

# Formulation and Evaluation of Ethanol Extract Emulgel Preparation of Durian (*Durio zibethinus*) Skin Waste Combination of *Kaempferiae Rhizoma* Extract as Analgesic-Anti-Inflammation

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**Abstract :** Durian skin waste that has not been utilized properly, because of it's difficult to decompose character, has the potential to become one of the biological wastes that can cause environmental pollution (Prabowo, 2009). Even though some studies have stated that durian rind has the potential as an anti-inflammatory only in that study, the largest dose was given (400 mg / Kg BW) activity is still not better than the comparator Na.diklofenak 0.9 / 200 g BW (Azizah and Fitriani, 2015). Comparable to durian kencur production was so high in Indonesia. Inexpensive and beneficial for people's lives making kencur as one of the most popular types of plants, because all people can consume it. Empirically based on kencur can be used as painkillers. Besides being empirical-based, several studies have stated that kencur extract can affect experimental animals better than acetosal in terms of reducing pain in mice at a dose of 32 mg / 20 g BW of mice. (Imaningrum, 2010). The purpose of this study is the utilization of waste by combining it with one of Indonesia's natural ingredients by making an emulgel preparation formulation and conducting in vivo testing which is tested on white Wistar rats to prove the analgesic-anti-inflammatory effect of a combination of durian and kencur skin as a topical treatment to be able to reduce or even eliminate a feeling of pain .. Evaluations carried out are organoleptic, homogeneity, pH, viscosity, rheology, centrifugation test, storage stability test at room temperature for 28 days, and spreadability. The results of the study explained that emulgel preparations containing ethanol extract of durian rind combined with kencur rhizome extract had good physical quality as topical preparations.

**Keywords:** *emulgel, analgetic anti-inflammation, durian extract*

## I. INTRODUCTION

Indonesia's natural wealth is in no doubt, abundant of all types of plants that have great potential to meet all the needs of the community. Of the thousands of plant species in Indonesia, kencur (*Kaempferiae Rhizoma*) and durian fruit (*Durio zibethinus* Murray) are included in plants that are familiar, because the spread of both of them has been so wide proportional to the high level of production. According to research from the Central Statistics Agency in 2011, Indonesia was able to reach 1,818,949 tons of durian production. (Noer, 2015).

Basically, durian that is consumed is only the flesh, while apart from that it will become a waste including durian rind, whereas the durian rind is the largest component, ranging from 60-75% of the total durian fruit. So it can be imagined if the production of high durian is certainly the skin available in the form of waste will also be high. Durian skin waste that has not been utilized properly, because of its difficult to decompose character, has the potential to become one of the biological wastes that can cause environmental pollution (Prabowo, 2009). However, several studies have stated that durian rind has the potential as an anti-inflammatory only in that study, the largest dose given (400 mg / Kg BW) activity is

still not better than the comparator Na.diklofenak 0.9 / 200 g BW (Azizah and Fitriani, 2015).

Comparable to durian kencur production was so high in Indonesia. Inexpensive and beneficial for people's lives, this kencur is one of the most popular types of plants, because all people can consume it. Empirically based on kencur can be used as painkillers. Besides being empirical based, several studies have stated that kencur extract can affect experimental animals better than acetosal in terms of reducing pain in mice at a dose of 32 mg / 20 g BW of mice. (Imaningrum, 2010).

Pain can have a negative impact on the sufferer, and therefore efforts are needed to minimize the feeling of pain, one of the factors of pain is due to inflammation, inflammation is a tissue response to physical or chemical stimuli that damage. This stimulation will cause inflammatory reactions such as swelling and pain (Adjimi, 2008).

Research on analgesic and anti-inflammatory activities of durian and kencur skin, shows that this natural material is interesting to use as a treatment.

Antiinflammatory activity of durian rind that is no better than this comparison is the background of doing the combination with kencur in the hope that synergistic activity occurs, thereby causing better treatment, especially in analgesic-anti-inflammatory effects. The renewal made from previous research is the manufacture of better drug preparations in terms of dosage forms that are more attractive and easy to use, good effectiveness, and more economical by utilizing basic ingredients derived from durian fruit peel waste and other cheaper basic ingredients namely galangal. In addition to economical materials for treatment that

come from nature it is believed that it is safer in long term use.

