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A PHARMACEUTICAL AND PHARMACOLOGICAL STUDY OF *FICUS RELIGIOSA*: A SYSTEMATIC REVIEW

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Abstract

Ficus Religiosa is a perennial evergreen tree. It is belonging to moraceae family and In India its commonly known as Peepal tree, Bodhi tree. The tree is native of India. Peepal tree contains many major bioactive constituents which possess various pharmacological activity and also useful in the treatment of various diseases and disorders includes Diabetes, ulcer, cancer, epilepsy, skin diseases, flu and also possess many medicinal activity such as anti-inflammatory activity, analgesic activity, anti-acetyl cholinesterase activity, anti-helminthic activity and wound healing activity and also exhibits some other activity such as anti-bacterial, anti-fungal etc. All parts of tree (leaves, bark, fruit, root and flower) are useful for the preparation of many ayurvedic formulation and useful for making herbal remedies etc. which is useful for treat and cure various diseases. The tree product not causes any major or severe side effect. The main goal of this review/study was to discover or promote the knowledge about this multipurpose medicinal valued tree.

Keywords: *Ficus Religiosa*, Pharmacological Activities

Introduction

Ficus Religiosa is a multipurpose, evergreen medicinal valued tree. It is commonly known as Peepal , Pipul, Piplo, Jari, Pippala, Bodhi tree and Ashwatha etc. The tree belonging to Moraceae Family. It is widely distributed/found in India (North and east regions), Bangladesh, Pakistan, Nepal, Sri-lanka, china, Myanmar, Thailand, Vietnam, Iraq and mainly found in tropical and sub-tropical forest regions etc. Tree contains a height up to 4,990 ft long and life span time of tree is 900–1,500 years. It is a native of India and Peepal tree are grows in very large height or size, it contains a broad branches. Bark of the tree is brown in colour. Leaves of the tree are thin, shiny, and cordate/heart shaped and mature leaves possess dark green colour and

immature leaves are reddish pink in colour. Immature/unripe fruit of tree are green colour and mature (ripe) fruit of tree is blackish purple in colour ^{1, 2-7}. Peepal tree is a most common symbol of Happiness, prosperity (success), Longevity (durability/longl-asting), good luck.

In ancient time tree is also useful for its medicinal property because the plant contains many bioactive/ phytochemical constituents which possess various medicinal activity. It is also a rich source of nutrients (macro-nutrients, micro-nutrients), protein, carbohydrates, fats and minerals etc. and all parts (Bark. Leaves, root, fruit) of tree contains many major bioactive compounds such as:-

lanosterol, β –sitosterol, bergaptol, bergapten, steroids, flavonoids, alkaloids, phenolic compounds, campesterol, stigmasterol, isofucoesterol, tannins, arginine, serine, aspartic acid, glycine, threonine, alanine, proline, tryptophan, tyrosine, methionine, valine, isoleucine, asparagine, tyrosine, undecane, tridecane, tetradecane, ocimene, limonene, dendrolasine, flavonoids (kaempeferol, quercetin) etc due to the presence of these major bioactive chemical constituents the tree possess various major pharmacological activity such as anti-diabetic activity, anti-convulsant, anti-oxidant, anti-inflammatory, analgesic activity, wound healing, anti-microbial, anti-bacterial, anti-cholinergic activity, used as a anti-venom and also useful in the treatment of various diseases and disorders includes ulcers, skin diseases, epilepsy, Gastro Intestinal (GI) disorders, infectious and sexual disorders, gonorrhoea, amnesia, asthma, and the branches of the tree is used as a tooth brush etc ^{1,8-12}.

Peepal tree is a sacred/holy tree in Hindu myth/religions. In ancient or vedas times, peepal tree are useful in the treatment of many diseases and also useful in preparation of many ayurvedic, unani, homeopathic, allopathic formulations ^{10,13-19}.

Peepal tree is also useful for treat and cure many other diseases, Food poisoning, useful in the treatment of bone fracture, mouth ulcer and the juice of the tree is also taken for treat and cure various diseases such as asthma, coughing, dysentery and some other GI disorders.

Peepal stem extract is useful for treatment of various Urinary disorders and also GI disorders. In another studied shown that the dried powder of peepal fruit is useful in some respiratory disorders ^{2, 20,21}.

