Formulation And Testing Of The Effectiveness Of The Ethanol Extract Lotion Of Rosella Flower (Hibiscus Sabdariffa L.) Lotion As A Skin Moisturizer

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Abstract
Rosella flowers are able to provide a moisturizing and smoothing effect because they contain many substances that are useful for the skin, rosella flowers are also synonymous with a sour taste so that it gives a fresh sensation. In this study, the ethanolic extract of rosella flowers used was at a concentration of 2%, 2.5%, 3%, and 5%. This type of research is experimental research using a pre-test and post-test control group design. The sample of this research is Rosella flower extract lotion (Hibiscus Sabdariffa L.). Data analysis using ANOVA. The results showed that the entire concentration group of rosella flower (Hibiscus Sabdariffa L.) ethanol extract in this study was effective in moisturizing the skin. Ethanol extract of rosella flower (Hibiscus Sabdariffa L.) which is most effective in moisturizing the skin is ethanol extract with a concentration of 5%. The entire concentration group of Rosella flower (Hibiscus Sabdariffa L.) ethanol extract in this study was effective in smoothing the skin. The ethanol extract of rosella flower (Hibiscus Sabdariffa L.) which was most effective in smoothing the skin was ethanol extract with a concentration of 5%.

Keywords: *Rosella Flower Ethanol Extract, Moisture, Smoothness, Lotion Cream.*

I. INTRODUCTION

Human skin has a function as a barrier to protect the body from various environmental influences from the outside either physically, mechanically, or chemically. In addition, also body covers the aesthetic value. The skin is said to be healthy and normal if the outer layer of the skin contains more than 10% water. This is due to the regulation of fluid balance in the skin. If the fluid balance in the skin is disturbed, oil production in the skin is reduced and is influenced by an unfavorable environment, which can cause the skin to become dry (Isfardiyana, 2016).Free radicals can damage the collagen and elastic structure that makes up the skin so that the skin becomes less elastic and wrinkles appear, interfere with the distribution of melanin pigment and melanocytes so that pigmentation is uneven, and damage the macromolecules that make up cells, namely proteins, carbohydrates, fats, and DNA. can cause skin cancer (Awwalina, 2016).Dry skin or Xerosis Cutis often occurs in elderly people, but it is not a physiological aging process. Symptoms that arise because the stratum corneum decreases in water content, resulting in abnormal desquamation of corneocytes. Symptoms usually include itching, burning, burning, and pulling of the skin. The incidence and severity of dry skin increase with age. Dry skin is common on the extremities. But it can also occur on the skin of the body or face. The description of dry skin is rough, looks scaly, reddish, and even looks like a crack if the situation is worse (Isfardiyana, 2016).

Increased Trans Epidermal Water Loss (TEWL) causes dry skin due to skin disorders that cause a lot of water to evaporate into the atmosphere. Dry skin is a problem that is often faced by almost everyone in all parts of the world. Dry skin will look dull, feel rough, scaly, wrinkled, and less elastic than normal skin (Partogi, 2018).Moisturizer is a complex formula made to maintain the water content in the skin between 10% - 30%. Skin moisturizers attempt to mimic epidermal lipids in the skin barrier, although they have not been completely imitated by various skin moisturizing formulations. Skin moisturizers have been known to treat dry skin by increasing hydration of the stratum corneum with occlusives or humectants and softening the skin surface with emollients (Ainaro, 2016).The use of rosella as a skin protector is still rarely used by the public, so it is necessary to develop it into a topical dosage form, namely a moisturizer. The preferred nature of the moisturizing lotion is that it is easy to apply, easy to wash with water, not sticky, and can provide a sense of comfort for the wearer because it contains a fairly high water content so that it can

maintain skin moisture and elasticity (Awwalina, 2016). Rosella flowers are able to provide a moisturizing effect because they contain many substances that are useful for the skin, rosella flowers are also synonymous with a sour taste so that it gives a fresh sensation. The sour taste in rosella flowers is due to the content of vitamin C (0.002-0.005%), citric acid, and malic acid with a total of 13%, and glycolic (Maryani and Kristiana, 2015).

Rosella (Hibiscus Sabdariffa L.) is a medicinal plant that has anti-aging properties due to its antioxidant content. The main bioactive compounds that act as antioxidants are anthocyanins, flavonoids, polyphenols, and ascorbic acid. Antioxidant substances in rosella can capture reactive oxygen species (ROS) and free radicals, reduce reactive O2, metabolize fat peroxidation into non-radical products, and prevent the generation of free radicals (Sarbini, 2017).From the description of the background of the problem above, the researcher is interested in conducting a study with the title, "Formulation and testing of the effectiveness of the ethanol extract lotion of rosella flower (Hibiscus Sabdariffa L.) lotion as a skin moisturizer".

