

Sun Protection Factor (SPF) Value In Patikala Leaves Ethanol Extract Lotion Preparation (*Etlingera elatior*)

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Abstrak

Indonesia is a country with a tropical climate which allows the skin to be continuously exposed to sunlight. Excessive free radicals in the form of ultraviolet rays from the sun will cause damage to the skin. Therefore, preparations containing SPF are needed as protection for the skin, one of which is SPF lotion from the patikala leaf plant (*Etlingera elatior*) which contains flavonoid compounds, saponins, alkaloids, steroids, polyphenols and essential oils. This study aims to determine the SPF value of the lotion preparation of patikala leaf extract (*Etlingera elatior*) in protecting the skin from exposure to UV rays and the most effective concentration to determine the SPF value contained in the lotion preparation. This research was carried out at the Pharmacy Laboratory of Muhammadiyah University of Palopo in September-October 2023. The type of research carried out was experimental, by taking samples, making SPF lotion preparations, testing the physical quality of lotion preparations, and determining the SPF value with a spectrophotometer. The research was carried out for 3 weeks starting from making the lotion preparation and testing it. During the 3 weeks of research, the best physical quality test results were found in formula 1 with a concentration of 15%. From the test results it is known that the SPF value using a spectrophotometer, the SPF value in formula 1 is 1.547, Formula 2 is 1.506 in the low protection category, while F3 with an SPF value of 5.205 has a protection value of 5 in. medium category.

Keywords: *Patikala leaves (Etlingera elatior)*, Lotion

1. Introduction

Lotion is a cosmetic preparation of the emollient group (softener) which contains more water (Iskandar et al., 2021). Its function is to retain skin moisture, cleanse, prevent water loss. The advantages are easy to spread, easy to use, gives a cool effect, easy to wash, works directly on local tissue and the expected therapeutic effect is easier to achieve [1]. Lotions that contain SPF values are lotions that can provide protection against UV rays. SPF value can be obtained from the antioxidant content contained in plants, where Flavonoids are the largest group of polyphenols which are also very effectively used as antioxidants [2]

Patikala leaf (*Etlingera elatior*) is a plant from the Zingiberaceae family. Patikala has bioactive compounds are flavonoids that function as antioxidants. Patikala leaf extract has strong antioxidant activity with an IC₅₀ value of 30.65 mg/mL [3]. In testing the antioxidant activity of patikala leaves, one of them can be used with the DPPH method [4]. DPPH is a free radical compound that is stable, so if it will be used as a test reagent in antioxidant activity testing, it is sufficient to dissolve it. The absorbance value of DPPH ranges from 515 - 520 nm [5].

Based on the background described above, the problem is formulated as follows, "What is the SPF value of patikala leaf extract (*Etlingera elatior*) which is used as a sunscreen lotion.

2. Methodology

A. Type of Research

This type of research was conducted experimentally, this research includes making simplisia, making extracts, making lotion preparations from patikala leaf extract (*Etlingera elatior*) by observing the sun protection factor (spf) value on the preparation.

B. Time and Place of Research

This research will be conducted in September-October 2023 and conducted at the Pharmaceutical Preparation Technology Laboratory, Faculty of Health Sciences, University of Muhammadiyah Palopo.

C. Sample and Population

The population in this study was patikala leaves (*Etlingera elatior*) taken in West Wara District, Mawa Village, Palopo City, South Sulawesi Province. The sample used in this study was patikala leaves (*Etlingera elatior*).

D. Research Procedures

a. Simplisia preparation

The simplisia used in this study were patikala leaves. The criteria for patikala leaves taken are fresh and the leaves used are old leaves, the selection of old leaves makes it easier for the leaf crushing process because it is easier to crush than younger leaves, picked at 09.00-12.00 when the photosynthesis reaction has been perfect then clean by washing using water and then separated between dirt and leaves, then wet sorting is carried out after which it is aerated outside the room should not be exposed to direct sunlight for 3-5 days until dry. This is in line with the literature of [6], which says that drying simplisia containing essential oils uses a black cloth cover in order to avoid evaporation too quickly which can reduce the quality or evaporate the compound content in the simplisia. Perform dry sorting to ensure that the simplisia is free from impurities. After that, patikala leaves are made into simplisia by chopping them until they are coarse.

b. Proses pembuatan ekstrak etanol daun patikala (*Etlingera elatior*)

Simplisia diekstrak dengan menggunakan metode maserasi ditimbang sebanyak 50 gram serbuk daun patikala dan di masukkan kedalam wadah kaca. Ditambahkan etanol 96% sebanyak 750 ml sampai simplisia terendam semua selama 3 hari dengan sesekali diaduk. Setelah itu disaring menggunakan kain putih Kemudian setelah proses maserasi selesai ekstrak cair yang didapatkan di angin-anginkan dengan menggunakan kipas angin hingga diperoleh ekstrak kental.

