

## Inflammatory Activity Test of N-Hexant Extract of Kandis Acid (*Garcinia Xanthochymus*) Against Male White Mice (*Rattus norvegicus*)

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### Abstract

Kandis acid (*Garcinia xanthochymus*) belongs to the genus *Garcinia* plants scattered in the tropics of Asia. The fruit is widely used as a flavoring dish by the Malay people. Based on research that has been done on the genus *Garcinia*, it is known that the largest active compound is the santon group. The research used is experimental. The sample in this study was a male white mouse. Anti-inflammatory activity test was conducted on test animals divided into 5 groups, each amounting to 5 heads with suspension test group N-hexan extract of kandis acid fruit dose 200, 400, 800 mg/kg bb, negative control group is CMC Na 1% suspension and positive control is Na diclofenac 2.25 mg/kg bb. Observations were made for 6 hours then the data was analyzed with a one way analysis of variance (ANOVA) test. Research showed kandis acid extract (*Garcinia xanthochymus*) was shown to provide anti-inflammatory effects in male white mice induced caragenan at a dose of 200 mg / kgbb with an average udem decrease of 5.25, 400 mg/kgbb with an average udem decrease of 5.17 and 400mg/kgbb with an average udem decrease of 6.08, with the most effective dose in anti-inflammatory reduction being 400 mg/kgbb. The most effective dose of kandis acid extract (*Garcinia xanthochymus*) in anti-inflammatory reduction in male white mice was the dose of kandis acid extract (*Garcinia xanthochymus*) 400 mg/kgbb. It is recommended to the next researcher to conduct fractionation research on kandis acid fruit plants..

### Keywords

Kandis Acid Fruit  
(*Garcinia xanthochymus*);  
Male White Rat (*Rattus norvegicus*)



## I. Introduction

Inflammation is a response protective local posed by injuries and damage to the tissue that serves to destroy, reduce, and locked or sequestration, both agents pencedera and tissue injury. Inflammatory diseases have symptoms such as calor, rubor, tumor, dolor, and lost or reduced function that can interfere with the patient's comfort (1). Inflammation is an attempt to eliminate triggers the occurrence of wound (e.g. infection) and to initiate the process of wound healing. (2). Antiinflammatory drugs that are generally used are divided into two major groups, namely anti-inflammatory class of steroids and anti-inflammatory class of nonsteroidal. However, both classes of drugs that have serious side effects on the consumer (3).

Drug class NSAID (Anti-inflammatory Non-Steroid) and AIS (Anti-inflammatory Steroid) is a drug commonly used as anti-inflammatory (4). Traditional medicine has used extracts of different plants for the treatment of various disorders including acute and chronic Inflammation. Among the active constituents of the extract, flavonoids are a family of substances whose members have many biological properties including anticancer, antimicrobial, antiviral, anti-inflammatory in, immunomodulatory, and activities

antithrombotic (5). *Garcinia* is a genus of the family Clusiaceae that spread in Asia, Africa, based on the literature review and observation of specimens terbarium, Indonesia has 64 species of *Garcinia* sp (6).

*Garcinia xanthochymus* is known as a rich source of xanthenes oxygenated and terpenilasi, Xanthenes are a class of polyphenols that show pharmacological properties are well-documented, such as antioxidants, antileukemia, antitumor, antiulcer, antimicrobial, antimikotoksik, and the activity of CNS depressants, especially because of the nature of the heterocyclic that the oxygenated and the diversity of functional groups (7).

The study of phytochemical previously from the leaves, seeds, fruits, bark of twigs, and wood have shown the presence of benzophenones, flavonoids, triterpenes and xanthenes (8). *Garcinia xanthochymus* grow very dynamic and can adapt to various soil types. This is the carrier heavy and sometimes even produce two harvests a year. It is cultivated and has grown to become a semi-naturalized in this condition is commonly known as mangosteen fake. In botany, a tree is a medium-sized, branched, evergreen tree or shrub with resin sap greenish. Stems coarse, brown with white latex. many branches slender, horizontal and twigs angled clear. Leaves mostly opposite, elliptic, its leaves are pale green when young and become dark green and glossy on the upper surface and thickness as well as the petiole. The flowers are white, small, sparkling. Fruit is a thin skin, give the skin a fleshy covering 2-8 seed pulp is great. The fruit is green and turns yellow to yellow-orange when ripe (9). In Indonesia, in addition to commonly used as a spice in cooking, the Fruits of this plant are used in traditional medicine to treat diarrhea, dysentery, expel worms (10). The constituents of phenolic and this has been reported to have various biological properties and pharmacological, such as bacteria, malaria, and cytotoxic activity (11).

