

Formulation And Evaluation Of Hand And Body Lotion Combination Of Sungkai Leaf Simplicia (*Peronema canescens* Jack) And Belimbing Wuluh Leaves (*Averrhoa bilimbi* L)

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ABSTRACT

The advantage of simplicia is that it has low toxicity because it is made from natural ingredients that have not been mixed with organic solvents. This study aims to obtain a good formula by varying the levels of active substances of simplicia. F0 as control formula, F1 sungkai leaf simplicia (0.75%), F2 wuluh star fruit leaf simplicia (0.75%) and F3 combination of sungkai leaf simplicia and star fruit leaf simplicia (0.75%) and see the physical characteristics in accordance with the criteria of a good lotion and determine the effect of penetration of Hand and Body Lotion sungkai leaf simplicia and wuluh star fruit leaf simplicia using Franz diffusion cell. The results showed that Hand and Body Lotion sungkai leaf simplicia (*Peronema canescens* Jack) and star fruit leaf simplicia (*Averrhoa bilimbi* L) fulfilled the criteria of a good lotion in general, no irritation occurs. However, Hand and Body Lotion in F2 and F3, namely the organoleptic test and the cycling test, experienced color instability. The cumulative value of penetration at minute 30 formulas F1, F2, F3 is 42.4936 $\mu\text{g}/\text{cm}^2$; 53.7824 $\mu\text{g}/\text{cm}^2$; 29.0864 $\mu\text{g}/\text{cm}^2$, respectively. The flux value (penetration speed) in F2 experiences a steady state or steady time at minute 15 because the membrane is in a saturated state or the diffusion process has run constantly. The penetration value is directly proportional to the flux value (penetration speed). The flux value (penetration speed) in F2 experiences a steady state or steady time at minute 15 because the membrane is in a saturated state or the diffusion process has run constantly. The penetration value is directly proportional to the flux value (penetration speed). The flux value (penetration speed) in F2 experiences a steady state or steady time at minute 15 because the membrane is in a saturated state or the diffusion process has run constantly. The penetration value is directly proportional to the flux value (penetration speed).

Keywords: sungkai leaf, star fruit wuluh leaf, hand and body lotion, franz diffusion cell

I. INTRODUCTION

Along with the development of science and technology, developments Cosmetics are now focusing on developing products that use natural ingredients, such as fruit, flowers and leaves. One of them is sungkai leaves (*Peronema canescens* Jack) and starfruit leaves (*Averrhoa bilimbi* Linn).

The sungkai plant (*Peronema canescens* Jack) in West Java is often called jati sabrang and in South Kalimantan it is called longkai. Sungkai leaves contain alkaloids, flavonoids, steroids, phenolics and saponins. In the Dayak Paser ethnic group, a decoction of sungkai leaves can be used to treat itchy skin diseases (Noorcahyati, 2012). Sungkai leaves (*Peronema canescens* Jack) are one of the natural plant ingredients

Cosmetics are also starting to move towards natural products because of the back to nature trend (Duraismy et al., 2011). Many companies on the skin. In general, cosmetic preparations are used that are not very sticky, spread more quickly on the surface of the skin, and are simple to make.

Based on the background above, researchers are interested in conducting research on Hand and Body Lotion Formulation, a combination of sungkai leaf simplicia (*Peronema canescens* Jack) and wuluh starfruit leaves (*Averrhoa bilimbi* Linn) by varying the levels of active substances and carrying out a penetration test into the skin using the test method. Franz diffusion cells.

that have the potential to be developed into cosmetic preparations and have the potential to be developed into natural skincare (Fadilaturrehman et al, 2021).

The starfruit plant (*Averrhoa bilimbi* Linn) in West Sumatra is often called balimbing and in North Sumatra it is popularly known as balingbing. Wuluh starfruit leaves contain flavonoids, alkaloids, tannins, saponins which are useful for skin health. Wuluh starfruit leaves can be formulated as a stable cream preparation (Ariem et al., 2021).

The skin penetration test is a method used to evaluate lotion preparations for other skin care products in penetrating the skin layers. This test aims to assess the extent to which the active ingredient is absorbed by the skin and reaches the desired target during a certain interval (Chandra, D, 2019).