Numerous researchers studied shown that the Present time/currently the tree synthesized compounds are useful for the treatment of various diseases or maintenance of several disorders. And now also increasingly use of tree synthesized compounds and they do not cause any severe/major side effect ²²⁻²⁷.

Botanical/ Scientific description of *Ficus Religiosa* (2,28).

Category	Botanical description
Kingdom	Plantae
Subkingdom	Viridaeplantae
Phylum	Tracheophytes (vascular plant)
Division	Magnoliophyta (flowering plant)
Class	Magnoliopsida/ Dicotyledons
Order	Urticales
Genus	<i>Ficus</i>
Family	Moraceae
Tribe	Ficeae
Species	<i>Ficus Religiosa</i>

Vernacular Names of *Ficus Religiosa* (2,12).

Languages	Names
Indian	Peepal, Pupil
Canada	Arali, aswaththa, basari, ranji
English	Pipul, peepal tree
Gujrati	Piplo, pipul, jari
Arabic	Teen mukadas, teen asnam
Kashmiri	Bad
Italian	Fico del diavolo
Bengali	Aswaths, asud, aswat
Spanish	Higuera de agva
Chinese	Putishu
Marathi	Pimpal, ashvatha
Punjabi	Pipal
Telugu	Ravichettu
Sanskrit	Bodhivriksha, pippala, ashwatha
Urdu	Peepal
Malayalam	Arasu, arayal, thullal

Morphology of the plant parts of *Ficus Religiosa* (11, 29-31).

Tree parts morphological description are discussed in below:-

Part used: Bark, leaves, root, fruit, flowers.



Fig. 1:- Green leaf of *Ficus Religiosa*.

1(a):- Unripe Fruit and bark of *Ficus Religiosa*.

- 1) **Bark:-** *Ficus Religiosa* is a perennial, Semi-evergreen, broad leaved tree. It contains a height up to 30 m long with broad branches. And irregular shaped tree. Bark of the tree is brown or white in colour.
- 2) **Leaves:-** Leaves of the peepal tree are dark green in colour, shiny, thin and contains a 5 to 7 veins/line. It is Cordate (heart shaped) in shape which is 10-17 cm long and broad up to 5-10 cm, elongate tip and arranged in alternately, leather like texture/ wrinkled.
- 3) **Fruit:-** Fruit of the plant are little/small in size which contains ½ inch diameter, round/ring shaped and the immature/unripened fruit are green in colour but after sometimes fruit are ripened (mature) which is turned in to blackish purple in colour. Fruit are originate in summer season and ripened in rainy season.
- 4) **Flower:-** Flower of peepal tree is rounded in shape, smooth, unisexual. And the flower are the tree is sessile/fixed and globose figs, axillary. It is grow in pair under/below the leaves and commonly flowers are look like a berry. And the mature flower are purple in colour and contains small red dots.
- 5) **Flowering and fruiting period:-** Flowering period of plant is February month and the fully ripened fruiting period of tree is rainy season but occur in summer season.

Some Ayurvedic and Herbal Remedies/ Formulations of *Ficus Religiosa* and it's applications (2, 32-34).

In ancient times *Ficus Religiosa* is used in the preparation of many herbal and ayurvedic formulation which is useful for treat and cure many diseases and disorders such as:-

Ayurvedic Formulation:

- Nalpamardi thailam oil by Kerala Ayurveda, It's few drops apply on skin which is useful in the treatment of various skin diseases includes Dermatitis, scabies, eczema (Inflammation on skin), acne, urticarial/hives and also useful for removal of blemish skin (mark, spot in skin).
- Sarasa syrup by Imis Pharmaceuticals, two spoon of syrup is mixed with water and administered orally which is useful in the treatment of Dermatitis, itching, eczema and fungal infections and also used as blood purifier.
- Nyagrodhadi churna is ayurvedic medicine in powder form which is mixed with honey and administered orally for the treatment of urinary disorders, useful in the treatment of diabetes, etc.
- Panchavalkadi tailam oil by Arya Vaidya Pharmacy, it is skin care oil applied on skin. Which is useful for the treatment of Eczema, dermatitis (skin inflammation), and some other skin diseases, virus infection (herpes) etc.

