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NOTE

Antiinflammatory Activity of Aqueous Extract of *Coccinia grandis* L. Voigt Leaves and Stem

S.V. DESHPANDE*, M.J. PATIL, S.C. DASWADKAR, U. SURALKAR and A. AGARWAL

Department of Pharmaceutical Chemistry, Padmashree. Dr. D.Y. Patil College of Pharmacy, Akurdi, Pune-411 044, India

*Corresponding author: E-mail: svdeshpande69@yahoo.co.in

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The aqueous extracts of leaves and stem of *Coccinia grandis* were investigated in chemically-induced inflammation rodents model. The aqueous extract of *Coccinia grandis* leaves (AEL) and stem (AES) were prepared and subjected to acute toxicity study as per CPCSEA guideline No. 423. The doses of 50, 100 and 200 mg/kg were selected for both leaves and stem extracts for further studies. The extracts inhibited carrageenan-induced paw edema in rats. These inhibitions were statistically significant ($p < 0.001$) as compared to control. Aqueous extract of leaves showed highest activity. The antiinflammatory activity of the extracts may be attributed to the reported polyphenolic, steroidal and flavonoid constituents of the plants.

Key Words: *Coccinia grandis* (Cucurbitaceae), Antiinflammatory, Polyphenols.

Coccinia grandis L. Voigt. (Cucurbitaceae), commonly known as 'Little gourd' and as 'Kovai' (Hindi), is a climbing perennial herb with a tuberous rootstock producing annual stems up to several meters long, hispid. The plant has been extensively used in Ayurvedic and Unani practice in the Indian subcontinent. The entire plant is reported to be used in the treatment of syphilis, sores and bacterial infections[1]. The fruit is used to treat leprosy, fever, asthma, infective hepatitis, jaundice and sore throats[2,3]. The plant also possesses potent antidiabetic and antidyslipidemic activity[2]. Indigenous people use various parts of the plant to get relief from asthma and cough[4].

Since the plant material reportedly contain polyphenolic components, it was decided to select this plant for the present investigation to assess the efficacy of aqueous extracts of leaves and stem for the antiinflammatory activity against carrageenan induced hind paw edema.

The plant material consists of dried powdered leaves and stem of *C. grandis* L. Voigt. (Cucurbitaceae). The plant was collected in and around 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-411001 (Ref. No. BSI/WC/Tech./2008/477 dated 3/10/2008).

Preparation of the extract: Air-dried powdered leaves and stems (500 g) of plant material were extracted separately with 2 L distilled water by continuous hot extraction method using Soxhlet apparatus. The solvent was concentrated under reduced pressure at 60 ºC, to obtain the solid residues from aqueous extract of leaves 21.2 g (4.24 %) and for stem19.29 g (3.86 %).

Animals: Albino wistar rats (150-200 g) and mice (18-25 g) of either sex were used for the study, obtained from DYPIPSR, Pimpri, Pune. After 1 week of acclimatization, the animals were used for further experiments. All the animal protocols were approved by institutional animal Ethics committee (Reg. No. 198/2000/CPCSEA) as per the Indian CPCSEA guidelines.

Acute toxicity studies: The acute toxicity was determined on albino mice by fixed dose method of OECD guide line No. 423 given by CPCSEA. Groups of 6 mice were administered test drug by oral route in the range of 300-2000 mg/kg and mortality was observed after 24 h, in case of *Coccinia grandis* leaves and stem, since there was death of one animal in the group treated with 300 mg/kg dose and all the animals died in the group of animals treated with 2000 mg/kg dose. Therefore 1000 mg/kg was treated as LD_{50} and1/20th, 1/10th and 1/5th (*i.e.*, 50, 100 and 200 mg/kg) of 1000 mg/kg were selected both the extract for further study.

Antiinflammatory activity

Carrageenan induced hind paw edema: The rats were divided into six groups (n = 6) and they were fasted for 12 h and at water *ad libitum*. Inflammation of the hind paw was induced by injecting 0.1 mL of 1 % carrageenan in normal saline into the subplanter surface of the right hind paw. The

