

CHAPTER III RESEARCH METHODS

3.1 Research Location and Time

The manufacture of transparent solid soap of red betel leaf extract was carried out at the Gontor University of Pharmaceutical Technology Laboratory. This research was conducted for 3 months from January 2020 to March 2020.

3.2 Research Tools and Materials

The tools used in this experiment were stirring rods, analytical scales, Erlenmeyer(*Pyrex*[®]), measuring cups(*Pyrex*[®]), beaker cups(*Pyrex*[®]), gloves, aluminum foil, mortar, magnetic stirrer, pH meter, autoclave(*Jenway*[®]), water bath, rotary evaporator(*Rotavapor Buchi*[®]), thermometer, test tubes, and tablet hardness tester.

The ingredients in this study were red betel leaf extract (*Piper crocatum* Ruiz & Piv). Other used ingredients were VCO (Virgin Coconut Oil), stearic acid, NaOH 20%, ethanol 70%, ethanol 96%, aquadest, glycerin, sucrose (*Gulaku*[®]), cocamidopropyl betaine, SLS, and BHT.

3.3 Research Design

This research belongs to the experimental research category, which was to get a transparent solid red betel leaf extract soap formulation whose results met the specified requirements and standards. The independent variable was the variation of the concentration of stearic acid and betaine with the dependent variable was the physical properties of transparent solid soap which includes transparency test, pH test, foam power test, organoleptic test, and water content test accelerated stability test and soap hardness test. The formulation of transparent solid soap of red betel leaf extract is made with the following formula:

Table 3.1 Formula for Solid Soap Transparent Red Betel Leaf Extract

Composition	Formula				Use
	F1	F2	F3	F4	
Red betel leaf extract	0.05gr	0.05 gr	0.05 gr	0.05 gr	Antibacterial
Stearic acid	9 gr	13 gr	9 gr	13 gr	Stiffening agent
Virgin Coconut Oil	6 gr	6 gr	6 gr	6 gr	Oil phase
Ethanol	20 gr	20 gr	20 gr	20 gr	Humectant, transparency agent
Glycerin	20 gr	20 gr	20 gr	20 gr	Humektan, transparency agent
NaOH 20%	20 gr	20 gr	20 gr	20 gr	Alkali
Sucrose	8 gr	8 gr	8 gr	8 gr	Transparency agent
Sodium Lauryl Sulfate	5 gr	5 gr	5 gr	5 gr	Surfactant Anionic
Cocamidopropyl betaine	8 gr	4 gr	4 gr	8 gr	Surfactant
Butylated Hydroxylated Toluene	0.01 gr	0.01 gr	0.01 gr	0.01 gr	Antioxidant
Parfume	3 drops	3 drops	3 drops	3 drops	Fragrance
Aquadest	Ad 100 ml	Ad 100 ml	Ad 100 ml	Ad 100 ml	Solvent

3.4 Research Procedure

3.4.1 Evaluation of the Characteristics of Dry Betel Leaf Dry Extracts

The results of the plant determination conducted at the UPT Herbal Materia Medica, BatuLaboratory showed that the plant samples in the form of red betel leaves used in this study with letter number 074 / 762A / 102.7 / 2019 had the Latin name *Piper crocatum* Ruiz & Pav with a morphology on the leaves: single, tapered tip, long rounded, base of heart shape, flat edge, 5-8 cm long, 2-5 cm wide, stemmed, smooth

surface, pinned reinforcement, the color of the bottom is shiny red. The name of the simplicia listed in the determination of the red betel leaf is *Piperis crocati Folium* which contains alkaloids, terpenoids, isprenoids, flavonoids, saponins, cyanogenic, tannins, glucosides, glucasonilates, polevenolad compounds and non-protein amino acids.

