

Pharmacological Uses and Recent Applications of Ficus Religiosa- A Review

*Sanjay Bansal, ¹Aruna Goyal

*Research Scholar, Shri Aurobindo Institute of Pharmaceutical Sciences, Bhopal

¹Research Scholar, Shri Aurobindo Institute of Pharmaceutical Sciences, Bhopal

Abstract: Ficus is among the biggest genera in the plant kingdom and is part of the Moraceae family. This review sought to present the medicinal properties as well as the phytochemistry and pharmacological effects of two main species belonging to this genus, specifically Ficus benghalensis as well as Ficus religiosa. The species are plentiful in all Asian countries as well as Malaysia. The report on chemical analysis revealed that Ficus species had a broad variety of phytoconstituents that included flavonoids, phenols, alkaloids and saponins. They also contain tannins, glycosides, terpenoids proteins volatile and essential oils, and steroids. The current research on effects of the pharmacological properties have revealed that the Ficus species had a wide variety of biological properties which included anti-oxidants, Antidiabetic an anti-inflammatory, anti-cancer, and anti-tumor and ant proliferative properties, as well as anti-mutagenic an anti-helminthic, anti-helminthic, liver protective anticoagulant, wound healing immune modulatory properties, anti-stress toxicological studies, and mosquitocidal effects.

Keywords: *Clitoria ternatea*, *Phytochemical studies*, *Pharmacological activity*, *Medicinal uses*

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Corresponding Author- bansalsanjaypharm@gmail.com *

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Introduction

In India the use of herbs has always been the main kind of medicine, such as Ayurveda, Siddha, Unani and Homeopathy. The medicinal plants are the indigenous of the

Indian culture and have a global significance¹. Genus Ficus includes more than 750 species of woody plant and of which Ficus religiosa is one the most

important and useful species. *Ficus religiosa* is commonly referred to as Peepal, is among the oldest trees mentioned in Indian literature².

Plants constitute livestock, which provide the essential needs for the entire universe in the form food clothing, shelter, and food. In addition to this, they also have their own properties, which are used in the form of tobacco, pharmaceuticals and coffee, alcohol as well as other substances across the world³. Since the Vedas time, plants have been used as medicines in the manner in Homeopathy, Allopathy, Unani and Ayurvedic medicine. In India, some of the species are considered sacred, particularly *Ficus benghalensis*, also called the country's National Tree that signifies spiritual knowledge and eternal existence⁴.

Some species are edible, and certain species are used for ornamental plants, including *Ficus Lyrata*, also known by the name of fiddle-leaf fig. These species are the richest sources of flavonoids, polyphenols and flavonoids⁵. They are antioxidants with strong properties that prevent ailments caused by oxidative stress, like diabetes, atherosclerosis and dyslipidemia⁶.

Since the beginning of time, it has been widely used for treatment of diverse

diseases, such as the Swarsh (juice) of the leaf is used in the treatment of asthma, cough problems with sexuality, such as hematuria problems with the ears and teeth headache, eye problems gastric issues as well as scabies etc⁷. Decoction of leaf is utilized as an analgesic to treat toothache. The stem bark is utilized in the treatment of bleeding, gonorrhoea, diarrhoea, fractures, antiseptic, and astringent and so on⁸.

Scientific Classification⁹

Sn.	Domain	Eukaryota
1	Kingdom	Plantae
2	Sub Kingdom	Viridaplantae
3	Phylum	Tracheophyta
4	Sub phylum	Euphyllopsida
5	Class	Magnoliopsida
6	Subclass	Dilleniidae
7	Order	Urticales
8	Family	Moraceae
9	Tribe	Ficeae
10	Genus	Ficus

11	Specific epithet	Religiosa Linnaeus
12	Botanical name	Ficus religiosa

Common Names in Different Language¹⁰

Sn.	Region	Name
1	Asam	Ahant
2	Bengali	Aswatha
3	English	peepal tree
4	Guajarati	Piplo, pipul
5	Hindi	Pipal
6	Kannada	Arali, aswaththa

