

**ANTIINFLAMMATORY ACTIVITY OF
WITHANIA COAGULANS DUNAL FRUITS**

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Summary

Alcoholic and chloroform extracts of fruits of *Withania coagulans* Dunal were screened for anti-inflammatory activity in carrageenan-induced rat paw edema at the dose level of 100 mg/kg body weight. Both the extracts produced significant ($p < 0.05$ and $p < 0.01$) anti-inflammatory activity when compared to control. The alcoholic extract showed better activity than chloroform extract.

Key words: *Withania coagulans*, anti-inflammatory activity, withanolides.

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Introduction

W. coagulans Dunal (Solanaceae) is a small shrub which are distributed in the east of Mediterranean region and extended to South Asia [1]. The fruit of *W. coagulans* is widely known as Indian cheese maker or Indian rennet. The fruits are having antimicrobial, anthelmintic, sedative, emetic, diuretic, antiasthmatic, hypoglycemic, antilipidimic and hepatoprotective activities [2, 3]. The fruits contain esterase, free amino acids, sitosterol-3 β -D-glucoside, withaferin A, essential oils and withanolides [4-6]. The natives in and around Varanasi, India are well aware about the anti-inflammatory activity of the fruits of *W. coagulans*. No scientific data is available regarding the anti-inflammatory activity of the same. Hence, the present investigation was taken up to evaluate the anti-inflammatory activity of the fruits of *W. coagulans*.

Materials and Methods

Collection and authentication of plant material

Fruits of *W. coagulans* were purchased from local market of Varanasi and were authenticated by Prof. V.K. Lal, Department of Pharmacognosy, College of Pharmacy, IFTM, Moradabad and a voucher specimen has been preserved in the department for further references.

Preparation of the extracts

The fruits were sun dried, coarsely powdered and extracted with alcohol using soxhlet apparatus. The alcoholic extract was concentrated by rotary vacuum evaporator and a gummy mass was obtained. The gummy mass was diluted enough with distilled water and extracted with n-hexane to remove fatty materials. The defatted portion was extracted with chloroform and the extract was concentrated to get the chloroform extract. The aqueous alcoholic portion was then concentrated to get the alcoholic extract. These two extracts were screened for anti-inflammatory activity.

Screening for anti-inflammatory activity

The albino rats of either sex weighing between 100-150 gm were selected for study. They were divided into four groups of six rats each. The animals were kept in polypropylene cages and fed with standard diet and water *ad libitum*. The control group received distilled water, p.o. at a dose of 10 ml/kg. The positive control group received the standard drug diclofenac sodium (10 mg/kg, i.p.). The other two groups were treated with 100 mg/kg of chloroform and alcoholic extract respectively. Diclofenac sodium and the extracts were administered 30 min before induction of edema by administering 0.1 ml of 1% w/v carrageenan in saline in the sub plantar region of left hind paw. The paw volume of all the animals of all groups was measured plethysmographically at 30, 60, 120 and 180 min after carrageenan administration, and the percent inhibition of paw edema was calculated using the following formula [7-9].

$$\% \text{ inhibition of paw edema} = [(V_{\text{control}} - V_{\text{test}}) / V_{\text{control}}] \times 100$$

Where V_{control} and V_{test} are the increase in edema volume of control group and treated group respectively.

Statistical analysis

The results were expressed as mean \pm SEM. Datas were analysed using one-way analysis of variance (ANOVA) followed by Dunnett's t-test and were considered statistically significant when $p < 0.05$.

Results and Conclusions

Both the chloroform and alcoholic extracts showed anti-inflammatory activity. After 30 min of carrageenan administration the percentage inhibition of paw edema by chloroform and alcoholic extract was 18.2 and 9.0% respectively but after 3 h the reduction of paw edema is more in alcoholic extract treated group than the group treated with chloroform extract. The percentage reduction of paw edema after 3 h by standard drug diclofenac sodium, chloroform extract and alcoholic extract was 51.4, 40.1 and 43.2% respectively (Table 1). Hence alcoholic extract revealed better anti-inflammatory activity than chloroform extract. Carrageenan-induced paw edema is believed to be biphasic and is commonly used to screen anti-inflammatory agents [10]. The first phase is due to release of histamine or serotonin and the second phase is due to release of prostaglandin [11]. Therefore, the anti-inflammatory activity of the chloroform and alcoholic extracts may be by inhibition of histamine, serotonin or prostaglandin synthesis.

The fruits of *W. coagulans* contain alkaloids, withanolides, amino acids and enzymes. So the anti-inflammatory activity may be due to and individual constituent or the synergistic effect of two or more constituents

Table 1: Effect of *W. coagulans* on paw edema induced by carrageenan in rats

Treatment group	Dose mg/kg b.w.	Increase in paw volume (in ml) after			
		30 min	60 min	120 min	180 min
Control	-	0.22 ± 0.03	0.36 ± 0.04	0.62 ± 0.04	0.74 ± 0.05
Diclofenac sodium (i.p.)	10	0.15 ± 0.02** (31.8)	0.23 ± 0.04** (36.1)	0.32 ± 0.03** (48.4)	0.36 ± 0.03** (51.4)
Chloroform extract (p.o.)	100	0.18 ± 0.03* (18.2)	0.28 ± 0.02* (22.2)	0.38 ± 0.04** (38.7)	0.44 ± 0.01** (40.1)
Alcoholic extract (p.o.)	100	0.20 ± 0.02* (9.0)	0.28 ± 0.03* (22.2)	0.36 ± 0.01** (41.9)	0.42 ± 0.03** (43.2)

Values are expressed as mean ± SEM (n = 6); *p<0.05, **p<0.01 vs. control.

Values in parenthesis indicates percentage inhibition of paw edema

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