THE FORMULATION OF KECOMBRANG FLOWER HAND SANITIZER

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ABSTRACT

Microorganisms that cause disease stick to the hands through physical contact with the environment. The easiest and most appropriate way to clean them is by washing your hands with soap and clean water. If clean water is not available, use an alcohol-based hand sanitizer or contains an antibacterial known as a hand sanitizer which contains a synthetic antiseptic which is relatively expensive and whose use causes dry, cracked skin and even hypersensitivity. It is necessary to look for an antiseptic made from natural ingredients that is effective, relatively safe, easy to obtain, and more affordable, namely the kecombrang flower because it contains flavonoids, essential oils with an aromatic smell, and has traditionally been used to stop bleeding and eliminate body odor. Fresh kecombrang flowers as test material were crushed and dried at a temperature of around 60OC, until dry powder was obtained. Liquid gel formulation with concentrations of 5%, 10% and 15%. Evaluation of the preparations obtained includes organoleptic tests, preference tests, homogeneity, pH, spreadability, stability, irritation to volunteer skin. The results show that the 10% concentration preparation is the best, very preferred, stable at room temperature storage for 12 weeks, no irritation occurs, and the 15% concentration is the most effective, killing Staphylococcus aureus and Escherichia coli bacteria in a strong category so that kecombrang flower liquid gel can be used to clean hands from bacteria, its use is easy, practical, safe without using water

Keywords*: Kecombrang flower, hand sanitizer gel, antibacterial activity.*

INTRODUCTION

Several hand sanitizer preparations can be found on the market with a fairly simple and fast way of using it, namely by dropping it on the palm of the hand, then flattening it on

the surface of the hand. However, it usually contains a lot of alcohol and antiseptics in the form of synthetic chemicals which are relatively expensive and often cause skin health problems, such as dry skin (a decrease in normal skin moisture) (Retno 2007). cheap, safe, effective, and easy to obtain, one example is the Kecombrang flower.

Kecombrang plant (*Etlinger elatior* Jack) is known as a ginger plant because this plant resembles ginger and is used as a spice in cooking, commonly found in various regions in Indonesia, especially in the highlands including in North Sumatra, the Kecombrang flower contains various active substances that have the potential to inhibit bacterial growth, namely saponins, flavonoids and essential oils and have a distinctive and sharp odor. Kecombrang flowers have often been used to treat various infectious diseases, such as stopping bleeding, eliminating bad breath and body odor, treating festering wounds. possibly caused by bacteria. Therefore, it is possible that Kecombrang flowers have antibacterial activity and can be formulated into hand sanitizer preparations. The use of natural ingredients directly into the formula certainly requires a large volume or concentration to get an effective antibacterial. For this reason, it is necessary to make efforts to reduce the volume, one of which is by drying.

The drying process by drying or heating at high temperatures is feared to damage the active compounds contained in it, especially those that have the potential as antibacterial, so drying is carried out using a water bath with a temperature of approximately 60^{o}C. To ensure the presence of chemical compounds, especially those with antibacterial potential, such as polyphenols, saponins, and essential oils in dried Kecombrang flowers, phytochemical screening was carried out on fresh and dried Kecombrang flowers.

Based on the description above, the researchers carried out phytochemical screening of fresh and dried Kecombrang flowers, then formulated the dry powder of Kecombrang flowers into hand sanitizer gel preparations with various concentrations. The purpose of this study was to obtain a hand sanitizer preparation containing natural antiseptic ingredients from Kecombrang flowers, so it is rational to use it for hand sanitizer without need the water.

METHOD

This type of research is experimental in the laboratory. The research included: the concentration of Kecombrang flowers in the liquid hand sanitizer gel preparation as the independent variable, and the quality parameter of the test of the

effectiveness of the preparation.

In addition to testing the effectiveness of the preparation as an antibacterial, it is hoped that this preparation can be used as a hand sanitizer (freeing hands from microbial contamination, it is also necessary to do a physical test (quality of preparation) on the preparation including a preference test (hedonic test) through organoleptic tests, homogeneity tests, type tests. emulsion,

pH test of the preparation, stability test of the preparation. To determine the safety of the preparation when used on the volunteer's skin, an irritation test was carried out on the volunteer.

