

ANTI-INFLAMMATORY ACTIVITY AND PHARMACOGONOSTICAL STUDY OF
FICUS ARNOTTIANA (MIQ) LEAVES EXTRACT

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ABSTRACT

Different species of *Ficus* have been studied for the anti-inflammatory activity. In spite of being one of the well-known medicinal plants used in Indian traditional medicine to treat several ailments, studies pertaining to the pharmacological properties of *Ficus arnottiana* are very scarce. The aim of this study was to evaluate, experimentally, the anti-inflammatory effect of ethanolic extract of the leaves of *F. arnottiana* in carragenan induced paw edema in rats at a dose level of 100, 200 and 300 mg/kg, orally. The extract was administered for the anti-inflammatory activity 1 h prior to carragenan injection in the sub plantar region. Paw edema was measured by plethysmometer on 1st and 3rd h, after carragenan injection. The extracts at all the doses significantly prevented the inflammation in dose dependent manner which was comparable to that of Diclofenac Sodium (5 mg/kg, intraperitoneal). Our results showed that *F. arnottiana* ethanolic extract could prevent inflammation in rats in a dose-dependent manner. The extract did not show any acute toxicity even at the dose of 5000 mg/kg indicating that the extract has no lethal effect. Preliminary phytochemical screening of this extract identified the presence of important secondary metabolites like flavonoids and tannins.

KEYWORDS: *Ficus arnottiana*, Anti inflammation, Pharmacogonosy, Flavonoids.

INTRODUCTION

Ficus arnottiana commonly known as paras peepal in india. It is an important traditional medicinal plant distributed throughout Indian mostly in rocky hills of 1,350 m elevations. It has several vernacular names such as *paras papal*, *beliya neem*, *kamru*. The bark and the leaves of the plants have been used for traditions in the folk and ancient preparations. It has been an oldest and well known plant of medicinal uses in India and have been found in the region of Madhya Pradesh that is Satpura and Vindhya, in Uttaranchal, Himachal Pradesh and various other parts of Indian sub continents¹⁻⁵. The plant extracts have been evaluated for hyperglycemic, antioxidant and ulcer protective activity^{6,7}. The plant has demonstrated positive results in the above screening performed. The present study is to evaluate the anti-inflammatory activity and describe the detail pharmacognosy of the plant.

Taxonomy

Domain: Eukaryote
Kingdom: Planate
Subkingdom: Viridiplantae
Class: Magnoliopsida Dicotyledons
Subclass: Dilleniidae
Superorder: Urticales
Order: Urticales
Family: Moraceae
Genus: *Ficus*
Botanical name: *Ficus arnottiana* Miq

Pharmacological Discription

Macroscopic

Drug is in cut pieces with or without bark of varying size, 0.5 to 2.0 cm in thickness, external surface brownish in color and slightly rough due to exfoliation of cork, cut surface, yellowish - brown in color. Fracture, fibrous, odour and taste not characteristic^{1,5,7}.

Microscopic

Transverse section of root shows thick cuticle, single layered epidermis, cells rectangular followed by 3 or 4 layers of cork cells; cork cambium 2 to 4 layered; secondary cortex wide consisting of rectangular to polygonal thin walled pitted cells, some filled with reddish-brown substance, circular to elongated, lignified, elliptical stone cells, a few showing concentric striations present in this region, a few prismatic crystals of calcium oxalate

and abundant round to oval starch grains up to about 12 μ present in cortical cells, endodermis and pericycle not distinct, secondary phloem shows a wide zone consisting of sieve tubes, companion cells, fibers and ray cells starch grains, latticiferous cells also present in this region, fibers non-lignified, thick walled with narrow lumen; secondary xylem elements thick walled and lignified, vessels and tracheids show bordered pits, medullary rays uni to multiseriate, wide towards peripheral region¹⁻⁴.

Traditional uses

The leaves of the plant are used for controlling fertility. Bark of the plant is used as astringent, aphrodisiac, demulcent depurative and emollients. It is also useful in inflammation, diarrhea, and diabetes, burning sensation, leprosy, scabies, wounds and skin diseases, ulcer protective^{1,2,8}.

PHYTOCHEMICAL PROPERTIES

The phytochemical study of *Ficus arnottiana* leaves was subjected to the preliminary phytochemical screening as per standard procedures¹⁰.