The choice of lotion preparation is because the preparation is in the form of an emulsion which is easily washed off with water and is not sticky compared to other topical preparations. Its liquid form makes it easy to use quickly and evenly made in an emulsion preparation because when Raw materials are starfruit leaves (Siteba, Padang City), sungkai leaves (Parak Rumbio, Padang City), ethanol, chloroform, Mayer's reagent, Bouchardat's reagent, Dragendorff's reagent, concentrated HCl, magnesium powder, FeCl (III), ethyl acetate, n-hexane, acetic acid, n-butanol, paraffin liquidum (Novalindo), cetyl alcohol (Novalindo), propylene glycol (Novalindo), glycerin (Novalindo), TEA (Trietanolamine), nipagin (Novalindo), nipasol (Novalindo) aquadest (Novalindo), aqua pro injection, calcium phosphate and NaOH (MERCK).

PLANT IDENTIFICATION

To find out the correct type or species of plants used in research carried out at the ANDA Herbarium, Faculty of Biology, Andalas University, Padang. The samples that were determined were the fruit, roots, stems and leaves.

Research procedure

The sungkai leaves and starfruit leaves that have been collected are wet sorted, then washed with clean running water, then drained. Carry out the process of chopping the leaves and drying them in the air then dry sorting them. The dried simplicia was powdered and then sieved with a No. 100 mesh sieve.

II. RESEARCH METHODS

This research is experimental research. Research data is presented descriptively to see the physical characteristics of hand and body lotion preparations and the penetration value into the cellulose nitrate membrane using a Franz diffusion cell. This research was carried out at the Pharmaceutical Technology Laboratory of the Padang College of Pharmaceutical Sciences (STIFARM), the Pharmacognosy Laboratory of the Padang College of Pharmaceutical Sciences (STIFARM), the Central Laboratory of the Padang College of Pharmaceutical Sciences (STIFARM) and the ANDA Herbarium, Faculty of Biology, FMIPA, Andalas University, Padang.

Tools and materials

The tools used in this research were standard laboratory glassware, silica gel 60 F254, sieve, analytical balance (Biobase), moisture balance analyzer (Ohaus MB 45), incubator (LABO), pH meter (Ionix), oven (Yenaco), Brookfield viscometer (DV-2T), furnace (Carbolite Gero ELF 1100), UV-Vis spectrophotometer (Shimadzu 1800@), refrigerator, water bath (Memmert), franz diffusion cell, centrifuge (NF-200).

Propylene glycol	5%	5%	5%	5%
Cetyl alcohol	2%	2%	2%	2%
Paraffin liquidum	10%	10%	10%	10%
TEA	2%	2%	2%	2%
Nipagin	0.02%	0.02%	0.02%	0.02%
Nipasol	0.02%	0.02%	0.02%	0.02%
Aquadest ad	200 mL	200 mL	200 mL	200 mL

The oil phase (stearic acid, cetyl alcohol, paraffin liquid, nipasol) is put in an evaporator cup and the water phase (propylene glycol, glycerin, TEA, nipagin, distilled water) is put in a glass beaker. The oil phase and water phase are heated separately in a water bath at 70°C until they melt completely. Enter the hot oil phase into the stirrer then grind quickly until a thick white cream is formed. Slowly add the water phase into the oil phase in the stamfer while grinding it constantly until an emulsion forms. Add distilled water slowly while grinding it until a homogeneous lotion is formed. Next, add sungkai leaf simplicia and starfruit leaf simplicia to the lotion base that has been formed, stir until mixed and a homogeneous lotion is formed.

Making Hand and Body Lotion Simplisia Sungkai Leaves and Wuluh Starfruit Leaves

Material	Formulas			
	F0	F1	F2	F3
Simplisia starfruit leaves	-	-	0.75%	0.375%
Simplisia sungkai leaves	-	0.75%	-	0.375%
Glycerin	6%	6%	6%	6%
Stearic acid	5%	5%	5%	5%

Homogeneity Test

A total of 0.1 g was placed on the object glass, then covered with a cover glass, observed visually against a black background and observed again using a microscope with a lens magnification of 40x. The preparation must show a homogeneous composition and no visible coarse grains (Wardatun, F, A et al., 2022).