1.1 Tools and Materials

a. Tools

The tools used in this research are glassware, autoclave blender incubator, gas stove, electric balance, refrigerator, oven, water bath.

b. Materials

The plants used are Kecombrang flowers, while the ingredients used are: distilled water, 96% alcohol, alpha naphthol, aluminum chloride, ammonia, acetic anhydride, glacial acetic acid, hydrochloric acid, nitric acid, sulfuric acid, acetone, benzene, iron (III) chloride, bismuth (III) nitrate, carboxyl methyl cellulose sodium, ethylacetate, n-hexane, iodine, isopropanol, potassium hydroxide, potassium iodide, chloroform, cupric sulfate, magnesium powder, methanol, sodium hydroxide, propylene glycol, mercury (II) chloride, zinc powder, lead(II) acetate. The media for bacteria were: nutrient agar (NA), nutrient broth (NB), nutrient Muller Hinton agar (MHA), and test bacteria Escherichia coli and Staphylococcus aureus.

c. Volunteer

Volunteers are women aged 20-25 years who are physically and mentally healthy, there is no history of diseases related to allergies.

d. Reactor

In this study used several reagents such as:

- Bouchardat's reagent
- Dragendorff's reagent
- Mayer's reagent
- 2N . hydrochloric acid reagent

- 1% iron (III) chloride reagent
- Molish rectifier
- Lead acetate 0.4 M

RESULTS AND DISCUSSION

2.2 Making Kecombrang flower dry powder

Fresh Kecombrang flowers are cleaned and then mashed using a blender and dried in a freezer at

-40°C for 24 hours, then mashed until dry powder is obtained.

a. Phytochemical Screening

Phytochemical screening was carried out to determine the class of chemical compounds contained in simplicia, including alkaloids, flavonoids, glycosides, saponins, tannins, and steroids/triterpenoids.

b. Alkaloid examination

In this study also examined alkaloids such as:

- Check for alkaloids
- Examination of flavonoids
- Glycoside test
- Test for sugar compounds
- Test on non-sugar compounds
- Saponin check
- Examination of tannins
- Steroid/triterpenoid examination
- Essential oil check

2.3. Preparation of Liquid Gel Preparations

a. Standard gel base formula

The preparation was made based on a standard formula based on CMC-Na gel.

Table 1 : Standard gel base formula

Ingredient	Weight (g)
CMC-Na	5

Gliserin		10
Propilenglikol		5
Aquadest	ad	100

c. Modified gel base formula

The basic formula for the modified gel is made by reducing the concentration of the ingredients used to get a thinner gel consistency, adding a little preservative (nipagin), making it easy and convenient to use and stable in storage.

Table 2 . Modified gel base formula

Ingredient		Weight (g)
CMC-Na		2
Gliserin		10
Propilenglikol		2
Aquadest	ad	150

As much as 1000 ml of hand sanitizer gel is made, the calculation is as follows:

CMC-Na $\frac{\cdot\ 1000}{150}$ x 2 g = 14 g

Gliserin $\frac{\cdot\ 1000}{150}$ x 10 ml = 66 ml

Propilenglikol $\frac{\cdot\ 1000}{150}$ x 2 g = 14 g

Nipagin $\frac{:\ 0{,}1}{100}$ x 1000 g = 1 g

Aquadest ad : $1000\ ml - (14 + 66 + 14 + 1) = 905\ ml$

d. Make a gel base

The ingredients are weighed according to the weight of each formula. Into a porcelain mortar filled with 200 ml of freshly boiled hot water, and added little by little CMC-Na while grinding so as not to agglomerate, until a transparent mass is formed. Next, nipagin is dissolved in 25 ml of hot water, put into a mortar while grinding, added propylene glycol, remaining distilled water, and alcohol, and stirred until homogeneous, and stirred until homogeneous so that a gel base with a weight of 500 g is obtained.

d. Making Kecombrang flower hand sanitizer gel

Gel preparations containing dried Kecombrang flowers were made with various

concentrations of 5%, 10%, 15%. The composition of the formula is as follows:

Table 3 : Composition of the Kecombrang handsanitizer formula

Formula	Kecombrang flower powder weight (g)	Liquid gel base weight (g)
5%	5	95 g
10%	10	90 g
15%	15	85 g

e. Preparations for Kecombrang flower hand sanitizer

Into the mortar, part of the liquid gel base was added which had been weighed according to each formula and ground. Then added Kecombrang dry flower powder which has been weighed while grinding, and added the remaining liquid gel base little by little while grinding until it runs out, and grinded homogeneously, then a liquid gel preparation is obtained.