Bioactive Compounds in Ficus religiosa¹¹

Sn.	Parts of the Plant	Phytochemicals
1	Fruits	Terpenoid1s, glyco1s1ides, flavonoids, serotonergic content
2	Bark	Steroids, flavonoids, alkaloids, phenol content, glycosides, tannins, saponins, polyphenolic compounds, sterols
3	Leaves	Flavonoids, terpenoids, tannins, phenols, sterols
4	Roots	Tannins, alkaloids, saponin, β -sitosteryl-Dglucoside
5	Latex	Alkaloids, glycosides, amino acids, flavonoids, tannins

7	Kashmiri	Bad
8	Malayalam	Arasu
9	Marathi	Pimpal
10	Nepali	Pipal
11	Oriya	Jari
12	Punjabi	Pipal
13	Sanskrit	Bodhivriksha
14	Telagu	Ravichettu
15	Tamil	Kanavam
16	Urdu	Peepal

Ecology and Distribution

The tree grows to be huge in size, with broad branching branches that spread out and brown bark. It has thin leaves, and its fruit is swollen and circular in form¹². The immature leaves of the new season are pinkish and transform into deep green in the time of maturation. The flowering season begins in February. The onset of fruit development begins in the summer months and ripening becomes completed before the beginning of the rainy season. Fruits are ripe in pairs to create an entire mass. The young fruits are green that change to blackish-purple as they mature¹³.

Ficus Religiosa is a widespread plant which is found in hot regions of the world particularly in the south East Asia including some part of the Bangladesh, Nepal, Pakistan and India. This plant is inherent to the some tropical regions of the Asia¹⁴. It has been distributed around the world, cultivated and spread. Naturally, it is wild tree, could easily found out in the forest (dry and rainy). There it has been propagated and cultivated. Although, the tree has widely spread around the corners, it is called by its 150 different names¹⁵.

Ficus Religiosa is considered to be having long life span compatibility and average life

is between 950-1550 years. *F. Religiosa* used to grow from the sea level of 35 ft. to 4995 ft. The height of the plants goes up to 100 ft. and the shoot width goes up to 10 ft¹⁶. *Ficus Religiosa* is also considered as the ornamental plants, it has been cultivated for the nursery and gardens from long time. Due to its growing habitat the tree could easily survive in hot and cold environment. The climate change does not affect the growth of the tree. This epiphytic plant does have the long hanging branches with long petioles. The leaves are glossy and ovate in shape. Leaves are shiny with the petiole consisting of a slight curve; the length of the leaves could be between 9-13 cm broad and 7-11 cm long¹⁷. The bark of the tree bent towards the end with having the 6-9 cm thickness. Bark is slightly on the grey side and covered with the crustose lichen brown or ash colored surface. Greenish fruits with 1.5 cm diameter are used grow in the pair. Male and female trees could be easily identified with the structure and morphology of the tree¹⁸.

Tradition Belief of the *Ficus Religiosa*

The Moraceae-often called the mulberry family or fig family. *Ficus religiosa* is the most popular one in this family. It has mythical, pious and medicinal properties

which enhance its importance in Indian culture¹⁹. There are such numerous holy books like Arthasastra, Puranas, Upanishads, Ramayana, Mahabharata, Bhagavad-Gita and Buddhist literature depicting *Ficus religiosa*. Based on Vedic chronicles in the Padma Purana, Brahma Purana and SkandaPurana, the Peepal tree considers as an indicative of Lord Vishnu²⁰.

Even on that it's a firm belief of people that all Trimurti's (Brahma, Vishnu, Mahesh) are born under this tree in Panchawa²¹. According to a mythological theory, Brahma enthroned the root of Peepal, trunk of trees devoted as Lord Vishnu and the leaves are regarded as Mahesh/Lord Shiva. Peepal tree procreate by far and wide and the ranches seem like supportive pillars. It's also known by 'Kalpavriksha'. Therefore, on the basis of different religious and historical beliefs, *Ficus religiosa* is glimpsed with numerous colloquial names²².

Pharmacological Uses of *Ficus Religiosa*

Antioxidant Activity

Baliyan, S., 2022 et al., examined that antioxidant activity was assessed by the DPPH activity. *Ficus Religiosa* is an important medicinal plant which is having the antioxidant properties as well as

antibacterial properties. However, DPPH is an excellent marker of the analyzing the anti-oxidant activity. To analyze the DPPH, the technique which would be used as elimination of the DPPH from the cells and then free radicles could be stabilized. This techniques also involved the DPPH interrelates with electrons and provide yields at 517nm. In this study extracts of the *F. religiosa* was interacts with the cells and DPPH was analyzed by the UV spectrophotometer. As the result showed that the DPPH activity was increased in the exposed extract of the *F. religiosa*. It could be concluded by the results that *Ficus Religiosa* does possess the anti-oxidant activities²³.

