

ANTI-INFLAMMATORY AND MAST CELL PROTECTIVE EFFECT OF FICUS RELIGIOSA

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ABSTRACT: *The aqueous extract of bark of Ficus religiosa was prepared and investigated for its anti-inflammatory effect and for its protective effect on mast cells against degranulation. A significant anti-inflammatory effect was observed in both acute and chronic models of inflammation. The extract also protected mast cells from degranulation induced by various degranulators. The observed anti-inflammatory and mast cell protective effect may be responsible for the beneficial effect of Ficus religiosa in kumkum dermatitis and other inflammatory conditions.*

INTRODUCTION

Ficus religiosa, the sacred peepul tree is found wild and also cultivated all over India. Various parts of this plant, like bark, fruit and seeds are used widely in indigenous systems of medicine. The bark is used externally in various skin lesions like eczema. The powdered bark is used in cases of anal fistula and inflammatory swellings. It is also sprinkled over ulcers and wounds¹.

Few reports are available on the pharmacological actions of this plant. The aqueous solution of the alcoholic extract of the bark of *Ficus religiosa* was reported to have anticholinergic effect in various experimental models². The alcoholic extract was also found to protect guinea pigs against acetylcholine and histamine induced asthma.

In recent study, the bark of *Ficus religiosa* was found to be very effective in kumkum dermatitis³. All the above reports indicate a potential anti-inflammatory effect for *Ficus*

religiosa. To investigate this possibility in detail, the aqueous extract of *Ficus religiosa* was screened for its anti-inflammatory effect in acute and chronic models of inflammation. In addition, the effect of *Ficus religiosa* on mast cell degranulation was also studied.

MATERIALS AND METHODS

Preparation of aqueous extract of *Ficus religiosa*

Dried bark of *Ficus religiosa* was powdered and extracted with water in a Soxhlet extractor. The water extract was concentrated in a flash evaporator. The dried extract was used for pharmacological investigation.

Animals

Male albino rats (120 – 150 g) were used for the study.

Anti-inflammatory study

Acute inflammation (Carrageenin induced hind paw edema⁴).

Paw edema was induced in rats by injecting 0.1 ml of Carrageenin (1% solution) into the planter surface of the right hind limb. 0.1 ml saline was injected into the other hind limb. The animals were treated with different doses (25, 50 and 100 mg | kg; s.c) of *Ficus religiosa* extract, thirty minutes prior to Carrageenin injection. Another group of animals received phenylbutazone 100 mg | kg; s.c. The paw volume was measured plethysmographically 5 hours after Carrageenin injection. A significant reduction in the paw volume, compared to control animals was considered as anti-inflammatory effect.

Chronic inflammation: (Cotton pellet implantation⁵).

Sterile cotton pellets (10 mg) were implanted s.c. in rats under light ether anaesthesia. The animals were treated with three different doses of (50,100 and 200 mg | kg; s.c.) of aqueous extract of *Ficus religiosa* for seven days. On the eighth day the animals were sacrificed and the cotton pellets along with the granulomatous tissue were removed, dried at 50°C for 12 h. and weighed. The increase in weight over the

initial weight was recorded. A separate group of animals was treated with phenylbutazone (100 mg | kg).

Mast cell degranulation

In vitro test for mast cell degranulation was carried out by the method of Kaley and Weiner⁶. Male albino rats were sacrificed, the mesentery was carefully removed, and cut into small bits. These bits were incubated for 5 minutes in tyrode solution containing different concentration (1, 10 and 100 µ g | ml) of *Ficus religiosa* extract. Mast cell degranulating substances like propranolol (50 µ g | ml) and Carbachol (10 µ g | ml) were added to the incubates and the bits were removed after ten minutes. They were carefully spread over glass slides and stained with 1% toluidine blue. Mast cells were counted in five different fields at random under high power objective field. The percentage of degranulated cells was calculated in each treatment group. Disodium Cromoglycate (DSCG) a known mast cell stabiliser was included in the study for comparison.

Statistics

All the results were analysed using students 't' test.

Anti-inflammatory Study

Treatment with aqueous extract of *Ficus religiosa*, significantly reduced the volume of paw edema in rats (Table 1).

TABLE 1
Effect of *Ficus religiosa* on paw edema

Treatment (mg / kg)	Vol .of paw edema (ml)
Control	0.8 ± 0.1
<i>Ficus religiosa</i>	
25	0.6 ± 0.1
50	0.5 ± 0.12 *
100	0.22 ± 0.08 *
Phenylbutazone 100	0.25 ± 0.05 *

Each value represents the mean ± SEM of six experiments

*P < 0.01 Compared to control value.

The reduction was dose dependent as evident from the table.

religiosa treatment (Table 2). The effect of 200 mg. dose of *Ficus religiosa* was comparable to that of phenylbutazone.

A dose dependent reduction in the weight of the cotton pellets was observed after *Ficus*

TABLE 2
Effect of *Ficus religiosa* on Cotton pellet granuloma

Treatment (mg / kg)	Wt. of Cotton Pellet (mg)
Control	49.6 ± 2.4
<i>Ficus religiosa</i>	
50	41.8 ± 1.9
100	34.4 ± 2.2 *
200	26.2 ± 1.7 *
Phenylbutazone 100	22.6 ± 1.2 *

Each value represents the mean ± SEM of six experiments

*P < 0.01 Compared to control value.

Effect on Mast cell degranulation

Propranolol (20 µ g | ml) and Carbachol (10 µ g | ml) produced 59.3% and 62%

degranulation of rat mesenteric mast cells respectively. Pretreatment with *Ficus*

Ficus religiosa significantly reduced the percentage of degranulation induced by either propranolol or Carbachol (Table 3).

TABLE 3
Mast cell studies on *Ficus religiosa*

Treatment (μ g/ml)	Percentage Degranulated Mast cells		
	In the absence of degranulator	In the presence of propranolol (20 μ g/ml)	Degranulators Carbachol (10 μ g/ml)
Saline	21.1 \pm 2.2	59.3 \pm 1.7	62.1 \pm 1.0
<i>Ficus religiosa</i>			
1	24.2 \pm 1.5	32.1 \pm 2.1 @	36.4 \pm 2.5 @
10	22.3 \pm 1.7	19.2 \pm 1.8 @	26.0 \pm 1.6 @
100	18.1 \pm 3.2	18.7 \pm 2.1 @	24.2 \pm 1.2 @
D.S.C.G. 10	18.2 \pm 1.3	23.5 \pm 1.7 @	17.8 \pm 1.9 @

Each value represents the mean \pm SEM of six experiments
@ P < 0.01 compared to degranulator treatment alone.

DISCUSSION

In spite of the wide distribution of the plant *Ficus religiosa* only very few reports are available on the pharmacological actions of this plant. The usefulness of *Ficus religiosa* in many inflammatory and allergic conditions is suggested in Indian system of medicine. The results of the present study showed a significant reduction in paw edema volume and decreased weight of cotton pellet granuloma after *Ficus religiosa* treatment, suggesting a potential anti-inflammatory effect in both acute and chronic inflammation. Moreover, *Ficus religiosa* protected the most cells against

degranulation. It is well known that, degranulation of mast cells will result in the release of several mediators like histamine, which are implicated in inflammation and allergy.

In an earlier study³, *Ficus religiosa* was shown to be very effective in dermatitis resulting from kumkum (bindhi) application. The protective effect on mast cells and the anti-inflammatory effect may be responsible for the beneficial effect observed in kumkum dermatitis and other inflammatory conditions.

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