

FORMULATION AND EFFECTIVENESS TESTING OF RED GINGER RHIZOME EXTRACT (*Zingiber Officinale Var. Rubrum*) EXTRACT FOR ACUTE INFLAMMATION IN WHITE RATS (*Rattus Norvegicus*) WISTAR STRAIGHT

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ABSTRACT

Background: This study aims to determine the effect of administration of red ginger (*Zingiber officinale var. Rubrum*) rhizome extract cream on changes in acute inflammation in test animals white rats (*Rattus norvegicus*) Wistar strain.

Material and methods: This type of research is a laboratory experiment that aims to see the anti-inflammatory effect of using red ginger (*Zingiber officinale var. Rubrum*) rhizome extract cream on white rats (*Rattus norvegicus*) wistar strain. The preparation of red ginger (*Zingiber officinale var. Rubrum*) rhizome extract cream with all concentrations of 1%, 3% and 5% gave an acute inflammatory healing effect because the active substance contained in the red ginger rhizome (*Zingiber officinale var. Rubrum*) was gingerol.

Result: Where gingerol has an anti-inflammatory effect due to its strong inhibition of prostaglandin biosynthesis. Based on the research results that have been obtained, it can be concluded that the red ginger rhizome extract (*Zingiber officinale var. Rubrum*) can be formulated in cream preparations.

Conclusion: The formulation of the red ginger (*Zingiber officinale var. Rubrum*) rhizome extract cream had an anti-inflammatory effect in research animals of white rats (*Rattus norvegicus*) Wistar strain. Based on statistical tests using One Way ANOVA, it was shown that the most effective formulation for providing anti-inflammatory effects was F2 (preparation of red ginger (*Zingiber officinale var. Rubrum*) rhizome extract cream) 3%).

KEYWORDS: Red ginger, cream, inflammation, white rat.

1. PRELIMINARY

Progress knowledge modern knowledge and technology this develop in line with progress increasingly technology sophisticated and in todays this, no so just shift role treatment traditional, but life side by side and mutually complement. This thing seen from a lot fans traditional medicine at the time this development drug traditional with various kinds and

types. Lots of ingredients drug traditional use as ingredient herbal medicine is getting of interest to the public.

As a producing country herbs and spices largest in the world, the Indonesian people, especially those living in the interior and now enter public urban has make use of it as ingredient base food, medicine, and cosmetics. One frequent seasoning used is ginger red (*Zingiber officinale* var. *Rubrum*). Plant this including in ethnic group Zingiberaceae which has utilized Besides as ingredient Spice cuisine, by empirical Ginger has also been used as one component various plant drug because have content oil the highest volatile and oleoresin component if compared to with type othe . Ginger like Jamu for increase power stand body, overcome inflammation, cough, sores, and allergies consequence bite insect

Ginger contains 7-10% oleoresin, 1-3% oil essential, about 52% starch, an amount small amount of protein, vitamins, and minerals. Ginger contains component oil essential oil, non- essential oil, and starch. Oil evaporation or oil essential is components that provide smell typical. Oil essential in ginger among others pinene, phellandren, borneol, limonene, linalool, citral, nonylaldehyde, decylaldehyde, methylepteno, 1,8 cineol, bisabelin, 1- α - curcumi, farnase, humulen, phenol, acetate. And the most abundant is zingiberene and zingiberol. Non- volatile oil or oleoresin gives a spicy and bitter taste. Oleoresin consists of of gingerol and zingiberene , shagol , and resin

Rhizome ginger red (*Zingiber officinale* var. *Rubrum*) contains gingerols which have activity antioxidant, antibacterial, anti Inflammatory, anticarcinogenic, antimutagenic, and antitumor.

One gingerol properties of rhizome ginger red (*Zingiber officinale* var. *Rubrum*) is for treat inflammation or inflammation. Inflammation is response network good by mechanical, chemical as well as those from from microorganisms. When the inflammatory process happens, reaction vascular occurs where liquid, element in blood, cells blood white, and chemical mediator gather at the location injury network. Usually be marked with appearance redness, swelling, pain and accompanied by a feeling of heat. Anti-inflammatory is effort body for deactivate or damage invading organisms, eliminating irritation and regulate repair network.

