

Anti-Inflammatory Activity of The Extract of Guava Leaves (*Psidium guajava* L) in The Rat (*Rattus norvegicus* L)

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Abstract

Using of natural sources that have anti-inflammatory activity for the prevention and treatment of degenerative diseases began to be further explored. An investigation on the anti-inflammatory activity of the aqueous extract of guava leaves (*Psidium guajava* L.) from Sawangan, Depok on white male rats of Sprague-Dawley strain had been carried out on the carrageenan-induced paw edema method. To examine the effect of guava extract on subcutan at different doses of 125, 250 and 500 mg/kg of body weight (BW). Indometacine at dose of 10 mg/kg BW was used as a positive control. Observations were made during five hours with an interval of one hour. These results demonstrate that the percentage of inflammation or edema (% E) optimal at the 4th hour and then decreased at the 5th hour, while the percentage of optimal inhibition occurred at the 5th hour. Guava extract at 125, 250 and 500 mg/kg BW reduced inhibitory percentage activities by 40.81, 55.45 and 43.61% ($p < 0.05$) respectively. In conclusion, this study suggests that guava extract has anti-inflammatory properties by decreasing edema level.

Keywords: Anti-inflammatory, guava leaves, edema

INTRODUCTION

Increased production of free radicals that can cause a decrease in the body's defense system (Qian and Nihorimbere, 2004). Free radicals are involved in the pathogenesis of chronic degenerative diseases such as inflammation, cancer, autoimmune, cardiovascular, neurodegenerative, and aging (Liu *et al.*, 2004).

Psidium guajava L. known as guava is a member of the family Myrtaceae. Pharmacological study of the whole extract of this plant like bark, fruits, and leaves showed the existence of anti-inflammatory activity, antioxidant, anti-bacteria, hypoglycemic, analgesic, antipyretic, spasmolytic, and central nervous system pressure (Rai *et al.*, 2007). Part of this plant is also used, among others, to heal wounds, ulcers, and cholera (Sanches *et al.*, 2005). In addition, this plant is often used as a cough medicine, anti-diarrhea, treatment of hypertension, obesity, and diabetes mellitus control (El Sohafy *et al.*, 2009).

The potential of guava leaves is essential to do research about its activities for the prevention and treatment of degenerative diseases caused by free radicals. The purpose of this study was to determine the effect of guava leaves of red fruit extract as an anti-inflammatory of test animals induced by carrageenan. This research is expected to provide additional information about the guava leaves as an anti-inflammatory effects that economic value can be improved.

METHODS

Plant material

Guava leaves of red local fruit were obtained from Sawangan, Depok. Then it stored in room conditioning before used.

Extracts Preparation

Guava leaves boiled during 2 hours then filtered by using Whatman paper no.1. After that the results dried for later dissolved by using distilled water.

Animals

Sparague-Dawley albino rats of male (180-200g) were housed in standard cages, which provided with food and water *ad libitum*. They kept for a week to acclimatization before experimental sessions. Rats were weighed and had behavior observed every day. The mice could be used for research unless they signed any symptoms of pains and their weight changed to more or less than 10% of initial weight. This preservation was performed in Balitbangkes RI, Jakarta.

Carrageenan induced rat paw oedema

Acute inflammation was induced by subcutan injection of freshly prepared suspension of carrageenan into the left hind paw of each rat. The paw volume was measured at 1st, 2nd, 3th, 4th, and 5th hour after the injection of carrageenan using a plethysmometer. Aqueous extracts of the guava leaves (125, 250, and 500 mg/kg) and standard drugs Indomethacine (10 mg/kg in 1% CMC) were administered by subcutan. The negative control group received 0.9% saline 0,1

ml/kg by eous. The positive control group receives 0,1 ml keragenan/NaCl 1%. Mean increase in the volume of edema was measured and the percentage of inhibition was calculated.

Statistical analysis

Analysis of data for testing anti-inflammatory performed using ANOVA.

RESULTS

Figure 1 shows that both the comparison group Indomethacine, or a group of samples *Psidium guajava* L. at doses of 125, 250, and 500 mg/kg both have the effect of lowering value of %E ($\alpha=0,05$) than the positive control group. This shows the inhibition of edema caused by injection carrageenan. Thus it can be presumed that the sample of *Psidium guajava* L have anti-inflammatory abilities.