II. LITERATURE REVIEW

2.1. Skin

Skin is the largest human unit, skin on body parts such as the outermost layer or tissue that functions to layer and maintain the body and has flexible properties. The width of the skin of an adult human is about $2m$ and weighs about 16% of the body weight. The average skin thickness is 1-2 cm, very thick on the soles of the feet and hands, which is about 6 mm, and very thin on the genital skin at about 0.5 mm (Rahmawanty and Sari, 2019).Human skin has a function as a barrier to protect the body from various environmental influences from the outside either physically, mechanically, or chemically. In addition, also body covers the aesthetic value. The skin is said to be healthy and normal if the outer layer of the skin contains more than 10% water. This is due to the regulation of fluid balance in the skin. If the fluid balance in the skin is disturbed, oil production in the skin is reduced and is influenced by an unfavorable environment, which can cause the skin to become dry (Isfardiyana, 2016).

The skin consists of three layers of tissue that function with different characteristics, namely the epidermis, dermis, and hypodermis layers. The main functions of the skin are protection, absorption, perception, excretion, regulation of body temperature, formation of pigment, and formation of vitamin D. Based on the point of view of care, skin consists of three types (Isfardiyana, 2016), namely normal skin (ideal skin that is healthy, not dull and shiny, fresh and elastic, with sufficient oil and moisture), oily skin (has oil content on the surface). excessive skin so that it looks shiny, dirty, and dull), and dry skin (has a little fat on the surface of the skin so that the skin becomes inelastic, stiff, and looks wrinkled).

2.2. Dry Skin

Dry skin or Xerosis Cutis often occurs in elderly people, but it is not a physiological aging process. Symptoms that arise because the stratum corneum decreases in water content, resulting in abnormal desquamation of corneocytes. Symptoms usually include itching, burning, burning, and pulling of the skin. The incidence and severity of dry skin increase with age. Dry skin is common on the extremities. But it can also occur on the skin of the body or face. The description of dry skin is rough, looks scaly, reddish, and even looks like a crack if the situation is worse (Isfardiyana, 2016).The etiology of dry skin is still not fully understood. It is thought that genetics plays a role and is triggered by factors from a cold or hot air environment, or by harsh soaps or cleaners used.

Some diseases such as chronic kidney failure, and hypothyroidism, can also cause xerosis. Changes that occur in the skin of the elderly also prove that dry skin can appear with age. This can also be influenced by the chronological process of aging, and damage triggered by the sun (photoaging) (Isfardiyana, 2016). The pathogenesis of dry skin consists of three kinds, namely decreased water content in the stratum corneum, depletion of epidermal lipids, and impaired keratinization.One of the management of dry skin is to use a moisturizer. Moisturizer is a complex mixture of chemicals that can make the skin softer, and more supple, by reducing the evaporation of transepidermal water, thereby increasing the water content in the skin. Moisturizers contain many ingredients, including occlusive ingredients and humectants that can optimally rehydrate the skin (Rahmawanty and Sari, 2019).

2.3. Moisturizer

Moisturizer is a complex formula made to maintain the water content in the skin between 10% - 30%. Skin moisturizers attempt to mimic epidermal lipids in the skin barrier, although they have not been completely imitated by various skin moisturizing formulations. Skin moisturizer consists of (Ainaro, 2016):

a. Occlusive: serves to maintain the moisture content of the skin by reducing evaporation of water into the atmosphere. Occlusion coats the stratum corneum to slow transepidermal water loss. Consists of oil in which water is insoluble.
b. Humectant: water-soluble material with high water absorption ability. Humectants can move water from the atmosphere (if the humidity is greater than 80 percent) and from the lower layers of the epidermis.
c. Emollient: a substance added to cosmetics to soften the skin. Emollient functions to fill the space between corneocyte desquamation to increase skin surface softness.