Could concluded that extract ginger gel ethanol Red according to Nurjannah Bachri , 2021 rhizome ginger red (*Zingiber officinale* var. *Rubrum*) at concentrations of 1%, 3% and 5% had anti- inflammatory effect the largest , which is 5% among concentration used. However, if compared to with preparation comparison, Control X has anti- inflammatory effect maximum.

From research previously studied effectiveness inflammation, researchers continue for formulate and test effectiveness preparation cream extract rhizome ginger red (*Zingiber officinale* var. *Rubrum*) for inflammation acute in yikus white (*Rattus norvegicus*) wistar strain.

2. MATERIALS AND METHODS

3.1 Ingredient

Tools used in study this is jar, stem stirrer, plate porcelain, glass watch, slide, slide glass, ruler, compass push, scale analytical, scales (weights), viscometer, cream pot,

thermometer, water bath, pH meter, mortar, stemper, spatula, spatula and utensils supporter other .

Materials used in study this is n -hexane, acid stearate, extract rhizome ginger red (*Zingiber officinale* var. *Rubrum*), glycerin , span 80, tween 80, methyl paraben, sodium diclofenate , 1 ml syringe, alcohol swab, tissue, handscoon , and carrageenin.

3. METHOD

3.1 Sample Processing

Plants used in research this is rhizome ginger red. Rhizome ginger red that has been collected sorted wet, separated from soil, roots and grass then washed use running water until clean . Next rhizome peeled the skin and chopped for extraction process is carried out.

3.2 Extraction Process

rhizome ginger Red as much as 1.7 kg that have been chopped , extracted with solvent n - hexane as much as 4 liters for 4 days with stirring by periodically . Filter results evaporated use fan wind until obtained extract thick.

3.3 Formulation preparation cream

Table 1. Formulation cream extract rhizome ginger Red (*Zingiber officinale* var . *Rubrum*)

No	Ingredient	Function	Formula			
			F0	F1	F2	F3
1.	Extract ginger Red	Substance active	-	1 %	3 %	5 %
2.	Stearic acid	Substance emulsifier	1 %	1 %	1 %	1 %
3.	Glycerin	Humectant	15 %	15 %	15 %	15 %
4.	Tween 80	Emulsifier	2 %	2 %	2 %	2 %
5.	Span 80	Emulsifier	2 %	2 %	2 %	2 %
6.	Methyl Paraben	Preservatives	0.02%	0.02%	0.02%	0.02%
7.	Paraben Propyl	Preservatives	0.01%	0.01%	0.01%	0.01%

DESCRIPTION : F0 = Formula 1 (Control negative)

F1 = Formula 2

F2 = Formula 3

F3 = Formula 4

1. Manufacturing supplies cream

Prepared tools and materials used. Weighed all material to be used in accordance calculation. Entered stearic acid and span 80 (capor 1) as phase oil and put glycerin , tween 80, methyl paraben and propyl paraben (capor 2) as water phase, then raised capor 1 and capor 2 separately together to on the previous water bath already heated and measured temperature up to 70°C. Poured capor 2 more formerly then capor 1 ago grind. Enter extract rhizome ginger Red (*Zingiber officinale* var . *Rubrum*) then grind until homogeneous with use method interming shaking.

2. Stability test

- a) Organoleptic test. Organoleptic test conducted visually, evaluated components covers smell, color, and shape and texture preparation cream extract ginger red.
- b) Homogeneity test. Taken 1 gram cream extract ginger red on the top, middle and bottom then smeared on the object glass. Observed if occur separation phase.
- c) PH test. Weighed as much 1 gram cream extract ginger red and diluted with 10 ml of distilled water. Then use a pH stick for look at the pH of the preparation.
- d) Viscosity test. Preparation cream entered to in a cup, then installed *spindle* no 4 and the rotor is run with speed 12 rpm. After brookfield viscometer show stable numbers, the results are recorded then multiplied with factor (500).
- e) Power test scatter. As much 0.5 gram cream results formulation weighed and placed on the glass that has been coated paper graph, then placed a petri on it and left for 1 minute , count wide given area preparation. Next given load on each stock consecutive of 50, 100 and 250 grams left for 60 seconds next calculated wide the resulting preparation.
- f) Adhesion Test a total of 0.5 grams of cream smeared on glass object that has been known breadth. Put glass another object on the cream the then pressed with 1 kg load for 5 minutes. Object glass the installed on the test equipment then given burden weighing 80 grams and note time until second glass object separate.