2.4. Evaluation of the Kecombrang flower hand sanitizer gel preparation is carried out by means of :

- Organoleptic test
- Homogenity test
- Determination of the pH of the preparation
- Determination of stock spread
- Observation of the stability of the preparation
- Irritation test on volunteers

2.4 Research data processing

The results of testing the effectiveness of the preparation as an antibacterial from the formula with various concentrations of Kecombrang flower content, concluded based on the wide diameter of the inhibition of bacterial growth, namely the larger the area of inhibition of bacterial growth, the stronger the preparation as an antibacterial. Based on the Indonesian Pharmacopoeia edis V (2014), The inhibition area is effective if it produces a boundary of the inhibition area with a diameter of approximately 14 mm. The diameter of the inhibition zone of 5 mm or less was categorized as weak, the zone of inhibition of 5-10 mm was categorized as moderate, the inhibition zone of 10-20 mm was categorized as strong and the zone of 20 mm or more was categorized as very strong.

2.5 Results

a. Plant Material Processing Results

500 g of fresh Kecombrang flowers, dried at a low temperature of about 50ºC, the weight of dried Kecombrang flower leaf powder is 50 g is pink.

b. Results of Screening/Examination of Chemical Compound Class Content

A phytochemical screening test was carried out to determine the class of chemical compounds contained in fresh Kecombrang flowers and dried Kecombrang flowers.

Table 4 . Results of Screening/Inspection of Chemical Compound Groups

No	Inspection	Fresh Kecombrang Flower	Kecombrang Flower Powder
1	Alkaloid	-	-
2	Flavonoid	+	+
3	Glikosid	+	+
4	Glikosid Antrakuinon	+	+
5	Essential Oil	+	+
6	Saponin	+	+
7	Steroida/Triterpenoid	+	+
8	Tanin	+	+

c. Organoleptis test results

An organoleptic test was carried out to assess the quality of the hand sanitizer gel preparation which was made using sensory sensitivity by measuring the level of liking or hedonic of the physical appearance of the gel preparation which was made including color and smell, shape, ease of application. The research was carried out on 20 untrained panelists who were asked to assess the form. , aroma, color, and easy to apply which are filled in via the questionnaire sheet.

Table 5. Organoleptic Observation Results of Each Formula

Types of Hand Sanitizer	Form	Color	Smell

Basis Hand sanitizer	Viscous liquid	Clear	No smell
5 % of Kecombrang Flower powder Handsanitizer	Viscous liquid	Pink	Distinctive scent of Kecombrang flower
10 % of Kecombrang Flower powder Handsanitizer	Viscous liquid	Pink	Distinctive scent of Kecombrang flower
15 % of Kecombrang Flower powder Handsanitizer	Viscous liquid	Deep pink	Distinctive scent of Kecombrang flower

Table.6 Organoleptic Preference Value Interval Test Results for Each Formula

Criteria	**Formula**	**Preference value range**	**Smallest vafority value**	**Conclusion**
Colour	Basis Hand sanitizer	1,4593 until 2,7407	1,4593 = 1	Really don't like
	5 % of Kecombrang Flower powder Handsanitizer	1,9396 until 2,9604	1,9396= 2	Don't like
	10 % of Kecombrang Flower powder Handsanitizer	4,5922 until 5,2078	4,5922 = 5	Really like
	15 % of Kecombrang Flower powder Handsanitizer	3,5475 until 4,6525	3,5475= 4	Like
Smell	Basis Hand sanitizer	1,4048 until 2,8952	1,4048 = 1	Really don't like
	5 % of Kecombrang Flower powder Handsanitizer	3,0974 until 4,1026	3,0974 = 3	Don't like
	10 % of Kecombrang Flower powder Handsanitizer	4,5922 until 5,2078	4,5922 = 5	Really like
	15 % of Kecombrang Flower powder Handsanitizer	3,5844 until 4,8156	3,5844= 4	Like
Consistency	Basis Hand Sanitizer	1,9396 until 2,9604	1,9396 = 2	Don't like

	5 % of Kecombrang Flower powder Handsanitizer	4,0396 until 5,0952	4,0396 = 4	Like
	10 % of Kecombrang Flower powder Handsanitizer	4,5922 until 5,2078	4,5922 = 5	Really like
	15 % of Kecombrang Flower powder Handsanitizer	3,9396 until 4,9604	3,9396 = 4	Like
Easy to apply	Basis Hand sanitizer	3,7288 until 4,8712	3,7288 = 4	Like
	5 % of Kecombrang Flower powder Handsanitizer	3,6769 until 4,7231	3,6769 = 4	Like
	10 % of Kecombrang Flower powder Handsanitizer	4,5922 until 5,2078	4,5922 = 5	Really like
	15 % of Kecombrang Flower powder Handsanitizer	3,6048 until 5,0952	3,6048 = 4	Like

Data shows that the hand sanitizer gel preparation that panelist likes best in terms of color and smell, shape/consistency, and ease of application is a gel formula that uses 10% dry powder of Kecombrang flowers. Because the preparation that uses 15% dry powder of Kecombrang flowers has a slightly harder consistency and is less comfortable when applied compared to the gel formula made using 10% dry powder of Kecombrang flowers. Meanwhile, the formula that uses 5% dry powder of Kecombrang flowers is less because it has less of aroma.

d. Preparation Homogeneity Check Result

The results of experiments that have been carried out on preparations with various concentrations of dry Kecombrang flower powder show that there are no grains on a piece of glass, so the preparation is said to be homogeneous.

