EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF NERIUM OLEANDER

Senthil Kumar*[1], Ganeshan R. Anand[1]
A.M. Reddy Memorial College of Pharmacy, Guntur, A.P.

Abstract

Oleander (Nerium oleander L., Apocynaceae) is an evergreen urbanite shrub, widely used for ornamental purposes in Egypt. Although this plant is naturally protected from several herbivores by its defensive secondary metabolites, it harbors many phytophagous pests. In the present study the anti-inflammatory and antipyretic activity of Chloroform, alcoholic and aqueous extract of Oleander leaf was evaluated. Paw edema was induces by administration of 0.1 ml of 1% w/v carrageenan in saline. Antipyratic effect was studied by Brewer's yeast-induced pyrexia in rats. The obtained data was statistically evaluated and it was observed that Oleander leaf shows its significant activity as anti-inflammatory and antipyretic agent. The antipyretic effect was almost equivalent to the paracetamol.

Keywords: *Psidium Guajava, Allivum Sativum, Azadirachta Indica*, Glibenclamide, Alloxan, Diabetes mellitus.

Introduction:

Inflammation is the response of living tissues to injury. It involves a complex array of enzyme activation, mediator release, extravasations of fluid, cell migration, tissue breakdown and repair [1, 2]. Inflammation has now the prime focused area of scientific research due to its implication in almost all human and animal diseases.

Nerium oleander L. (Apocynaceae) is an evergreen shrub distributed in the Mediterranean region and subtropical Asia. It is an urbanite plant widely used for ornamental purposes in streets, gardens, and hospitals. Some plants are utilized by certain heterotrophs, and protected from others by their secondary toxic metabolites [3, 4, 5].

Material and Methods

Drugs and reagents

Tween 80 (Ranchem, India), Indomethacin (MicroLab, India), carrageenan (Himedia), Brewer's yeast (Himedia), and paracetamol (Cipla) were used in the study.

Plant material

The leaves of N. Oleander were collected from Banglore, Karnataka, India. The plant was identified by Dr. R. K. Sharma, JSS Medical College, Mysore, India.

Preparation of extracts

The leaves were washed thoroughly, dried under a shade and pulverized. The coarse powder was extracted successively with petroleum ether, chloroform and alcohol using a soxhlet apparatus. Finally, the aqueous extract was prepared by decoction. The extracts were dried using a rotary vacuum evaporator and stored in a desiccators until further use.

Animals

Wistar rats of both sexes, weighing 125 150 g were used for the study. The animals were kept in polypropylene cages in a room maintained under

Author for Correspondence
Senthil Kumar
A.M. Reddy Memorial College of Pharmacy, Petlurivaripalem, Narasaraopet Mandal, District Guntur Andhra Pradesh
Email: Senthil_6432@rediff.com

controlled atmospheric conditions. The animals were fed with standard diet and had free access to clean drinking water.

Anti-inflammatory activity

The anti-inflammatory activity of the extracts was determined according to the method of Borgi and Vogel [6, 7]. The rats were divided into ten groups of six rats each. The control group received 1% (v/v) Tween 80 in water, p.o. at a dose of 10 ml/kg. The positive control group was treated orally with the standard drug, indomethacin (10mg/kg).

Different extracts were administered to the other groups in doses of 100 and 200 mg/kg as shown in Table 1. All the suspensions were administered 30 min before the induction of oedema by administering 0.1 ml of 1% w/v carrageenan in saline [8, 9]. The degree of paw oedema of all the groups was measured using a plethysmometer at 40, 80, 120, and 180 min after the administration of carrageenan to each group.

Antipyretic activity

Animals were selected for the experiment after confirmation of approximate constant rectal temperature for 7 days. The antipyretic activity of the extracts was evaluated based on Brewer's yeast-induced pyrexia in rats [10, 11]. Pyrexia was induced by subcutaneous injection of 10 ml/kg of 15% w/v Brewer's yeast suspension below the nape of the neck.

The rectal temperature of each rat was measured at time, 0 h, using a telethermometer and before injection of the yeast. At 16 h following yeast injection, the different groups were treated with the vehicle, extracts (100 and 200 mg/kg) and standard drug, paracetamol (150 mg/kg). The rectal temperature was then recorded over a period of 5 h.

Statistical analysis

The results were expressed as mean ± S.E.M. Statistical analysis of the data were carried out using Student's t-test and results were considered significant when $p < 0.05$.

Results

Anti-inflammatory activity

The chloroform and alcoholic extracts of N. Oleander produced significant ($p < 0.05$) anti-inflammatory activity, while petroleum ether and aqueous extracts did not. Significant reduction of paw oedema was observed 40 min and 3 h after carrageenan injection, for alcoholic and chloroform extracts, respectively. The reduction in carrageenaninduced paw oedema by 400 mg/kg of chloroform and alcoholic extracts after 4 h was 43.7 and 47.5%, respectively, while oedema reduction by the standard drug, indomethacin (10 mg/kg) was 53.7% (see Table 1).