Based on research conducted sebelumnya bahwa ekstrak ethanol fruit kandis Acid shows anti-inflammatory activity At a dose of 800 mg / kg bw pose a greater percent inhibition of inflammation after 60-180 minutes. These results indicate that the ethanol extract of the fruit of Asam kandis (a dose of 800 mg/kg bw) has anti-inflammatory activity (12). The author tries to do the research to know the effect of anti-inflammatory extracts of n-hexane buah asam kandis in white male rats induced by carrageenan.

## II. Research Methods

The method used in this research is experimental. This research was conducted in the Laboratory of Pharmacology, Faculty of Pharmacy, University of Sumatera utara. The sample used is the fruit of asam kandis (*Garcinia xanthochymus*)

The tools used in this research are, among others: Blender, analytic scale (wiggen hauser), staple, erlenmeyer flask, stir bar, measuring cup, glass beaker, petri dish, paper label, mask, spatula, watch-glass, pipette drops, mortar and stamper, filter paper, cotton, tissue roll, syringe injection supplantar 1 ml and 3 ml, stopwatch, animal scales, plestimometer digital, cage rat, sonde, gloves, masks, stationery, digital cameras.

The materials used in this study is the fruit of asam kandis (*Garcinia xanthochymus*), chemicals used were: n-hexane, carrageenan, sterile distilled water, karagenin 1% Na-CMC, tablet Diclofenac Sodium.

### 2.1 Animal Experiments

Experimental animals used was a white male rats (*Rattus norvegicus*) with a body weight of 150-200 grams and the average age of 2-3 months, the condition of the animal

healthy white male rats (*Rattus norvegicus*), which used as many as 15 mice were divided into 5 groups and each group consists of 3 tails.

## 2.2 Extraction of Samples

The extract prepared by the method of maceration storey using the solvent n-hexane. As many as 100 g serbuk simplisia daun asam kandis inserted into the vessel, then pour 75% of the solvent n-hexane equivalent to 750 ml (0.75 liters). The mixture is allowed to stand for 5 days while performed shuffle 3 hours so evenly distributed, filtered and squeezed. The pulp is washed with the solvent n-hexane 25% of the equivalent of 250 ml (0.25 liter), moved into a closed vessel, left in a cool place and protected from light for 2 days. The precipitate is then separated, maserat obtained is evaporated using a rotary evaporator to obtain a thick extract of leaves of asam kandis. The yield obtained in the scales and recorded.

$$\text{Rendemen} = \frac{\text{bobot ekstrak}}{\text{bobot simplisia}} \times 100\% \text{ (13).}$$

## 2.3 The Making of a Solution of Na-CMC 1%

As much as 1 gram of Na-CMC in the enter little by little into the 100 ml beaker containing 50 ml of distilled water (70C) while stirring with a stir bar to form a solution of colloidal, and then its done with distilled water up to 100 ml. The Manufacture Of Suspension Of Carrageenan 1%. Carrageenan 1% obtained with a suspension of 1 gram of carrageenan in 0.9% Sodium chloride to 100 ml in beaker glass.

## 2.4 The Manufacture of Suspension of Sodium Diclofenac

As many as 10 tablets of Sodium in klofenak (each tablet contains sodium in klofenak 25 mg) in weigh, then calculate the weighted average and then crushed. Sodium in klofenak weigh later in the suspensikan with in a solution of Na-CMC 1% bit by bit while stirring until homogeneous and then put in the pumpkin of course ukur 100 ml, then the volume on make up to 100 ml.

## 2.5 Treatment of Animals

Before testing the rats adapted for 1 week to remain in the give water to drink and food to taste. For 1 week the rats given the extract at a dose that has been determined for medication. Rats are classified in 5 groups, namely negative control group (Na-CMC), a group of test material (three doses of a suspension of extract) positive control (in klofenak). The test animals used in this study is the white male rats by as much as 25 mice were divided to 5 groups. Then measured the volume of edema soles of the feet of mice after treatment each interval of 1 h for 6 hours. The Volume of the edema is determined based on the increase in mercury on the tools plathysmometer.

## 2.6 Data Analysis

Data analysis based on the results of observation followed by analysis and statistically using Anova.