Some formulations or dosage forms commonly used as anti-inflammatory and analgesic, including cream and gel. The newest dosage form is emulgel which is a development of gel. Emulgel is a dosage form that is made by mixing emulsions and gelling agents with a certain ratio, these preparations have advantages that are thermodynamically stable, transparent, isotropic, ease of preparation and high absorption and diffusion rates (Jafar, et al., 2011).

The scope and purpose of this study is the utilization of waste by combining it with one of Indonesia's natural ingredients by making an emulgel preparation formulation and conducting in vivo testing tested on white wistar rats to prove the analgesic-anti-inflammatory effect of a combination of durian and kencur skin as a topical treatment. so that it can reduce or even eliminate a feeling of pain.

From the descriptions above, it seems clear that this research will be useful in making a very meaningful contribution to science, especially pharmacy and medicine, and at a later stage also very beneficial for many people, if an emulgel formula from the durian peel extract has been developed. and kencur extract which has good effectiveness and safety by utilizing raw materials from nature.

## II. MATERIAL AND METHOD

### A. Tools

The tools used in this study are maserator tubes for the extraction process, chemical beakers (Pyrex), stirring rods (Pyrex), Flannel Fabrics, Mortars, Steam Cups, Measuring Cups (Pyrex), Rotary Evaporators (EYELA), Waterbath, Petri dishes, Reaction Tube (Pyrex), Viscometer (Brookfield® DV-I +), pH meter

(Mettler Toledo) and Magnetic Stirrer (IKA®RW 20 Digital).

#### B. Material

The materials used in this research are durian fruit skin extract, kencur extract, 96% ethanol (Bratachem), tween 80® (Bratacem), plantacare (NerdevChemie Singapore), Viskolam® AT 100P (Nerdev Chemie Singapore), TEA, glycerin (Brataco), Propilenglikol (Brataco), DMDM hydantoin (Nerdev Chemie Singapore), aquadeion (School of Life Science and Technology, Bandung Institute of Technology) (Herliyadi 2014).

#### C. Plant Determination

Determination was carried out at Bandungense Herbarium, School of Technology and Life Sciences (STIH) of the Bandung Institute of Technology on durian rind and kencur.

#### D. Sample preparation

Durian skin and kencur that have been collected, washed, cleaned and dried (roasted), then blended and sieved using a 60 mesh sieve to obtain a fine and uniform powder. The results are put in a closed container.

#### E. Sample Extraction

Simplicia powder of durian skin and kencur, each weighed as much as 500 grams and then put into a maserator whose base has been coated with cotton, then put 96% ethanol solvent until the simplicia is completely submerged. Let stand for 3 x 24 hours, while stirring occasionally. Maserat is removed and accommodated, the ethanol filtrate obtained is mixed then the extract is concentrated using a vacuum rotary evaporator followed by a water bath so that a thick extract is obtained (Depkes, RI, 2000).

#### F. Inspection of Extract Quality Parameters

Examination of the extract parameters was carried out to determine the quality of the extract from its

physical properties and chemical content. The parameters examined include: Organoleptic extract, extract yield, total ash content and moisture content.

#### G. Phytochemical Screening

Phytochemical screening was conducted to determine the content of secondary metabolites contained in the extract. Screening includes: test for alkaloids, tannins, polyphenols, saponins, flavonoids, monoterpenes, sesquiterpenes, steroids, triterpenoids and quinones.

#### H. Optimization of the Emulgel Formula

Before the emulgel formulation is made using a combination of durian and kencur peel extract, first perform an optimization of the gel base, so that an optimal base is produced based on the consistency of the base. Durian rind extract and kencur are formulated in the concentration of anti-inflammatory activity test results. The formula for the durian fruit extract emulgel can be seen in Table 1.