3. Making carrageenin 1%

Weighed 1000 mg of carrageenin , then dissolved in aquadest that has been heated as much as 100 ml.

4. Setup test animal

Before test begins, each animal in each group treatment weighed weighed and given sign identifier. All animal try quarantine on the environment test for 7 days. Experimental animals used is rat White (*Rattus norvegicus*) strain male and healthy wistar with a minimum weight of 100 - 200 mg as many as 11 tails and divided into 5 groups treatment . Each group treatment consist of 3 tails rat White (*Rattus norvegicus*) strain the male wistar During the quarantine period , animals try given eat 3 times a day with feed standard and weight constant food.

5. Making inflammation I

First thing to do _ that is shaved hair thigh rat White (*Rattus norvegicus*) strain wistar part right , then be measured use period push as reject measuring healing inflammation acute. After it's a disinfectant with use alcohol swab, injected 0.1 ml of 1% carrageenin

that has been diluted by intramuscularly in the thigh adjacent right and give sign as well as measure the edema formed as initial volume formation inflammation acute.

6. Treatment animal try

Experimental animals that have given inflammation artificial with induced carrageenin 1%, in group first given cream without extract ginger Red (*Zingiber officinale var. Rubrum*) as control negative (-), group second given sodium diclofenate as control positive (+), group third given cream 1% extract ginger Red (*Zingiber officinale var. Rubrum*) , group fourth given cream 3% extract ginger Red (*Zingiber officinale var. Rubrum*) , and group fifth given cream 5% extract ginger Red (*Zingiber officinale var. Rubrum*).

4. RESULTS AND DISCUSSION

4.1 Evaluation preparation cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*)

a). Organoleptic test

Table 2. Organoleptic test preparation cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*)

Formulation	Characteristics			
	Smell	Color	Form	Texture
F0	Typical base	White	semisolid	Gentle
F1	Ginger special	light yellow	semisolid	Gentle
F2	Ginger special	Yellow	semisolid	Gentle
F3	Ginger special	dark yellow	semisolid	Gentle

Organoleptic test conducted observation visually covering smell, color, shape and texture preparation cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) .This conducted for knowing cream made in accordance with color and smell extract used (Azkiya , Zulfa et al , 2017). Research results show that preparation cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) with concentrations of 1%, 3% and 5% have smell and color from extract used as well as shaped semisolid. Cream with without extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) or control negative have color white, smelly typical base, and shaped semisolid. This thing show cream made in accordance with color and smell extract used.

b). Homogeneity Test

DESCRIPTION:

H = Homogeneous

Homogeneity test aim for see and know mixed up ingredients preparation cream. On evaluation this, homogeneity test cream conducted visually by observing color cream and there whether or not parts that don't mixed up with good.

Table 3. Homogeneity test preparation cream extract rhizome ginger Red (*Zingiber officinale var . Rubrum*)

Formulation	Homogeneity
F0	H
F1	H
F2	H
F3	H

Research results show that preparation cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) with concentrations of 1%, 3% and 5% meet condition homogeneity that is no seen particle rough. Likewise with preparation cream without extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) or control negative . Condition preparation cream that is if smeared on a piece glass no existence separation among component composer emulsion the.

c). pH test

Table 4. Test the pH of the preparation cream extract rhizome ginger Red (*Zingiber officinale var . Rubrum*)

Formulation	pH
F0	5.4
F1	5.7
F2	5.9
F3	6.2

DESCRIPTION:

