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**Chemical Compounds and Biological Potentials of *Ficus religiosa* Linn: A review**

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| **Abstract** |
| *Ficus religiosa* is a medicinal plant from Moraceae family. The applications of the green nanotechnology using *F. religiosa* proved that the phytochemical analysis of plant extracts proved the presence of flavonoids, tannins, phenoids, alkaloids, saponins and terpenoids. It has several medicinal potentials as antidiabetic, anticancer, antiulcer, anticonvulsant, antioxidant, nootropic and wound healing activities.**Keywords:** *Ficus religiosa*, plants, chemical compounds, bioactivities. |
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**1. Introduction**

Medicinal plants have been used an exemplary source for centuries as an alternative remedy for treating human diseases because they contain numerous active constituents of therapeutic value [1]. The potential of higher plants as source for new drugs is still largely unexplored. Thus, any phytochemical investigation of a given plant will reveal only a very narrow spectrum of its constituents. Plants are important source of potentially useful structures for the development of new chemotherapeutic agents [1]. There are more than 800 species and 2000 varieties of Ficus genus, most of which are native to old world tropics. *Ficus benghalensis* (Banyan tree), *Ficus religiosa* (Pipal tree) and *Ficus carica* (Anjir tree) are some of the commonly occurring trees of this genus belonging to family Moraceae [2]. *Ficus religiosa* Linn is a large perennial tree from Moraceae family and it is found throughout India. It is used traditionally in the treatment of asthma, diabetes, epilepsy, cancer, hyperlipidemia, inflammatory disorders, and infectious disorders. The different parts of the *F. religiosa* species tree namely bark, fruits, leaves, seeds and latex are used as chief indigenous medicines to cure various ailments. Traditionally the bark is used as an antibacterial, antiprotozoal, antiviral, astringent, antidiarrhoeal, in the treatment of gonorrhea, ulcers, and the leaves used for skin diseases. The leaves reported antivenom activity and regulates the menstrual cycle [3, 4]. It also has been used in the treatment of various diseases such as cancer, inflammation, or infectious diseases and high fever [5]. Fruits are used as laxatives, latex is used as a tonic, and fruit powder is used to treat asthma [6-8]. This review discovered the chemical compounds and bioactivities of *Ficus religiosa* plant.

2. Chemical compounds

2.1 The bark Constituents

The bark has lanosterol, β-sitosteryl-Dglucoside, bergapten, bergaptol and stigmasterol have been isolated from the petroleum ether and alcoholic extracts of the bark of *F. religiosa* [9-11]. *F. religiosa* bark has around 8.7% of total tannin content [12]. Phenolic components, acid detergent fiber (ADF), neutral detergent fiber (NDF), acid detergent lignin (ADL) and saponins have been identified in the inner bark of *F. religiosa* [13]. The bark has tannin, wax, saponin, leucocyanidin- 3-0-β-D glucopyrancoside, leucopelargonidin- 3-0-β-Dglucopyranoside, leucopelargonidin-3-0-α- Lrhamnopyranoside, lupeol, ceryl behenate, lupeol acetate, α-amyrin acetate, leucoanthocyanidin and leucoanthocyanin [14].

2.2 The seeds Constituents

The seeds have phytosterolin, β-sitosterol, and its glycoside, albuminoids, carbohydrate, fatty matter, coloring matter, caoutchoue 0.7–5.1% [15- 17].

2.3 The leaves Constituents

Leaves yield campestrol, stigmasterol, isofucosterol, α-amyrin, lupeol, tannic acid, arginine, serine, aspartic acid, glycine, threonine, alanine, proline, tryptophan, tryosine, methionine, valine, isoleucine, leucine, nnonacosane, n-hentricontanen, hexa-cosanol and n-octacosan [15-17].

3. Biological activities

3.1 Anti-inflammatory and analgesic Effects

Antiinflammatory effect was evaluated using carrageenan-induced paw edema and analgesic activity by acetic acid-induced writhing test. Treatment with the extract (125, 250 and 500 mg/kg; p.o.) decreased the paw volume and number of writhings in carrageenan-induced paw edema and acetic acid-induced writhing test, respectively. Anti-inflammatory and analgesic effect of the extract at 250 mg/kg dose was found to be equipotent to indomethacin (5 mg/kg) and aspirin (100 mg/kg) [18].

