

# Anti-Inflammatory Activity of Leaves of *Argyrea Nervosa* in Carrageenan-Induced Paw Edema in Rats

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## ABSTRACT

The present study was designed to investigate the anti-inflammatory activity of the water extract of *Argyrea nervosa*. Inflammatory diseases including different types of rheumatic diseases are very common throughout the world. Therefore the search for a better tolerated anti-inflammatory agent appears to be a necessity. *Argyrea nervosa* is used as a folk medicine for the treatment of inflammation in India. Present study revealed that the plant *Argyrea nervosa* possesses a significant anti-inflammatory activity as evidenced in carrageenan induced paw edema method, which supports the folkloric claim of the anti-inflammatory activity of the plant. Our finding supports the reported therapeutic use of herb *Argyrea nervosa* in tribal medicine for the treatment of inflammation.

**Keywords:** Inflammatory disease, *Argyrea nervosa*, herbal drugs..

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## INTRODUCTION

The plant kingdom is abundant in species that act as anti-inflammatory to animal tissue. Whilst they are rarely as immediately powerful as the steroid drugs, they are very rarely as dangerous and potentially life threatening. In a well known study, 163 species of plants and fungi were tested to determine their anti-inflammatory activity. Due to adverse effects associated with the use of NSAIDs and other medications, there arise new scopes for Herbs and Herbal Formulation in treatment of inflammatory diseases.<sup>[1]</sup>

*Argyrea speciosa* (Linn.f.) sweet belongs to family Convolvulaceae is a climbing shrub with woody tomentose stem, found mainly in Deccan, Karnataka and East slopes of the West Ghats at an altitude of 900m.<sup>[2]</sup> It is commonly known as Elephant creeper and in Samudrasok Hindi.<sup>[3]</sup> Traditionally, leaves are used by Rajasthani tribes to prevent conception.<sup>[4]</sup> Seeds of *Argyrea nervosa* found to possess hypotension, spasmolytic,<sup>[5]</sup> and anti-

inflammatory activity.<sup>[6]</sup> Chemical analysis revealed the presence of triterpenoids, flavanoids, steroids and lipids.<sup>[7]</sup> Roots of *Argyrea nervosa* proved the immunomodulatory activity against the myelosuppressive effects induced by Cyclophosphamide.<sup>[8]</sup> 24R-ergost-5-en-11-oxo-3 beta-ol alpha -D glucopyranoside xylose was isolated from seeds of *Argyrea nervosa* known as Argyreioside.<sup>[9]</sup>

## CLASSIFICATION [10]

Kingdom	: Plantae – Plants
Subkingdom	: Tracheobionta – Vascular plants
Superdivision	: Spermatophyta – Seed plants
Division	: Magnoliophyta – Flowering plants
Class	: Magnoliopsida – Dicotyledons
Subclass	: Asteridae
Order	: Solanales
Family	: Convolvulaceae.
Genus	: <i>Argyrea</i> Lour. – <i>Argyrea</i>
Species	: <i>Argyrea nervosa</i> (Burm. f.) Bojer.



**Figure 1:** Leaves

## **Botanical description: (See on Figure: 1)**

A very large climber; stem stout, white-tomentose. Leaves are 7.5-30.0 cm. in diameter, acute, ovate, glabrous above, persistently white-tomentose beneath, base cordate; petioles 5-15 cm. long, white-tomentose. Flowers in subcapitate cymes; peduncles 7.5-15 cm. long, stout, white-tomentose; bracts large, ovate-lanceolate with a long acumens, thin, veined, pubescent outside, glabrous inside, deciduous the outer sometimes 5 cm. long; pedicels very short often almost 0, white-tomentose. Calyx white-tomentose outside; corolla 5-6.3 cm. long, tubular-infundibuliform, the bands silky pubescent outside, tube somewhat inflated, white pubescent outside, rose purple and glabrous inside. Ovary glabrous. Fruit glabrous, 2.0 cm. in diameter, apiculate.<sup>[4]</sup>

## **MATERIALS AND METHODS**

### **Plant material**

The fresh leaves of *Argyreia nervosa* were collected in the months of July-August from the local market of Amaravati, Maharashtra state, India, and authenticated by the authority of the botany department, VMV, Amaravati. A voucher specimen was submitted at Institute's herbarium department for future reference. Dried leaves were ground to coarse powder.

### **Extraction**

For extraction coarsely and air dried 350gms powder of *Argyreia nervosa* leaves was taken. Extraction was carried out by using Distilled water by a maceration process, the extract was concentrated to dryness and it was preserved in a refrigerator. The maceration process was carried out until the solvent found to be colorless. Finally the solvent was filtered and distilled off. By using rotary vacuum flask evaporator.

### **Animals**

Albino wistar rats of either sex weighing 100-150g were procured from the central animal house of the institute.

They were housed in standard polypropylene cages and kept under controlled room temperature ( $24 \pm 20^\circ\text{C}$ ; relative humidity 60 - 70%) in a 12 h light-dark cycle. The rats were given a standard laboratory diet and water ad libitum. Food was withdrawn 12 h before and during the experimental hours. All experimental protocols were approved by institutional animal ethical committee (Registration No.751/01/abc/CPCSEA).

## **In vivo Anti-inflammatory activity**

### **Carrageenan-induced paw edema in rats**

Albino wistar rats of either sex weighing 100-150g were divided in to four groups as shown in table. 1.