Normal pH range of skin ie 4.5 – 6.5

PH test aims knowing security preparation cream moment used so that no irritating skin. If stock has a low pH or sour could irritating skin, and vice versa if the pH of the preparation too tall will result in skin Becomes dry moment use. preparation topical must fulfil condition, because if the pH is too speak caused skin Becomes scaly, on the contrary if skin pH too sour could trigger happening irritation skin. On preparation cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) known that pH test results of each preparation cream with 1% concentration is 5.7, 3% concentration is 5.9 and 5%

concentration is 6.2 and control negative ie 5.4. This result as expected, where the stock cream have is the right pH with normal skin pH range ie 4.5 - 6.5.

d). Viscosity Test

**Table 5. Viscosity test preparation cream extract rhizome ginger Red
(*Zingiber officinale* var . *Rubrum*)**

Formulation	Speed	Data (cp)	Percentage (%)
F0	12 rpm	3.850	7.7
F1	12 rpm	3,799	7.6
F2	12 rpm	2,100	4.2
F3	12 rpm	2,040	4.0

DESCRIPTION :

The viscosity required by SNI is 2,000 cp – 50,000 cp

Based on the data obtained results that is preparation cream extract rhizome ginger Red (*Zingiber officinale* var. *Rubrum*) known that preparation fulfil condition Mark viscosity with preparation cream that uses rhizome extract ginger red (*Zingiber officinale* var. *Rubrum*) 5% concentration has Mark viscosity of 3,850 cp more tall compared to with cream rhizome extract ginger red (*Zingiber officinale* var. *Rubrum*) concentration of 3% has Mark viscosity of 3,799 cp more tall compared to with cream rhizome extract ginger red (*Zingiber officinale* var. *Rubrum*) 1% concentration has Mark viscosity of 2,100 cp more tall compared to with preparation cream without extract rhizome ginger Red (*Zingiber officinale* var. *Rubrum*) or control negative has Mark viscosity of 2,040 cp, meaning preparation cream with extract ginger red (*Zingiber officinale* var. *Rubrum*) has prisoner more big compared to with a vanishing cream base so that cream with more viscosity tall will the more hard for applied to the skin. Preparation cream with extract ginger red (*Zingiber officinale* var. *Rubrum*) has Mark viscosity more tall because contain more many phase oil from content extract ginger red (*Zingiber officinale* var. *Rubrum*) that is *gingerol* so that consistency far more tall compared to base vanishing cream.

e). Power test sticky

DESCRIPTION:

Condition time power good stick _ for preparation topical is no not enough of 4 seconds.

**Table 6. Test power sticky preparation cream extract rhizome ginger Red
 (*Zingiber officinale* var . *Rubrum*)**

Formulation	time(s)
F0	8
F1	11
F2	14
F3	16

preparation cream that uses rhizome extract ginger red (*Zingiber officinale* var. *Rubrum*) 5% concentration is 16 seconds more tall compared to with cream rhizome extract ginger red (*Zingiber officinale* var. *Rubrum*) 3% concentration is 14 seconds more tall compared to with cream rhizome extract ginger red (*Zingiber officinale* var. *Rubrum*) 1% concentration is 11 seconds more tall compared to cream with ready cream without extract rhizome ginger Red (*Zingiber officinale* var. *Rubrum*) or control negative ones by 8 seconds . Condition time power good stick for preparation topical is no not enough than 4 seconds

f).Power test spread

**Table 7. Test power spread preparation cream extract rhizome ginger Red
 (*Zingiber officinale* var . *Rubrum*)**

Formulation	Weight (g)	Size (cm)
F0	50	4.2 and 4.5
	100	4.5 and 4.7
	250	5.0 and 5.1
F1	50	4.7 and 4.8
	100	5 and 5.2
	250	5.6 and 5.6
F2	50	4.8 and 5.1
	100	5.1 and 5.4
	250	5.7 and 5.9
F3	50	4.8 and 5.3
	100	5.3 and 5.7
	250	5.8 and 6.2

DESCRIPTION :

