Malaysian Journal of Science **18**: 21-22 (1999)

Effect of *Zingiber otensii* on acute paw-oedema in rats

Saadiah Mohd. Hidir[1] and **Halijah Ibrahim**[2]

[1]Department of Physiology, Faculty of Medicine and [2]Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur.

Abstract. In the study on glucose oxidase-induced oedema in rats, the aqueous extract of the rhizomes of *Zingiber ottensii* (Zingiberaceae) did not show anti-inflammatory activity when given intraperitoneally at a dose of 500 mg kg^{-1} it showed slight anti-inflammatory activity at doses of 1 and 2g kg^{-1}. The percentage suppression of oedema at 1 and 2g kg^{-1} is about 10% when measured at 2 and 3 hours after the injection of glucose oxidase into the paws. In carrageenin induced oedema, the percentage suppression of oedema at 3 and 4.5 hours after the injection of carrageenin is 60%.

Abstrak. Dalam kajian edema yang diinduksikan oleh glukosa oksidase di tikus, ekstrak akueus rizom *Zingiber ottensii* (Zingiberaceae) tidak menunjukkan aktiviti anti-radang apabila diberi secara intraperitoneal pada dos 500 mg kg^{-1} tetapi ia menunjukkan sedikit aktiviti anti-radang pada dos 1 dan 2 g kg^{-1}. Peratus perencatan edema pada dos 1 dan 2 g kg^{-1} adalah lebih kurang 10%, apabila diukur pada 2 dan 3 jam selepas suntikan glukosa oksidase ke dalam tapak kaki tikus. Pada edema yang diinduksikan oleh karagenin, peratus pengurangan edema pada 3 dan 4.5 jam selepas suntikan karagenin adalah 60%.

Introduction

Zingiber zerumbet (L.) Sm., known locally as lempoyang, a member of the ginger family (Zingiberaccae) that has been shown to have a strong anti-inflammatory activity in carrageenin induced oedema. This oedema is a commonly used animal model for acute inflammation; glucose oxidase-induced oedema is also an animal model for acute inflammation [1]. *Zingiber ottensii* Val. is closely associated with *Z. zerumbet* in its general morphology but differs in its dark purplish rhizome. The colour is reflected in the name lempoyang hitam or bonglai hitam. This study reports the effect of the aqueous extract of the rhizomes of *Z. ottensii* on the two animal models of acute inflammation.

Experimental

Preparation of aqueous extract of Z ottensii. Mature rhizomes (collected from Rimba Ilmu Botanic Garden, University Malaya) were washed thoroughly, homogenised in water (1:1 w/v) and then centrifuged. The supernatant was freeze-dried.

Induction of acute oedema. For the glucose oxidase induced inflammation, 0.1 mL of a 4% solution of glucose oxidase in normal saline was injected into the hind paw of 150 – 200 g Sprague-Dawley rats. A volume of 1 mL of the aqueous extract of *Z ottensii* at doses of 1 and 2g kg^{-1} were given intraperitoneally to the rats 40 minutes before the injection of glucose oxidase. Control rats were given water intraperitoneally. The paw oedema was evaluated by measuring the change in thickness of the paw by means of a caliper immediately before and at 2 and 3 hours after glucose oxidase injection. The percentage inhibition of oedema by the extract was assessed by comparison with the control group. Carrageenin oedema was induced by injecting 0.05mL of 2% carrageenin solution in normal saline into the rat paw. A volume of 1 mL of the aqueous extract at a dose of lg kg^{-1} was given to the rats 40 minutes before the injection. Measurements of paw oedema were taken at 3 and 4.5 hours after carrageenin injection. The

statistical difference between test groups was calculated by the use of Student's *y*-test. Results were considered significant if $P < 0.05$.

Results

The intraplantar injection of glucose oxidase produce an inflammatory response in rats. The glucose oxidase reacts with endogenous glucose to generate gluconic acid and hydrogen peroxide (H_2O_2). Hydrogen peroxide can react to produce hydroxy (OH) radicals that are responsible for tissue damage and for the accompanying inflammation changes. The extract does not show anti-inflammatory activity when given intraperitoneally at a dose of 500mg kg^{-1} but showed slight but significant anti-inflammatory activity at doses of 1 and 2g kg^{-1} (Table 1). The anti-inflammatory action did not seem to be dose dependent because the percentage suppression of oedema at doses of 1 and 2g kg^{-1} was about 10% when measured at 2 and 3 hours after the injection of glucose oxidase into the paws.

The carrageenin-induced oedema is produced by a different mechanism [2]. The initial phase is attributed to the release of histamine and serotonin. The oedema is then maintained by kinin-like substances and the second phase (3-5 hours) is believed to be promoted by prostaglandin-like substances. In carrageenin oedema, the percentage suppression of oedema at a 1 g kg^{-1} was about 59% when measured at 3 and 4.5 hours after carrageenin injection (Table 2). The results show that the anti-inflammatory effect of the extract is not strong in peroxide-induced oedema compared that in carrageenin-induced oedema. The mechanism of its anti-inflammatory action remains to be determined.

Table 1. Effect of aqueous extract of *Z. ottensii* on glucose oxidase-induced oedema

Treatment	Increase in paw diameter (mm) Afer 2 hours	Afer 3 hours
Control	5.00±0.02	5.04±0.11
1 g kg^{-1}	4.50±0.15*	4.54±0.13*
2 g kg^{-1}	4.35±0.17*	4.48±0.16*

Each result represents the mean of 6 values ±SEM. $*P < 0.05$.

Table 1. Effect of aqueous extract of *Z. ottensii* on carrageenin-induced oedema

Treatment	Increase in paw diameter (mm) Afer 3 hours	Afer 4.5 hours
Control	11.1±0.15	10.58±0.12
1 g kg^{-1}	4.46±0.16*	4.25±0.13**

Each result represents the mean of 6 values ±SEM. $**P < 0.001$.

Acknowledgements

We would like to thank the University of Malaya for financial support (PJP 25188).

References

1 Saadiah M. Hidir and Halijah Ibrahim (1995). *Konvensyen Kebangsaan Tumbuhan Ubatan*, 13-15 Oktober 1995, FRIM Selangor.

2 2 Vinegar, R. *et al.* (1969). *J. Pharm. Exp. Ther.* **166**: 96.