2.4. Rosella Flower Plant (Hibiscus Sabdariffa L.)

Rosella (Hibiscus sabdariffa L) in Indonesia is known by the regional names of gametes walanda (Sunda) and Kasturi roriha (Ternate). Rosella flower plants have seeds shaped like kidneys with pointed and hairy corners. This seed is about 5 mm long and 4 mm wide. each fruit contains 30-40 seeds. The size of the seeds is 3-5 mm x 2-4 mm which is reddish-brown. Rosella plant roots contain many secondary metabolites that are very useful in antioxidant and antibacterial activity. The roots of the rosella plant are reddish-brown (Nurnasari, 2017).

The active ingredients found in rosella flowers are grossypeptin, anthocyanin, glucoside hibiscin, and flavonoids. Anthocyanin compounds found in rosella flower petals are very beneficial for the body, especially to prevent cancer, efficacious in rosella flowers are direct glycosides, flavonoids, tannins, saponins and alkaloids, organic acids (hydroxylic acid, hibiscus acid), anthocyanins, polysaccharides (pectin) and flavonoids. Rosella flowers can help to protect the skin from free radicals and harmful UV rays. The benefits of rosella for the skin can be felt by diligently consuming rosella tea. Rosella tea contains essential proteins, amino acids, and vitamin C which can make skin healthier and brighter (Nurnasari, 2017).

2.5. Cosmetics

Cosmetics are materials or mixtures of materials used on the body or parts of the human body with the intention of cleaning, maintaining, increasing attractiveness, and changing appearance (Agoes, 2018).According to Tranggono and Latifah (2017), the classification of cosmetics according to their use for the skin is divided into two, namely skincare and cosmetics. Cosmetics as skin care function to clean, moisturize, and protect the skin. While the function of cosmetics as makeup is used to make up and cover up flaws in the skin.

2.6. Lotion

The lotion is a liquid emulsion consisting of an oil phase and a water phase stabilized by an emulsifier, containing one or more active ingredients in it. The liquid consistency allows for a quick and even application on the skin surface, so it spreads easily and dries immediately after application, and leaves a thin layer on the skin surface (Megantara et al, 2017). The components contained in the lotion include Stearic Acid, Cetyl Alcohol, TEA (Triethanolamine), Lanolin, Propylene Glycol, Glycerin, Nipagin, Nipasol, Ethanol, and Aquadest.

2.7. Extract

The extract is a product resulting from taking the active substance through an extraction process using a solvent, where the solvent used is re-evaporated so that the active substance of the extract becomes concentrated. The form of the resulting extract can be the form of thick extract or dry extract depending on the amount of solvent evaporated (Marjoni, 2016).

2.8. Test Animals

In this study, the animal that will be used as a test is a white rat. Rats are mammals belonging to the order Rodentia and the Muridae tribe. Rat species found in almost all countries are mice and sewer mice (Rattus norvegicus) (Widiartini, 2016).

III. METHODS

3.1. Types of Research

This type of research is experimental research using a pre-test and post-test control group design. Experiments were conducted to determine the formulation and effectiveness of Rosella flower extract lotion (Hibiscus Sabdariffa L.) in moisturizing and brightening the skin.This research was conducted at the Laboratory of the Faculty of Pharmacy, University of North Sumatra. The research was carried out from November 2021 to completion.The sample of this research is Rosella flower extract lotion (Hibiscus Sabdariffa L.) which was obtained from an online shop. Preparation of extract from 1 kg of Rosella flower petals soaked in 96% ethanol.

3.2. Tools and Materials

The tools used in this research are a stopwatch, stamper, mortar, evaporation cup, measuring cup (Pyrex), horn spoon, dropper, spatula, analytical balance (Mettler Toledo), UV-Vis spectrophotometer (Jasco V-730), parchment paper, napkins, containers, stirring rods, rotary evaporator (Ika), water bath (Memmerth), pH meter (Mettler Toledo) and centrifuge (Hettich). The materials used in this study were rosella flower petals (Hibiscus Sabdariffa L.), stearic acid, TEA (Triethanolamine), cetyl alcohol, lanolin, glycerin, nipagin, nipasol, propylene glycol, oleic acid, ethanol, and aqua dest, rats, husks. for rat cage, rat feed, rat drinking water.

3.3. Test Animals

The test animals that will be used are male Wistar rats obtained from the Laboratory of the Faculty of Pharmacy, University of North Sumatra, the body weight of rats is 150-250 g and rats aged 2-3 months, totaling 30 tails. Rats are kept in the Laboratory of the Faculty of Pharmacy, University of North Sumatra.

3.4. Preparation Effectiveness Test

Testing the effectiveness of the preparation was carried out on 30 test animals of Wistar rats. The test is carried out on the area of the skin of the test animal that has been previously shaved. All test animals have first measured by the initial condition of the shaved skin marked using a skin analyzer and moisture checker.