TABLE-1
EFFECT OF AEL AND AES ON CARRAGEENAN INDUCED PAW EDEMA IN RATS

Treatment	Dose (mg/kg) p.o.	Mean paw edema volume in mL (antiinflammatory effect) (%)				
		1 h	2 h	3 h	4 h	5 h
Control	–	0.476 ± 0.007	0.623 ± 0.009	0.743 ± 0.008	0.72 ± 0.008	0.711 ± 0.008
Standard	25	0.136 ± 0.008*** (71.42)	0.188 ± 0.01*** (69.82)	0.24 ± 0.007*** (67.69)	0.191 ± 0.008*** (73.47)	0.145 ± 0.01*** (79.60)
AEL	50	0.088 ± 0.01*** (81.51)	0.303 ± 0.01*** (51.36)	0.316 ± 0.01*** (57.46)	0.295 ± 0.01*** (59.02)	0.255 ± 0.01*** (64.13)
AEL	100	0.18 ± 0.003*** (62.18)	0.246 ± 0.004*** (60.51)	0.293 ± 0.003*** (60.56)	0.258 ± 0.004*** (64.16)	0.235 ± 0.01*** (66.94)
AEL	200	0.133 ± 0.002*** (72.05)	0.191 ± 0.003*** (68.24)	0.236 ± 0.005*** (69.34)	0.195 ± 0.005*** (72.91)	0.165 ± 0.009*** (76.79)
AES	50	0.233 ± 0.007*** (51.05)	0.358 ± 0.01*** (42.53)	0.321 ± 0.01*** (56.79)	0.302 ± 0.02*** (58.05)	0.265 ± 0.03*** (63.99)
AES	100	0.21±0.04*** (55.88)	0.28 ± 0.02*** (55.05)	0.328 ± 0.02*** (55.85)	0.274 ± 0.02*** (61.94)	0.242 ± 0.03*** (65.96)
AES	200	0.23 ± 0.03*** (51.68)	0.301 ± 0.02*** (51.68)	0.351 ± 0.01*** (52.75)	0.298 ± 0.02*** (58.61)	0.278 ± 0.03*** (60.90)

Significance $*p < 0.01$, $**p < 0.05$ and $***p < 0.001$, compared to control, respectively. Values are the mean ± SEM of six rats/treatment. Significance $*p < 0.01$, $**p < 0.05$ and $***p < 0.001$, compared to control, respectively; AEL = Aqueous extract of *Coccinia grandis* leaves; AES = Aqueous extract of *Coccinia grandis* stem.

first group was given normal saline and the second group was given diclofenac sodium (25 mg/kg) p.o. The 3rd, 4th and 5th groups received the aqueous extract of *Coccinia grandis* leaves at doses of 50, 100 and 200 mg/kg p.o., respectively. The 6th, 7th and 8th groups received the aqueous extract of *Coccinia grandis* stem at doses of 50,100 and 200 mg/kg p.o, respectively. All the drug treatment was given 0.5 h before the carrageenan injection. The measurement of paw volume was accomplished immediately by mercury displacement technique using the plethysmometer before the carrageenan injection and at 1, 2, 3, 4 and 5 h after the carrageenan injection. Oedema was expressed as the increment in paw volume due to carrageenan administration[5,6]. Percentage inhibition was calculated by using following formula

$$\text{Inhibition } (\%) = 1 - \frac{dt}{dc} \times 100$$

whereas dt = difference in paw volume in drug treated group, dc = difference in paw volume in control animals.

Statistical analysis: The results were expressed as ± SEM. The statistical analysis was carried out by one way analysis of variance (ANOVA) followed by student 't' test.

Phytochemical screening: Phytochemical screening of the crude aqueous extract of the leaves and stem of plant material revealed the presence of flavonoids, saponins, phenols, tannins and terpenoids.

Carrageenan induced hind paw edema: aqueous extract of *Coccinia grandis* leaves and aqueous extract of *Coccinia grandis* stem showed significant antiinflammatory activity. The doses of aqueous extract of *Coccinia grandis* leaves and aqueous extract of *Coccinia grandis* stem did not show significant inhibition at 1 h of inflammation but they showed significant activity at 2nd, 3rd, 4th and 5th h of inflammation (Table-1). Orally administered doses of 50, 100 and 200 mg/kg observed that the aqueous extract of *Coccinia grandis* leaves has inhibited the inflammation to the extent of 64.13, 66.94 and 76.79 %, respectively, after 5 h. It was also observed that the aqueous extract of *Coccinia grandis* stem at the doses of 50, 100 and 200 mg/kg produced 63.99, 65.96 and 60.90 % inhibition, respectively, after 5 h.

Conclusion

Flavonoids, steroids and polyphenols are known to target prostaglandins which are involved in the late phase of acute inflammation[7]. Hence the chemical constituents like flavonoids, steroids or polyphenols present in both the extracts may be contributing to its antiinflammatory activity. However further studies needed to confirm the role of each constituents.

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