The animals were divided into groups as control, Standard, Test-1 and Test-2, 6 animals in each group. Acute inflammation was produced by sub plantar injection of 0.1 ml of 1% suspension of carrageenan in normal saline, in the right hind paw of the rats, before topical application of the formulation. The paw volume was measured plethysmometrically (Ugo Basile, Italy) at 0, 30, 60, 90, 120, 180 min. after the carrageenan injection. The difference between the two readings was taken as the volume of edema and the percentage anti-inflammatory activity was calculated. % inhibition of paw edema is calculated by comparing the control.<sup>[11]</sup>

The average foot swelling in test as well as standard groups was compared with that of the control group and the % edema was calculated by using the formula.

$$\% \text{ Edema} = \frac{C_o - C_r}{C_o} \times 100$$

Where,  $C_r$  = Average paw volume of treated group.  
 $C_o$  = Average paw volume of control group.

### **Statistical Analysis**

The values obtained were expressed as mean  $\pm$  S.E.M. Statistical significance of the differences between control and treated groups was calculated by one way ANOVA

**Table 1: Group specification and dose for individual treatment.**

Group no.	Group Specification
I	Control (Ointment base)
II	Standard (Containing 1.16% Diclofenac sodium)
III	Formulation 1 (Containing 3% water extract of <i>Argyreia nervosa</i> )
IV	Formulation 2 (Containing 5% water extract of <i>Argyreia nervosa</i> )

**Table 2: Effect of Standard on carrageenan-induced paw edema in rat.**

Animal no.	Initial Paw Volume (ml)	Paw Volume after 3 hr.	Difference in paw volume ( Edema)
1	0.066	0.15	0.084
2	0.065	0.16	0.098
3	0.066	0.16	0.094
4	0.064	0.15	0.086
5	0.065	0.13	0.065
6	0.065	0.14	0.075
Mean ± SEM	0.0651±0.0006	0.1483±0.011	0.0831±0.0110

**Table 3: Effect of Formulation 1 on carrageenan-induced paw edema in rat.**

Animal no.	Initial Paw Volume (ml)	Paw Volume after 3 hr.	Difference in paw volume ( Edema)
1	0.066	0.26	0.194
2	0.067	0.25	0.183
3	0.066	0.25	0.184
4	0.065	0.26	0.195
5	0.067	0.25	0.183
6	0.066	0.26	0.194
Mean ± SEM	0.06616±0.00071	0.255±0.0054	0.1888±0.0060

**Table 4: Effect of Formulation 2 on carrageenan-induced paw edema in rat.**

Animal no.	Initial Paw Volume (ml)	Paw Volume after 3 hr.	Difference in paw volume ( Edema)
1	0.062	0.23	0.168
2	0.063	0.24	0.177
3	0.065	0.24	0.175
4	0.064	0.22	0.156
5	0.063	0.24	0.177
6	0.063	0.24	0.177
Mean ± SEM	0.06333±0.0010	0.235±0.0083	0.1716±0.00843

**Table 5: Effect of various treatments on carrageenan-induced paw edema in rats.**

Treatment	Initial Paw Volume (ml)	Paw Volume after 3 hr. (ml)	Increase in Paw Volume (ml)	% inhibition
Control	0.0646±0.00054	0.621±0.00661	0.556±0.0077	-
Standard	0.0651±0.0006	0.1483±0.011	0.0831±0.0110	83.97
Formulation 1	0.06616±0.00071	0.255±0.0054	0.1888±0.0060	66.04
Formulation 2	0.06333±0.0010	0.235±0.0083	0.1716±0.00843	69.13

followed by Dunnett's test.  $P < 0.05$  was considered to be significant.

## RESULT:

In-vivo Anti-inflammatory activity

1. In-vivo Anti-inflammatory activity of Formulation 1 was given after the injection of carrageenan (1%, 0.1

ml) into sub-planter region of hind paw of rat produced edema (0.255±0.0054 ml) when compared with the mean of initial paw volume (0.06616±0.00071 ml) and the difference observed was 0.1888±0.0060 ml (Table- 03). The inhibition of paw edema was found to be 66.04% (Table-05).

2. In-vivo Anti-inflammatory activity of Formulation 2 was given after the injection of carrageenan (1%, 0.1

ml) into sub-planter region of hind paw of rat produced edema ( $0.235 \pm 0.083$  ml) when compared with the mean of initial paw volume ( $0.06333 \pm 0.0010$  ml) and the difference observed was  $0.1766 \pm 0.0843$  ml (Table- 04) The inhibition of paw edema was found to be 69.13 % (Table-05).

### DISCUSSION

Formulations exhibited significant anti- inflammatory activity against carrageenan-induced rat paw edema. Formulation 1 and 2 inhibited the edema formation significantly induced by carrageenan to an extent of 66.04 and 69.13% respectively. Diclofenac sodium as a reference standard inhibited the edema formation due to carrageenan to an extent of 83.97 % at the topically applied 0.5 gm (Table-05). Diclofenac sodium and both the formulations of water extract of *Argyrea nervosa* leaves exhibited significant anti-inflammatory activity against carrageenan-induced rat paw edema. The edema formation was greatly inhibited between 2-3 hours after sub-planter injection of carrageenan in all treated groups. (Table-05).

### CONCLUSION

As per previous reports, phytochemical analysis of *Argyrea nervosa* confirms the authenticity of the plants. The present study of *Argyrea nervosa* leaves might be useful to supplement information in regard to its identification parameters assumed significantly in the way of acceptability of herbal drugs in present scenario of lack of regulatory laws to control quality of herbal drugs. In present study *Argyrea nervosa* was taken to evaluate in vivo anti-inflammatory activity. Present study revealed that the plant *Argyrea nervosa* possesses a significant anti-

inflammatory activity in carrageenan induced paw edema method, which supports the folkloric claim of the plant.

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- Botanical description: (See on Figure: 1)