Table 1. The Formula for The Durian Fruit Extract Emulgel.

composition		Concentration (%)			
		b/b			
		F0	F1	F2	F3
Durian extract	Active compound	-	5	10	15
Kencur extract	Active compound	-	15	10	5
Tween 80	Emulgator	15	15	15	15
Plantacare	Oil fase	10	10	10	10
Viscolam	<i>Gelling agent</i>	7	7	7	7
TEA	Alkali agent	qs	qs	qs	qs
Gliserin	Humectan	15	15	15	15
DMDM Hydantoin	Preservatif	0,5	0,5	0,5	0,5
aquadeion	solvent	Ad 100%			

**I. Evaluation of preparations**

Evaluation of preparations that will be carried out are: Organoleptic, homogeneity, pH, viscosity, rheology, centrifugation test, storage stability test at room temperature for 28 days, and spreadability.

**J. Data analysis**

Data generated from antipyretic and anti-inflammatory testing were processed using one way ANOVA test.

**III. RESULTS AND DISCUSSION**

**A. Material Collection and Sample Preparation**

The collection of materials starts from the selection and taking of durian and kencur fruits obtained from the Tasikalaya cikurubuk market as much as 10kg. A total of 10 kg of durian skin waste and kencur kempur rhizome are peeled and sorted by the skin of the fruit, washed with running water to remove impurities attached to the sample, then dried under the indirect sun. Simplisia is blended with a blender until it becomes powder and sieved with a 60 mesh sieve.

**B. Manufacture of ethanol extract of Durian rind and kencur kencur**

Simplisia powder of durian rind and kencur kencur were macerated using 70% ethanol solvent. The choice of ethanol solvent is based on the level of safety and ease of evaporation and its properties which are able to attract polar secondary metabolites which are present in the sample (Umar, 2014).

The maceration method was chosen because it avoids damaging the compound due to the heating process. Maceration method is done by immersing simplicia with organic solvents (ethanol 70%) for 3 x 24 hours, through soaking the cell wall will break due to pressure differences between inside and outside the cell so that secondary metabolites present in the

cytoplasm will dissolve in organic solvents. From the extraction process, the yield of durian rind extract was 15.5% and the galangal rhizome was 10.5%.

**C. Extract parameters**

**Moisture Test**

The moisture content test was carried out by the Azeotop method obtained for durian rind extract by 9.8% and for galangal rhizomes by 8.5%.

**Test for Total Ash Content**

Total ash content test was used to determine the overall amount of minerals contained in durian skin extracts obtained ash content of 1.8%, while the ash content for turmeric rhizome obtained by 2.1%.

**Phytochemical Screening Extracts**

Phytochemical screening is carried out to find out secondary metabolite compounds contained in thick extracts from the skin of durian fruit and turmeric rhizome

**Table 2. Observation Results of Phytochemical Screening of durian skin extract**

No	assay	results	
1	Alkaloid	White precipitate	(+)
2	Flavonoid	orange	(+)
3	Saponin	Stable foam	(+)
4	Tanin	Yellow and white	(+)
5	Steroid/Triterpenoid	purple	(+)
			Triterpenoid

**Table 3. Results of Phytochemical Screening Observation of Turmeric Rhizome Extract**

No	assay	results	
1	Alkaloid	Chocolate precipitate	(+)
2	Flavonoid	orange	(+)
3	Saponin	Negatif	(-)
4	Tanin	White and yellow	(+)
5	Steroid/Triterpenoid	purple	(+)
			Triterpenoid

D. Formulation and preparation of Analgesic-Anti-inflammatory Emulgel This emulgel preparation is made by mixing the oil and water phases by using a magnetic stirrer for 15 minutes with the stirring speed being reduced to form a good cream mass. The formula was made using a concentration of durian rind extract and turmeric with a concentration of 5.10 and 15%. The optimized emulgel preparation is then evaluated to see the quality of the preparation.

E. Evaluation of Analgesic-Anti-inflammatory preparations

Organoleptic Observation

Organoleptic observation of emulgel preparations included color, phase separation, and odor in a storage period of 28 days (Sharon, 2013). From the prepared emulgel, an evaluation was carried out during the 28-day storage period at room temperature (28°C). Organoleptic observations as a whole showed that the semisolid preparations were in the form of emulgel, and showed no change or phase separation during the 28 day storage period. The result of organoleptic emulgel is yellowish brown.

Homogeneity Test

Homogeneity test is performed to find out that the preparations made are homogeneous and free of particles. which is still clumping (Sukandar & Elin, 2006). The result of homogeneity test that the all formula 0-28 day is homogen.

