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EFFECTIVENESS OF ANTI-INFLAMMATORY PLASTER FROM KENCUR (*KAEMPFERIA GALANGA* L.) RHIZOME ETHANOL EXTRACT

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ABSTRACT: Kencur (*Kaempferia galanga* L.) is a plant of Zingiberaceae family. Some studies have shown that kencur can reduce inflammation because flavonoid kaempferol which is contained in kencur has anti-inflammatory activity. Optimized the use of the rhizome kencur, research was conducted on anti-inflammatory plaster containing kencur rhizome extract and its effectiveness for treating inflammation. The study was conducted through the stages of manufacture of plasters kencur rhizome extract and effectiveness of anti-inflammatory plaster test on acute inflammation. Based on this research, kencur rhizome extract can be manufactured as plaster. There were 5 groups of animals test using male white rats Wistar strain which is induced by carrageenan for acute inflamation test. The result showed by one-way ANOVA (analysis of variant) with a 95% confidence level, there was a significant difference between test groups and negative control group based on variation doses for inflamation test. Kencur rhizome ethanol extract can be used as anti-inflammatory plaster to reduce inflammation in rats.

INTRODUCTION: The skin is a largest organ in the human body [1]. The skin has a great power regeneration, for example when the skin injured, the cells of the dermis will be against a local infection of capillaries and connective tissue will regenerate epithelium grows from the wound edges to cover the connective tissue regenerated, those forming scar tissue that was initially reddish because increasing the number of capillaries and eventually turned into a whitish collagen fibres are visible through the epithelium[10].

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Inflammatory process involves a series of events that can be caused by a variety of stimulation (e.g. infection substance, ischemia, antigen-antibody interaction, and injury due to heat or other physical injury). Each type of stimulus triggers has a typical response pattern that shows the diversity of relatively small. At the macroscopic level, the response is usually accompanied by clinical signs are generally in the form of erythema, edema, are very sensitive to pain (hyperalgesia), and pain [5]. Kencur (*Kaempferia galanga* L.) is a plant of Zingiberaceae family, is a small herb that thrives in low-lying areas or mountainous which have crumbly land [2]. One of the chemical substances in the kencur rhizomes which are anti-inflammatory is kaempferol (**Fig. 1**). Beside as an antioxidant and anticancer, kaempferol also has the ability to inhibit the inflammatory process by inhibiting the expression of the enzyme cyclooxygenase-2 (COX-2).

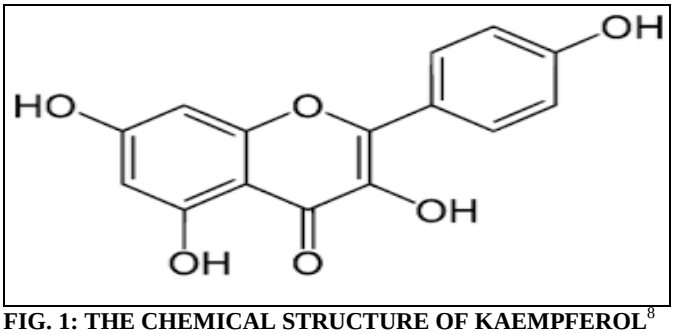

FIG. 1: THE CHEMICAL STRUCTURE OF KAEMPFEROL[8]

Research in Thailand about anti-inflammatory effects of ethanol extract of kencur rhizome used in vitro models that kencur rhizome has anti-inflammatory effects. Therefore, the extract has the potential to be used as an anti-inflammatory plaster to help accelerate the healing process of inflammation [3].

Drugs plaster is a flexible preparations containing one or more active substances. The preparation is intended to use on the skin. Plaster drug designed to maintain the active agent in direct contact with the skin may be absorbed slowly, or act as ceratolytic or protective material [4].

MATERIAL AND METHOD:

Materials which is used in this study were kencur rhizome (*Kaempferia galanga* L.), ethanol 96% (Brataco), glycerol, aquades (Brataco), sterile bandage (Husada), and plaster (Leukoplast). Experimental animals that used in this study is a white male Wistar rats aged 2.5 - 3 months with body weight 140-210 grams.

Plants determined in Herbarium Taxonomy Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, University of Padjadjaran. Kencur rhizome (age 10-12 months) obtained from Manoko Plantation, Lembang, West Java. Rhizome kencur wet sorted, washed, drained, chopped crosswise with a thickness of 2-5 mm and dried in an oven with a temperature of 40 - 50^0C until dry (moisture content ≤ 10%).

Extraction was used maceration method with ethanol 96% solvent by 3 times replacement for 3 days. Liquid extract that has been collected evaporated with a rotary evaporator (rotary) at a temperature of 40-50^0C, macerat heated over a water bath at a temperature not more than 50^0C, in order to obtain a viscous extract.

Viscous rhizome kencur extract with 3 kinds of different concentration, 18 mg / Kg BW rats, 36 mg / Kg BW rats and 45 mg / Kg BW rats bearing impregnated into the wound that has been prepared. Bearing wounds that have been impregnated by a 60% extract added ethanol and glycerol. After that, the wound pad attached to the adhesive plaster. As a negative control pads made of plaster with wounds that were given 60% ethanol and glycerol, while as a positive control used plaster diclofenac sodium topikal gel. Testing of anti-inflammatory plaster ethanol extract kencur conducted on 5 groups of test animals. Each group consisted of 3 rats Wistar strain. Rats induced inflammation by using a solution of 1% carrageenan on its feet.

