
Anti-inflammatory activity of Volatile oil of *Psidium guajava*

S. KAVIMANI*, R. ILANGO KARPAGAM AND B. JAYKAR

Periyar College of Pharmaceutical Sciences for Girls, Trichy-21, Tamil Nadu

Oil of *Psidium guajava* leaves obtained by steam distillation was given orally to study its effects on the exudative and proliferative phases of the inflammatory reaction, using the technique of carrageenan-induced paw edema and cotton pellet granuloma in male albino rats. The antiinflammatory activity was compared with ketorolac tromethamine. In carrageenan-induced paw edema, 0.8 ml/kg of the volatile oil showed antiinflammatory activity comparable to that of ketorolac tromethamine. The oil was also found to be effective in cotton pellet granuloma studies.

P *SIDIUM guajava* (Family - Myrtales)¹ leaves contain a yellowish green essential oil, which gives a pleasant agreeable odour. It consists of d- and dl-limonenes, Beta-caryophyllene, a bicyclic sesquiterpene alcohol and a tertiary sesquiterpene alcohol^{2,3}. We previously reported the antiinflammatory activity of the volatile oil of *Toddalia asiatica* in comparison with ketorolac tromethamine⁴. The present study is focused on the evaluation of antiinflammatory activity of the volatile oil *Psidium guajava* leaves on different phases of inflammation.

MATERIALS AND METHODS

Volatile oil was extracted from the fresh leaves of *P. guajava* by steam distillation. This oil was used after emulsifying in gum acacia (5%) for oral administration. Male albino rats weighing between 150 and 200 g bred at the King Institute, Guindy, Madras were selected for the studies. Antiinflammatory activity was studied by carrageenan-induced rat hind paw edema and cotton pellet granuloma methods.

Carrageenan-induced edema

The rats were divided into 5 groups, each group consisting of 10 animals. One group served as a

negative control (received 5% Gum acacia soln. 5 ml/kg), second group served as the positive control (received ketorolac tromethamine 10 mg/kg) while the other groups received the essential oil in different doses of 0.2, 0.4 and 0.8 ml/kg orally.

Edema was produced by the method described by Winter *et al* (1962)⁵. The paw volume was measured at 0 and 3 h after the injection of carrageenan. The apparatus used for the measurement of rat paw volume was that of Buttle *et al*, as modified by Singh and Ghosh⁶. This method, was able to detect, a minimal change of paw volume of 0.02 ml. Drug pre-treatment was given 1 h before the injection of carrageenan. The percent inhibition of edema was calculated.

Cotton Pellet Granuloma

Albino rats were divided into 4 groups, each group consisting of 8 animals. One group served as the negative control (received 5% gum acacia 5ml/kg body wt.), the second group served as the positive control (received ketorolac tromethamine 10 mg/kg body wt) and the remaining two groups received the volatile oil of *P. guajava* leaves (0.4 and 0.8 ml/kg body wt. respectively). After shaving off

* For correspondence

Table 1 : Effect of volatile oil *P. guajava* on carrageenan-induced paw edema

Sl. No.	Drug	Dose ml/kg	Increase in Paw volume after 3 h mean \pm SEM	% Decrease In Paw volume mean \pm SEM
1.	Control (5% Gum acacia)	5	0.34 \pm 0.028	—
2.	Standard (Ketorolac tromethamine)	10mg/kg	0.15 \pm 0.020	56.73* \pm 4.80
3.	Oil	0.2	0.25 \pm 0.017	28.08 \pm 2.27
4.	Oil	0.4	0.22 \pm 0.018	36.55 \pm 2.60
5.	Oil	0.8	0.16 \pm 0.016	52.05* \pm 3.72

*P < 0.05

Table 2 : Effect of volatile oil of *P.guajava* on granulation weight

Sl. No.	Drug	Dose ml/kg	Granulation weight in mg mean \pm SEM	% In granulation weight mean \pm SEM
1.	Control (5% Gum acacia)	5	63 \pm 3.48	—
2.	Standard (Ketorolac tromethamine)	10mg/kg	37 \pm 4.80	41.27 \pm 2.8
3.	Oil	0.4	48 \pm 3.72	23.81 \pm 2.17
4.	Oil	0.8	39 \pm 2.26	38.1* \pm 2.72

