

**A STUDY ON ANTI-INFLAMMATORY ACTIVITY OF THE LEAF AND STEM
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ABSTRACT: The Aqueous extracts of *Coccinia grandis* L. Voigt leaves and stem were investigated in chemically-induced inflammation rodents model. The extracts inhibited formaldehyde-induced paw edema in rats. These inhibitions were statistically significant ($p < 0.05, 0.01, 0.001$) as compared to control. Aqueous extract of leaves showed highest activity.

Key words: *Coccinia grandis* (Cucurbitaceae), Anti-inflammatory, Leaf extract, Formaldehyde induced

INTRODUCTION

Inflammation is part of the complex biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells, or irritants. Inflammation is a protective attempt by the organism to remove the injurious stimuli and to initiate the healing process. Inflammation is not a synonym for infection, even in cases where inflammation is caused by infection. Infection is caused by an exogenous pathogen, while inflammation is one of the responses of the organism to the pathogen. Without inflammation, wounds and infections would never heal. Similarly, progressive destruction of the tissue would compromise the survival of the organism. However, chronic inflammation can also lead to a host of diseases, such as hay fever, atherosclerosis, and rheumatoid arthritis. It is for that reason that inflammation is normally closely regulated by the body¹.

Coccinia grandis L.Voigt, of the family Cucurbitaceae is distributed in tropical Asia, Africa and is commonly found in Pakistan, India, Bangla Desh and Srilanka. *Coccinia grandis* is a climber and trailer. The fruit of *Coccinia grandis* is used as vegetable when green and eaten fresh when ripened into bright scarlet colour². Every part of this plant is valuable in medicine and various preparations have been mentioned in indigenous system of medicine for various skin diseases, bronchial catarrh, bronchitis and Unani systems of medicine for ring worm, psoriasis, small pox, and scabies and other itchy skin eruptions and ulcers³. Oil of this plant is used as an injection into chronic sinuses. The plant is used in decoction for gonorrhoeae, diabetes and also useful in dropsical condition, pyelitis, cystitis, strangury, snake bite, urinary gravel and calculi^{4,5}. It is also useful to induce perspiration in fever and cures sores in the tongue⁶. It has antilithic⁵, hypolipidemic⁷, antimutagenic⁸ and hypoglycemic activities^{9,10}.

MATERIAL AND METHODS

Collection and extraction of plant material

The leaves and stems of *C. grandis* L. Voigt. were collected from the farms of Chikhali, Tal-Haveli, Dist.-Pune, Maharashtra, India during the month of September-2008 and was authenticated by Joint Director, Botanical Survey of India, Western Circle, Pune-4110 01 (Ref No BSI/WC/Tech./ 2008/477 dated 3/10/2008). The dried and powdered leaves and stems were extracted with water in Soxhlet apparatus. The solvent extracts were concentrated separately using Buchi rota evaporator and dried under vacuum. The dried extracts were preserved in desiccators until further use.

Animals

Sprague Dawley rats (120-150 g) and Swiss albino mice (40-50 g) were used in these experiments. They were housed in polypropylene cages and kept in room temperature maintained under controlled condition. All animals were fed with a standard diet ad libitum and had free access to drinking water. All the animal protocols were approved by institutional animal Ethics committee (Reg. no.198/2000/CPCSEA) as per the Indian CPCSEA guidelines.

Formaldehyde-induced rat hind paw edema

The effects of extracts/fractions and indomethacin on the acute phase of inflammation were investigated. Doses of extracts/fractions were administered orally once a day for a period of 2 days. An hour after the last dose was administered; 0.2 ml of formaldehyde (1%, w/v) was injected into the rat hind paw. Before formaldehyde injection, the paw volume for each rat was measured separately by means of Plethysmometer. Edema caused by formaldehyde was measured at 3, 6 and 24 h the first day, and measured once per day on the following days until inflammation disappeared. The anti-inflammatory potency of extracts/fractions was determined by comparing it with a group in which a 10 mg/kg dose of indomethacin was administered orally. The ratio of the anti-inflammatory effect of extracts/fractions was calculated by the following equation:

$$\text{Anti-inflammatory activity (\%)} = (1-D/C) \times 100$$

Where D represents the percentage difference in paw volume after extracts/fractions were administered to the in the control group¹¹.

Statistical analysis

Body weight and volume of paw level was analyzed by using one way new man-Keulis ANOVA with repeated measures. The level of significance was set at $p < 0.05$.