### III. Results and Discussion

#### 3.1 Results

##### a. The Results of the Examination of the Organoleptic

**Table 1.** The Results of the Physical Examination of the Extracts of N-Hexane Buah Asam Kandis

Number	Type of examination	Results
1	Form	Thick extract
2	Color	dark brown
3	Smell	Distinctive and sour

##### Skrining Fitokimia

**Table 2.** The Results of the Phytochemical Screening of the Extract N-Hexane Fruit Asam Kandis

Number	Secondary Metabolites	Results	
		Simplisia	Ekstrak N-Heksan
1	Alkaloid	-	-
2	Saponin	-	-
3	Tannin	-	-
4	Flavonoid	+	-
5	Glikosida	+	-
6	Steroid/Terpenoid	+	+

Description:

(+) Positive = Contains classes of compounds

(-) Negative = does Not contain classes of compounds

Table 2, Shows that the extract of N-hexane containing compounds are secondary metabolites, namely alkaloids and steroids/Terpenoids. From some research it is known that plants kandis acid also contain xanton, xanton terpenilasi and xanton tertetraoksigenasi on almost all parts such as the roots, bark, leaves, fruit and sap (14).

##### b. The Test Results of the Activity of the Anti-Inflammatory Fruit Extract Asam Kandis

###### 1. Edema

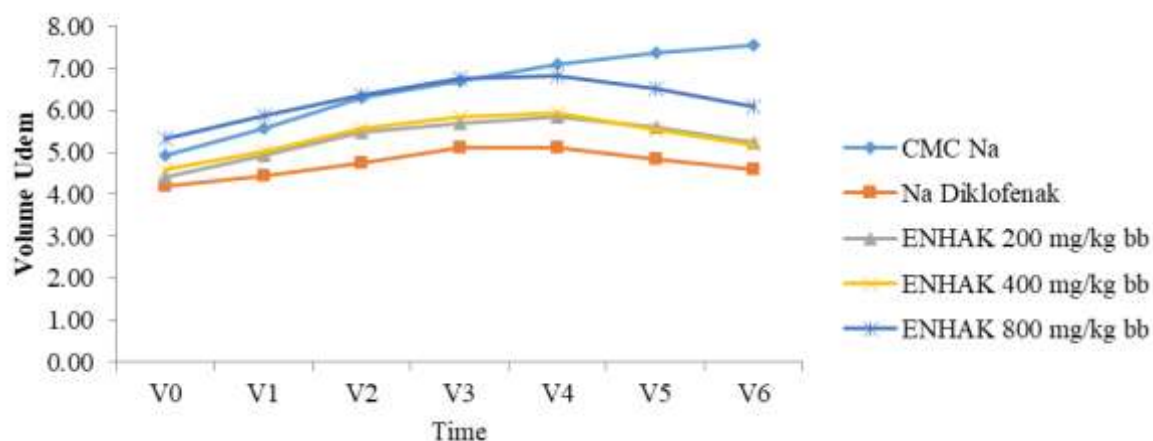
**Table 3.** Volume table Edema Soles of the Feet of Rats after Treatment

No	Groups	Volume Edema on the time- $\pm$ SD						
		0	1	2	3	4	5	6
1	CMC Na 1%	4,93 $\pm$ 0,35 <sup>#</sup>	5,58 $\pm$ 0,39 <sup>#</sup>	6,31 $\pm$ 0,45	6,71 $\pm$ 0,41	7,11 $\pm$ 0,42	7,39 $\pm$ 0,38	7,56 $\pm$ 0,52
2	Natrium Diklofenak	4,18 $\pm$ 0,29 <sup>*</sup>	4,45 $\pm$ 0,33 <sup>*</sup>	4,75 $\pm$ 0,35	5,12 $\pm$ 0,39	5,10 $\pm$ 0,46	4,84 $\pm$ 0,35	4,58 $\pm$ 0,24
3	EEBS 200 mg/kg bb	4,41 $\pm$ 0,76 <sup>#*</sup>	4,92 $\pm$ 0,83 <sup>#*</sup>	5,49 $\pm$ 0,92 <sup>#*</sup>	5,70 $\pm$ 0,94 <sup>*</sup>	5,86 $\pm$ 1,02 <sup>*</sup>	5,61 $\pm$ 1,03 <sup>#</sup>	5,25 $\pm$ 0,97 <sup>#</sup>
4	EEBS 400 mg/kg bb	4,61 $\pm$ 0,65 <sup>#*</sup>	5,03 $\pm$ 0,64 <sup>#*</sup>	5,58 $\pm$ 0,86 <sup>#*</sup>	5,83 $\pm$ 0,81 <sup>#*</sup>	5,92 $\pm$ 0,79 <sup>#*</sup>	5,54 $\pm$ 0,80 <sup>#</sup>	5,17 $\pm$ 0,71 <sup>#</sup>
5	EEBS 800 mg/kg bb	5,33 $\pm$ 0,69 <sup>#*</sup>	5,87 $\pm$ 0,86 <sup>*</sup>	6,37 $\pm$ 0,87 <sup>*</sup>	6,75 $\pm$ 0,84 <sup>#*</sup>	6,82 $\pm$ 0,91 <sup>#*</sup>	6,52 $\pm$ 1,03 <sup>*</sup>	6,08 $\pm$ 1,00