Table 1: Effect of N. Oleander extracts of leaf on paw oedema induced by carrageenan in rats Values are expressed as mean ± S.E.M. (n = 6); *

Group treated with	Dose (mg/kg)	Increase in paw volume (in ml) after various times			
		40 min	80 min	120 min	180 min
Control		0.26 ± 0.02	0.40 ± 0.04	0.88 ± 0.05	0.80 ± 0.05
Indomethacine	10	0.18 ± 0.04*	0.23 ± 0.02**	0.35 ± 0.02**	0.43 ± 0.05**
PE extract	100	0.28 ± 0.06	0.45 ± 0.07	0.68 ± 0.07	0.86 ± 0.07
	200	0.25 ± 0.05	0.42± 0.05	0.66 ± 0.07	0.78 ± 0.05
CH extract	100	0.23 ± 0.04	0.32 ± 0.04	0.55 ± 0.06	0.63 ± 0.04*
	200	0.22 ± 0.01	0.28 ± 0.05	0.48 ± 0.09	0.52 ± 0.04**
AL extract	100	0.22 ± 0.01	0.30 ± 0.04	0.52 ± 0.06*	0.62 ± 0.06**
	200	0.18 ± 0.01**	0.25 ± 0.02*	0.42 ± 0.05*	0.48 ± 0.05**
AQ extract	100	0.27 ± 0.04	0.38 ± 0.07	0.68 ± 0.08	0.87 ± 0.08
	200	0.28 ± 0.03	0.42 ± 0.04	0.72 ± 0.07	0.88 ± 0.07

$p < 0.05$, ** $p < 0.01$ vs. control, PE, petroleum ether extract; CH, chloroform extract; AL, alcoholic extract; AQ, aqueous extract

Antipyretic activity

Chloroform and alcoholic extracts produced significant antipyretic activity ($p < 0.05$), but petroleum ether and aqueous extracts did not.

Chloroform extract significantly decreased the elevated rectal temperature 3 h after the administration of a dose of 400 mg/kg only, while the alcoholic extract reduced the hyperthermia at both 200 and 400 mg/kg doses 1 h after administration. The initial and final rectal temperatures in the groups treated with chloroform extract (400 mg/kg), alcoholic extract (400 mg/kg) and paracetamol (150 mg/kg) were 38.03 ± 0.16 and 37.41 ± 0.26, 38.55 ± 0.14 and 37.81 ± 0.19, and 38.70 ± 0.15 and 37.87 ± 0.18 0C, respectively.

Paracetamol and alcoholic extract showed significant antipyretic activity throughout the test period of 6 h (see Table 2).

Table 2: Effect of extracts of N. Oleander leaf on Brewer's yeast-induced pyrexia in rats

Group treated with	Dose (mg/kg)	Rectal Temperature in °C various times (Hr)				
		-10	0 h	1 h	3 h	5 h
Control	-	35.33± 0.08	36.08± 0.11	36.30± 0.09	36.26± 0.06	36.25 ± 0.09
PE extract	100	35.52± 0.10	36.20± 0.16	36.43± 0.16	36.31± 0.16	36.25 ± 0.16
	200	35.20± 0.12	36.00± 0.08	36.01± 0.09	36.01± 0.09	36.05 ± 0.05
CH extract	100	35.82± 0.09	36.63± 0.11	36.48± 0.06	36.41± 0.06	36.38 ± 0.09
	200	35.35± 0.16	36.03± 0.16	35.73± 0.23	35.61± 0.21*	35.63 ± 0.21**
AL extract	100	35.92± 0.11	36.78± '0.03	36.51± .05**	36.38± .09**	36.16 ± 0.14**
	200	35.72± 0.19	36.55± 0.14	36.15± 0.19*	36.11± 0.20*	35.88 ± 0.22**
AQ extract	100	35.30± 0.12	36.03± 0.14	36.08± 0.14	36.03± 0.16	36.00 ± 0.14
	200	35.55± 0.09	36.28± 0.19	36.26± 0.17	36.18± 0.14	36.05 ± 0.16
Paracetamol	150	35.85± 0.17	36.70± 0.15	36.43± 0.14*	36.25± 0.12**	36.00 ± 0.15**

Values are expressed as mean ± S.E.M. (n = 6); * $p < 0.05$, ** $p < 0.01$ vs. control, PE, petroleum ether extract; CH, chloroform extract; AL, alcoholic extract; AQ, aqueous extract

Discussion

Carrageenan-induced paw oedema is a commonly used primary test for the screening of new anti-inflammatory agents and is believed to be biphasic [12]. The first phase (1-2 hr) is due to the release of histamine or serotonin and the second phase of oedema is due to the release of prostaglandin [13, 14]. The results of this study indicate that the chloroform and alcoholic extracts of N. Oleander significantly reduced carrageenaninduced paw oedema in rats. Therefore, the mechanism of action may be by inhibition of histamine, serotonin or prostaglandin synthesis.

Therefore, the anti-inflammatory and antipyretic activities of the chloroform and aqueous extracts may be due to the presence of alkaloids, sterols and flavonoids.

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