

Anti - inflammatory potential of the seeds of *Ocimum basilicum* Linn. in rats

PANKAJ RAKHA, SUNIL SHARMA AND MILIND PARLE

Guru Jambheshwar University of Science and Technology, HISAR(HARYANA) INDIA

(Accepted : November, 2009)

In the present study, the effect of the seeds of the plant *Ocimum basilicum* Linn. on inflammation induced by histamine and prostaglandins was studied. A total of 60 rats divided in 10 groups were used in this study. The experimental design was approved by IAEC. The increase in paw edema served as the index of inflammation and was measured using digital vernier calipers after injecting various edemogens such as histamine and PGF₂α. Petroleum ether fraction (400mg/kg, p.o) and ethanolic fraction (400mg/kg, p.o) of the seeds of *Ocimum basilicum* Linn. significantly inhibited the paw edema produced by histamine and PGF₂α. These findings reveal that the seeds of the plant *Ocimum basilicum* Linn. possesses potent anti-inflammatory activity.

Key words : Anti-inflammatory, Histamine, Prostaglandins

INTRODUCTION

Ocimum basilicum Linn. (Labiatae) popularly known as Sweet basil is used in both Ayurvedic and Unani systems of medicine (Jain *et al.*, 1988). It is a small perennial, tropically growing shrub of Asian origin (Dhar *et al.*, 2002). *Ocimum* has been reported to possess anti-HIV (Yamasaki *et al.*, 1998), antimicrobial (Suppakul *et al.*, 2003), anti-oxidant (Javanmardi *et al.*, 2003), anti-ulcer (Singh and Majumdar, 1999), analgesic (Aziba *et al.*, 1999) and hypolipidemic properties (Zeggwagh *et al.*, 2007). The present study was designed to investigate the anti-inflammatory potential of the seeds of the plant *Ocimum basilicum* Linn in rats.

MATERIALS AND METHODS

Collection and identification of the plant material :

The seeds of the plant *Ocimum basilicum* Linn. were procured from C.C.S. Haryana Agriculture University, Hisar (Haryana) and were authenticated by Raw materials, Herbarium and Museum division of NISCAIR, New Delhi. A voucher specimen has been retained in the Department of Pharmaceutical Sciences, Guru Jambheshwar University of Science and Technology for future reference.

Preparation of the extract

500g of the seeds were collected and extraction was done for 72 hrs using petroleum ether as solvent using soxhlet apparatus. The filtrate was collected, marc was pressed and the seeds were again subjected to extraction with ethanol for three more days. After complete

extraction, the solvents were removed by distillation under reduced pressure and the residue was concentrated to dryness in vacuum to obtain petroleum ether and ethanolic fraction of the seeds of the plant (*Ocimum basilicum* Linn).

Drugs :

Histamine dihydrochloride was purchased from S.D. Fine Chemicals and Prostaglandins (PGF₂α) from Sigma Chemicals, USA.

Instruments :

Digital vernier calipers (*Mitutoyo*, Japan) was used to measure the paw edema induced by various edemogens *i.e.* histamine and PGF₂α.

Animals :

A total of 60 Wistar rats of either sex with an average weight ranging between 120-150g were used in this study. The animals were procured from Disease free Small Animal House, Chaudhary Charan Singh Haryana Agricultural University, Hisar and were housed under natural conditions with a 12 h light / dark cycle. The animals were fasted overnight before the investigations, but had free access to water during the study. The care of animals was taken as per the guidelines of IAEC, Guru Jambheshwar University of Science and Technology, Hisar constituted as per the specifications of CPCSEA, Ministry of Forest and Environment, Govt. of India.