Description: # there is no difference with the group of Sodium Diclofenac

\* There is no difference with the group CMC Na

Testing the effects of anti-inflammatory Extracts of N - hexane fruit asam kandis and Nadiklofenak done to test animals white male rats, strain witsar, aged 2-3 months with a body weight of 150-250 grams. This test intended to determine the effect of anti-inflammatory Extracts of N - hexane fruit kandis acid and Na-diclofenac. The results of testing the effect of anti-inflammatory extract buah asam kandis in the get data on the volume of edema the average of each treatment group. Can be seen in the images table 4.4 and image of figure 1.



**Figure 1.** Chart of the Volume of Edema Rat Leg

Based on the above chart shows that the sodium in klofenak to 240 (v4), 300 (v5), and minutes to the 360 (v6) has a curve edema of the most low compared to the dose of treatment and negative control. It can be said that in the diclofenac sodium is able to inhibit the edema is better than other treatment. From image chart 4.1 shows that the control group negative percentage of edema of the largest compared with the test group of the other, this is because of the control group, a negative does not contain active substances that can inhibit the formation of edema.

## 2. Percent of Inflammation

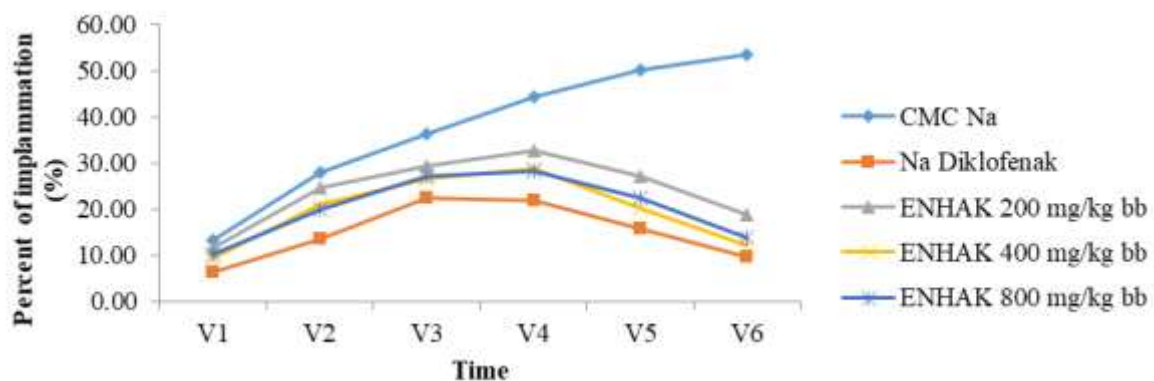
**Table 4.** Percent of Inflammation of the Feet of Rats after Treatment

Number	Group	Percent of Inflammation (%) on the clock to a- ± SD					
		1	2	3	4	5	6
1	CMC Na 1%	13,34 ±	28,03 ±	36,32	44,46 ±	50,08 ±	53,45 ±
		0,90	1,94	± 2,90	2,98	3,50	3,29
2	Natrium Diklofenak	6,49 ±	13,50 ±	22,43	21,93 ±	15,73 ±	9,68 ±
		2,27	3,13	± 3,60	5,59	1,14	2,21
3	EEBS 200 mg/kg bb	11,59 ±	24,58 ±	29,47	32,72 ±	27,04 ±	18,79 ±
		0,85*	3,11*	± 1,48	4,00	4,24	2,17
4	EEBS 400 mg/kg bb	9,30 ±	20,99 ±	26,66	28,75 ±	20,31 ±	12,26 ±
		1,81#	2,14#	± 0,80	1,57#	0,88#	0,74#
5	EEBS 800 mg/kg bb	10,34 ±	19,94 ±	27,27	28,31 ±	22,35 ±	13,92 ±
		2,50*	3,74#	± 4,95	3,51#	2,58	1,81

