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Evaluation of anti-inflammatory and analgesic activities of *Solanum trilobatum* Linn. roots

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ABSTRACT

The *Solanum trilobatum* Linn. (Family: Solanacea) roots powder was extracted with chloroform, methanol and tested for its anti-inflammatory and analgesic activities. The anti-inflammatory and analgesic activities of chloroform and methanolic extracts were studied by Carragennan induced paw oedema method and Tail flick method. The chloroform extract in doses of 100mg/kg and 200mg/kg showed 27.103% and 29.161% inhibition of paw edema respectively. The methanolic extract in doses of 100mg/kg and 200mg/kg showed 29.537% and 36.692% inhibition of paw oedema respectively. The both extracts also exhibited significant analgesic activity. The percentage inhibition of paw oedema by the methanolic extract is found to be higher than the chloroform extract. The degree of analgesic observed with methanolic extract revealed a higher degree of analgesic activity than the chloroform extract.

Keywords: *Solanum trilobatum*, Roots, Analgesic, Anti-inflammatory

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INTRODUCTION

The plant *Solanum trilobatum* (Family: Solanacea) grows as a climbing undershrub and is widely distributed throughout the state of Andhra Pradesh and Tamilnadu. This plant is well known in Ayurved and Siddha systems. In Sanskrit it is known as 'Alarka', in Telugu 'Alarkapatramu', in Tamil 'Tuduvalai' and in Malayalam 'Tutuvalam'. The roots, berries and flowers are used for cough [1]. The decoction of entire plant is used to treat acute and chronic bronchitis [2]. The review of literature revealed that some chemical constituents like solasodine and β-solamarine have been isolated from whole plant [3]. The *Solanum trilobatum* posse's antioxidant, hepatoprotective, anti-inflammatory, analgesic, antidiabetic and antimicrobial activities [4-10]. In this present study the anti-inflammatory and analgesic activities of the *Solanum trilobatum* roots chloroform and methanolic extracts were have been investigated.

MATERIALS AND METHODS

Preparation of extracts

The roots of *Solanum trilobatum* were collected from the coastal area of Andhra Pradesh. They were dried, powdered and extracted in soxhlet with chloroform and methanol (2 liters each) and concentrated to a small volume. The concentrated extracts were tested for anti-inflammatory and analgesic activities.

Phytochemical screening

The preliminary phytochemical investigation was carried out for the two different extracts obtained from the crude drug. It revealed the presence of alkaloids, flavanoids, gums & mucilage, glycosides, saponins, terpenes and tannins.

Animals

Healthy adult male Wister rats weighing (150 - 200 grams) were selected for the studies. Rats were housed in polypropylene cages (3 animals per cage), maintained under standard laboratory conditions (i.e. 12:12 hr light and dark sequence; at an ambient temperature of 25 ± 1ºC). The animals were fed with standard pellet diet and water ad libitum.

Instrument

Plethysmometer, it is glass tube of 20 mm internal diameter and one end fabricated to a glass tube with 0.5 mm bore. This tube is fused to a flexible tube and a pump (glass - syringe) and fixed to other end of the tube. This pump is used to adjust the level of mercury in both the flexible tube and graduated glass tube upto zero level.

Procedure

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Evaluation of Anti-inflammatory activity

The anti-inflammatory activity was assessed by the method suggested by Winter et.al., 1962 [11], using carrageenan as phlogestic agent and Wistar rats of either sex weighing between 150-200g. Six groups of each six animals were used. Paw swelling was elicited with 0.1 ml Carrageenan in 1% saline (w/v) injected in the right hind foot under the plantar aponeurosis. Group-I received 0.5% sodium carboxy methyl cellulose (2ml/kg) served as Control. Group-II received Ibuprofen 10 mg/kg, served as Standard. Group-III & V received chloroform and methanolic extract of *Solanum trilobatum* (100 mg/kg), and Group IV & VI received chloroform and methanolic extract of *Solanum trilobatum* (200 mg/kg), served as Tests respectively. All the animals in III, IV, V and VI groups were received their respective doses of the test drug 30 minutes prior to the administration of carrageenan 0.1 ml of 1 % w/v solution.

The inflammation was quantified by measuring the volume displaced by the paw, using a plethysmometer at time 0, 1, 2, 3, & 4 hours after carrageenan injection. The difference between the left and the right paw volumes (indicating the degree of inflammation) was determined and the percent inhibition of oedema was calculated in comparison to the control animals. Results are expressed as mean ± S.E.M. Results are recorded in Table NO.1.

