



# International Journal of Pharmaceutical Erudition

Research for Present and Next Generation

**MAY 2019**

Vol: 09 Issue:1  
(26-32)





## Research Paper

# ANTI-INFLAMMATORY ACTIVITY OF HYDROALCOHOLIC EXTRACT OF BOMBEX CEIBA

**Chawala Ravi and Sharma Yogesh**

Jaipur College Of Pharmacy, Jaipur, Rajasthan 302022

The aim of the present study was to explore the probable anti-inflammatory activity of hydro alcoholic extract of Bombex Ceiba rats. rats were treated orally with normal saline (as control group) and Bombex Ceiba extract (200 and 400 mg/kg), 60 min before 0.1 mL 1% carrageenan injection. Paw volume was measured before and 1, 2, and 3 h after the injection of carrageenan. The results were expressed as the Mean  $\pm$ SEM and the statistical significance of differences between groups was analyzed by One Way Analysis of Variance (ANOVA) followed by Dunnett's test. The sub plantar injection of carrageenan caused a time-dependent paw edema in the mice. Oral administration of Bombex Ceiba extract (200 and 400 mg/kg) inhibited paw swelling dose-dependently at 1, 2, and 3, h after Carrageenan injection. We can conclude from the outcome of the present work that Bombex Ceiba extract exert an excellent anti-inflammatory effect in the rat.

**Keywords:** Bombex Ceiba , Anti-inflammatory, Carrageenan, Ibuprofen, hydro alcoholic extract

## INTRODUCTION

Medicinal plants constitute a source of raw materials for both traditional systems of medicine (e.g. Ayurvedic, Chinese, Unani, Homeopathy, and Siddha) and modern medicine. Nowadays, plant materials are employed throughout the industrialized and developing world as home remedies, over-the-counter drugs, and ingredients for the pharmaceutical industry. As such, they represent a substantial proportion of the global drug market. Most rural populations, especially in the developing world, depend on medicinal herbs as their main source of primary health care. Although most medicinal herbs are not, in their natural state, fit for administration, preparations suitable for administration are made according to pharmacopeia directions. The therapeutic potential of a herbal drugs depends on its form: whether parts of a plant, or simple extracts, or isolated active constituents. Herbal remedies consist of portions of plants or unpurified plant extracts containing several constituents, which often work together synergistically.<sup>1</sup>

Inflammation is defined as the local response of living mammalian tissues to injury due to any agent. It is a body defence reaction in order to eliminate or limit the spread of injurious agent, followed by removal of the necroses cells and tissues.

Agents causing inflammation may be as under:

1. Infective agents like bacteria, viruses, and their toxins, fungi, parasites.
2. Immunological agents like cell mediated and antigen antibody reactions.
3. Physical agents like heat, cold, radiation, mechanical trauma.
4. Chemical agents like organic and inorganic poisons.
5. Inert materials such as foreign bodies.<sup>2</sup>

Inflammation is characterized in acute phase by increased blood flow and vascular permeability along with the accumulation of fluid, leukocytes and inflammatory mediators such as cytokines. In the sub acute/chronic phase it is characterized by the



Figure-1 *Bombex ceiba*

development of specific humoral and cellular immune responses to pathogens present at the site of tissue injury.<sup>3</sup>

*Bombax ceiba* is literally known as “cotton-tree flowers” in China. It is also the official flower of Canton, the capital of Guangdong Province in southern China. With some trees flowering from late February to early May. Fruiting can start as early as March. At the peak of its flowering season, elderly people could often be found picking flowers off the ground to dry, which later could be used to make a type of tea or soup. The flowers are very attractive to local wildlife, with many birds like the Japanese white-eye, a type of fruit eating bird, which often draws a hole in an unopened *Bombax ceiba* flower bud. Honey bees, and bumble bees also attracted to the flowers to collect pollen and nectar.

Because the flowers attract many insects, crab spiders can be occasionally found on a fully opened flower, hunting bees.

### Material and methods

#### Plant material and Authentication

The fresh leaves of *Bombax ceiba* plant was collected from Jaipur, Rajasthan, India. The plant was authenticated and a specimen sample of the same was preserved in the herbarium section of the Rajasthan University. Initially leaves were washed with fresh water to remove adhering dirt and foreign particles and dried at 35 - 40°C in an oven. The dried bark was crushed and grinded to get powder and weighed. The weighed powder was then used for extraction procedure.