Description: # there is no difference with the group of Sodium Diclofenac

\* there is no difference with the group CMC Na 0,5%





**Figure 2.** Chart of the Percent of Inflammation of the Feet of Rats after Treatment

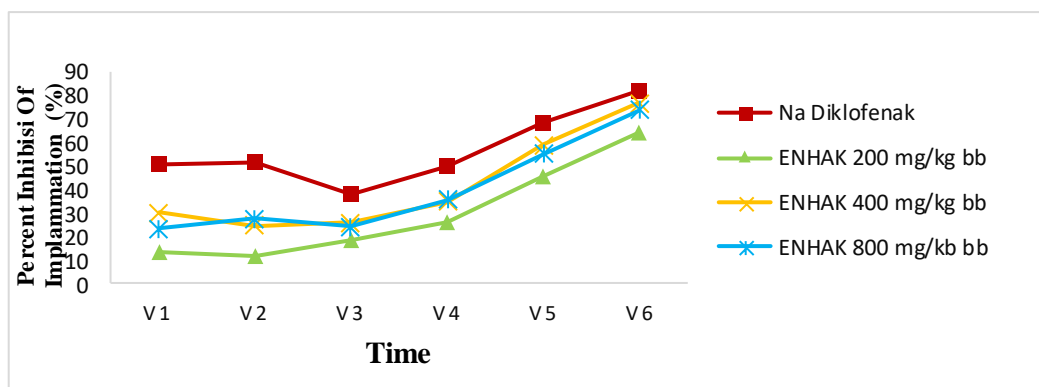
In The 2nd Century the number of displaced people was increased by 2 percent in the hour to-1 hour to-3 set to be subjected to resistance, which resulted in a decline in the hours to-4 to-6 in the seminary of resistance groups. In the lihat of the daily 4.2 percentage points, the average percentage value of the kandis acid is 200 mg/kgBB rats, 400 mg/kgBB rats, 800 mg/kgBB rats, 400 mg / kgBB rats, 800 mg / kgBB rats, 800 mg / kgbbb rats. It is credited with the decline of anti-inflammatory power percentages between extreme and kandis acid. The extreme fertilisation of kandis acid with a dose of 400 mg/kgBB rats is the highest dose of high cholesterol in uddem. It is believed that the dose of 400 mg/kgBB rats is the most effective dose in the band, with a dose of 200 mg/kgBB and an 800 mg / kgBB dose of rats.

### 3. The Percentage Inhibition of Inflammation

**Table 5.** Percent Inhibition of Inflammation of the Feet of Rats after Treatment

Number	Group	Percent of Inflammation (%) on the clock to a- ± SD					
		1	2	3	4	5	6
1	Natrium Diklofenak	50,55 ± 19,66	51,84 ± 10,73	37,96 ± 11,04	50,22 ± 14,20	68,45 ± 3,57	81,87 ± 4,09
		13,24 ± 8,90	12,24 ± 9,82	18,67 ± 4,09 <sup>#</sup>	25,93 ± 11,65	45,50 ± 11,05	64,81 ± 4,02
2	EEBS 200 mg/kg bb	30,12 ± 14,13 <sup>#</sup>	24,86 ± 8,82	26,08 ± 8,03 <sup>#</sup>	35,05 ± 6,45 <sup>#</sup>	59,27 ± 3,52 <sup>#</sup>	76,98 ± 2,28 <sup>#</sup>
		23,32 ± 15,14	27,95 ± 17,93	24,38 ± 16,76 <sup>#</sup>	35,93 ± 10,49 <sup>#</sup>	55,20 ± 6,22	73,91 ± 3,36

Description: # there is no difference with the group of Sodium Diclofenac



**Figure 3.** The Percentage Inhibition of Inflammation

Based on table 5 indicates that the greater the percentage of inhibition of edema, the smaller the percentage of udemnya, it is seen that starting from 1 to-6 increased inhibition of inflammation. This shows that it has antiinflammatory effects of each treatment group in rats fed the Extract of N - hexane buah asam kandis.