Power test conditions spread for preparation topical about 5 – 7 cm

preparation cream that uses rhizome extract ginger red (*Zingiber officinale var. Rubrum*) 5% concentration is 5.3 – 6.2 cm more tall compared to with cream rhizome extract ginger red (*Zingiber officinale var. Rubrum*) concentration of 3% is 5.1 – 5.9 cm more tall compared to with cream rhizome extract ginger red (*Zingiber officinale var. Rubrum*) 1% concentration is 4.8 – 5.6 cm more tall compared to cream with ready cream without extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) or control negative ones of 4.5 cm - 5.1 cm. This result as expected, where is the power test requirements spread for preparation topical about 5–7 cm.

g) Results of measuring edema in animals study rat (*Rattus norvegicus*) Wistar strain

Table 8. Results Measurement of edema in animals study rat (*Rattus norvegicus*) Wistar strain

Group	BB (g)	Induction (mm)		Day - _						
		Before	After	1	2	3	4	5	6	7
1	120.4	12	19	17.8	15.4	14.1	12.8	12	12	12
	161.1	13.6	20	18.7	16.7	14.4	13.6	13.6	13.6	13.6
	171.1	14.7	21	19.2	17,9	16,1	14,7	14,7	14,7	14,7
2	136	13,6	17,8	16,5	15,4	14,4	13,6	13,6	13,6	13,6
	164,7	13,6	20,2	17,9	14,0	13,6	13,6	13,6	13,6	13,6
	124,6	12,6	18,2	16,8	13	12,6	12,6	12,6	12,6	12,6
3	139,7	12,5	20,3	16,9	13,2	12,5	12,5	12,5	12,5	12,5
	151,2	14,7	18,8	17,8	14,1	14,1	14,1	14,1	14,1	14,1
	114,7	13,8	14,1	13	13	13	13	13	13	13
4	162.9	12.4	20.3	17.7	13.7	12.4	12.4	12.4	12.4	12.4
	143.7	14.1	17.5	15.3	13.7	13.7	13.7	13.7	13.7	13.7

DESCRIPTION:

Group 1 = control negative

Group 2 = stock cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) 1%

Group 3 = stock cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) 3%

Group 4 = stock cream extract rhizome ginger Red (*Zingiber officinale var. Rubrum*) 5%

Group 5 = control positive

Research animals used as many as 11 tails are divided into 5 groups carried out observation for 7 days done measurement every gift preparation ie 3 times a day. Conducted for 7 days because inflammation I is response fast to damage cell and lasts fast (several hours – days).

On the day testing, each animal that has weighed shaved on the part on and given mark on the tail. Each animal study initial diameter measured with use libertine push before induced with solution carrageenin by intramuscular. After that, done measuring the diameter of the edema in the thigh before given preparation cream topically. Then each mouse given appropriate test treatment the group. Group 1 cream base as control negative, group 2 cream extract ginger red 1%, group 3 cream extract ginger red 3%, group 4 cream extract ginger red 5%, and group 5 preparations brand X cream as control positive . And measurement conducted every day for 7 days.

Based on research conducted with gift carrageenin 1% in group animal 1 (control negative) no influence drop edema by maximum, with a diameter after induced by 19 mm. On observation 1-7 days after gift each preparation obtained diameters of 17.8 mm, 15.4 mm, 14.1 mm, 12.8 mm, 12 mm, 12 mm, and 12 mm, where on the 5th day it was already back to normal to the previous diameter induction that is 12 mm. Where F0 (control negative) no contain extract rhizome ginger red (*Zingiber officinale var. Rubrum*) so that no give maximum effect.

In group 2 giving preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 1% gives effect anti-inflammatory more fast compared to with control negative , where in rats first (1) with diameter after induction by 20 mm. On observation 1-7 days after gift each preparation obtained diameters of 18.7 mm, 16.7 mm, 14.4 mm, 13.6 mm, 13.6 mm, 13.6 mm, and 13.6 mm, where on the 4th day it was back to normal to the previous diameter induction ie 13.6 mm. on mice second (2) with diameter after induction by 21 mm. On observation 1-7 days after gift each preparation obtained diameters of 19.2 mm, 17.9 mm, 16.1 mm, 14.7 mm, 14.7 mm, 14.7 mm, and 14.7 mm, which on the 4th day had back to normal to the previous diameter induction ie 14.7 mm. on mice third (3) with a diameter after induction of 17.8 mm. On observation 1-7 days after gift each preparation obtained diameters of 16.5 mm, 15.4 mm, 14.4 mm, 13.6 mm, 13.6 mm, 13.6 mm, and 13.6 mm, where on the 4th day it was back to normal to the previous diameter induction ie 13.6 mm. Drop result edema that occurs every day because existence network fix skin caused addition extract so that drop edema in each animal study more fast compared to with control negative.