Experimental protocol :

The procedure and technique described earlier (Bilici

et al., 2001 and Willis and Correlsen, 1993) was employed for inducing paw edema using histamine and prostaglandins as edemogens. The rats were fasted overnight before all the experiments providing free access to water. The test fractions consisting of the seeds of *Ocimum basilicum* Linn. were suspended in gum acacia (2%) and were administered orally 30 minutes before the injection of histamine dihydrochloride 0.1 ml. of 1% w/v solution (Parmar and Ghos, 1978) or PGF2 α 0.1 ml. of 1% w/v solution (Nikolov *et al.*, 1978) into the sub plantar region of left hind paw of each rat. The control group of animals received the vehicle 30 minutes before the injection of histamine dihydrochloride. Diclofenac sodium (5mg/kg) served as the standard drug for this study. The test groups received petroleum ether fraction (400 mg/kg, p.o.) and ethanolic fraction (400 mg/kg, p.o.). The paw thickness was measured with the help of digital vernier calipers after 1h and 2 h of treatment with various edemogens.

RESULTS AND DISCUSSION

In the present study both, petroleum ether fraction as well as ethanolic fraction of *Ocimum basilicum* Linn. seeds (400 mg/kg, p.o.) significantly reduced rat paw thickness ($p < 0.001$), when measured after 1h of administration of histamine. The percentage inhibition for petroleum ether fraction in histamine induced rat paw edema was found to be 11.7 per cent after 1h, whereas ethanolic fraction produced 10.8 per cent inhibition of Histamine induced rat paw edema. PGF2 α induced rat paw edema was also reduced by petroleum ether fraction to the extent of 13.5

per cent and by ethanolic fraction to the extent of 11.5% (Table 1 and 2).

Furthermore, there was remarkable reduction in rat paw edema, with both the fractions of the seeds of *Ocimum basilicum* Linn. when measured after 2h of administration of histamine and PGF2- α . (Table 1 and 2). Thus petroleum ether fraction as well as ethanolic fraction of the seeds of *Ocimum basilicum* Linn. produced anti-inflammatory activity in both the experimental models employed in the present study. These findings are consistent with the reports in the literature (DiPasquale *et al.*, 1973).

Since different fractions of the seeds of *Ocimum basilicum* Linn. inhibited histamine induced rat paw edema, there is a possibility that *Ocimum basilicum* Linn. possessed anti-histaminic property. This suggestion is inline with the studies conducted in the past. (Singh *et al.*, 1996). It is noteworthy that *Ocimum basilicum* Linn. also inhibited the thickness of rat paw edema induced by PGF2 α in the present study. These findings suggest that *Ocimum basilicum* Linn. also attenuated prostaglandins-induced biochemical events at the molecular level in some manner. However, the possibility of *Ocimum basilicum* Linn. producing inhibition of lipoxygenase pathway can not be ruled out since leukotrienes contribute as important mediators of inflammation (Brain and Williams, 1990). However, further studies need to be carried out to confirm this possibility. Thus, the present study highlights the anti-inflammatory potential of *Ocimum basilicum* Linn. seeds in two different experimental models.

Table 1 : Effect of petroleum ether fraction and ethanolic fraction on histamine dihydrochloride induced rat paw edema

Sr. No.	Treatments	Dose mg/kg	Mean paw thickness (mm)			
			1h	% Inhibition	2h	% Inhibition
1.	Control (Vehicle)	-	5.62 \pm 0.01	0	6.39 \pm 0.03	0
2.	Diclofenac sodium	5	4.53 \pm 0.02*	19.39	4.95 \pm 0.01*	22.53
3.	Petroleum ether fraction	400	4.96 \pm 0.01*	11.74	5.48 \pm 0.01*	14.24
4.	Ethanolic fraction	400	5.01 \pm 0.02*	10.85	5.54 \pm 0.01*	13.30

Data are expressed as Mean \pm SEM

Table 2 : Effect of petroleum ether fraction and ethanolic fraction on prostaglandins induced rat paw edema