### 3.2 Discussion

Based on the research results obtained shows that the administration of a solution of Na-CMC did not affect the decrease in the percentage of inflammation of the rat leg. In the group of Na-CMC percentage of inflammation that is produced increased and continued in the h-6. The negative group is a reference in comparing the results achieved by other groups. Group test results with significantly different to the negative control group showed the presence of the effects of compounds or materials medication given to the test animals. This is because the Na-CMC is only as solvent media of the drug so that there is no stimulus in the form of drugs to reduce the edema so that the edema will continue to increase and the process of removal of inflammatory mediators in the mouse body only naturally-occurring, so that the percentage decrease in udemnya 0%.

Extract N - hexane buah asam kandis with a dose of 200 mg/kg has the activity of anti-inflammatory but not potential in suppressing edema that occur on the feet of the animal test, it was shown from the results of the measurements are significantly different to the kntrol positive in each measurement. The group Extracts of N - hexane fruit kandis acid 400 mg/kg starting from minute-60 to 360 shows the difference in the effect against the negative control and vice versa does not indicate the existence of differences significantly on the positive control. Based on these results imply that the activity of the Extracts of N - hexane fruit kandis acid 400 mg/kg has activity similar to diclofenac sodium of 2.25 mg/kg as a positive control. The group Extracts of N - hexane fruit kandis acid 800 mg/kg in the 60th minute show results is not significantly different to the control negative and positive, on-180 showed that the results did not differ significantly to the positive control while in the 240 to 360 results show that significantly different to the negative control, and positive. Based on these results it can be concluded that the Extract of N - hexane buah asam kandis with a dose of 800 mg has the activity of anti-inflammatory but not potential in suppressing edema that occur on the feet of the animal test is the same is the case with the group of the Extract of N - hexane fruit kandis acid 200 mg/kg.

Based on the results of the calculation of the percent inhibition of edema and after the performed statistical tests achieved the same result against the value of the edema that occurs. Percent inhibition of diclofenac sodium of 2.25 mg/kg as a control, a standard reference in the view of potential medicinal compounds in suppressing inflammation, which will happen after the test animals induced carrageenan. The result of statistical test showed that the group of the Extract of N-hexane fruit kandis acid 200 mg/kg and EEBAK 800 mg/mb indicates the presence of activity in suppressing edema that occurs, but has not been able to approach the value of diclofenac sodium of 2.25 mg/kg in each measurement. The group Extracts of N - hexane fruit kandis acid 400 mg/kg showed good results, where the second group is able to approach the value of diclofenac sodium of 2.25 mg/kg based on the test statistics that stated that the results of this group did not differ significantly to the positive control.

Flavonoids not found in the Extract of N - hexane kandis acid, whereas the two compounds also act as anti-inflammatory (18) explains that in inhibiting the process of inflammation, flavonoids work through two mechanisms, namely by inhibiting the permeability of capillaries and inhibiting arachidonic acid metabolism and the secretion of lysosomal enzymes from the cells of neutrophils and cells of the endothelial. Flavonoids

mainly work on the endothelium microvascular surgery to reduce the occurrence of hipermeabilitas and inflammation. Some of the compounds flavonoids can inhibit the release of arachidonic acid and the secretion of lysosomal enzymes from the membrane with a way to block the path of cyclooxygenase. Carrageenan in the induction of inflammatory is the cause of the occurrence of the release of nitrite anti-stati (NO) on the tissue injury. Compensation of the body above the abandonment of NO as a mediator of inflammatory diseases is by means of releasing the inhibitor of NOS non selective (aminoguanidine hemisulfat), NG-monomethyl-L-Arginin-acetate (L-NMMA), which serves to suppress the release of NO. The process of compensation is happening on the hour to 2.5 – 8 (19).

The results of the analysis of the data statistically by using ANOVA which factors count is greater than factor table shows the significant value that means there is no difference in effects between the treatment, so it is said that there is the effect of the extract of the fruit of asam kandis against the antiinflammatory effects of male rats.

#### IV. Conclusion

Based on the results of the research that has been done can be concluded that the extract of N - hexane buah asam kandis (*Garcinia xanthochymus*) can give the effect of anti-inflammatory Extracts of N - hexane buah asam kandis (*Garcinia xanthochymus*), which has the effect of antiinflammatory most is 400 mg between the concentration used.

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