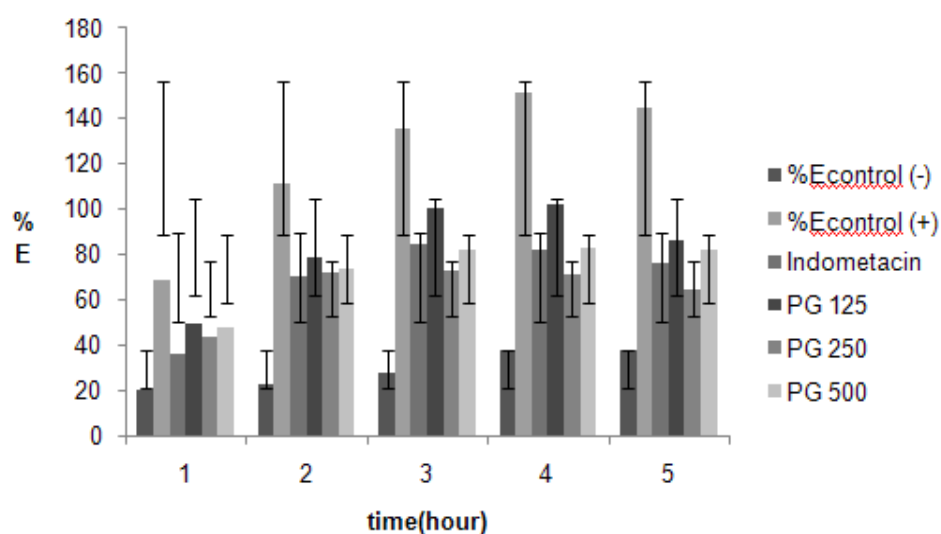


Fig. 1. The relationship edema rate (% E) and time (hr)

Figure 2 shows that there was inhibition by Indomethacine and samples of inflammation caused carrageenan. This is indicated by the value of %I have available. From this figure also shows

that *Psidium guajava* L. at a dose of 250 mg/ml give the best effect among the three doses tested. Even starting at 4th hour, the effect is better than Indomethacine.

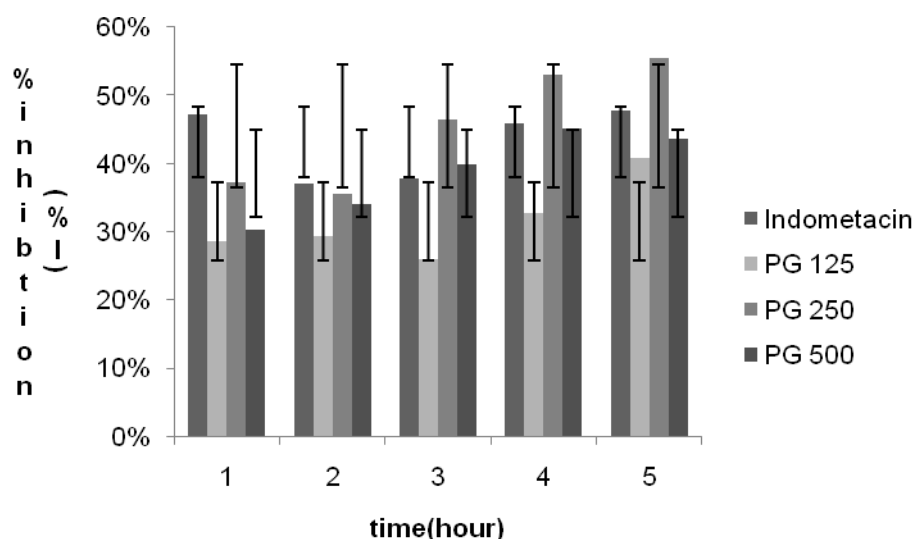


Fig. 2. The relationship between the inhibition rate (%I) and time

DISCUSSION

Inflammation is a normal protective response to tissue injury caused by physical trauma, noxious chemicals or microbiologic agents. Inflammation is body's response to inactivate or destroy the invading organisms, remove irritants and set stage for tissue repair. Inflammation is triggered by the release of chemical mediators from the injured tissues and migrating cells. The specific chemical mediators vary with the type of inflammatory process and include amines such as histamine, serotonin, and lipids such as prostaglandins and small peptides such as kinins (Thangam and Dhananjayan, 2003).

Anti-inflammatory test results can be seen in Figures 1 and 2. Edema rate (% E) reached the peak at 4th hours. Acute inflammatory process induced by carrageenan occurs through two phases. In phase 1st hour after induction with carrageenan, occurs cytoplasmic enzymes and serotonin activation in mast cells, and increase the amount of prostaglandins in areas of inflammation. In the second phase occurs in the time span of 3-5th hours after induction with carrageenan. In this phase, macrophage-induced tissue area showed elevated

levels of interleukin-1 (IL-1) which then induces the cell nucleus polymorphic (PMNs) in the area of inflammation. Activation of PMNs lysosomes activate enzymes and oxygen radicals, particularly superoxide, which damages tissues and causes swelling (Ratheesh and Helen, 2007).

CONCLUSION

1. The value of %E and %I both Indomethacine and samples of *Psidium guajava* L. have anti-inflammatory effect ($P < 0.05$) in these experimental conditions.
2. Anti-inflammatory power *Psidium guajava* L. at a dose of 250mg/ml at least better than other dose groups. Even starting at the 4th hour the effect is better than the comparison Indomethacine. The percentage of inflammation or edema (% E) optimal at the 4th hour and then decreased at the 5th hour, while the percentage of optimal inhibition occurred at the 5th hour.

ACKNOWLEDGMENT

The authors wish to thank the Penelitian Hibah Strategi Nasional (PHSN) DIKTI for research funding

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