



Pharmacology

EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF PAVALAMALLI (NYCTANTHES ARBOR-TRISTIS LINN.) LEAVES ON FORMALIN INDUCED HIND PAW OEDEMA IN RATS

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ABSTRACT The present study is designed to evaluate anti-inflammatory activity of methanolic extract of *Pavalamalli* leaves (*Nyctanthes arbor-tristis* Linn.) on formalin induced hind paw oedema in rats. Indomethacin is the standard drug taken. The percentage of inhibition of 300mg/kg of *Pavalamalli* leaves methanolic extract is found to be 83.08% (P<0.001), significant, proving its anti-inflammatory activity.

KEYWORDS : Anti-inflammatory, Pavalamalli leaves, Indomethacin, Hind paw oedema.

INTRODUCTION

Nyctanthes arbor-tristis Linn. (*Pavalamalli*; Night Jasmine) [1] is 'a night flowering sad tree' of family: Oleaceae (Nyctaginaceae) is well known in India and its neighboring countries as one of the most versatile medicinal plants having a wide spectrum of biological activities [2]. Traditionally in Siddha medicine *Pavalamalli* leaves are given in obstinate cases of sciatica, rheumatism, gout, back pain and fever [1][3][4]. In order to justify their anti-inflammatory activity in experimental models, this present study is carried out.

MATERIALS AND METHODS**Collection of plants and identification:**

Pavalamalli leaves are collected at Tirunelveli, Tamil Nadu and is identified and authenticated by the botanist of Department of Medicinal Botany, Government Siddha Medical College, Tirunelveli, Tamil Nadu.

Preparation of Pavalamalli leaves methanolic extract:

The fresh leaves of *Pavalamalli* are made to dry in shade for about a week. Then, they are made into coarse powder. About 100 grams of the coarse powder is taken and is soaked in 90% of methanol and subjected to extraction. Then distill off the solvent and the *Pavalamalli* methanolic extract concentration found in water bath is taken for the present study.

Requirements:

Test Animal: Wistar albino rats (180-200gm) both male and female were used. They were maintained under isolated and hushful conditions and were fed with standard pellet diet with water ad libitum. This experimental model was done according to the ethical guidelines (Reg. No. 659/02/a CPCSEA) with IAEC approval No. 1012 /C06

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Drugs and chemicals: Indomethacin (Standard), 0.1ml of 1% formalin, *Pavalamalli* leaves methanolic extract.

Apparatus: Vernier Caliper**Formalin induced Oedema: (Hemamalini et al., 2010) [5]**

Albino rats were divided in 5 groups (6 animals in each group). Animals of all the groups were injected with 0.1ml of 1% formalin in 0.9% normal saline, under the plantar aponeurosis of the right hind paw.

Group - I: Treated with a plain aqueous suspension in 0.5% of Tween 80, 30 minutes prior to formalin injection.

Group - II, Group - III & Group - IV: Treated with 100, 150 and 300 mg/kg of *Pavalamalli* leaves methanolic extract suspension in 0.5% of Tween 80, respectively, 30 minutes prior to formalin injection.

Group - V: Treated with an aqueous solution of Indomethacin (10mg/kg), 30 minutes prior to formalin injection (Standard Reference Group).

The paw oedema diameter of the rats was measured by using the vernier caliper just before and every hour up to 4 hours after formalin injection and the paw oedema diameter was expressed in millimeter.

Statistics:

Data are expressed as mean \pm SEM; data analyzed by one way ANOVA followed by Tukey Kramer multiple comparisons tests to determine the significance of the difference between the control group and rats treated with test groups.