Table 7. Measurement pH Data for Preparations when completed.

Formula	pH			
	I	II	III	Range
Basis Hand sanitizer	6,6	6,8	6,7	6,7
5 % Kecombrang Flower Hand sanitizer	6,7	6,6	6,6	6,6
10 % Kecombrang Flower Hand sanitizer	6,5	6,4	6,6	6,5

15 % Kecombrang Flower Hand sanitizer	6,3	6,3	6,4	6,3

The average pH of all the preparations tested ranged from 6.3 – 6.7, meaning that it meets the requirements for a skin moisturizing preparation because according to Balsam (1972), the pH requirement for a skin moisturizing preparation is 5-8. It does not appear that the higher the concentration of dry fragrant Kecombrang flower powder used, the lower the pH of the preparation. This is because the dry powder of fragrant Kecombrang flowers contains compounds that are acidic.

e. Spreadability Test Results

The spreadability test is carried out to determine the softness and ease of spreading of the gel preparation when used. The greater the spreadability, the easier the preparation is when applied. A good spreadability of gel preparations is around 5-7 cm (Garg, et al, 2002). The results of measuring the spreadability of hand sanitizer preparations formulated using dry Kecombrang flower powder as an antiseptic ingredient with various concentrations can be seen in below table.

Table 8 Data on Measuring the Spreadability of Newly Made Preparations

Formula	Spreadability (cm)			
	I	II	III	Range
Basis Hand sanitizer	5,30	5,25	5,30	5,28
5 % Kecombrang Flower Hand sanitizer	5,10	5,10	5,25	5,15
10 % Kecombrang Flower Hand sanitizer	5,10	5,15	5,10	5,12
15 % Kecombrang Flower Hand sanitizer	5,00	5,10	5,20	5,10

The above table shows that the average spreadability of all preparations tested ranges from 5.10 cm - 5.18 cm, meaning that it meets the good criteria for gel preparations..The criteria for good spreadability for skin preparation is 5-7. It can be seen that there is a slight difference in the spreadability of the preparation the higher the concentration of dry Kecombrang flower powder used, resulting in a smaller spreadability, although this difference is not too big, and overall is still within good criteria. This is possibly due to the presence of combrang flower powder in the preparation, resulting in the preparation becoming more concentrated.

f. Observation of Stock Stability Result

The results of observations on the stability of the gel preparation formula made using dry powder of fragrant Kecombrang flowers as an antiseptic ingredient of various concentrations, in storage for up to 12 weeks, and observed every week can be seen in below table :

Table 9 . Observation data on stock stability

Formula	Observations during storage														
	Done			1 week			4 weeks			8 weeks			12 weeks		
	x	Y	Z	x	y	z	x	y	z	x	y	z	x	Y	z
Basis Hand sanitizer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 % Kecombrang Flower Hand sanitizer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 % Kecombrang Flower Hand sanitizer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15 % Kecombrang Flower Hand sanitizer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note : x : consistency
y : Changes in smell and color
x ; Spreadability

f. Irritation Test Results for Volunteers

Using cosmetics that are not good for the skin can cause various reactions (side effects). To determine whether or not these side effects exist, a skin irritation test is carried out. Based on the research carried out, the results obtained are as shown in below table.