E. Evaluation of the preparation

Evaluation of lotion preparations was carried out for 4 weeks consisting of organoleptical testing, homogeneity, pH, spf value test.

1. Organoleptical testing

Organoleptical testing is done by observing the color, smell, and shape of the lotion preparation.

2. Homogeneity

Homogeneity testing is done by putting 0.1 gram of patikala leaf ethanol extract lotion in the center of the glas object and covered with another glas object then to fulfill the homogeneity requirements seen from the resulting lotion preparation is homogeneous and there are no coarse grains.

3. pH testing

In testing the pH of the preparation is carried out using a pH meter.

Spreadability Test The qualified spreadability is 5-7

4. Irritation test

The irritation test was carried out by applying the preparation to the skin of the back ear with a diameter of 2 cm, left open for 2 hours and observed what happened.

5. Hedonic test

Hedonic test was conducted to observe the organoleptic and level of liking of serum preparations by distributing questionnaires using goggle from to 20 panelists.

6. Spf value test

Determination of sunscreen effectiveness is done by determining the SPF value in Vitro with UV-Vis spectrophotometer.

The Sun Protection Factor (SPF) value was obtained from absorbance measurements at wavelengths between 290-320 nm using a UV-Vis spectrophotometer.

$$SPF = CF \times \sum EE(\lambda) \times I(\lambda) \times abs(\lambda)$$

Description:

CF: Correlation factor

EE: Erythema efficiency

I : Sunlight simulation spectrum

Abs: Absorption value read

The EE X 1 value is a constant (fixed). The value of the wavelength is 290-320 nm and every difference is 5 nm [6].

Result and Discussion

A. Simplisia Quality Standardization

1. Drying Shrinkage Calculation Results

Results of determination of drying shrinkage of patikala leaf simplisia (Etlingera elatior)

cawan kosong	3gram
cawan + sampel sebelum di oven	3gram
cawan + sampel setelah di oven	ram
sampel	n

2. Results of Water Content Calculation

Results of determination of water content of patikala leaf simplisia (Etlingera understood with the support of research data that may require half or a full page, then that data

cawan + sampel sebelum di oven	ram
cawan + sampel setelah di oven	ram
sampel	am

B. Physical Quality Test of Preparations

1. Organoleptical test

Table. 4.3 Organoleptical test observation data on lotion preparations

ula	gu ke	oleptis		
		lk		a
ila 1		padat	tea	t muda
		padat	tea	t muda
		padat	tea	t muda
ila 2		padat	tea	t muda
		padat	tea	t muda
		padat	tea	t muda
ila 3		padat	tea	t tua
		padat	tea	t tua
		padat	tea	t tua

Keterangan: Formula 1 : Konsentrasi ekstrak 15% 1: Minggu Ke-1

Formula 2 : Konsentrasi ekstrak 20% 2: Minggu Ke-2

Formula 3 : Konsentrasi ekstrak 25% 3: Minggu Ke-3

2. Homogeneity test

Homogeneity Test Observation Data of Lotion Preparations

Formula	Pengamatan Homogenitas		
	Minggu ke		
	1	2	3
Formula 1	Homogen	Homogen	Homogen
	Homogen	Homogen	Homogen
	Homogen	Homogen	Homogen
Formula 2	Homogen	Homogen	Homogen
	Homogen	Homogen	Homogen
	Homogen	Homogen	Homogen
Formula 3	Homogen	Homogen	Homogen
	Homogen	Homogen	Homogen
	Homogen	Homogen	Homogen

Keterangan: Formula 1 : Konsentrasi ekstrak 15% 1: Minggu Ke-1

Formula 2 : Konsentrasi ekstrak 20% 2: Minggu Ke-2

Formula 3 : Konsentrasi ekstrak 25% 3: Minggu Ke-3

3. pH test

Observation data of pH test of lotion preparation

ula	rata	Range
		pH kulit 4,5-6,5 (Kusumawati <i>et al.</i> , 2022)

Keterangan: Formula 1 : Konsentrasi ekstrak 15% 1: Minggu Ke-1

Formula 2 : Konsentrasi ekstrak 20% 2: Minggu Ke-2

Formula 3 : Konsentrasi ekstrak 25% 3: Minggu Ke-3

4. Spreadability Test

Observation data of the results of the spreadability test on lotion preparations

ula	Sebar	rata	Range
			5-7 (Sayuti et al., 2015)
Keterangan: Formula 1 : Konsentrasi ekstrak 15% 1: Minggu Ke-1 Formula 2 : Konsentrasi ekstrak 20% 2: Minggu Ke-2 Formula 3 : Konsentrasi ekstrak 25% 3: Minggu Ke-3			