Group of test animals I as a negative control, group of test animals II as a positive control, a group of test animals III granted plaster impregnated ethanol extract kencur 18 mg / Kg BW, groups of test animals IV granted plaster impregnated ethanol extract kencur 36 mg / Kg BW, groups of animals V test given plaster impregnated ethanol extract kencur 45 mg / Kg BW.

RESULTS AND DISCUSSION:

Determination plants at the Herbarium Taxonomy Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, University of Padjadjaran identification plants is kencur (*Kaempferia galanga* L.). Processing of simplicia used fresh rhizome kencur 5000 grams, 750 grams simplicia kencur rhizome obtained. Yield of simplicia is 15%. Kencur rhizome simplicia was made to reduce the water content.

TABLE 1: RESULT OF EXAMINATION QUALITY PARAMETERS RHIZOME *KENCUR SIMPLICIA*.

Quality Parameters	Observation Result
Water Content (%) w/v	7,30
Total Ash (%) w/v	6,5
Concentration of water soluble extract (%) w/v	12,6
Concentration of ethanol soluble extract (%) w/v	8,6

Water content of simplicia is not more than 10%. The total ash content indicates the total mineral (anorganic residue) contained in the simplicia. The simplicia has total mineral as much as 6.5%. Concentration in water soluble extract shows the percentage of compounds that can dissolve in water, which was 12.6% and the concentration ethanol soluble extract shows the percentage of compounds that can be dissolve in ethanol, which was 8.6% (**Table 1**).

Maceration selected as extraction process of kencur rhizome because the flavonoids are efficacious in kencur are thermolabile. Ethanol 96% has been able to dissolve almost all secondary metabolites contained in simplicia. From 500 grams of rhizome kencur simplicia extracted, 29.29 grams viscous extract obtained. The yield of the extract was 5.86%. Flavonoid compound was detected at kencur rhizome extract. By detecting flavonoids, there are indications that the extract can be used as anti-inflmmatory because flavonoid compounds provide an anti-inflammatory effect.

Anti-inflammatory plaster is made in 5 types of plasters, namely:

1. Plaster which wound pads impregnated with 60% ethanol and one drop glycerol (negative control)

2. Plaster which wound pads impregnated with ethanol 60% and diclofenac sodium topical gel (positive control)

3. Plaster which wound pads impregnated with kencur extract dose 18 mg/Kg BW (test I)

4. Plaster which wound pads impregnated with kencur extract dose 36 mg/Kg BW (test II)

5. Plaster which wound pads impregnated with kencur extract dose 45 mg/Kg BW (test III)

Ethanol 60% was used as solvent because it can be used as a preservative and volatile and also can dissolve the extract was tested based on the results of the assay of the water soluble extract and concentration ethanol soluble extract. The amount of aqueous extract impregnated into the wound pads were 0.5 mL. It was the amount that can be absorbed completely by wound pads. The wound pads created by the length of a square with each side 1 cm. This size was adjusted to the feet of mice induced by carrageenan. Impregnated wound pads placed on the adhesive plaster and ready for use.

TABLE. 2: THE OBSERVATION OF THE AVERAGE VOLUME OF INFLAMMATION

Group	Average Inflammation Volume (µL)					
	V0	V1	V2	V3	V4	V5
Negative Control	56.57 ± 5.77	73.33 ± 11.55	73.33 ± 11.55	73.33 ± 11.55	76.66 ± 5.77	73.33 ± 11.55
Positive Control	60 ± 10.00	66.67 ± 11.55	60 ± 17.32	60 ± 17.32	46.67 ± 15.28	43.33 ± 5.77
Dose 18 mg/KgBW	53.33 ± 5.77	70 ± 0.00	73.33 ± 5.77	70 ± 10.00	66.67 ± 5.77	63.33 ± 5.77
Dose 36 mg/KgBW	63.33 ± 15.28	70 ± 10.00	73.33 ± 15.28	76.77 ± 5.77	73.33 ± 5.77	66.67 ± 5.77
Dose 45 mg/KgBW	60 ± 17.32	63.33 ± 5.77	60 ± 0.00	60 ± 10.00	60 ± 10.00	63.33 ± 15.28

Description:
V0 = The volume measurement of Rat's foot before carrageenan induction
V1 = Measuring rats foot volume after 30 minutes induced carrageenan
V2 = Measuring rats foot volume after 30 minutes of plaster usage
V3 = Measuring Rat's foot volume after 60 minutes of plaster usage
V4 = Measuring rats foot volume after 90 minutes of plaster usage
V5 = Measuring rats foot volume after 120 minutes of plaster usage

Rats foot before induction of carrageenan was measured using pletismometer. After we have V0, rats foot was given an induction carrageenan as much as 0.1 mL for causing edema. Carrageenan selected because it is able to release prostaglandin after injected into test animals. After 30 minutes induced carrageenan, rats foot measured its volume then given a plaster. Measurement of rat foot volume after the foot was given the plaster every 30 minutes for 2 hours. From the three doses was given, the dose of 45 mg/Kg BW that provide the most excellent anti-inflammatory effect. Edema

volume decreases after30 minutes of administration of anti-inflammatory plaster. Inhibition percentage of dose 45 mg/Kg BW most large compared to the inhibition percentage of the test group of dose 18 mg/Kg BW and 36 mg/Kg BW (**Tab. 2**). After test using one-way ANOVA statistic, it is a significant of variation dose with a confidence level of 95%.

CONCLUSION: Based on research, kencur (*Kaempferia galanga* L.) rhizome ethanol extract can be made as anti-inflammatory plaster. A dose of 45 mg/Kg BW rat kencur (*Kaempferia galanga* L.) rhizome ethanol extract provide the most excellent anti-inflammatory effect.

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