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Formulation of Facial Wash from Nettle Leaf (*Urtica Dioica L.*) Ethanol Extract

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ABSTRACT

Face wash is a facial cleanser in the form of a gel containing foam which is recommended for sensitive, oily and acne prone skin. One of the natural ingredients that can be developed is nettle (*Urtica dioica L.*). The aim of this study was to determine the potential of nettle leaf extract facial wash. The process of making nettle leaf extract using the maceration method with ethanol as a solvent. The results of the characteristics of nettle leaf *simplicia* powder obtained 13.78% water content, 37.7% water soluble extract content, 37.89% ethanol soluble extract content, 14.69% total ash content. The screening of *simplicia* powder results were positive for containing alkaloids, flavonoids, terpenoids, steroids, saponins, tannins. From the research that has been done, it can be concluded that ethanol extract of nettle leaves can be formulated in a facial wash with a variation of concentration of 5%, 10% and 15%.

Keywords: daun jelatang (*Urtica dioica L.*), facial wash

I. Introduction

The skin is one of the largest parts of the body where the skin makes up 15% of body weight. The skin is very important as the body's defense against disease. Some microorganisms enter the body through open areas of the skin such as hair follicles or sweat gland sacs. A disease that occurs on the skin is acne¹.

Facial skin is susceptible to health problems caused by excess oil production from the oil glands, hormonal factors, or daily activities inside and outside the home².

Facial cleansing using facial soap is the first step to prevent aging and acne³. Soap is a type of surfactant that can reduce surface tension and interfacial tension, and has saponification, dispersibility, emulsification and cleaning properties⁴. The ability of this soap can be used to clean the face from exposure to dust, dirt, and oil on the face which can initiate acne.

Face wash gel is a facial cleanser in the form of a gel containing foam which is recommended for sensitive, oily and acne skin because the gel

formula is gentle on the skin so it does not irritate acne prone skin.

One of the natural materials that can be developed is nettle (*Urtica dioica* L.). The leaf extract has strong antioxidant activity⁵ so that it can be further used to help with anti-aging skin care⁶.

Nettle leaves contain chlorophyll, protein, carotenoids such as lutein, β carotene, and their isomers; minerals including iron, phosphorus, magnesium, calcium, potassium, sodium; vitamins B C, and K⁷; flavonoids such as isoquercetin and rutin, tannins, histamine, serotonin, formic acid, resinous acid, glucokinin⁸; ursolic acid linoleic acid, neoxanthin, violaxanthin, lycopene⁹. Polysaccharides, vitamin C, carotene and the flavonoids quercetin, rutin, kaempferol, and beta-sitosterol¹⁰. Nettle leaves contain 14.4 mg/100 g of tocopherol; 0.23 mg/100g riboflavin; 13 mg/100 g iron; 0.95 mg/100g phosphorus; and 532 mg/100 g potassium¹¹. The leaf extract has strong antioxidant activity⁵ so that it can be further used to help anti-aging skin care⁶. The old nettle leaves contain higher vitamin C compared to the young one¹².

Nettle leaves can be used as active ingredient in cosmetics. It has anti-aging benefits when formulated in cream preparation¹³.

Based on this description, the researcher is interested in conducting research on the formulation of facial wash preparations from nettle leaf ethanol extract as a facial wash.

II. Experimental

2.1. Chemicals, Equipment and Instrumentation

The plant materials used in this study were ethanol extract of nettle leaves, carbopol 940 (Bratachem), Methyl paraben, propyl paraben, sodium lauryl sulfate, distilled water, triethanolamine (TEA), propylene glycol, 96% ethanol. The tools used in this study were mortar, stamper, cup, stirring rod, pipette, measuring cup, beaker glass, analytical balance, pH meter, aluminum foil, volumetric flask, blender, spatula, sieve, water bath, spreadability test equipment. , homogeneity test equipment.