3.2 Immunomodulatory Effect

The alcoholic extract of the of *F. religiosa* bark proved the immunomodulatory effect in experimental rats. Sheep red blood cells were injected as an anti-genic material to sensitize the mice. Both cellular and humoral anti-body responses are ameliorated by the administration of extracts. The immune-stimulant properties are responsible for its immune-modulatory activity [19].

3.3 Anti-ulcer Activity

*F. religiosa* leaves ethanolic extract proved anti-ulcer activity. When compared to the rats treated with the standard drug ranitidine, and there is no drastic change in the gastric secretion volume of the animals treated with *F. religiosa* leaf extract 500 mg/kg. When examined through microscope, the stomachs of animals showed complete ulceration when not treated with either ranitidine or *F. religiosa*. Ranitidine is used to treat the animals, 250 mg/kg and 500 mg/kg ethanolic extract of *F. religiosa* showed a preventive effect against ulceration. The leaf extract *F. religiosa* have substantial anti-ulcer activity in animal models. The extract is not toxic even at moderate high concentrations. The phytochemical investigation of methanolic extracts proved the presence of flavonoids and these flavonoids are responsible for the anti-ulcer activity. The plant extract also inhibits the activity of hydrazine, an evident compound that plays a key role in induced liver damage in rats, which result in higher rate of inhibition of biliary secretion and an increase in liver cell lipid peroxidation, and cytochrome P450 [20, 21].

3.3 Anti-oxidant Effect

The anti-oxidative effect of *F. religiosa* bark and fruit extracts was proved by using different solvents. In diabetic rats, the oxidative stress harmonizes the reduction of anti-oxidant status, and increases the toxicity in free radicals. When the type 2 diabetes rats are treated with the aqueous extract of *F. religiosa*, it was found that the oxidative stress was reduced. Not only had that, during the progression of development when compared to the normal rats, the type 2 diabetes rats showed less weight. The weight loss is due to the less usage of glucose and induced β-oxidation in the adipose tissue. The aqueous extract of *F. religiosa* increases the body weight of diabetic rats [22]. The aqueous extract of *F. religiosa* modifies the superoxide dismutase (SOD) activities and minimizes the catalase (CAT) activity. This is conceivable due to less accessibility of NADPH. The action of the catalase and glutathione peroxidase (GSH-Px) is upregulated by the aqueous extract of *F. religiosa* bark [23]. The nitric oxide production and pro-inflammatory cytokines in lipopolysaccharide (LPS) are inhibited by the methanolic extract of *F. religiosa* leaf. The strong anti-inflammatory properties in microglial activation are carried out by the extract. It is expected that extract has inflammatory mediators like cytokines and nitric oxide that act as a neuroprotective effect against inflammation [24]. Also, neurotrophic effects and acetyl- cholinesterase inhibitory activity were affected by the methanolic extract of *F. religiosa* [25].

3.4 Anti-convulsant Effect

The anti-convulsant activity against picrotoxin-induced convulsions and maximum electroshock (MES) with no neurotoxic effect depends on the dosage of the methanolic extract of fruits of *F. religiosa*. A major protection in picrotoxin-induced convulsion and MES models are studied by the dosage of *F. religiosa* extract. When the mice were treated with the doses (25, 50, and 100 mg/kg) in MES model, they showed a substantial reduction in the period taken for the extension of hind limbs, when compared to control group. The anti-convulsant activity of the extract is similar to that of the phenytoin-treated group. Though a substantial increase in the dormancy is observed in the 50 and 100 mg/kg dose of the extract it is lesser when compared to that of the control group. The extract mediates its consequences through glutamergic neurotransmission, due to the anti-epileptic inhibition effect of extract by cyproheptadine treatment.

3.5 Anthelmintic Effect

*Haemonchus contortus* worms are highly lethal to a methanolic extract of *F. religiosa* bark. The *Ascaridi agalliin* *in vitro* are killed by the bark and stem extracts of *F. religiosa*. The latex of *F. religiosa* has anthelmintic activity against *Syphacia obvelata*, *Aspiculuris tetraptera*, and *Vampirolepis nana* [26].

4. Conclusion

This present review mentioned the phytochemical and pharmacology properties of *Ficus religiosa* (Moraceae). *F. religiosa* is a good source of traditional medicine for the treatment of asthma, diabetes, epilepsy, cancer, hyperlipidemia, inflammatory disorders, and infectious disorders. Most of the mentioned pharmacological studies were aimed on validating its traditional uses. The medicinal value of this plant in the treatment of a large number of human ailments is mentioned in Ayurved.

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