Another study was performed by the Murugesu, S., 2021 et al., confirming the anti-oxidant activity of the *F. religiosa*. The extracts were prepared separately for the leaves and stem. Both the extract was subjected to the analysis of DPPH in the cells. The extracts were prepared through the steam distillation and maceration method in organic and inorganic solvents. Phytochemical test were performed to confirm the bio compound present in the leaves and stem thus, can correlate with the activity. The active phytochemical were found as alkaloids, terpenoids, and

flavonoids. The results showed and confirmed the anti-oxidant activity of the tree. According to the total antioxidant assay the results were satisfactory. And, study also reveals that the maximum antioxidant activity was seen in the organic solvents. However, inorganic solvent also indicates the presence of the anti-oxidants²⁴.

Anti-microbial Activity

Ficus religiosa does have the anti-oxidant activity and other medicinal benefits as described by the Koirala, B., 2021 et al. The methanolic extract were prepared in the organic solvent methanol and exposed to the bacteria (gram negative). The zone of inhibition was detected by the placing it on the center of the petri plate. That submerged round paper were the marker for the zone and surrounding area was considered for the inhibition zone. 122.3 µg/ml extract was prepared and exposed; results showed that support the hypothesis of the author. The zone of inhibition was observed during the experiment which explains that the phytochemicals presents in the plants could possibly have the anti-microbial properties. To support this argument author has done qualitative test of phytochemicals present in the plant. Alkaloids, saponins, flavonoids

and tannins were majorly found in the extract of the plant part in methanol²⁵.

The similar study was performed by the Chavan, A., 2019 et al., against the *E. coli* and *Staphylococcus aureus*. The Minimal inhibitory concentration was found during the exposure of the extract as a result. At the concentration of the 25 mg/mL and 12 mg/mL ethanolic extract of the *Ficus religiosa* leaves does have the anti-microbial property²⁶.

The antimicrobial properties of the plants were seen by the Mamta, P. S., 2021 et al., against the gram positive and gram negative bacteria. The different extracts were prepared using different solvents such as organic and inorganic. All the extracts at the different dose concentrations were exposed to the gram positive and gram negative bacteria²⁷.

Antidiabetic activity

Ficus religiosa is considered to have the renoprotective function also. Singh, T. G., 2020 et al., studied that the *F. religiosa* decreases the oxidative stress which helps to maintain equilibrium between blood glucose and energy of the body and possibly share same pathology of the disease. By decreasing the free radicals in body down

the antioxidant level and increase the activity of the renal and other glucose regulatory mechanism. The results also suggested that it can also help to reduce the oxidative stress to overcome the disease particularly in the chronic diabetes. In this study diabetes were induced by the single injection of the streptozotocin in the rats. The extract was given at the different doses for 45 days and blood glucose was recorded once in day. Histopathology results suggested that *F. religiosa* does have the renoprotective function. Blood parameters revealed that it helps in reduce the blood glucose and oxidative stress²⁸.

Similar study was performed by the Choudhary, S., et al., (2011). In this study, the ethanolic extract of the plant were used and administered in the Wistar rats. Diabetes was induced buy the single injection of the Alloxan. The three dose concentrations were followed in the study; however the lowest dose was administered as 100mg/kg. The results showed that the plant extract could not be able to help in the lowering the blood glucose level. Precisely, the fruit extract does not endorse the effectiveness on the blood glucose level. And, the leaf extract too does not have any effect on lowering the glucose level²⁹.

Tiwari, P., et al., (2017) did an experiments with the endophytic fungus grown on the plant extract with the help of the potato dextrose media. The fungi was isolated from the PDA plates and incubated at 37°C for 21 days. The experiment was done to evaluate the α -amylase, α -glucosidase inhibition by the fungus extract. The result showed the maximum inhibition of α -amylase, α -glucosidase by 91 and 42% respectively. The results are also revealed that the percentage of inhibition was near to the standard³⁰.

