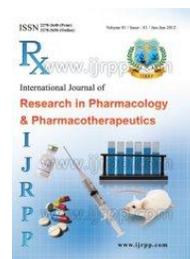




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Anti-inflammatory activity of root and stem bark of *Bauhinia variegata*

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ABSTRACT

Bauhinia variegata Linn. (Leguminosae) is commonly known as 'Chemmandharai' in Hindi. It is distributed almost throughout India. Its powdered root and stem bark is traditionally used for tonic and ulcers. It is also useful in skin diseases. The roots are used as antidote to snake poison. NSAIDs are one of the most widely used categories of drugs presently and there are many clinical situations where one needs to use them for fairly long periods. A literature survey of herbs with anti-inflammatory effects led to *Bauhinia variegata* which was quoted in the Ayurvedic literature as having many therapeutic activities. Lot of research work is reported on this plant but the root and stem bark was not evaluated for anti-inflammatory activities. A hydro ethanolic extract was prepared and evaluated for anti-inflammatory activity using conventional pharmacological animal models. The results indicated that the bark extract at a dose of 200mg/kg showed significant anti-inflammatory activity compared to the root extracts and control group.

Keywords: NSAIDs, *Bauhinia variegata*, anti-inflammatory, stem bark.

INTRODUCTION

Herbs are widely used in disease therapy as well as in cosmetics, teas, foods. About 60% of the pharmaceutical preparations that are in use at present are plant based^(1,2). This indicates the importance of herbal formulations in disease therapy and since NSAIDs are one of the widely used drug categories, an herb with analgesic, anti-inflammatory and antipyretic activities was selected for pharmacological evaluation. *Bauhinia variegata* (Linn) contains sterols, flavonoids, saponins and tannins in various parts of the plant like roots, bark, leaves and flowers and is known to possess many

pharmacological properties^(3,4). And anti-inflammatory, analgesic and antipyretic properties are among them the non-steroidal anti-inflammatory drugs (NSAIDs) presently available are associated with a number of side effects like gastric irritation, effect on renal blood flow in the compromised kidney and a tendency to prolong bleeding through inhibition of platelet function⁽⁵⁾. Hence we have made an attempt to evaluate pharmacologically these properties of roots and stem bark of the plant *Bauhinia variegata*.

Many noninfectious diseases are known to be treated

by herbal remedies throughout the history of mankind. Even today, plant materials continue to play a major role as therapeutic remedies in many developing countries (8). The inflammation in the oral tissues may be related to the expression of inflammatory cytokines including IL-1 β , a key mediator of various immunological and inflammatory phenomena (7). IL-1 β can stimulate the expression of IL-6 and prostaglandin E2 (PGE2) from human gingival fibroblasts (9). The use of herbal remedies for anti-inflammatory and arthritis treatment has been gaining momentum in recent years (6). There has been some concern over the use of COX-2 inhibitors for therapeutic intervention, especially since, some of the products based on COX-2 were either withdrawn or made to carry warning by the US FDA (10). Inflammation is known to occur via a series of complex pathophysiological pathways, influenced by various mediators such as prostaglandins and leukotrienes. These mediators can cause edema such as heat, pain, disturbed tissue function, reddening and swelling (11).

MATERIALS & METHODS

COLLECTION & EXTRACTION

The roots and stem bark of *Bauhinia variegata* was collected from the Ananthapuram area A.P, India. The plant was taxonomically identified by Prof. Prasad, Head, Dept. of Botany, SK University, Ananthapuram, A.P, India. The roots and stem bark of *Bauhinia variegata* was shade dried and powdered in a mechanical grinder and passed through sieve No#40. The coarse powder (1000g) was extracted with 1 liter of 60% alcohol by continuous hot percolation using soxhlet apparatus at 60 $^{\circ}$ c for 12 hr. After completion of extraction, solvent was removed under reduced pressure and washed with petroleum ether and dried in desiccator.

Acute Toxicity studies

The hydro-ethanolic extract of the roots and stem bark of *Bauhinia variegata* was subjected to chemical tests for the identification of chemical constituents and acute toxicity and gross behavioral studies were carried out in mice in accordance with OECD guidelines to determine the test doses. All

animal studies were carried out after the approval of Institutional Animal Ethical committee. Acute toxicity test was performed in mice as per OECD guidelines 2002 in mice.

PHARMACOLOGICAL EVALUATIONS

The extracts of *Bauhinia variegata* roots and stem bark was studied at doses of 100mg/kg and 200 mg/kg for anti-inflammatory activity. The extracts and the standard drugs were given as a suspension by oral route.

Anti-inflammatory activity

Carrageenan- induced paw oedema in rats

Wister rats (150-200g) of either sex were randomized into 4 groups of six each and food was withheld 10 hours prior to experimentation but free access to water was allowed. All animals were administered the preparations by oral route as a suspension in 2% gum acacia, at doses 100mg/kg and 200mg/kg. Control group were treated with 2% gum acacia. Diclofenac sodium at a dose of 30mg/kg was used as standard.

Inflammation in the hind paw was induced in each animal by injecting 0.1ml of freshly prepared Carrageenin suspension (1% w/v) in normal saline into the sub plantar surface of the rat hind paw. Paw oedema was measured by wrapping a piece of cotton thread round the paw and measuring the circumference with a meter rule (Hess and Miloning, 1972, Bamgbose and Noamesi, 1981). Measurement was carried out immediately before and 5 hours following Carrageenan injection. The inhibitory activity was calculated by the following formula.

$$\text{Percentage inhibition} = \frac{(\text{Ct} - \text{Co})_{\text{control}} - (\text{Ct} - \text{Co})_{\text{treated}}}{(\text{Ct} - \text{Co})_{\text{control}}} \times 100$$

(Ct-Co) Average increase in paw circumference at time t

RESULTS & DISCUSSION

The root and bark extract at dose of 2000mg/kg was studied in acute toxicity and no signs of toxicity and behavioral changes were observed.