Table 1 - Effect of Pavalamalli leaves methanolic extract on the percentage inhibition of formalin induced hind paw oedema

Treatment groups	Oedema volume (mm) % Inhibition after 180 min.						
	Dose mg/kg	0 min	60 min	120 min	180 min	% Inhibition after 180 min.	
Control (Group-I)	Normal saline	32.88 \pm 1.18	76.51 \pm 1.13	121.36 \pm 2.54	136.84 \pm 2.93	-	
Extract	Group-II	100	33.16 \pm 1.34	56.16 \pm 1.36**	44.31 \pm 1.36***	36.31 \pm 1.54***	73.46
	Group-III	150	30.46 \pm 1.13	52.84 \pm 1.84**	34.54 \pm 1.85***	27.84 \pm 1.31***	79.65
	Group-IV	300	31.84 \pm 1.59	43.16 \pm 1.18***	28.81 \pm 1.46***	23.14 \pm 1.94***	83.08
Indomethacin (Group-V)	10	32.46 \pm 1.36	39.84 \pm 1.36***	24.36 \pm 1.18***	19.84 \pm 1.06***	85.50	

• Values were considered significant at P<0.01. Each value is SEM \pm 6 individual observations *P<0.05; **P<0.01;***P<0.001 compared paw oedema induced control vs. drug treated rats.

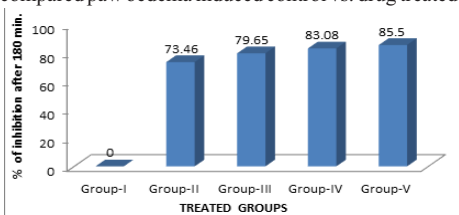


Figure-1: A graphical representation showing the percentage of inhibition of methanolic extract of Pavalamalli leaves (Nyctanthes arbor-tristis Linn.) in the treated groups.

RESULTS AND DISCUSSION

After the administration of formalin, the paw diameter goes on increasing gradually for a period of nearly 3 hours. *Pavalamalli* leaves methanolic extract showed high level of anti-inflammatory activity in a dose dependent manner along with increase in time, in the reduction of formalin stimulated hind paw edema and are statistically significant.

The hind paw oedema diameter tends to reaches the maximum at the 60

minutes in Group-II, III and IV (at the dose of 100mg/kg, 150mg/kg, and 300mg/kg of *Pavalamalli* methanolic extract respectively) with 56.16mm ($P < 0.01$), 52.84mm ($P < 0.01$) and 43.16mm ($P < 0.001$). This is comparatively significant with that of Group-V standard drug Indomethacin 10mg/kg with 39.84mm ($P < 0.001$).

After 60 minutes, the diameter of the paw oedema decreases steadily in all groups which are statistically significant at $P < 0.001$ (Table - 1).

The percentages of inhibition after 180 minutes are shown in the Figure-1. Group - IV with dose of 300mg/kg of the methanolic extract of *Pavalamalli* leaves shows the maximum inhibition of 83.08% while Group - V standard drug Indomethacin of 85.50%. Thus, it proves the efficacy and potentiality of methanolic extract of *Pavalamalli* leaves towards anti-inflammatory activity.

Formalin induced hind paw oedema is one of the most appropriate procedure to assess both acute and chronic anti-inflammatory activity, as it closely resembles human arthritis^[5].

The inflammatory effect of formalin is biphasic (Wheeler AH *et al.*,)^[6]. The first phase is due to release of histamine and serotonin (Della Loggia A *et al.*,)^[7]. Prostaglandins play a major role in the development of second phase of reaction that is measured around 3 hours time^[5]. Based on these statements, it is clear that *Pavalamalli* leaves methanolic extract inhibits the initial intermediate phase (120 min.) by hindering the release of histamine and serotonin and also the subsequent phase (180 min.) by inhibiting prostaglandin synthesis, quite similar to that of Indomethacin.

CONCLUSION

From the reports inferred, the present study explained that the *Pavalamalli* leaves (*Nyctanthes arbor-tristis*, Linn.) has got redoubtable anti-inflammatory activity and justify that the Siddha medicine, *Pavalamalli* leaves can be treated in case of inflammatory and excruciating situations.

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