Anticancer activity

Shaikh, A., et al., (2020) explore the opportunities of this magical plant *Ficus religiosa*. The anticancer activities were evaluated by using leaves extract in chloroform against the breast cancer cell lines (MDA-MB-231). The cell lines were grown up to the 70% confluency and exposed by the extract at the different concentrations. Further, the phytochemical analysis was done by the LCMS to identify the specific phytochemical. The in vitro test performed to see the activity of the *Ficus religiosa* extract using the trypan blue and growth inhibition. The extract was managed to kill the 50% of cells in dye test, the test was evaluated by using the

spectrophotometer. The results are also revealed that extract of the *Ficus religiosa* could resist the cell growth and inhibited up to 500 µg/mL concentrations. Hence, *Ficus religiosa* plants extract could possibly inhibit and kill the cancer cells³¹.

Similar study was done by the Saida, L., et al., (2021) using the extract of the latex of *Ficus religiosa*. The study was performed human breast cancer cell line. The results showed the significant decrease in the cell lines by inhibiting the growth by 50% at the IC₅₀ 4.8 µg/ml. The cell cycle was also observed by the Flowcytometry analysis. The cell cycle arrest happened in the G2/M phase of the cell. The cell inhibition and reducing the growth has happened due to the pre and anti- apoptotic. Based on the results it can concluded that the *Ficus religiosa* possess the anticancer activities³².

Tulasi, C. D. S. L. N., et al., (2018) concludes that *Ficus religiosa* possess the cytotoxic activity against the cell lines breast cancer cell line MCF-7. The activity was performed using MTT. The cell lines were grown in the 96 well plates for 24h and exposed with the test item for 24h at the different concentrations. The growth of the cells was analyzed by using MTT dye which gives a blue color formazan. The IC₅₀ value

was maximum in the ethanolic extract and lowest in the ethyl acetate extract. By the results it could be concluded that ethanolic extract of the *Ficus religiosa* could inhibit the cell growth by 50% at the dose of 101µg/ml³³.

Anti-inflammatory activity

Mamidiseti, Y. D., et al., (2018) concluded that the methanolic extract of the *Ficus religiosa* fruits possess the anti-inflammatory properties. The study was done in Wistar rats. Inflammation was induced by the carrageenan. The dose was administered at 200 and 400mg/kg per animal. The inflammation (paw edema) was induced by the single injection of the carrageenan. The evaluation parameter was assessed for the paw licking. Inflammation was considerably reduced in the high dose groups of animals. Histopathology also revealed that inflammatory cells were reduced at site of the injection. Similarly the experiment was performed for acetic acid induced writhing, the same doses were administered and result revealed that high dose was more pronounced as compared to other groups³⁴.

Similar study was performed by the Charde, R. M., et al., (2010), the ethanolic extract were administered in the animals. The

inflammation was induced in the animals by using the single injection of the carrageenan. The doses were administered at 200µg/ml to 1000 µg/ml. The paw licking activity was seen in the animals. The rates of the paw licking were reduced by 6-13% in test animals. These results were comparable with the standard drug Diclofenac³⁵.

Rathod, V. D., et al., (2018) were examined the anti-inflammatory activities of *Ficus religiosa*. In this study, ethanolic extracts was prepared and administered in the arthritis induced animals. The doses were given at 100, 200, and 400mg/kg for 21 days. Different parameters were assessed during the study to confirm the activity of the plant extract such as knee diameter, rota rod, arthritic score and body weight. Each parameter was evaluated once in a three days interval till the day of necropsy. The results showed that at the dose of 200 and 400mg/kg the activities were significantly enhanced and inflammation was reduced in all the animals. Blood parameter results revealed that RBA, WBC, ESR count and TNF-alpha level were reduced. Hence, it could be concluded that the *Ficus religiosa* could reduce the inflammation³⁶.

Conclusion

The literature review suggested that *Ficus religiosa* isn't an ordinary plant despite of being available at almost every region of the world. The phytochemicals screening reveled that due to the presence of the phytochemicals of almost every class could be interfering with pathophysiology of the disease and eradicating it. The class of chemicals such as Saponins, alkaloids, tannins, flavonoids are depicting the pronounced the ability of the plant in many diseases such as cancer, inflammation, fungus infection, diabetes etc. The future perspective of the research on this plant could be exploring the possibility of cell killing actions other than the breast cancer cell and tumor.

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