# COMPARATIVE EVALUATION OF HEPATOPROTECTIVE ACTIVITY OF LEAVES AND STEMS OF *FICUS BENGALENSIS*

**Ritesh Kumar Srivastav[1*] and Neelam Verma[2]**

[1]Faculty of Pharmacy, Integral University, Integral University, Dasauli, P.O. Basha Kursi Road, Lucknow – 226026 . (U.P.), India.

[2]Faculty of Pharmacy, Babu Banarasi Das National Institute of Technology & Management, Dr. Akhilesh Das Nagar, Lucknow-227105. (U.P.), India.

***For correspondence:**
Ritesh Kumar Srivastav, M. Pharm (Pharmacology),
Faculty of Pharmacy, Integral University, Integral University,
Dasauli, P.O. Basha Kursi Road, Lucknow – 226026 . (U.P.), India.
Email: ritesh.9956540549@gmail.com, kumar.ritesh99@yahoo.com.

## Summary

**Objective:** To evaluate the hepatoprotective effect comparatively in the ethanolic extract of leaves and stems of *Ficus bengalensis* in experimental animal models. **Methods:** Acute toxicity study was performed in rats after administration of the extract orally in graded doses. Hepatoprotective activity was carried out by $CCl_4$ induced hepatotoxicity model respectively at 100 and 200 mg/kg doses. **Results:** The preliminary phytochemical screening of the extract showed the presence of flavonoid, alkaloids, glycoside, carbohydrates, steroids, protein and amino

acid. The ethanolic extract produced significant hepatoprotective effect in a dose dependent manner and hepatoprotective effect was more significant at 200 mg/kg dose in stem than leaves. **Conclusion:** The present study shows that ethanolic extract of *Ficus bengalensis* has significant hepatoprotective properties and it demonstrates the stem was more potent hepatoprotective activity than leaves of *Ficus bengalensis*.

**Keywords:** *Ficus bengalensis*, stems, leaves, hepatoprotective activity, $CCl_4$ induced hepatotoxicity model.

## Introduction

*Ficus bengalensis* are fast growing, evergreen tree found in monsoon and rain forests regions, grow up to 3.0 meters long [1]. *Ficus benghalensis* is commonly called nyagrodha. Charaka prescribed aqueous extract of leaf buds of nyagrodha, udumbara and ashvattha mixed with sugar and honey for checking diarrhoea; milk processed with the arieal 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. *Nalpamaram* is an important group of ayurvedic formulation that constitutes the barks of *Ficus racemosa* Linn, *Ficus religiosa* Linn and *Ficus benghalensis* Linn., widely used in the treatment of skin diseases with *pitta* and *rakta* predominance and also used in various ailments[2,3]. The bark of the *Ficus bengalensis* contains leucopelargonidin-3-0-α-L rhamnoside and leuco cynidin 3-0-α-D galactosyl cellobioside, glucoside, beta glucoside, 20-tetratriaconthene-2-one,6-heptatriacontene-10-one,pentatriacontan-

5-one, beta sitosterolalpha-D glucose, and meso-inositol [4,5]. It is reported that the plant having antioxidant, hypolipidaemic [6], antibacterial, anticancer [7], anthelmintic [8], analgesic and anti-inflammatory [9] activities.

Reactive oxygen species and free radicals play an important role in the etiology of various diseases such as inflammation, cataract, atherosclerosis, rheumatism, arthritis, ischemia reperfusion injury including liver disorders [10]. Paracetamol and $CCl_4$ share a common property of being converted into their respective reactive metabolites viz. N-acetyl p- benzoquinoneimine, NAPQI [11] and halogenated free radical [12] respectively by hepatic cytochrome P-450.

## Material and Method

### Plant material

The leaves and stems of *Ficus bengalensis* were collected in the month of August from local gardens of Lucknow, Uttar Pradesh and were authenticated by CSIR recognized institute, National Botanical Research Institute, (NBRI) Lucknow.

### Animals

Wistar strain albino rats of either sex weighing 120 to 150 g and wistar strain albino mice 30-50g
were fed on standard diet and water *ad libitum*. The animals were housed at room temperature (25 ± 1 °C), relative humidity 45-55% and a 12:12 hrs. light/dark cycle. The Protocol followed was approved by Institutional Animal Ethics Committee (IAEC) under CPCSEA committee (BBDGEI/IAEC/05/2011) was taken before animal experimentation.

### Preparation of extract

The leaves and stems were dried, crushed to moderately coarse power, and stored in airtight container. The dried powdered drug was macerated using ethanol. The solvent from the extract was eliminated under reduced pressure, and dried extract was collected.

### Acute toxicity studies

Acute toxicity study was carried out as per the guidelines set by Organization for Economic Cooperation and Development (OECD)

revised draft guidelines received from Committee for purpose of control and supervision of Experimental Animals (CPCSEA), Ministry of Social Justice and Empowerment, Govt of India. 1/10th of the LD-50 was taken as therapeutic dose [13].