2.2. Research Procedure

The nettle leaves are washed in running water and then drained. Then it is weighed as much as half a kg, then dried in the sun or in the air, then dried using a drying cabinet, after drying the sample is ground using a blender until it becomes

powder sieved through a 60 mesh sieve to obtain simplicia powder. Extraction was carried out by maceration by placing 500 g of sample into the macerator and adding 10 parts of solvent (5 L ethanol). Soaked for the first 6 hours while occasionally stirring, then allowed to stand for 18 hours. The macerate is separated by filtration. The filtering process was repeated three times using the same type of solvent, half the volume of solvent used in the first screening¹⁴ . The maserate was concentrated using a rotary evaporator at $\pm 40^{\circ}$ C, the extract was evaporated over a water bath until a thick extract was obtained, then put into the freezer to free the solvent.

Examination of Simplicia Characteristics

Parameters for examining the characteristics of simplicia include: macroscopic examination, determination of water content, determination of total ash content, determination of water-soluble extract, determination of ethanol-soluble extract.

*Phytochemical Screening of Nettle Leaf Extract (*Urtica dioica* L.)*

Phytochemical screening includes examination of alkaloids, flavonoids, and tannins.

Formulation of Facial Wash Gel Preparations

The formula for making the basic gel facial wash, is

R / Nettle Leaf Extract	
Carbopol 940	2
Trietanolamin	1,3
Propilen glikol	15
Sodium Lauryl Sulfat	2
Metil paraben	0,15
Propil paraben	0,15
Aquadest ad	100

Preparation of gel preparations is carried out by making mixture 1, namely weighing 15 grams of propylene glycol, dissolved in 40 ml of distilled water in the beaker glass, stir until dissolved. Weigh 2 grams of sodium lauryl sulfate, dissolve it in 10 ml of distilled water in a glass beaker, stir until dissolved. Propylene glycol and sodium lauryl sulfate solutions were mixed and stirred until homogeneous. Make mixture 2, namely weighing 2 grams of carbopol 940, sprinkle it over 20 ml of warm water until it swells and then grinds it until a gel mass is formed. Weighing 1.3 grams of triethanolamine, added little by little into the gel mass and ground until homogeneous. Mix mixture

1 into mixture 2 and grind until homogeneous. Weigh the nettle leaf extract according to the concentration (5, 10, 15) put into mixtures 1 and 2, and grind until homogeneous. Add the remaining aquadest and stir until homogeneous, then put it in a container.

Evaluation of Physical Stability of Gel Preparations

Evaluation of the Physical Stability of Gel Preparations includes organoleptic testing carried out by observing changes in shape, color, and smell of the facial wash preparation¹⁵. To determine whether there is an effect during the 28 day storage period.

pH measurements were carried out on days 1, 7, 14, 21, and where day 1 was the time the preparations were made. Determination of the pH of the preparation was carried out using a pH meter, which was first calibrated using a neutral standard buffer solution (pH 7.01) and an acidic pH buffer solution (pH 4.01) until the tool showed the pH value. Furthermore, the electrodes were washed using aquadest, then dried with a tissue. The sample was made at a concentration of 0.6%, that is, 600 mg of the preparation was weighed and dissolved with distilled water up to 100 ml, then the electrode was dipped in the solution. Let the tool show the pH until it is constant and the number shown by the pH meter is the pH of the sample preparation.

The spreadability test was carried out by weighing 0.5 gram of the gel preparation, after that the gel was placed under a round glass with a diameter scale below it, after which the diameter of the spread was measured. After 1 minute, 50 grams of weight was added and left for 1 minute, then the diameter of the spread was measured. The same thing was done every 1 minute with the addition of 50 grams of load until a sufficient diameter was obtained to see the effect of the load on the spreading diameter of the gel preparation.