5. Irritation Test

Irritation test observation results

Responden	Reaksi Terhadap Kulit		
	F1	F2	F3
1	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
2	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
3	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
4	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
5	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
6	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
7	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
8	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
9	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
10	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
11	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
12	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
13	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi
14	Tidak terjadi iritasi	Tidak terjadi iritasi	Tidak terjadi iritasi

Keterangan : (-) = Tidak terdapat iritasi
(√) = Terdapat iritasi

6. Hedonic Test

Hedonic test observation data on lotion preparations

Formula	Indikator	Panelis (%)			
		SS	S	KS	TS
F1	Warna	21,4	71,4	7,1	-
	Aroma	7,1	85,7	7,1	-
	Tekstur	21,4	71,4	7,1	-
F2	Warna	7,1	78,6	14,3	-
	Aroma	7,1	85,7	7,1	-
	Tekstur	7,1	85,7	7,1	-
F3	Warna	7,1	64,3	28,65	-
	Aroma	14,3	78,6	7,1	-
	Tekstur	21,4	78,6	-	-

Discussion

1. Organoleptical test

The color of lotion preparations in formulations 1 and 2 is light brown while in formulation 3 it is dark brown, this is due to the concentration of extracts added to each formulation, the higher the concentration of extracts, the darker the color of the resulting preparation. From observations for 3

weeks, the three formulas did not experience changes in either shape or smell while the color formed from the three formulations had differences, namely in formulas 1 and 2 had a light brown color while formula 3 had a dark brown color.

2. Homogeneity test

The results of the homogeneity test of lotion preparations of patikala leaf extract (*Etlingera elatior*) show that from the three preparation formulas there are no coarse particles and lumps from the extract or from the lotion ingredients, indicating that the mechanism of stirring the ingredients used in each formula is appropriate and the results obtained from this homogeneity are that all lotion preparation formulas have homogeneous homogeneity.

3. pH test

The results of pH testing of the three dosage formulations carried out for 3 weeks obtained stable dosage pH results, namely at pH 6, which means that it meets the skin pH requirements of 4.5-6.5.

4. Spreadability Test

The requirements of a good spreadability test according to Sayuti (2015) in the range of 5-7 cm. This is because lotion is a cosmetic preparation in the form of an emulsion containing more water [7]. Good spreadability is when applied to the skin can be spread evenly on the skin and easily absorbed.

5. Irritation Test

From the results of the irritation test, it can be concluded that the moisturizing lotion preparation made is safe to use on the skin.

6. Hedonic Test

Hedonic test aims to measure the level of panelists' liking for patikala leaf extract lotion preparations. The hedonic test was conducted with 14 respondents using the slovin formula with an error of 20%. This is because the population used is small.

7. Determination of SPF (Sun Protection Factor) Value of Patikala Leaf Extract Lotion (*Etlingera elatior*)

Determination of the SPF value of patikala leaf extract lotion is done to determine the ability of the lotion to withstand ultraviolet light. Determination of SPF value is done by measuring the absorbance of patikala leaf extract lotion preparation using UV-VIS spectrophotometry with a wavelength of 290-320 nm where measurements are described every 5 nm interval. The SPF values of patikala leaf extract lotion Formula I, II and III were 1.547; 1.506 and 5.205, respectively. Based on the level of sunscreen ability [8]. Sunscreen lotion formulas I and II are not included in the category of protection strength because they have low values. While formula III has medium protection strength.

From the results of the physical characteristics evaluation test on the preparation of patikala leaf ethanol extract lotion (*Etlingera elatior*), the best preparation is formula 1 with 15% extract concentration. As for the SPF test, the best formula is formula 3 with 25% extract concentration.

Conclusion

Based on the results of the study, it can be concluded that the SPF value contained in the lotion preparation of patikala leaf extract (*Etlingera elatior*) where formulas FI, FII, and FIII each have a value of 1,547; 1,506 and 5,205. Where FI and FII are not included in the protection strength category because they have low values. While FIII has a moderate sunscreen ability with an SPF value of 5.205 where the protection value obtained is SPF 5.

Acknowledgement

1. Further research needs to be done to get a high SPF value by increasing the concentration of patikala leaf extract (*Etlingera elatior*) in lotion preparations.
2. It is suggested that future researchers can test the SPF value of other plant extracts.

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