3.5. Data Analysis

The results of the formula obtained from physical quality testing in the form of color, odor, pH, homogeneity, adhesion, and spreadability are presented in tabular form. The data obtained after the antioxidant test will be calculated as % inhibition. The research data were analyzed using the SPSS (Statistical Product and Service Solution) program. If the data is normal, it will be analyzed using the One Way ANOVA method. Followed by the Post Hoc Tukey HSD test to see the difference between concentrations. Meanwhile, if the data is not normal, it is continued by being analyzed using the Kruskal Wallis method, followed by the Post Mann-Whitney test (Sugiyono, 2017).

IV. ANALYZE AND RESULT

4.1. Extraction Results

4.1.1. Phytochemical Screening Test Results Rosella Flower Extract (Hibiscus Sabdariffa L.)

Phytochemical screening is a qualitative test that is used as an initial step for rosella flower extract (Hibiscus Sabdariffa L.). The purpose of phytochemical screening is to determine the secondary metabolite compounds contained in rosella flower extracts. The results of phytochemical screening can be seen in Table 1 below.

Table 1. Phytochemical Screening Results of Rosella Flower Extract (Hibiscus Sabdariffa L.)

No.	Group	Simplicity	Extract
1.	Alkaloids	+	+
2.	Flavonoids	+	+
3.	Tannin	+	+
4.	Glycoside	+	+
5.	Saponins	+	+
6.	Triterpenes/Steroids	+	+

Information: (+) Positive : Contains a class of compounds
(-) Negative : Does not contain compounds

The results of phytochemical screening on samples of rosella flower extract (Hibiscus Sabdariffa L.) showed that simplicia and ethanolic extract of rosella flower extract (Hibiscus Sabdariffa L.) contained alkaloids, flavonoids, tannins, glycosides, saponins, and triterpenoids/steroids.

4.2. Lotion Preparation Results

Based on the results of the orientation carried out, it was found that the rosella flower extract formula (Hibiscus Sabdariffa L.) used was 2%, 2.5%, 3%, and 5%, the basil lotion used was stearic acid, TEA (Triethanolamine), cetyl alcohol, lanolin, glycerin, nipagin, nipasol, propylene glycol, oleic acid, ethanol, and aqua dest.

4.3. Lotion Preparation Evaluation Results

4.3.1 Organoleptic Evaluation Test

The organoleptic examination did not show any color difference in cream preparations with concentrations of 2%, 2.5%, 3%, and 5%, all four of which had a reddish-white color due to the extract of rosella flowers. The four concentrations of rosella flower cream extract produced give rise to a distinctive aroma. has a soft texture, spreads easily, forms a semi-solid consistency, and does not feel sticky.

Table 2. Organoleptic Observation Cream Rosella Flower Extract (Hibiscus Sabdariffa L.)

Examination	2%	2.5%	3%	5%
Organoleptic - Color	Reddish White	Reddish White	Reddish White	Reddish White
Organoleptic – Aroma	Distinctive Fragrance	Distinctive Fragrance	Distinctive Fragrance	Distinctive Fragrance
Organoleptic – Shape	Homogeneous Cream	Homogeneous Cream	Homogeneous Cream	Homogeneous Cream

The homogeneity examination at the four cream concentrations aims to observe the presence of coarse particles on the slide. The results of the observations show that the four concentrations of cream preparations are physically homogeneous, this shows that the ingredients used in making the cream are perfectly mixed.

4.3.2 pH Test Results

Testing the pH of the preparation is carried out to know the level of acidity of the preparation. If the pH of the preparation is low or acidic it will cause irritation irritates pH of the preparation is high or alkaline it will cause the skin to dry when applied. The results of testing the pH of the lotion preparation can be seen in Table 3.

Table 3. pH Test Results

Preparations	pH Test Results			
	pH			Average ±STD
2%	5,5	5,5	5,5	5,5±0,00
2,5%	5,7	5,6	5,7	5,667±0,06
3%	5,5	5,6	5,6	5,567±0,06
5%	5,4	5,3	5,3	5,33±0,06

In table 4.3 it can be seen that the measured pH of the four concentrations of the 2% cream formula was 5.5±0.00, 2.5% was 5.667±0.06, 3% was 5.567±0.06 and 5% was 5.333±0,06. The pH value is still within the ideal cream pH range.