Spreadability Test

Weigh 0.5 grams of each lotion preparation formula in the middle between 2 scaled round glass plates. Then a load of 50g, 100g, 150g and 200g is given, left for 1 minute, then the diameter of the distribution area is measured and recorded. Good spreading power is between 5 - 7 cm (Wardatun, F, A et al., 2022).

Adhesion Test

Weigh 0.1 gram of each lotion preparation formula on a glass object. Then cover with another glass object. Then a 50g load is given for 5 minutes. After that, record the time it takes for the two glass objects to separate. Good adhesion time is more than 4 seconds (Wardatun, F, A et al., 2022).

Test pH

Weigh 1 gram of lotion and dilute it with 10 ml distilled water then measure the pH then record the pH (Akhtar et al., 2011).

Cycling Test

A total of 10 grams of lotion was put into an ointment pot and then stored in the refrigerator at 4°C for 24 hours. After that, it is removed and placed back into the oven at 40°C for 24 hours, this process is calculated as 1 cycle. Testing is carried out every day from day 0 to day 12. Observe physical and color changes in the lotion preparation (Apriyanti, 2016).

25 and 30. The sampled solution was immediately replaced with phosphate buffer pH 7.4 to maintain the liquid volume constant. The sample is put into a vial.

Evaluation of Hand and Body Lotion Preparations

Organoleptic Test

The organoleptic test is carried out by visually observing the shape, color and odor of the lotion preparation (Wardatun, F, A et al., 2022).

Mechanical Method Stability Test

This was carried out using a mechanical test method using a centrifuge at a speed of 3600 rpm for 4.5 hours. Observe the physical changes indicated by the phase separation of the emulsion. (Pujiastuti, A & Kristen, M, 2019)

Viscosity Test

This was done using a Brookfield type DV2T viscometer by installing spindle number 64 at a speed of 10 rpm. Viscosity measurements are recorded with numbers that appear on the viscometer layer (Pujiastuti, A & Kristen, M, 2019).

Emulsion type

This is done using the staining method by taking 0.1g of each lotion preparation formula then placing it on an object glass, then adding 1 drop of methylene blue then mixing until homogeneous, covering with a cover glass and observing under a microscope. The external phase will be colored blue if the lotion is oil in water (O/W) (Pujiastuti & Kristen, 2019).

Irritation Test

This is done by rubbing a small amount of lotion on the skin of the inner arm, then covering it with gauze and plaster, then looking for signs of irritation that arise. This irritation test was carried out for each formula on 5 panelists.

Penetration Power Test With Franz Diffusion Cells

Before carrying out Franz diffusion, the wavelength and calibration curve of each sample were determined using a UV-Vis spectrophotometer. Apply ± 1 g of lotion preparation to the cellulose nitrate membrane. Set the temperature at $37 \pm 1^\circ\text{C}$ with a speed of 120 rpm. Samples were taken as much as 1 mL from the receptor compartment solution at 5, 10, 15, 20 minutes,

Next, the absorption was measured using a UV-Vis spectrophotometer at each maximum wavelength (Sapra et al., 2019)

III. RESULTS AND DISCUSSION

Organoleptic Test

FORMULA	DAY	FORM	SMELL	COLOR
Formula 0	1	Lotion	Doesn't smell	White
	2	Lotion	Doesn't smell	White
	3	Lotion	No Smell	White
Formula 1	1	Lotion	Distinctive smell	Green
	2	Lotion	Distinctive smell	Green
	3	Lotion	Distinctive smell	Green
Formula 2	1	Lotion	Good luck	Brown Green
	2	Lotion	Distinctive smell	Brown Green
	3	Lotion	Distinctive smell	Chocolate
Formula 3	1	Lotion	Distinctive smell	Brownish green
	2	Lotion	Distinctive smell	Green to grey
	3	Lotion	Distinctive smell	Green to grey

The color change that occurs in formula 2 and formula 3 is due to the presence of triethanolamine which is an amine which is a strong base with flavonoids which are phenolic compounds so the color changes when it reacts with a base (Mektildis, R, 2018).

