupta, V.K. and S.K. Sharma, In vitro antioxidant activities of aqueous extract of Ficus Bangalensis Linn. Root. Int. J. Biol. Chem., 4: 2010, 134-140.
33. Rimi Shukla, Shweta Gupta, J.K Gambhir, K.M Prabhu and P.S Murthy, Antioxidant effect of aqueous extract of the bark of Ficus bengalensis in hypercholesterolaemic rabbits J Ethnopharmacol, 92:(1) 2004,47-5.

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