Evaluation of Analgesic activity

The analgesic activity was tested using analgesiometer [12]. Albino rats (125- 150 grams) were randomly distributed in control and test groups of four animals each. The chloroform and methanolic extracts 100 & 200 mg/kg were administered respectively to each test group orally after 12 hr fast and standard drug Pentazocin (30 mg/kg) was administered to the standard group orally. The control group received the saline solution(2ml/Kg). The basal reaction time was noted at 15 min, 30 min, 45 min, and 60 min. After administration the tip of the rat was placed in the radiant heat of analgesiometer at 55^{0} c $\pm$ 0.5^{0} c. The actual tail flick response of rats was calculated and compared with control group. Results are recorded in Table No. 2.

RESULTS AND DISCUSSION

The chloroform and methanolic extracts of the roots of *Solanum trilobatum* showed significant anti-inflammatory and analgesic activity at both the dose levels (100 mg/kg and 200 mg/kg). The percentage inhibition of paw oedema by the methanolic extract is found to be higher than the chloroform extract. The degree of analgesia observed with methanolic extract revealed a higher degree of analgesic activity than the chloroform extract. The observed activities were further revealed that the amount of activity is increased with concentration of the extract.

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Table no 1: Effect of *Solanum trilobatum* roots extracts on Carrageenan induced Paw oedema.

GROUP	TREATMENT	DOSE	VOLUME OF MERCURY DISPLACED (ml)				PERCENTAGE INHIBITION OF PAW OEDEMA AT 4 HR
			0 hr	1 hr	2 hr	4 hr	
I	Control (0.5% sodium CMC)	2 ml/kg	0.966 ± 0.016	1.278 ± 0.27	1.36 ± 0.018	1.458 ± 0.019	-
II	Standard (Ibuprofen)	10 mg/kg	1.27 ± 0.018**	0.987 ± 0.196	1.29 ± 0.015	1.327 ± 0.019	41.252
III	Chloroform extract	100 mg/kg	1.00 ± 0.06	1.324 ± 0.022	1.37 ± 0.016	1.38 ± 0.010*	27.103
IV	Chloroform extract	200 mg/kg	1.002 ± 0.08	1.30 ± 0.016	1.33 ± 0.016	1.36 ± 0.016*	29.161
V	Methanol extract	100 mg/kg	1.003 ± 0.002	1.294 ± 0.010	1.333 ± 0.012	1.348 ± 0.018*	29.537
VI	Methanol extract	200 mg/kg	1.012 ± 0.03	1.295 ± 0.011	1.338 ± 0.04	1.334 ± 0.014**	36.692

Results expressed as Mean ± SEM from six observations *P < 0.01, **P < 0.001

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Table no 2: Analgesic activity of *Solanum trilobatum* roots extracts (Tail flick method)

GROUP	TREATMENT	DOSE	BASAL REACTION TIME (sec)	REACTION TIME (sec)			
				15 min	30 min	45 min	60 min
1	Control(0.5% Sodium CMC)	2mg/Kg	2.14 ± 0.277	2.4 ± 0.0202	2.65 ± 0.09	2.65 ± 0.09	2.65 ± 0.189
2	Pentazocin	30mg/Kg	2.36 ± 0.194	3.1 ± 0.410	4.67 ± 0.387*	6.34 ± 0.36**	8.69 ± 0.454**
3	Chloroform extract of S.trilobatum	100mg/Kg	2.17 ± 0.282	3.18 ± 0.30	3.7 ± 0.206	4.7 ± 0.311*	5.7 ± 0.314**
4	Chloroform extract of S.trilobatum	200mg/Kg	2.68 ± 0.194	3.34 ± 0.193	4.83 ± 0.436*	5.84 ± 0.60**	6.85 ± 0.683**
5	Methanolic extract of S.trilobatum	100mg/Kg	1.85 ± 0.30	2.34 ± 0.194	4.10 ± 0.34*	5.10 ± 0.237**	6.69 ± 0.305**
6	Methanolic extract of S.trilobatum	200mg/Kg	2.35 ± 0.193	3.84 ± 0.30*	4.83 ± 0.435**	6.6 ± 0.458*	7.85 ± 0.461**

Results expressed as Mean ± SEM from six observations *P < 0.01, **P < 0.001

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