Herbal formulations/Remedies^{2, 35-38}:

- Leaves extract of *ficus religiosa* is useful for treatment of Cardiac diseases and according to researchers studied, leaves of tree is bind/tie the bleeding wound area because the tree possess wound healing activity and also useful for stop bleeding. Powder of leaves mixed with sugar and fennel seed which is beneficial for constipation.

Another study shown that the Leaves of the tree is coated with ghee and heated which is applied/tied on infected area are used for treat and cure various skin infection and mumps/epidemic parotitis etc.

- Administration of the five leaves of tree with milk and jaggery which is beneficial for treat and cure flu and fever. And extract of leaves is mixed with sugar and water and taken two times a day for cure jaundice.
- Numerous studied shown that the extract of leaves (2 to 3 drops) are put in nostril for useful in treatment of various nasal infection and also useful for bleeding problems includes stop bleeding in nose.
- Leaves powder of *ficus religiosa* are mixed with sesame oil, its possess pain relief activity such as useful in treatment of ear pain.
- In ancient time, The twigs/stem of the tree is used as tooth brush. It provides gum strengthen and the plant possess antibacterial property which is used as a anti-bacterial agent. The bark paste of tree is

mixed with honey which is used as a facepack for skin because the plant possess anti-bacterial property

and useful for the treatment of skin diseases and commonly its provide a freshness in face.

Pharmacological activity of *Ficus Religiosa*

Ficus Religiosa tree possess various pharmacological activity and the bark. Leaves, fruit, flower, root and latex all parts of tree are useful in the treatment of various diseases and used in traditionally and ethanobotanically etc. It is also used in combination with other compounds/plant extract^{39, 40, 41}. Various pharmacological activity of tree discussed in below:

***Ficus Religiosa* possess anti-diabetic activity^{44,42-43}**

According to several researchers reports the bark of the tree possess anti-diabetic activity. In evaluation of study shown that the orally taken of bark extract of tree at proper dose level (25mg/kg, 50mg/kg, 100mg/kg) streptozotocin (STZ) induced diabetes in rat.

After the administration of extract they observed that the significantly decrease the level of glucose in rat model and induce insulin level in liver and also useful for decrease the triglyceride level and cholesterol level because the plant also possess hypolipidaemic activity. Hence, the studied proved that the plant possess hypoglycaemic activity.

Anti-inflammatory Activity of *Ficus Religiosa*^{45-47, 48}

The bark extract (methanolic) of tree possess anti-inflammatory activity and also possess analgesic activity. In evaluation of study shown that methanolic extract of *ficus religiosa* administered at proper dose level (125mg/kg, 250mg/kg, 500mg/kg) in carrageenan induced paw edema in animal model. They shown significantly reduction of paw volume and reduce inflammation in animal model.

Analgesic Activity of *Ficus Religiosa*^{45, 48-50}

Numerous research reports shown that the methanolic extract of bark of peepal possess analgesic activity. In investigation of studied they shown that the analgesic activity is induced by writhing test (It is a chemical method test is used to induce a pain in animal model) using acetic acid in rat. And after this process the orally administration of extract at adequate dose level (125mg/kg, 250mg/kg, 500mg/kg) and at 250mg/kg the extract shown analgesic activity which is similar to indomethacin and aspirin (analgesic activity possess drug).

***Ficus Religiosa* possess anti-convulsant activity**^{31,51,52}

In evaluation of studied shown that the leaves extract of tree possess anti-convulsant effect. The convulsion is induced by pentylenetetrazol (PTZ) in animal model and the administration of extract in animal before 30 minutes to Pentylenetetrazol induced convulsion and after the induction of PTZ in model they found that the extract possess 80 to 100% beneficial effect against convulsion and protect seizure. Hence, the study proved that the plant possess anti-convulsion effect.

Wound healing effect of *Ficus Religiosa*^{31,18}

The hydro alcoholic extract of tree possess wound healing activity In investigation of studied found that though incision, cuts and burn or wounds are induced in rat model and the hydro alcoholic extract of tree is applied on the wound/ Infected area as a ointment and after sometimes the studied shown that that the reduction of wounds or inflammation in affected area or improve the wounds in rat model. This study proved that the plant possess wound healing activity.