MATERIAL AND METHODS

Plant material and Preparation of Herbal Extract

Ficus arnottiana fresh leaves were collected from the area of mandideep that falls in Raisen district of Madhya Pradesh. Initially these leaves were washed with fresh water to remove adhering dirt and foreign particles and were allowed to dry in shed. The dried leaves were crushed and grinded to get powder and weighed. The weighed powder was then placed with ethanolic solution in a cylinder. 500g of *Ficus arnottiana* powder in 1.0 liter of ethanolic solution were macerated for 7 days. The mensturm was removed and concentrated by vaccum distillation. Again the crude material was allowed to undergo maceration for 4 days followed by 2 days for complete extraction. The mensturm was collected and concentrated by vaccum distillation and then air dried in an evaporating dish till constant weight was obtained. The percent yield of *Ficus arnottiana* leaf extract is 26.52 %.

Animals

In the present study male Wistar rats (150-200g) were used for the study. They were individually housed and maintained on normal standard diet and water *ad libitum*. Temperature was maintained at 23 \pm 1 $^{\circ}$ C with 12hr light and dark cycle.

Acute toxicity studies

Acute toxicity studies were carried out on Swiss albino mice. Active extract at doses of 100, 300, 500, 1000 and 3000 mg/kg was administered to five groups of mice, each group containing 6 animals. After administration of extracts the animals were observed for the first 3h for any toxic symptoms followed by observation at regular intervals for 24 h up to 7 days. At the end of study the animals were also observed for general organ toxicity, morphological behavior and mortality¹¹.

Anti-inflammatory Study and group treatment

Sprague Dawley rats (220-225 g) of either sex were divided into five different groups containing 5 animals each. Group I received 0.1 ml of normal saline (in the sub plantar region) while group II, III, IV and V received 0.1 ml of 1%, w/v carragenan (in the sub plantar region). During the treatment, group II received vehicle of the extract (5 ml/ kg, 0.1% Na-CMC, orally), while group III, IV and V received *Ficus arnottiana* extract (100, 200 and 300 mg/kg, orally). Group VI was administered Diclofenac Sodium (5 mg/kg, intraperitoneal) as standard anti-inflammatory agent. The vehicle, extracts and Diclofenac Sodium were administered 1 h before carragenan administration.

Assessment of the anti-inflammatory activity in carragenan induced paw edema

The increase in the paw volume was recorded on plethysmometer at 1st and 3rd h after administration of carragenan. The results are expressed in terms of mean increase in paw volume at 1st and 3rd h and anti-inflammatory activity was expressed in terms of percent inhibition of paw edema at 3rd h¹².

RESULTS**Phytochemical screening**

After phytochemical investigation it was found that extract of the leaves of *ficus arnottiana* showed the presence of sterols, carbohydrates, phenols, alkaloids and tannins.

Assessment of anti-inflammatory activity

One way ANOVA revealed a significant ($p < 0.0001$) influence of FBE on the carragenan induced inflammation in rat paw. Post hoc Dunnett test indicated that the dose of 100 mg/kg produced significantly less effect while higher doses 200 and 300 mg/kg produced maximum effect when compared to vehicle. This effect of FBE was comparable to that of Diclofenac Sodium, a standard anti-inflammatory agent

Table 1: Assessment of the anti-inflammatory activity of *Ficus arnottiana* in carragenan induced paw edema

Treatment	Dose (mg/kg)	Mean increase in paw volume		Percent inhibition of paw edema at 3 rd hr
		1hr	3hr	
Vehicle	–	0.70 ± 0.02	0.73 ± 0.04	–
FAS	100	0.55 ± 0.02*	0.50 ± 0.008*	31.50
FBS	200	0.36 ± 0.01#	0.32 ± 0.002#	56.16
FBS	300	0.28 ± 0.006@	0.22 ± 0.01@	69.86
DSD	5	0.22 ± 0.01@	0.20 ± 0.02@	72.60

FAS- *ficus arnottiana* extract, DSD- Diclofenac sodium.

Each value is presented as mean ± SEM ($n = 5$ rats; one-way ANOVA followed by Post hoc Dunnett test). * $p < 0.05$, # $p < 0.05$, @ $p < 0.05$ compared with the vehicle.

DISCUSSION AND CONCLUSION

The results of the present study showed that *Ficus arnottiana* treatment prevented carragenan induced inflammation and development of edema in rat paw. This effect of *Ficus arnottiana* was very much comparable to that of Diclofenac sodium. Since, *Ficus arnottiana* exhibited its anti-inflammatory effect at both 1st and 3rd h, it is possible that *Ficus arnottiana* might be influencing both the stages of inflammation i.e. release of histamine at 1st h and release of bradykinin and prostaglandins and other inflammatory mediators at 3rd h after administration of carragenan. The phytochemical screening of *Ficus arnottiana* has shown that it contained flavonoids, terpenes and tannins. It has been reported that the bark contain flavonoid called ficanone responsible for the antioxidant and hyperglycemic activity. The studies conducted on the plant yet relive that there is much more to evaluate for it. Systematic study related to other models of evaluation should be performed.

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