**Hepatoprotective activity**

Hepatoprotective activity was determined by $CCl_4$ induced hepatotoxicity model. Rats were fasted for 16 h, and then divided into seven groups of five animals each. Group I control received vehicle and group II received CCl4 (3ml/kg body weight in a 50% olive oil solution). Group III received standard drug Silymarin (250 mg/kg, suspension in 1% CMC, i.p.), group IV, V, VI and VII received ethanolic extract of leaves and stems 100mg/kg and 200mg/kg respectively daily for seven days simultaneously with toxicant $CCl_4$. All animal were killed 72 h after $CCl_4$ administration. Blood was collected for different assays.

## Results and Discussion

The preliminary phytochemical studies of the leaves and stems of *Ficus bengalensis* showed the presence of presence of flavonoid, alkaloids, glycoside, carbohydrates, steroids, protein and amino acid as the major phyto-constituents. $CCl_4$ induced hepatotoxicity model is commonly used model for the screening of hepatoprotective activity of drugs. The extent of hepatic damage is assessed by the level of released cytoplasmic alkaline phosphatase and transaminases GOT and GPT in circulation [10]. There was significant evaluation of SGPT, SGOT, alkaline phosphatease and total bilirubin in $CCl_4$ induced hepatotoxicity model. Maximum hepatoprotective activity was found in ethanolic extract of stems of *Ficus bengalensis* at the dose 200mg/kg.

It is concluded that ethanolic extract of *Ficus bengalensis* stems exhibited more hepatoprotective effects than leaves against $CCl_4$ induced hepatotoxicity model.

**Table 1: Effect of ethanolic extracts of *Ficus bengalensis* leaves and stems on $CCl_4$ induced hepatotoxicity**

| S.No. | Group | Serum biochemical parameters | | | |
|---|---|---|---|---|---|
| | | SGPT U/ml | SGOT U/ml | Alkaline Phosphatease K.A. Units | Total Bilirubin mg/dl |
| 1. | Normal Control | 32.70±3.56 | 40.05±2.78 | 15.03±0.45 | 0.93±0.34 |
| 2. | $CCl_4$ | 206.87±6.70 | 195.19 ±2.09 | 41.11±0.57 | 2.78±0.08 |
| 3. | Silymarin+ $CCl_4$ | 48.10 ±4.53 | 86.34±4.09 | 16.26±1.76 | 0.98±0.4 |
| 4. | Ethanolic extract of leaves (100mg/kg)+ $CCl_4$ | 95.37±4.24 | 121.76±2.96 | 26.13±0.94 | 1.8±0.13 |
| 5. | Ethanolic extract of leaves (200mg/kg)+ $CCl_4$ | 54.65±2.67 | 91.87±5.03 | 19.25±0.56 | 1.4±0.55 |
| 6. | Ethanolic extract of stems (100mg/kg)+ $CCl_4$ | 87.67±1.78 | 109.43±4.85 | 22.78±0.34 | 1.63±0.1 |
| 7. | Ethanolic extract of stems (200mg/kg)+ $CCl_4$ | 50.67±3.40 | 88.56±3.65 | 18.53±0.87 | 1.1±0.11 |

Each value represents mean ±SEM of five rats.

## REFERENCES

1. Chopra RN, Chopra IC and Varma BS. Supplement to Glossary of Indian Medicinal plants, reprinted ed. CSIR, NewDelhi, 1992:29.
2. Sivarajan VV, Balachandran I. Ayurvedic Drugs and Their Sources, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 1994.
3. Joy PP, Thomas J, Mathew S, Skaria BP. Medicinal Plants In: Bose TK, Kabir J, Das P & Joy PP (ed.) Tropical Horticulture, Vol. 2, 2001:449-632.

4. 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, 1999:24-6.
5. Subramanian PM, Misra GS. Chemical constituents of *Ficus bengalensis*. Pol J Pharmacol Pharm 1978; 30:559-62.
6. Shukla R, Gupta S, Gambhir JK, Prabhu KM, P.S Murthy PS. Antioxidant effect of aqueous extract of the bark of *Ficus bengalensis* in hypercholesterolaemic rabbits. J Ethnopharmacol 2004; 92(1):47-51.
7. Mousa O, Vuorela P, Kiviranta J, Wahab SA, Hiltohen R, Vuorela H. Bioactivity of certain Egyptian *Ficus* species. J Ethnopharmacol 1994;41:71- 76.
8. Aswar M, Aswar U, Watkar B, Vyas M, Wagh A, Gujar KN. Anthelmintic activity of *Ficus bengalensis.* IJGP 2008;2:3.
9. Vishnu NT, Anupama AS, Avinash DD, Suresh RN. Stem bark extraction of *Ficus bengalensis* linn for anti-inflammatory and analgesic activity in animal models. Indian journal of Experimental Biology 2010; 48:39-45.
10. Osawa, Kavakishi T, S, Namiki, M. Antmutagenesis and anticarcinogensis mechanisms. 1990; 2:139-144.
11. Bessems, JG, Vermuelen NP. Paracetamol/acetaminophen induced toxicity. Crit Rev Toxicol 2001; 31:363-368.
12. Packer, JE, Slater, TF, Wilson, RL. Reaction of $CCl_4$ related per-oxy free radical with amino acids. Life Science 1978; 23:2617-2622.
13. Dixon WJ. The up and down method of small animals. J Amer Statist Assoc 1965; 60: 967-78.
14. Dr. Mukherjee PK. Quality control of Herbal Drugs, 1st edition, Business horizons Pharmaceutical Publishers, 2002:525.