An irritation test was carried out on 6 volunteers aged 18-35 years to find out whether the preparations made could cause redness of the skin (erythema) and accumulation of body fluids (edema). The way cosmetics are used on the face, is done 2 times a day for 3 consecutive days (morning, evening). Irritation reactions are characterized by the presence of redness, itching on the facial skin that is treated¹⁶.

Tests were carried out visually, the panelists in this study totaled 12 people. Each panelist was asked to wash the facial wash on the face and provide an assessment of the texture, color, aroma, clean impression and moist impression on the skin. The panelist's assessment of the face wash preparation was categorized into 5 levels, namely: very like (5), like (4), quite like (3), don't like (2), and don't like (1). Then the percentage of preference level is calculated. A preference test or hedonic test was carried out to determine the level of preference of the panelists for the preparations produced. Panelists are members who are involved in the organoleptic assessment of various subjective impressions and analysis of the sensory properties of a product presented.

III. Result and Discussion

3.1. Analysis of Characterization Results

Nettle leaves are green with a rough texture covered with stinging hairs (trichomes), measuring 2-3 inches, slender, serrated, and 7-pointed at the tip. Nettle leaves are also green around the edges and purple in the middle. Then nettle leaves can cause itching when touched on the skin. The results of examining the characterization of nettle leaf simplicia powder can be seen in table 1.

Table 1. Simplicia Characterization Results

Parameters	Result
Moisture content	13,78%
Total ash content	14,69%
Water soluble essence content	37,7%
Ethanol soluble essence content	37,89%

Phytochemical screening of simplicia, ethanol extract of nettle leaves was carried out to determine the class of secondary metabolites present in it. The results of the phytochemical screening of simplicia and nettle leaf extract revealed that the plant contains flavonoids, alkaloids, saponins and triterpenoids/steroids.

Inspection of the stability of nettle leaf extract gel preparations was carried out on four formulas, namely one blank and three formulas that had been added with extract with each concentration. Inspection was carried out visually for 4 weeks at room temperature with weekly observations. The results can be seen in the following table 2.

Table 2. Observation Data on Form, Color, Odor of Preparations, and Storage Time (weeks)

Observation	Preparation	Lama penyimpanan (minggu)			
		1	2	3	4
Form	F0	-	-	-	-
	F1	-	-	-	-
	F2	-	-	-	-
	F3	-	-	-	-
Color	F0	cl	cl	cl	cl
	F1	g	g	g	g
	F2	g	g	g	g
	F3	bg	bg	bg	bg
Smell	F0	s	s	s	s
	F1	s	s	s	s
	F2	s	s	s	s
	F3	s	s	s	s

Description :

- : no shape changed
- cl : clear
- g : green
- bg : brownish green
- s : specific
- F0 : The formula does not contain nettle leaf extract
- F1 : The formula contains 5% nettle leaf extract
- F2 : The formula contains 10% nettle leaf extract
- F3 : The formula contains 15% nettle leaf extract

Based on the data above, the stability test of the facial wash preparation of nettle leaf ethanol extract for 4 weeks showed a stable shape, color and odor of the preparation.

Examination of the homogeneity of the nettle leaf extract facial wash preparation was carried out on four formulas, namely one blank and three formulas that had been added to the extract with each concentration. Examination is carried out with a certain amount of preparation placed on the glass and then closed in another way. The results can be seen in Appendix 13. Checking homogeneity can be seen in Table 3 below.

Table 3. Observation Data of Preparation Homogeneity

Parameter	Formula	Lama Pengamatan (Minggu)			
		1	2	3	4
Homogeneity	F0	H	H	H	H
	F1	H	H	H	H
	F2	H	H	H	H
	F3	H	H	H	H

Examination of the pH of the nettle leaf extract facial wash preparation was carried out on the four formulas using a pH meter. Observation results can be seen in the attachment. Checking the pH can be seen in table 4 below.