Tree possess inhibitory activity against acetyl-cholinesterase^{44,53}

Ficus religiosa bark extract (methanolic) possess anti-acetyl cholinesterase activity. It is also used in treatment of Alzheimer disease because it inhibit the activity of acetyl cholinesterase enzyme (AChE) (It is a enzyme that catalyze the breakdown of acetylcholine neurotransmitter). Hence, the extract of stem useful in the treatment of Alzheimer disease.

***Ficus Religiosa* possess Anti-tumor Activity**⁴⁴

Ficus Religiosa is useful in the treatment of cancer because the tree parts possess many bioactive constituents due to the presence of various bioactive constituent the plant possess anti-cancer/tumor activity. In the investigation of studied shown that the powder bark (1 to 3 gm) or extract (60-120ml) of *ficus religiosa* tree possess anti-cancer activity.

Tree possess anti-helminthic (anti-parasitic) activity^{22, 54}

Numerous studied shown that the tree possess anti-helminthic activity. In evaluation of study found that the methanolic extract of bark of tree administered in sheep model and using a haemonchus contortus (parasitic worm, also known as barber's pole worm) for gastro Intestinal(GI) Infection. After the administration of extract they shown the bark extract of tree possess anti-helminthic activity and the extract is also useful for treat the human and animal for inhibit the parasitic worm infection any other GI infection.

Another study shown that the fruit aqueous extract of *Ficus religiosa* possess potent anti-helminthic effect against *Pheretima posthuma* (earth worm, mainly found in new guinea pig) and the extract of the bark of this plant possess very harmful/ fatal effect against many parasitic worm includes *Ascaridia galli* (parasitic round worm) etc

Anti-ulcer Activity of *Ficus Religiosa*³¹

The bark ethanolic extract of this tree possess anti-ulcer effect. In evaluation of anti-ulcer activity using in vivo process through administration of bark ethanolic extract at proper dose level (100mg/kg,200mg/kg, 400mg/kg) and the Gastric ulcer is induced by indomethacin and cold restraint stress. And after some time they shown the bark extract possess significant effect against gastric ulcer and decrease the level of gastric ulcer index. And another studied shown that the tree hydro-alcoholic extract also possess inhibitory activity against gastric ulcer in animal model and the ulcer is induced by pylorus ligation, ethanol and aspirin. And after the administration of extract they found that the tree significantly reduces the ulcer activity and decrease level of ulcer index.

Anti-bacterial effect of *Ficus Religiosa*³¹

Ficus Religiosa possess inhibitory activity against many bacteria includes *Salmonella paratyphi*, *Staphylococcus aureus*, *Shigella dysenteriae*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Escherichia coli* (*E.coli*). In Evaluation of studied shown that the aqueous and ethanol extract of leaves of *Ficus Religiosa* possess anti-bacterial activity. And chloroform extract of leaves also possess potent anti-bacterial activity against many bacteria.

Anti-microbial activity of *Ficus Religiosa*³¹

Numerous studied shown that the tree also possess anti microbial activity against many microbes such as *Azobacter chroococcum*, *Bacillus megaterium* (rod like, gram positive bacteria), *B. cereus* (gram positive bacteria), *Streptomycin lactis*, *Streptococcus faecalis*, *Klebsiella pneumonia* etc. In investigation of study found that the fruits chloroform extract possess anti microbial activity.

Anti-fungal Activity of *Ficus Religiosa*^{31,54,16}

Tree possess inhibitory activity against many fungus includes *Candida albicans* (cause fungal infection), *aspergillus niger*, etc. In studied found that the the ethanolic extract of leaves possess potent anti-fungal activity.

Conclusion

The present review/study describes that the *Ficus religiosa* play a major role for improving the health of humans and also useful for treat and cure various diseases and disorder, possess different beneficial activity. This tree has an important place among herbal plants. This review mainly reveals that the plant possess many phyto-chemical constituents and also in rich source of nutrient, vitamin, minerals due to the presence of major bioactive constituent it is useful for the treatment of various diseases and possess many medicinal activity such as anticonvulsant activity, antioxidant activity, anti-cancer activity, hypoglycemic, hypocholesterolemic activity, anti-helmintic activity, wound healing activity and anti-bacterial, anti-fungal activity etc. And all parts of plant also useful for the preparation of many ayurvedic and herbal formulations etc.

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