3.4.2 Extraction

Simplicia powder of red betel leaf extract was extracted using maceration method using ethanol as a solvent. The use of ethanol solvents in this maceration process is because ethanol is one of the solvents that is permitted and recommended by BPOM and also according to Pharmacopoe IV edition ethanol is a solvent that has the ability to search with large polarity ranging from non-polar compounds to polar compounds. To get thick extract, the heating process was carried out using Waterbath. The thick extract obtained produced a dark brown color of 40.5 g.

3.4.3 Phytochemical Analysis of Red Betel Leaves

Tests carried out on the composition of flavonoids, alkaloids tannins, saponins and steroids. The reagents used in the flavonoid test were 3 ml of 30% methanol and H_2SO_4 , thealkaloid testused 5 ml of chloroform, 3 drops of NH_4OH and 2 drops of H_2SO_4 , the tannin test used 5 l of aquadest and 5 drops of $FeCl$ 1 %, the saponin test used 5 ml of hot distilled water and the steroid test used 5 ml of 10% ethanol.

3.4.4 Formulation of Transparent Solid Soap of Red Betel Leaf

Extract

All ingredients were weighed first. Stearic acid was first melted at $60^\circ C$ using a beaker glass above the water bath to melt, then added VCO, and BHT was stirred until homogeneous using a mixer. NaOH solution was added to the beaker glass formula if the temperature has reached $70-80^\circ C$ and stirred for 2-4 minutes until it was homogeneous to help the saponification process and soap form, the temperature was

lowered to 50-60°C. Then added glycerin, sucrose, betaine, and SLS which have been dissolved first in the heated aquadest and added to the mixture while continuing to stir for 7-10 minutes until homogeneous. Red betel leaf extract was added to the base mixture and then stirred at 40°C until homogeneous and added to perfume then put into the mold.

3.4.5 Evaluation of the Physical Properties of Transparent Soap

Test the physical properties of transparent soap include:

a. Transparency Test

Observation of soap transparency was carried out in the third week of the soap making process. Soap was cut with a thickness of 0.25 inches or equivalent to 0.635 cm. Soap placed on paper with the type 14 font. Tests were carried out on all formulas and all results were recorded and determined that the soap was transparent or not.

b. pH test

The pH test of this preparation was carried out using 1 gram of base dissolved with hot aquadest up to 10 mL. The electrode was dipped in the container, allowing the needle to move to a constant position. The number shown by the pH meter was the pH value of the preparation.

c. Soap foam power test

One gram of soap was weighed and dissolved in 10 mL aquadest. If needed, the mixture can be heated to help the solubility process. A total of 5 ml of the previously prepared soap solution was put into a test tube on a scale and then shaken with the help of vortex for 2 minutes. The foam formed was observed and recorded the height of the foam formed.

d. Organoleptic Test

Organoleptic test conducted direct observations which include the shape, odor, and color produced on transparent soap.

The desired soap was to have a solid, clear/translucent shape and having a distinctive odor.

e. Water content test

A water content test was performed to determine the water content in soap. The water content test was carried out using soap being roasted for 2 hours at 105°C then weighed. Water content in water can be determined by calculation:

$$\frac{W_0 - W_1}{0} \times 100\%$$

W0: Initial water content

W1: Moisture content after roasting.

f. Hardness test of soap

Test on the soap was done using a tablet hardness measurement tool. The value obtained will indicate the weight of the tool needed, so it can change the shape of the soap. Hardness measurement results obtained by reading the numbers stated on the tool.

g. Stability test

Test conducted in this study using the accelerated method by storing for 4 cycles where each cycle for 2 days and storage at 40°C and 4°C or for 8 days. The parameters carried out include testing the hardness of the soap using a penetrometer, determining the pH and foam content.

3.5 Data Analysis

The data of the transparent soap physical properties test results obtained from testing the physical properties of soap include the transparency test, pH test, soap foam power test (cm), moisture content test (%), organoleptic test, soap hardness test (kg) and stability test that is compared to the requirements contained in the Indonesian Pharmacopoeia 3rd edition (1979), Indonesian Pharmacopoeia 5th edition (2014), SNI 1994 and SNI 2016.