* P < 0.05

the fur on the back, the rats were anesthetized with pentobarbitone (30 mg/kg). Through a single middle incision on the dorsal surface, sterilised preweighed cotton pellets (30 mg) were implanted in both axillae and groin regions according to the method of D'Arcy *et al.*, (1960) with slight modification⁷. The drugs were administered daily for 10 days (0 to 9 days). On the 10th day the pellets were dissected out and dried at 60°, and the dry weight was determined. The weight is expressed as mg/100 g body weight⁸. Granuloma weight was obtained by deducting the weight of the cotton pellets on 'O' day (i.e., before

start of the experiment) from the weight of the cotton pellet on the 10th day (i.e., at the end of the experiment).

RESULTS

Table 1 shows the effect of drug treatment on carrageenan induced edema. The results were analysed by analysis of variance⁹. Edema suppressent effect of 0.8 ml/kg dose of the oil was 52.05 \pm 3.72 which was near equivalent to that of 10 mg/kg dose of ketorolac tromethamine is 56.73 \pm 4.80. The

edema suppressent effect was significant (at $P < 0.05$) in dose level of 0.8 ml/kg when compared to control. Though the oil showed dose response inhibition of inflammation, this effect was not at 0.2 and 0.4 ml/kg dose levels.

Table 2 shows the effect of drug treatment on the mean weights of cotton pellets. The oil at both the dose levels (0.4 ml and 0.8 ml/kg) inhibited the granuloma formation showing dose dependent inhibitory effect on the granuloma weight. The inhibitory effect of oil at the dose of 0.8 ml/kg body weight was found to be similar to that of ketorolac tromethamine 10 mg/kg.

DISCUSSION

Carrageenan-induced paw edema was taken as a prototype of exudative phase of inflammation. The development of edema has been described as biphasic¹⁰. The initial phase is attributable to the release of histamine, serotonin and kinins in the first hour after injection of carrageenan. A more pronounced second phase is related to the release of prostaglandins like substances in 2-3 hours.

The significant antiinflammatory effect of oil of *P. guajava* leaves, appears to be similar to that of the methanolic fraction of the chloroform extract of unripened fruits, which could be related to its histaminic, kinin and prostaglandin inhibitory activity¹¹.

In the cotton pellet granuloma model, inflammation and granuloma develops during a period of several days. This model is an indication of the proliferative phase of inflammation. Inflammation

involves proliferation of macrophages, neutrophils and fibroblasts, which are basic sources for granuloma formation. Therefore, the decrease in granuloma weight indicates suppression of the proliferative phase, which was effectively inhibited by *P. guajava* leaf oil in the present investigation.

REFERENCES

1. The wealth of India, Raw Materials, Publication and Information Directorate, CSIR, New Delhi, Vol. VIII 1989, 286.
2. Bhati, *Perfume. essent. oil Rec.*, 1953, 44, 46.
3. Sagrero, M., Bartley, J.P., and Provisschwe. A., *Flower and fragrance Journal.*, 1994, 9, 135.
4. Kavimani S., Vetrichelvan, T., Ilango. R. and Jaykar, B., *Indian J. Pharm. Sci.*, 1996, 58, 67.
5. Winter, C.A., Risley, E.A., and Nuss. G.W., *Proc. Soc. Exp. Biol.*, 1962, 111, 544.
6. Singh, H. and Ghosh, M.N., *J.Pharm. Pharmacol.*, 1968, 20, 316.
7. D'Arcy. P.D., Howard, E.M., Muggleton, P.W. and Townsend, S.B., *J. Pharm. Pharmacol.*, 1960, 12, 659.
8. Dipasquale G., and Meli A., *J. Pharm. Pharmacol.*, 1965, 17, 379.
9. Armitage, P. *Statistical Methods in medical research.*, Blackwell Scientific publication., 1971, 217.
10. Vinegar, R., Truax, J.F. and Selph, S.L., *Fed. Proc.*, 1971, 23.
11. Das, A., Sen. T., Dutta. A.S., and Nagchaudhuri. A.K., *Indian J. Pharm. Sci.*, 1994, 56, 163.