Homogeneity testing is done by putting all preparations of emulgel formula between a piece of glass and transparent material. The results show that all formulas are homogeneous and there are no coarse particles visually. According to Nofianty (2008), a homogeneous final product is influenced by stirring during the manufacturing process which can increase

the speed of homogenization of the ingredients so that the resulting preparations are homogeneous.

Determination of pH

The pH measurement of the emulgel preparation was carried out at room temperature in order to find out whether the emulgel preparation in this study was in accordance with the skin pH which is 4.5 - 6.5 (Erza et al., 2016). Measurements were made using a pH meter with a period of 28 days.

Table 4. Observation Results of pH

formula	pH assay				
	0	7	14	21	28
F1	6.1	6.0	5.7	5.6	5.6
F2	5.1	5.1	5.0	5.0	4.9
F3	5.4	5.2	5.0	5.0	5.0

Note:

F1 = Emulgel with durian rind extract and turmeric 5% rhizome

F2 = Emulgel with durian rind extract and turmeric rhizome 10%

F3 = Emulgel with durian rind extract and turmeric 15%

The pH of the preparation during storage has decreased. The decrease in pH is due to the thick extract of durian rind and turmeric which is slightly acidic so that it affects the pH of the preparation but the decrease in pH is still within the range of pH requirements for topical preparations. Where according to the Indonesian Ministry of Health (1979), states that topical preparations must have a pH similar to the physiological pH of the skin, which is 4.5 - 6.5. If the pH of the preparation is more acidic (<4.5), it can cause skin irritation if used for a long time. The more alkaline or acidic the material that is on the skin, the more difficult it is to neutralize it and the elasticity of the skin will be damaged. The skin can become dry, cracked, sensitive and susceptible to infection. Therefore the pH of the preparation must have the same value or as close as possible to the

physiological pH of the skin (Tranggono and Latifah, 2007). **Viscosity Test**

Viscosity test aims to determine the level of viscosity of the emulgel preparation. Testing is carried out for 28 days (Yenti, Afrianti, Afriani, & Cara, 2011).

**Table 5. Observation Results of Viscosity**

Formula	viscosity (cPs)				
	0	7	14	21	28
F1	14920	14910	14880	14880	14880
F2	16950	16930	16840	16820	16820
F3	16870	16660	16480	16480	16320

Note:

F1 = Emulgel with durian rind extract and turmeric 5% rhizome

F2 = Emulgel with durian rind extract and turmeric rhizome 10%

F3 = Emulgel with durian rind extract and turmeric 15%

In table 5 the viscosity of F1, F2, F3 preparations using Brookfield Viscometer with spindle no. 6 at a speed of 50 rpm produced good viscosity of preparations. According to (Herdiana et al. 2016), a good emulgel viscosity requirement is around 2000-20,000 cPs with a spindle no. 4 at a speed of 50 rpm. **Scattering Power Test**

The spread test is carried out to determine the extent of emulgel spread on the skin. The scatter power test is carried out using a load of 50 grams, 100 grams, 150 grams in successive tests. Surface spreads produced by increasing load can illustrate a characteristic in creams (Voight, 1994).

**Table 6. Observation Results of Scattering Power Test**

formula	weight (gram)		
	50	100	150
F1	3.5 cm	4.5 cm	4.7 cm
F2	2.5 cm	3.5 cm	4.0 cm
F3	2.1 cm	2.4 cm	3.0 cm

Note:

F1 = Emulgel with durian rind extract and turmeric 5% rhizome

F2 = Emulgel with durian rind extract and turmeric rhizome 10%

F3 = Emulgel with durian rind extract and turmeric 15%

The spreadability of semisolid preparations can be divided into 2, namely semistiff (high viscosity) with a range of 3-5cm, and semifluid (low viscosity) with a range of 5-7cm (Pakki, Tayeb, & Maisarah, 2009). In tables 4.8, F1, F2, and F3 show the results of the semistiff type in the range 3-5cm. According to Zain Muhamad (2006), stated that the greater the viscosity value, the smaller the spread power of a preparation.

#### IV. CONCLUSIONS

From the results of the study it can be concluded that the emulgel preparations containing ethanol extract of durian rind combined with the kencur rhizome extract have good physical quality as topical preparations.

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