Spreadability Test

FORMULA	SPREADING POWER (cm)				
	No burden	50g	100g	150g	200g
Formula 0	4.85	5.25	5.62	5.92	6.47
Formula 1	4.5	4.95	5.37	5.6	5.85

Homogeneity Test

FORMULA	HOMOGENEITY	STANDARD
Formula 0	Smooth, even and homogeneous	Homogeneous
Formula 1	Fine particles	
Formula 2	Fine particles	
Formula 3	Fine particles	

In formula 0, homogeneous results were obtained and there were no clumping/particles in the preparation, formula 1, formula 2 and formula 3 obtained homogeneous results but there were particles of simplicia.

Test pH

FORMULA	pH	STANDARD
Formula 0	7.74	4.5-8
Formula 1	5.69	
Formula 2	5.54	
Formula 3	5.67	

The pH test obtained that the lotion preparation in the formula 0, 1,2,3 met the pH requirements for the lotion, namely pH 4.5-8.

Viscosity Test

FORMULA	VISCOSITY (cps)	STANDARD
Formula 0	10,400 cps	2,000 cps – 50,000 cps
Formula 1	9,200 cps	
Formula 2	10,600 cps	
Formula 3	11,900 cps	

The viscosity test obtained that the lotion preparation in the formula 0,1,2,3 met good requirements. According to SNI 1996 No.16-4399 a good viscosity value is 2,000 cps – 50,000 cps. The difference in viscosity values is also caused by differences in the force applied during the mixing process or the process of stirring the oil phase and the water phase (Irmayanti, M et al., 2021)

Irritation Test

Planelist	Formulas			
	0	1	2	3
I	-	-	-	-
II	-	-	-	-

Formula 2	4.42	4.7	5.02	5.45	5.7
Formula 3	3.67	4.2 2	4.62	5	5.25

The spreadability test results using the formula 0,1,2,3 show that the spreadability of the lotion meets the requirements, namely 5-7cm (Dominica, D & Handayani, D, 2018).

Adhesion Test

FORMULA	ADJUSTMENT POWER (Second)
Formula 0	14.25
Formula 1	07.96
Formula 2	08.72
Formula 3	07.17

The results of the adhesion test using the formula 0,1,2,3 show that the adhesion of the lotion meets the requirements, namely more than 4 seconds.

Emulsion Type Test

FORMULA	LOTION EMULSION TYPE
Formula 0	M/A (Oil in Water)
Formula 1	M/A (Oil in Water)
Formula 2	M/A (Oil in Water)
Formula 3	M/A (Oil in Water)

The results for the emulsion type in formula 0,1,2,3 are the O/A type because the blue color in methylene blue gives an even color to all preparations. Methylene blue is a hydrophilic dye or easily soluble in water.

Centrifugation Stability Test

FORMULA	PHASE SEPARATION
Formula 0	No phase separation occurs
Formula 1	No phase separation occurs
Formula 2	No phase separation occurs
Formula 3	No phase separation occurs

The results of the centrifugation test were obtained in formulas 0, 1,2,3, namely that there was no phase

III	-	-	-	-
IV	-	-	-	-
V	-	-	-	-

The results showed that the four hand and body lotion formulations did not show any irritation reactions on the five volunteers' skin.

Cycling Test

The results of observing the color in the cycling test of F0, F1 and F2 did not experience a color change, but F3 experienced a quite significant color change. The color change of the lotion in formula 3 is due to the presence of triethanolamine which is an amine which is a strong base with flavonoids which are phenolic compounds so the color changes when it reacts with a base (Mektildis, R, 2018).

Wavelength of Simplisia Starfruit Leaves

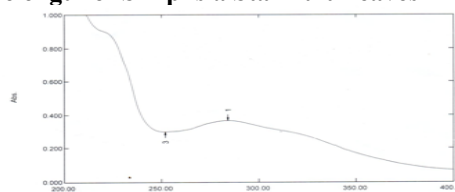


Figure 1. Wavelength of Simplisia Starfruit Leaves

Based on the measurement results, the wavelength produced in the starfruit leaf simplisia is 284.00 nm with an absorbance value of 0.367 separation in the preparation. This shows that the four formulas are stable

Sungkai Leaf Simplicia Wavelength

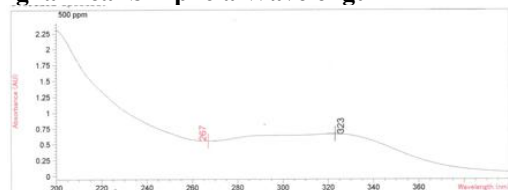


Figure 2. Wavelength of Sungkai Leaf Simplicia
 Based on the measurement results, the wavelength produced in sungkai leaf simplicia is 323.00 nm with an absorbance value of 0.662