DISCUSSION

Indomethacin showed more or less uniform inhibition of edema in early intermediate and later phases. Aqueous extract of leaves of the plant material showed also more or less significant inhibition of formaldehyde induced edema in early phases while significant inhibition at later phases. Aqueous extract of leaves showed more significant percentage inhibition of paw edema than aqueous extract of stem and standard, used as indomethacin. Acute inflammation induced by formaldehyde results from cell damage, which provokes the production of endogenous mediators, such as, histamine, serotonin, prostaglandins, and bradykinin. It is well known that inhibition of edema induced by formalin in rats is one of the most suitable test procedures to screen antiarthritic and anti-inflammatory agents as it closely resembles human arthritis. Arthritis induced by formalin is a model used for the evaluation of an agent with probable antiproliferative activity. As some of the above fractions significantly inhibited this model of inflammation they can be thought to possess antiproliferative and antiarthritic activities similar to indomethacin, a cyclooxygenase inhibitor.

Table 1: EFFECT OF EXTRACTS ON PAW EDEMA INDUCED BY FORMALDEHYDE IN RATS :

Groups	Dose (mg/kg)	Before formaldehyde	Mean paw volume \pm SEM (ml) and % Inhibition		
			Time after formaldehyde injection		
			+3h	+6h	+24h
I	-	0.82 \pm 0.01	1.38 \pm 0.02	1.64 \pm 0.02	1.56 \pm 0.02
II	10	0.82 \pm 0.008	1.29 \pm 0.01 (6.52)*	1.11 \pm 0.01 (32.31)*	1.13 \pm 0.01 (27.56)*
III	50	0.85 \pm 0.01	1.10 \pm 0.02 (20.28)*	0.97 \pm 0.02 (40.85)*	0.99 \pm 0.06 (36.53)*
IV	100	0.90 \pm 0.02	1.04 \pm 0.02 (24.64)***	0.97 \pm 0.01 (40.85)***	1.01 \pm 0.01 (35.25)*
V	200	0.90 \pm 0.01	1.27 \pm 0.03 (7.97)*	1.14 \pm 0.03 (30.48)*	1.05 \pm 0.03 (32.69)*
VI	50	0.86 \pm 0.01	1.1 \pm 0.02 (20.28)*	0.97 \pm 0.02 (40.85)*	0.94 \pm 0.02 (39.74)*
VII	100	0.84 \pm 0.01	1.02 \pm 0.01** (26.08)	0.96 \pm 0.02 (41.46)*	0.93 \pm 0.02 (40.38)*
VIII	200	0.86 \pm 0.01	1.06 \pm 0.01 (23.18)*	0.94 \pm 0.02 (42.68)***	0.94 \pm 0.03 (39.74)*

Group-I: Diseased control,

Group-II: Diseased rat treated with standard indomethacine drug,

Group-III: Diseased rat treated with aqueous extract of leaves at concentration 50,

Group-IV: Diseased rat treated with aqueous extract of leaves at concentration 100,

Group-V: Diseased rat treated with aqueous extract of leaves at concentration 200,

Group-VI: Diseased rat treated with aqueous extract of stem at concentration 50,

Group-VII: Diseased rat treated with aqueous extract of stem at concentration 100,

Group-VIII: Diseased rat treated with aqueous extract of stem at concentration 200,

0.05<p*, 0.01<p**, 0.001<p*** all values in \pm SEM.

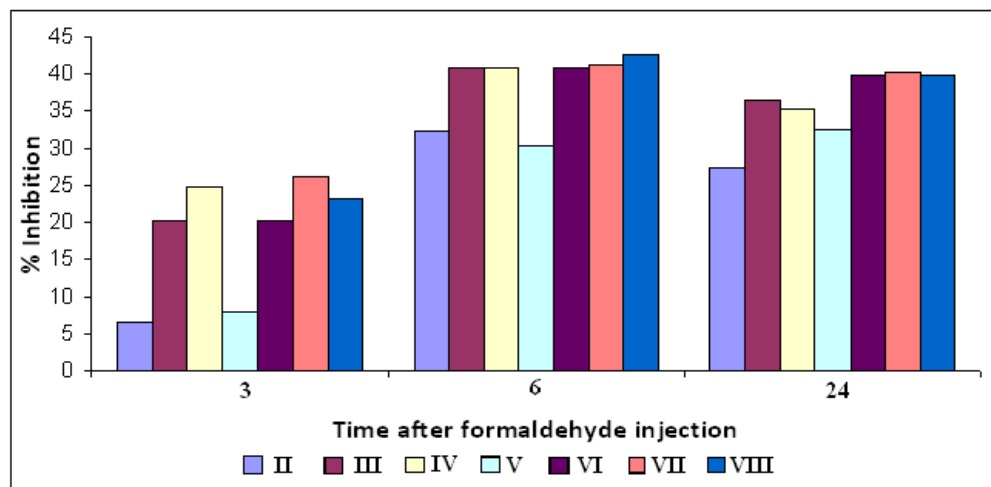


Figure 1: Percentage inhibition of formaldehyde induced edema in rats by aqueous extract of Leaves and Stem.

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