#### Preparation of Herbal Extract



The leaves of *Bombex Ceiba* were shade dried and powdered. Subsequently an hydroalcoholic extract of the leaves was obtained using Soxhlet apparatus. The extract was concentrated under reduced pressure. The crude extract obtained was suspended in 1% methyl cellulose for oral administration in albino rats.

### Chemicals

All the chemicals were of analytical grade and were either Sigma or Merk chemicals.

### Experimental Animals

Albino rats (150-200g) of either sex were used in the entire study. They were housed in standard polypropylene cages and kept under controlled room temperature ( $24 \pm 2$  °C; relative humidity 60-70 %) in a 12 h light-dark cycle. The animals were fed with standard laboratory diet and water ad libitum. Food was withdrawing 12h before and during the experimental hours. The experimental protocol was approved by Institutional Animal Ethics Committee.

### Screening of Anti-inflammatory Activity

#### Carrageenan induced rat paw oedema inhibition method

Wistar albino rats were divided into 4 groups each containing 6 rats. Acute inflammation was produced by injecting 0.1 ml of 1% carrageenan suspension in normal saline to right hind paw. One hour after drug administration, according to the technique of Winter et al, 0.1 ml of 1% carrageenan in 0.5% carboxy methyl cellulose was injected into the subplantar region of right hind paw. A mark was made on the leg at the

malleous to facilitate uniform dipping at subsequent readings. The volume of paw oedema volume

#### Cotton pellet granuloma method :

Rats were divided into 4 groups, each group consisting of 6 rats. Under light ether anaesthesia, the hair in the axillary and groin region were cut and sterile cotton pellets of 10mg each were implanted in the subcutaneous tissue on either sides of axilla and sterile grass pith (25 x 2mm) in the groin region (Plate-2). Wounds were then sutured and animals were caged individually after recovery from anaesthesia. The rats then received treatments as described earlier. The scheduled drug administration was started on the day of implantation and repeated every twenty four hours, regularly for 7 days. During the 7 days any change in food intake, motor activity and diarrhea, if any were noted. On the 8<sup>th</sup> day, the rats were sacrificed and cotton pellets and grass piths removed. The pellets free from the tissue were dried overnight at 60°C to their dry weight. Net granuloma formation was calculated by subtracting the initially weight noted (i.e. 10 mg). The grass piths were served in 10% formalin for histopathological studies.

#### Statistical analysis

Results were analyzed using One way analysis of variance (ANOVA) and expressed as Mean  $\pm$  SEM. Data was further subjected to Dunnett's test and differences between means were regarded significant at  $P < 0.01$  and  $P < 0.05$ .



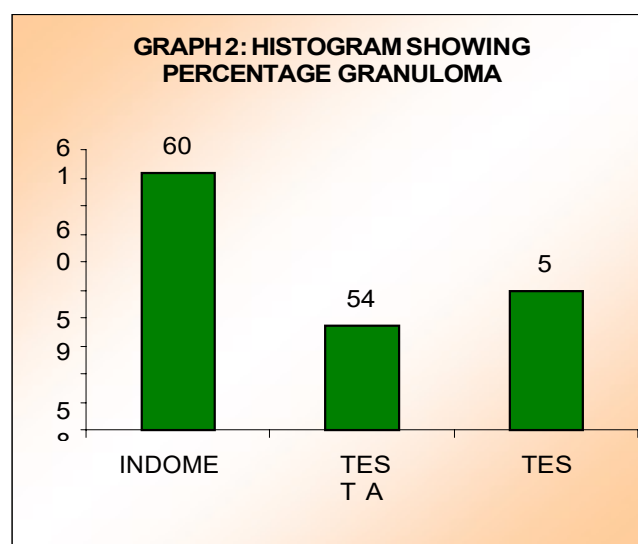
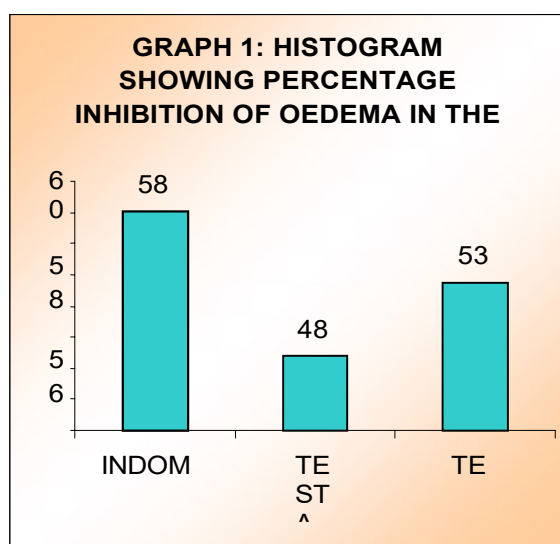
Table 1: Result of Anti-inflammatory activity