Anti-inflammatory activity

The anti-inflammatory activity by carrageenan induced paw odema is shown in table 1 and figure 1. The anti-inflammatory effect was found to be significantly high at 100 mg/kg and 200 mg/kg doses of the extract compared to the control group and the effect at 200 mg/kg dose was comparable with diclofenac sodium 30 mg/kg.

DISCUSSION

A review of the plant *Bauhinia variegata* indicates that the various parts of the plant contain many chemical constituents which may be responsible for the various medicinal properties attributed to it. (Pandit CK and Suresh 1992, Jain et al 2004, Kirthikar and Basu 1999). (Rao et al 2008, Yadava

RN and Reddy VM. 2001 Yadava RN and Reddy VM

2003). Present study is conducted to evaluate root and bark extract with the activities which were reported earlier for extract of leaves. The results proved that the root and bark of *Bauhinia variegata* also contains similar active principles present in other parts. Activity was significantly high and isolation of active principles will potentiate the effect.

CONCLUSIONS

The extract of *Bauhinia variegata* stem roots and bark was studied at doses of 100mg/kg and 200mg/kg for anti-inflammatory activity. The extract exhibited Anti-inflammatory activity reduced inflammation in Carrageenan induced rat paw oedema model and the effect was comparable with Diclofenac sodium.

Table 1. Anti-inflammatory activity

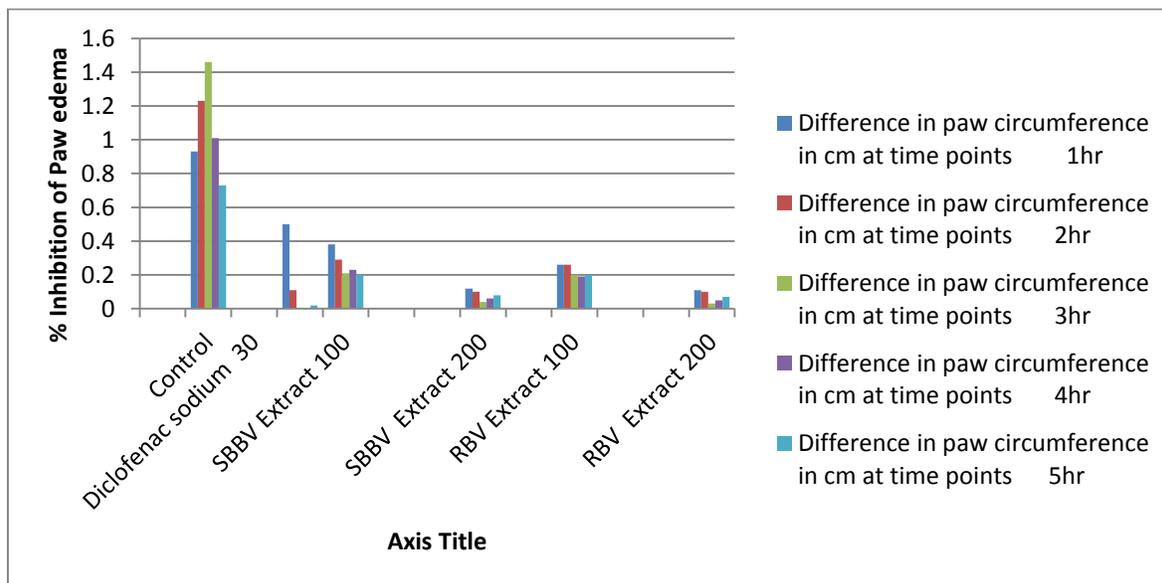
Treatment dose (mg/kg)	Difference in paw circumference in cm at time points				
	1hr	2hr	3hr	4hr	5hr
Control	0.93±0.28	1.23±0.16	1.46±0.15	1.01±0.21	0.73±0.15
Diclofenac sodium 30	0.5±0.10 ^{***a}	0.11±0.07 ^{***a}	0±0.01 ^{***a}	0±0.07 ^{***a}	0.02±0.08 ^{**a}
SBBV Extract 100	0.38±0.08 ^{***a}	0.29±0.05 ^{***a}	0.21±0.05 ^{***a*b}	0.23±0.05 ^{***a}	0.2±0.05 ^{***a}
SBBV Extract 200	0.12±0.05 ^{***ab}	0.1±0.04 ^{***a}	0.04±0.10 ^{***a}	0.06±0.08 ^{***a}	0.08±0.04 ^{***a}
RBV Extract 100	0.26±0.08 ^{***a}	0.26±0.05 ^{***a}	0.20±0.05 ^{***a*b}	0.19±0.05 ^{***a}	0.2±0.05 ^{***a}
RBV Extract 200	0.11±0.05 ^{***ab}	0.1±0.05 ^{***a}	0.03±0.10 ^{***a}	0.05±0.07 ^{***a}	0.07±0.05 ^{***a}

n=6, Values are expressed as Mean±SEM.

a: when compared with control, **b:** when compared with reference standard.

(**P<0.01, ***P<0.001)

Figure 1: Anti-inflammatory activity by paw oedema method



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