Sr. No.	Treatments	Dose mg/kg	Mean paw thickness (mm)			
			1h	% Inhibition	2h	% Inhibition
1.	Control (Vehicle)	-	5.56 \pm 0.01	0	6.41 \pm 0.02	0
2.	Diclofenac sodium	5	4.50 \pm 0.02*	19.06	4.92 \pm 0.01*	23.24
3.	Petroleum ether fraction	400	4.81 \pm 0.02*	13.48	5.32 \pm 0.01*	17.01
4.	Ethanolic fraction	400	4.92 \pm 0.01*	11.51	5.41 \pm 0.02*	15.60

Data are expressed as Mean \pm SEM

REFERENCES

- Aziba, P.I., Bass, D. and Elegbe, Y. (1999).** Pharmacological investigation of *O. gratissimum* in rodents, *Phytotherapy Res.*, **13**: 427-429.
- Bilici, D., Akpınar, E., Gursan, N., Dengiz, G.O., Bilici, S. and Altas, S. (2001).** Protective effect of T-type calcium channel blocker in histamine-induced paw inflammation in rat, *Pharmacol. Res.*, **44**: 527-531.
- Brain, S.D. and Williams, T.J. (1990).** Leukotrienes and inflammation, *Pharmacol. & Therapeutics*, **46**(1): 57-66.
- Dhar, A.K. (2002).** Sweet Basil. *Ocimum basilicum*- a review, *J. Medicinal & Arom. Plant Sci.*, **24**: 738-755.
- DiPasquale, G., Rassaert, C., Richter, R., Welaj, P. and Tripp, L. (1973).** Influence of prostaglandins (PG) E₂ and F_{2a} on the inflammatory process, *Prostaglandins*, **3**(6): 741-757.
- Jain, M.L. and Jain, S. R. (1988).** Therapeutic utility of *Ocimum basilicum* Linn, *Planta Med.*, **54**: 66-70.
- Javanmardi, J., Stushnoff, C., Locke, E. and Vivanco, J.M. (2003).** Antioxidant activity and total phenolic content of Iranian *Ocimum* accessions, *Food Chem.*, **83**: 547-550.
- Nikolov, R., Nikolova, M., Peneva, M. (1978).** Study of dipyrene (Analgin) antagonism toward certain pharmacological effects of prostaglandins E₂ and F_{2a}. In : Ovtcharov R, Pola W (eds) Proceedings Dipyrene. Moscow Symposium, Schattauer-Verlag : 81-89.
- Parmar, N.S. and Ghosh, M.N. (1978).** Anti-inflammatory activity of gossypin of bioflavonoid isolated from *Hibiscus vitifolius* Linn, *Indian J. Pharmacol.*, **10**: 277-293.
- Singh, S. and Majumdar, D.K. (1999).** Evaluation of gastric anti ulcer activity of fixed oil of *Ocimum basilicum* L. and its possible mechanism of action, *Indian J. Experimental Biol.*, **36**: 253-257.
- Singh, S., Majumdar, D.K., and Rehan, H.M.S. (1996).** Evaluation of anti-inflammatory potential of fixed oil of *Ocimum sanctum* (Holybasil) and its possible mechanism of action, *J. Ethnopharmacol.*, **54**: 19-26.
- Suppakul, P., Miltz, J., Sonneveld, K. and Bigger, S.W. (2003).** Anti microbial properties of Basil and its possible application in food packaging, *J. agric. & Food Chem.*, **51**: 3197-3207.
- Willis, A.L. and Cornelsen, M. (1973).** Repeated injection of prostaglandin E in rat paws induces chronic swelling and a marked decrease in pain threshold, *Prostaglandins*, **3** : 353-357.
- Yamasaki, K., Nakano, M., Kawatha, T., Mori, H., Otake, T. and Ueba, N. (1998).** Anti HIV activity of herbs in Labiatae, *Biol. & Pharmacol. Bull.*, **21**: 829-833a
- Zeggwagh, N.A., Sulpice, T. and Eddouks, M. (2007).** Anti-hyperglycemic and hypolipidemic effects of *Ocimum basilicum* aqueous extract in diabetic rats, *American J. Pharmacol. & Toxicol.*, **2** (3): 123-129.