Groups	Control	Indomethacin	Test compound	
			A=100mg	B=200mg
Rat No.				
1	0.5	0.3	0.3	0.1
2	0.5	0.2	0.2	0.3
3	0.4	0.2	0.1	0.1
4	0.3	0.1	0.3	0.2
5	0.4	0.2	0.2	0.3
6	0.5	0.1	0.2	0.2
Mean	0.43	0.18	0.22	0.20
SD	0.08	0.08	0.08	0.09
SE	0.30	0.33	0.30	0.36
Mean Difference	-	0.25	0.21	0.23
P* Value	-	P<0.05	P<0.05	P<0.05
% Inhibition	-	58.13%	48.83%	53.48%

Group	Control					Indomethacin				
	Wt. of the cotton pellet (mg)					Wt. of the cotton pellet (mg)				
rat no	I	II	III	IV	mean	I	II	III	IV	Mean
1	20	17	18	15	17.5	9	6	7	7	7.2
2	22	18	19	20	19.7	9	8	5	6	7
3	21	19	20	14	18.5	8	5	9	7	7.2
4	22	16	17	16	17.7	6	6	8	7	6.7
5	20	18	19	16	18.2	10	7	6	7	7.5
6	18	21	18	15	18	8	9	7	8	8
Mean					18.27					7.27
SD					0.79					0.45
SE					0.32					0.18
Mean Difference					-					11
P* Value					-					P<0.05
% Inhibition					-					60.20%



Group	Test compound									
	A=100mg/kg					B=200mg/kg				
rat no	I	II	III	IV	Mean	I	II	III	IV	Mean
1	7	8	6	9	7.5	9	6	8	9	8
2	8	11	7	8	8.5	8	9	9	8	8.5
3	9	9	12	8	9.5	9	11	7	9	9
4	9	8	8	10	8.7	8	8	9	7	8
5	8	8	12	5	8.2	6	12	8	5	7.7
6	9	6	8	6	7.2	7	8	8	5	7
Mean					8.27					8.03
SD					0.84					0.68
SE					0.34					0.27
Mean Difference					10					10.23
P* Value					P<0.05					P<0.05
% Inhibition					54.70%					56%





## Discussion

In order to provide a scientific explanation for the folk use of *Bombex ceiba*, we have investigated the biological effects of its extracts, mainly the ones related to the inflammatory process. The present data clearly showed that extracts of dried bark *Bombex ceiba* have anti-inflammatory activity by the highly significant responses of some extracts on inhibiting the edema formation after carrageenan subplantar injection.

The extracts which showed the highest anti-inflammatory activity, presented also highly significant statistic values ( $P < 0.01$ ) for carrageenan induced edema inhibition after the treatment with the phlogistic agent. The present study establishes the anti-inflammatory activity of extracts of *Ficus virens*. It is evident that carrageenan is a sulphated polysaccharide obtained from sea weed (Rhodophyceae) and is commonly used to induce acute inflammation and is believed to be bi-phasic. The first phase is due to release of histamine and serotonin. The second phase is caused by the release of bradykinin, protease, prostaglandin and lysosome. Based on this, it would be argued that suppression of 1st phase may be due to inhibition of release of early mediators, such a histamine, serotonin and action in 2nd phase may be explained by an inhibition of cyclo-oxygenase. These mediators take part in inflammatory response and are able to stimulate nociceptive and thus reduce pain. It has been reported that second phase of oedema is sensitive to most clinically effective anti inflammatory drugs, which has been

frequently used to access the anti-oedematous effect of natural products.<sup>9</sup> Based on these reports, it can be inferred that the inhibition effect of the extract of *Ficus virens* on carrageenan induced inflammation in mice may be due to inhibition of the mediators responsible for inflammation.

## Conclusion

Thus Hydroalcoholic extract of *Bombex Ceiba* shows a promise in the development of new anti-inflammatory drugs and can be considered for more extensive studies in other anti-inflammatory models

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