Franz Diffusion Cell Test

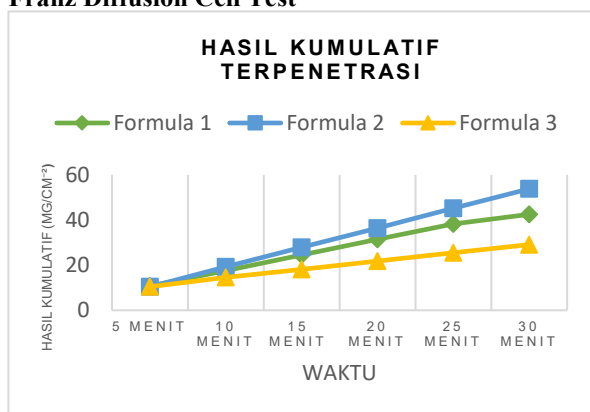


Figure 3. Cumulative Penetration Value ($\mu\text{g}/\text{cm}^2$)
 The results of the cumulative amount of penetration obtained from F1 were in the range of $10.7536 \mu\text{g}/\text{cm}^2$ - $42.4936 \mu\text{g}/\text{cm}^2$. At F2, it is in the range of $10.4 \mu\text{g}/\text{cm}^2$ - $53.7824 \mu\text{g}/\text{cm}^2$ and at F3 it is in the range of $10.4416 \mu\text{g}/\text{cm}^2$ - $29.0864 \mu\text{g}/\text{cm}^2$. From the graph obtained, it can be seen that the cumulative amount of active substances penetrated is increasing, this shows that the penetration speed is increasing (Rieski, A et al., 2021). Shabrina, N (2006) revealed that the longer the lotion sticks to the membrane, the more active substances from each formula are absorbed by the skin.

CONCLUSION

Based on the research that has been carried out, the conclusions that can be drawn are:

1. Sungkai leaf simplicia (*Peronema canescens* Jack) and starfruit leaf simplicia (*Averrhoa bilimbi* L) can be formulated into hand and body lotion preparations.
2. The hand and body lotion preparations of sungkai leaf simplicia (*Peronema canescens* Jack) and wuluh starfruit leaf simplicia (*Averrhoa bilimbi* L) fulfill the criteria for good hand & body lotion, however the hand and body lotion preparation in the combination of simplicia, namely the

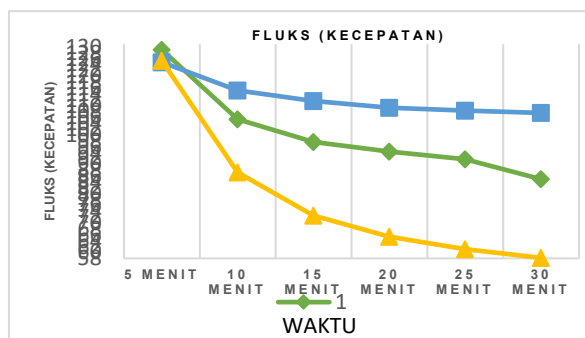


Figure 4. Flux (Penetration Speed)

The penetration flux (velocity) at F1, F2 and F3 shows that the three flux graph formulas decreases over time because saturation time begins to occur in the membrane. It can be seen that after the 5th minute the release of the drug begins to slowly decrease and the flux graph begins to flatten which indicates that this condition has reached a steady state (Rieski, A et al., 2021).

Steady state conditions are conditions where the membrane is in a saturated state or the diffusion process is running constantly. The penetration flux is directly proportional to the cumulative amount of active substance penetrated. The more medicinal substances that penetrate the membrane, the greater the penetration speed (flux) in accordance with Fick's law 1 (Nur, SS, 2006).

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organoleptic test and the cycling test, has experienced color instability.

3. Hand & body lotion preparations containing sungkai leaf simplicia and wuluh starfruit leaves as well as a combination of simplicia provide good penetration power which can be seen from the penetration value and flux value which are directly proportional.

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