Table 4. Data on The Results of The Preparation of The Ph Test

Parameter	Formulas	Observation Period (weeks)			
		1	2	3	4
pH	F0	6,4	6,4	6,4	6,4
pH	F1	6,5	6,4	6,3	6,3
	F2	6,3	6,3	6,2	6,2
	F3	5,5	5,5	5,4	5,3

Description :

- F0 : The formula does not contain nettle leaf extract
- F1 : The formula contains 5% nettle leaf extract
- F2 : The formula contains 10% nettle leaf extract
- F3 : The formula contains 15% nettle leaf extract

Based on the results above after storage for 4 weeks, the pH obtained decreased slightly compared to the pH of the preparation after it was made. Even though the preparation has decreased, the pH of the preparation is still in accordance with the pH of the skin, which is around 4.5-6.5. A pH that is too acidic can irritate dry skin.

Spreadability test of nettle leaf extract facial wash preparation was carried out on four formulas using a glass. The test results data can be seen in Table 5 below.

Table 5. Data of Spreadability Test Results

Formula	Observation Data (diameter)		
	10 g	50 g	100 g
	cm	cm	cm
F0	5	5,1	5,2
F1	5,2	5,3	5,4
F2	5,1	5,2	5,3
F3	5	5,1	5,2

Description :

- F0 : The formula does not contain nettle leaf extract
- F1 : The formula contains 5% nettle leaf extract
- F2 : The formula contains 10% nettle leaf extract
- F3 : The formula contains 15% nettle leaf extract

Based on the data above, it shows that the nettle leaf extract facial wash met the dispersion or diameter requirements which were measured after 1 minute after each load was given. Good

spreadability will guarantee satisfactory release of the drug substance. The spreading power of a good facial wash is between 5-7 cm.

Based on the results of the irritation test conducted on 5 volunteers who were carried out by applying the preparation on the inner upper arm for 3 consecutive days, the results showed that all volunteers gave negative results for the parameters of the irritation reaction. Parameters observed were erythema, itching or edema. From the results of the irritation test, the nettle leaf ethanol extract facial wash is safe to use.

Hedonic tests were carried out on texture, color, aroma and stickiness when using Nettle Leaf Ethanol Extract Formula FI, F2 and F3 face wash. The results of the hedonic test on 10 panelists with different formulas showed that F3 was the most preferred preparation by the panelists. Formula F3 gets the highest score on 4 criteria, namely good texture, appearance of color when the facial wash is used, attractive aroma and the ability of the facial wash to penetrate the skin well. Results can be seen in the table 6.

Table 6. Preference Test Result (Hedonic Test)

No	Formula	Research Aspects	Evaluation				
			5	4	3	2	1
1	FI	Texture	8	2	0	0	0
		Color	2	8	0	0	0
		Aroma	0	1	9	0	0
		Sticky Effect	2	6	2	0	0
2	FII	Texture	0	3	7	0	0
		Color	1	9	0	0	0
		Aroma	0	1	7	2	0
		Sticky Effect	0	3	7	0	0
3	FIII	Texture	0	1	9	0	0
		Color	0	2	7	1	0
		Aroma	0	1	6	3	0
		Sticky Effect	0	4	6	0	0

Description :

5= Really like 3= Enough like 1= Not likely

4= Like 2= Less like

The hedonic test was carried out on texture, color, aroma and stickiness when using Nettle Leaf Ethanol Extract Formula FI, F2 and F3 face wash. Convenience when using face wash, namely good texture, appearance of attractive face wash colors, a

distinctive aroma and the ability of face wash to absorb into the skin properly.

IV. CONCLUSION

Based on the results of the research that has been done, it can be concluded that the ethanol extract of nettle leaves (*Urtica dioica* L.) can be formulated in a facial wash with a concentration of 5%, 10% and 15%. Convenience when using face wash, namely good texture, appearance of attractive face wash colors, a distinctive aroma and the ability of face wash to absorb into the skin properly, good spreadability will guarantee satisfactory release of the drug substance. From the results of the irritation test, the nettle leaf ethanol extract facial wash is safe to use.

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