4.3.3 Spreading Power Observation Results

The spreadability test was carried out to determine the ability of the base to spread on the skin surface when applied. The ability to spread a good base will provide convenience when the cream preparation is applied to the skin, the results of the spreadability test can be seen in Table 4 below.

Table 4. Results of Observation of Spreading Power of Rosella Flower Extract Cream (Hibiscus Sabdariffa L.)

Mass Load (g)	Diameter of Spread (cm)											
	2%			2,5%			3%			5%		
	I	II	III	I	II	III	I	II	III	I	II	III

0	3,6	3,8	3,8	3,6	3,7	3,9	3,7	3,8	4,0	4,1	4,3	4,4
25	4,1	4,0	4,2	4,2	4,3	4,5	4,3	4,2	4,2	4,6	4,7	4,8
50	4,6	4,6	4,8	4,8	4,9	4,9	4,6	5,0	5,3	5,0	5,1	5,3
75	5,0	5,1	5,1	5,1	5,3	5,4	5,7	5,7	5,8	5,4	5,6	5,9
100	5,4	5,4	5,5	5,7	5,7	5,8	6,0	6,1	6,3	6,3	6,2	6,6
125	5,7	5,8	5,9	6,0	6,1	6,3	6,8	6,7	6,8	6,6	6,8	6,9

Note: The scattering power value above is the average value of three repetitions

The results showed that the cream with a concentration of 5% had a higher dispersion value than the concentrations of 2%, 2.5%, and 3%. This shows that the greater the concentration of rosella flower extract, the greater the area of spread produced due to an increase in viscosity. The wider the spread area produced by a cream, the cream will have a better spreading ability when applied.

4.4. The Results of the Preparation of Effectiveness Test

Testing the effectiveness of the lotion preparation was carried out on test animals, namely rats. The treatment on the test animals was then cut the rat's hair first, then shaved until the rat's skin was visible, and cleaned with 70% alcohol. Then the next step after the rats were cleaned, the rats were treated with several concentrations of rosella flower lotion extract and the positive and negative controls. The treatment was given every day during the research process.

4.4.1. Humidity (Moisture)

Measurement of the effectiveness of humidity (moisture) is carried out using a moisture checker tool contained in the skin analyzer device. The results of measuring the effectiveness of humidity can be seen in Table 5.

Table 5. Moisture Test Results

F	Volunteer	Beginning	Week 1	Week 2	Week 3	Week 4	Recovery Percent
F0	1	32	33	34	34	35	8,57
	2	31	31	33	34	35	11,42
	3	31	33	34	35	36	13,88
	4	33	34	34	35	35	5,71
	5	32	33	33	34	35	8,57
Average		31,8	33	33,6	34,4	35,2	9,63
F1	1	30	32	33	35	37	18,91
	2	32	35	37	38	40	20
	3	33	34	36	39	41	19,51
	4	30	31	32	34	36	16,66
	5	31	33	35	37	39	20,51
Average		31,2	33	34,6	36,6	38,6	19,11
F2	1	33	35	39	41	44	25
	2	32	34	36	39	42	23,80
	3	32	35	38	40	43	25,58
	4	31	33	35	38	43	27,90
	5	31	34	36	38	43	27,90
Average		31,8	34,2	36,8	39,2	43	26,03
F3	1	32	35	38	42	45	28,88
	2	31	34	37	41	44	29,54
	3	31	35	37	42	45	31,11
	4	30	33	37	40	43	30,23
	5	30	34	38	41	44	31,81
Average		30,8	34,2	37,4	41,2	44,2	30,31
F4	1	30	36	39	44	47	36,17
	2	30	35	38	43	46	43,78
	3	30	36	38	44	48	37,5
	4	31	36	40	45	50	38
	5	31	35	39	43	49	36,73
Average		30,4	35,6	38,8	43,8	48	38,43
F5	1	31	38	42	47	53	41,50
	2	31	37	41	46	52	40,38
	3	32	39	44	50	55	41,81
	4	30	36	42	46	50	40

5	30	37	40	45	49	38,77
Average	30,8	37,4	41,8	46,8	51,8	40,49

Information: F0: Negative Control (Lotion preparation without rosella flower extract)
F1: Lotion preparation with rosella flower extract concentration 2%
F2: Lotion preparation with rosella flower extract concentration 2,5%
F3: Lotion preparation with rosella flower extract concentration 3%
F4: Lotion preparation with rosella flower extract concentration 5%
F5: Positive Control (Citra Hand Body Lotion)

From the data obtained, it can be seen that there was an increase in water content in the results of humidity measurements for 4 weeks of use in each formula, namely, F1 19.11%; F2 26.03%; F3 30.31%, and F4 with the highest increase of 38.43%.