In group 3 giving preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 3% gives effect anti-inflammatory more fast compared to with preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 1%, where in rats first (1) with diameter after induction of 20.2 mm. On observation 1-7 days after gift each preparation obtained diameters of 17.9 mm, 14 mm, 13.6 mm, 13.6 mm, 13.6 mm, 13.6 mm, and 13.6 mm, where on the 3rd day it was back to normal to the previous diameter induction ie 13.6 mm. on mice second (2) with diameter after induction of 18.2 mm. On

observation 1-7 days after gift each preparation obtained diameters of 16.8 mm, 13 mm, 12.6 mm, 12.6 mm, 12.6 mm, 12.6 mm, and 12.6 mm, where on the 3rd day it was back to normal to the previous diameter induction which is 12.6 mm. on mice third (3) with a diameter after induction by 18.8 mm. On observation 1-7 days after gift each preparation obtained diameters of 16.9 mm, 13.2 mm, 12.5 mm, 12.5 mm, 12.5 mm, 12.5 mm, and 12.5 mm, where on the 3rd day it was already back to normal to the previous diameter induction that is 12.5 mm. Drop result edema that occurs every day because existence network fix skin caused addition extract so that drop edema in each animal study more fast compared to with preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 1%. The more tall total concentration extract used, then the more good for give effect anti-inflammatory what's wrong animal research.

In group 4 giving preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 5% gives effect anti-inflammatory more fast compared to with preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 3%, where in rats first (1) with diameter after induction by 18.8 mm. On observation 1-7 days after gift each preparation obtained diameters of 17.8 mm, 14.1 mm, 14.1 mm, 14.1 mm, 14.1 mm, 14.1 mm, and 14.1 mm, where on the 2nd day it was already back to normal to the previous diameter induction ie 14.7 mm. on mice second (2) with diameter after induction by 13 mm. On observation 1-7 days after gift each preparation obtained diameters of 13 mm, 13 mm, 13 mm, 13 mm, 13 mm, and 13 mm, where on day 1 it was already back to normal to the previous diameter induction ie 13.8 mm. on mice third (3) with a diameter after induction of 20.3 mm. On observation 1-7 days after gift each preparation obtained diameters of 17.7 mm, 13.7 mm, 12.4 mm, 12.4 mm, 12.4 mm, 12.4 mm, and 12.4 mm, where on the 3rd day it was already back to normal to the previous diameter induction that is 12.4 mm. Drop result edema that occurs every day because existence network fix skin caused addition extract so that drop edema in each animal study more fast compared to with preparation cream extract rhizome ginger red (*Zingier officinale var. Rubrum*) 3%. The more tall total concentration extract used, then the more good for give effect anti-inflammatory in animals research.

In group animal 5 (control positive) gives effect anti-inflammatory almost same with preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 3%, with a diameter after induced by 19 mm. On observation 1-7 days after gift each preparation obtained diameters of 17.5 mm, 15.3 mm, 13.7 mm, 13.7 mm, 13.7 mm, 13.7 mm, and 13.7 mm, where on the 3rd day it was back to normal to the previous diameter induction ie 14.1 mm. This thing because preparation brand X cream is drug anti- inflammatory that can with fast hinder formation of inflammatory mediators namely prostaglandins. However, preparation creamextract rhizome ginger red (*Zingier officinale var. Rubrum*) 5% more good give effect anti-inflammatory compared to with control positive used in research this.