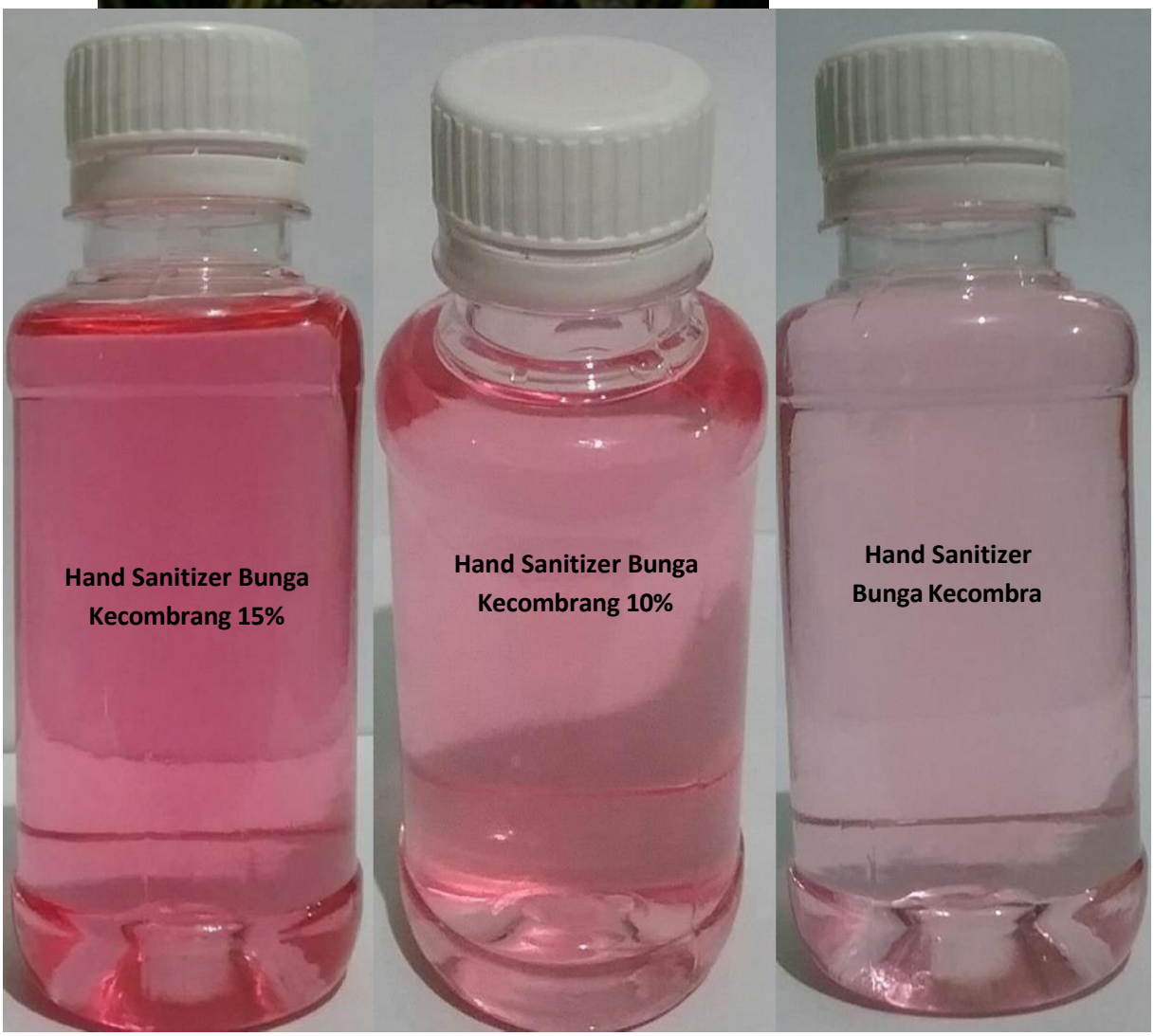
Table 10. Irritation test data on volunteer skin

Formula	Volunteers				
	I	II	III	IV	V
Skin redness	-	-	-	-	-
Itchy skin	-	-	-	-	-
Skin becomes rough	-	-	-	-	-

According to Wasitaatmadja (1997), a skin irritation test to determine the presence or absence of side effects was carried out by applying cosmetics to the forearms or behind the ears of 6 volunteers, then leaving it for 24 hours and seeing the changes that occurred in the form of redness, itching and roughness. on the skin.

Table 10 shows that there are no visible side effects in the form of redness, itching and roughness on the skin caused by the preparation. So it can be concluded that the hand sanitizer gel preparation which is formulated using dry powder of Kecombrang flowers as an antiseptic ingredient in various

concentrations does not cause irritation to the skin.



Picture 1. Kecombrang Flower
Picture 2. Kecombrang Flower Hand sanitizer

CONCLUSIONS

The conclusions obtained in this research are :

- Kecombrang flowers (*Etlinger elatior* Jack) are still fresh and have been dried at a temperature of around 600C, contain the same class of chemical compounds, namely: flavonoids, glycosides, anthraquinones, saponins and tannins.
- Dried Kecombrang flowers can be formulated into a gel-shaped hand sanitizer with concentrations of 5%, 10% and 15%, homogeneous, pH around 6.3-6.7, spreadability 5.10-5.18 mm, stable for 12 weeks of storage.
- .Hand sanitizer preparations containing Kecombrang flowers do not cause irritation to the skin.

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