- h) The results of data analysis using statistical system calculations Analysis of Variance (ANOVA)
i) Table 9. Results data analysis using calculation of the statistical system Analysis of Variance (ANOVA)

Test of Homogeneity of Variances

Size Inflammation

Levene Statistics	df1	df2	Sig.
.861	4	72	.492

ANOVA

Ukuran Inflamasi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	32.200	4	8.050	2.870	.029
Within Groups	201.964	72	2.805		
Total	234.164	76			

MULTIPLE COMPARISONS

Dependent Variable: Ukuran Inflamasi

LSD

(I) Group	(J) Group	Mean Difference (I,J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
control negative	cream 1%	-1.3619	.7310	.067	-2.819	.095
	cream 3%	.1429	.7310	.846	-1.314	1,600
	cream 5%	.0714	.7310	.922	-1.386	1,529
	control positive	-.7429	.8952	.409	-2,527	1.042

cream 1 [^] %	control negative	1.3619	.7310	.067	-.095	2.819
	cream 3%	1.5048 *	.5169	.005	.474	2,535
	cream 5%	1.4333 *	.5169	.007	.403	2.464
cream 3%	control positive	.6190	.7310	.400	-.838	2.076
	control negative	-.1429	.7310	.846	-1,600	1.314
	cream 1 [^] %	-1.5048 *	.5169	.005	-2,535	-.474
cream 5%	cream 5%	-.0714	.5169	.890	-1.102	.959
	control positive	-.8857	.7310	.230	-2.343	.571
	control negative	-.0714	.7310	.922	-1,529	1.386
control positive	cream 1 [^] %	-1.4333 *	.5169	.007	-2.464	-.403
	cream 3%	.0714	.5169	.890	-.959	1,102
	control positive	-.8143	.7310	.269	-2.271	.643
krim 5 %	control negative	.7429	.8952	.409	-1.042	2,527
	cream 1 [^] %	-.6190	.7310	.400	-2.076	.838
	cream 3%	.8857	.7310	.230	-.571	2,343
	krim 5 %	.8143	.7310	.269	-.643	2.271

*. The mean difference is significant at the 0.05 level.

Based on results testing obtained value Sig. of 0.492 ($p > 0.05$), then concluded that this data homogeneous. Next conducted testing ANOVA where the data says there is difference between treatment if Sig value < 0.05 and the data is said to be no there is difference between treatments if Sig value > 0.05 . Based on ANOVA. Test obtained value Sig. of 0.029 ($p < 0.05$) means could our conclude there is difference significant between treatment.

Test statistics then next with LSD (Least *Significant Difference*) test for see is there is meaningful difference between each treatment. LSD test results show effect healing inflammation I preparation cream extract rhizome ginger red (*Zingiber officinale var.*

Rubrum) 1% indicates difference mean with cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 3% and cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 5%, but show difference no mean with control negative , and control positive . preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 3% indicates difference mean with cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 1%, but show difference no mean with control negative , cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 5% and control positive. preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 5% indicates difference mean with cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 1%, but show difference no mean with control negative, cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 3% and control positive.

CONCLUSION

Based on results research that has been obtained could concluded that extract rhizome ginger red (*Zingiber officinale var. Rubrum*) can be formulated in preparation cream . Formulation preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) :

- 5.1 Could give effect anti-inflammatory in animals study rat white (*Rattus norvegicus*) Wistar strain.
- 5.2 Based on statistical test use *One Way ANOVA* shows the most effective dosage formulas give effect anti-inflammatory is F2 (preparation cream extract rhizome ginger red (*Zingiber officinale var. Rubrum*) 3%).

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DECLARATION OF CONFLICT OF INTEREST

All Writers no have conflict interest whatever to result on result study this.

Bibliography

Books:

- 1) Anonym. 1995. "Pharmacopoeia Indonesia Edition Fourth ". Jakarta: Indonesian Ministry of Health.
- 2) Ansel, C. Howard. 2008. "Introduction Form Pharmaceutical Preparation Edition Fourth ". Jakarta: UI Press.
- 3) Baratawidjaja, Garna Karnan . 2012. " Basic Immunology 10th Edition". Jakarta: UI Press.
- 4) BPOM RI. 2017. "Regulation of the Head of BPOM RI Number 24 of 2017 concerning Criteria and Procedures for Drug Registration". Jakarta.
- 5) Gunawan, Gan Sulistia. 2008. "Pharmacology and Therapy 5th Edition ". Jakarta: UI Press.
- 6) Hanani, Endang. 2017. "Analysis Phytochemicals ". Jakarta: EGC Press.
- 7) Hapsah, et al. 2010. "Cultivation and Technology Ginger Postharvest ". Medan, USU Press.

- 8) Lachman, Leon. 2008. "Industrial Pharmacy Theory and Practice Edition Second ". Jakarta: UI Press.
- 9) R. Voigt. 1994. Pharmaceutical Technology Textbook Edition Fifth " .Yogyakarta: UGM Press.
- 10) Rowe, C Raymond. 2009. "Handbook of Pharmaceutical Excipients Sixth Edition" . Washington: Pharmaceutical Press.
- 11) Sloane, Ethel. 2018. "Anatomy and Physiology for Beginners ". Jakarta: EGC Press.
- 12) Tjay, Hoan Tan. 2013. "Important Medicines Edition Sixth 3rd Printing ".Jakarta: Gramedia.
- 13) Journals :**
- 14) Anggraeni, Yulia et al. 2012. "Characteristics Preparation and Release of Sodium Diclofenate in the System Niosomes With Carbomer 940" Gel Base. *PharmaScienti*, 1(1): 1-4.
- 15) Red Ginger (*Zingiber officinale* var. *Rubrum*) Against Bacteria *Streptococcus pyogenes*". *Medika Tadulako, Journal Scientific Medicine* 3(1): 34-35.
- 16) Awanis, Aulia Mirna and Andi Alfiah Mutmainnah. 2016. "Anti- Bacterial Test Oleoresin Extract
- 17) Azkiya, Zulfa et al. 2017. " Evaluation of Physical Properties of Red Ginger Extract Cream (*Zingiber officinale* Rosc . var. *Rubrum*) As Anti-Pain". *Journal of Current Pharmaceutical Sciences* 1(1): 14-17.
- 18) Dewi, Puspita Stephani. 2010. "Anti-inflammatory Power Extract Ethanolic red ginger (*Zingiber officinale* Roxb .) And Kencur (*Kaemferia galangal* L.) in male white mice . Yogyakarta: USD Press.
- 19) Dharma, Surya et al. 2016. "Test Effect Anti-inflammatory Extract Ethanol Ginger rhizome (*Zingiber officinale* Roscoe) in Male White Rats". *Thing*. 79.
- 20) Ethics, Nurma Arif et al. 2017. "Influence Ginger Extract (*Zingiber officinale* Roscoe) against the number of fibroblast cells in mice (*Rattus norvegicus*)". *Journal of Nursing Care & Biomolecular* 2(1): 11.
- 21) Handrianto, Prasetyo. 2016. "Antibacterial Test Red Ginger Extract (*Zingiber officinale* var. *Rubrum*) Against *Staphylococcus aureus* and *Escherichia coli*". *Journal of Research and Technologies* 2(1): 1-2.
- 22) Nurjannah Bachri, Nielma Auliah et al, 2021. " Formulation and Testing The Effectiveness of Gel Extract of Red Ginger (*Zingiber Officinale* Var. *Rubrum*) as Anti-inflammatory in White Male Rats (*Rattus Norvegicus*) " . *Proceedings of the International Conference of Innovation Science, Technology, Education, Children and Health*. Unfortunately: Institute Technology, Science and Health RS DR. Soepranoen Media Expert.
- 23) Pairul, Beta Prima Piesta et al. 2017. "Ginger (*Zingiber Officinale*) As Anti- Ulserogenic" . *Journal Medulla* 7(5) : 44.
- 24) Panjaitan, Natalia Ester et al. 2012. Gel Formulation Of Extracts Red Ginger Rhizome (*Zingiber officinale* Roscoe) . *Journal of Pharmaceutic and Pharmacology* 1(1): 10.
- 25) Setyarini , Holida . 2009."Extract Gel Anti-Inflammatory Power Test Ethanol Ginger 10% (*Zingiber officinale* Roscoe) Provided Topical To Induced rat foot edema Carrageenin ". Surakarta: UMS Press.