4.4.2. Research Data Normality Test Results

In this study, the normality test used the Shapiro Wilk test because the number of samples in this study was less than 50 samples, the results of the normality test for humidity data can be seen in Table 6.

Table 6. Normality Test Results of Humidity Research Data

Group	P-Value	Information
Negative Control	0,000	Abnormal Data
Concentration 2%	0,754	Normal Data
Concentration 2,5%	0,325	Normal Data
Concentration 3%	0,314	Normal Data
Concentration 5%	0,967	Normal Data
Positive Control	0,899	Normal Data

Based on the results of the normality test that has been carried out using the Shapiro Wilk p-value, only the negative group has a p-value <0.05, which means for humidity research data the negative control group has abnormal data, and for the p-value, the group is 2%, 2.5%, 3%, 5%, and the positive control has a p-value > 0.05 which means the data is normally distributed.

4.4.3. Result of Homogeneity Test of Research Data

In this study, the homogeneity test was used as reference material to determine the next statistical test decision, for the results of the homogeneity test in this study can be seen in Table 7 below.

Table 7. Results of Homogeneity Test of Humidity Research Data

Group	P-Value	Information
Negative Control Concentration 2% Concentration 2,5% Concentration 3% Concentration 5% Positive Control	0,217	Homogeneous

Based on the output of Table 7, it is known that the p-value for each group in this study is 0.217, because the p-value is 0.217 > 0.05, it can be concluded that the data variance of the entire group is homogeneous. With the results of the research data being normal and homogeneous, the data analysis can be continued by using the ANOVA statistical test.

4.4.4. Average Similarity Test of Rosella Flower Extract in Moisturizing Skin

Table 8. ANOVA Test Results Average Similarity of Rosella Flower Extract in Moisturizing Skin

Group	Mean ± SD	P-Value
Rosella Flower Extract 2%	19,12 ± 1,496	0,000
Rosella Flower Extract 2,5%	26,04 ± 1,819	
Rosella Flower Extract 3%	30,31 ± 1,176	
Rosella Flower Extract 5%	38,44 ± 3,069	

Based on the ANOVA output above, it is known that the P-Value 0.000 < 0.05, so it can be concluded that the average of each group of rosella extract is significantly different in moisturizing the skin, as seen from the average value for the most effective rosella flower ethanol extract in moisturizing the skin is rosella flower extract with a concentration of 5% the average is 38.44 and the standard deviation value is 3.069.

4.4.5. Test Results of the Effectiveness of Rosella Flower Ethanol Extract Lotion in Moisturizing Skin

The following are the results of testing the effectiveness of rosella flower extract lotion preparations in moisturizing the skin.

Table 9. Test Results of the Effectiveness of Rosella Flower Ethanol Extract Lotion in Moisturizing Skin

Treatment Group	P-Value
Rosella Flower Extract 2%	0,000
Rosella Flower Extract 2,5%	0,000
Rosella Flower Extract 3%	0,000
Rosella Flower Extract 5%	0,000

Table 9 describes the results of the test of the effectiveness of the lotion preparation of rosella flower ethanol extract in moisturizing the skin, from the results of the study the p-value of each concentration group was 0.000 <0.05, which means the rosella flower ethanol extract had effectiveness in moisturizing the skin with the most effective concentration in the study. this is the 5% concentration group.

4.4.6. Subtlety (Evenness)

Measurement of skin smoothness (evenness) using a skin analyzer device with a 60x magnification lens (normal lens) with a blue sensor light color. Data on the results of volunteer skin smoothness measurements can be seen in Table 10.

Table 10. Smoothness Test Results (Evenness)

F	Volunteer	Beginning	Week 1	Week 2	Week 3	Week 4	Recovery Percent
F0	1	41	40	40	40	39	4,87
	2	40	40	39	39	38	5
	3	40	39	38	37	37	7,5
	4	40	38	37	37	37	7,5
	5	42	42	40	39	38	9,52
Average		40,6	39,8	38,8	38,4	37,8	6,87
F1	1	42	40	37	35	32	23,80
	2	43	41	39	36	32	25,58
	3	41	38	36	34	31	24,39
	4	42	39	36	34	31	26,19
	5	41	39	37	35	33	19,51
Average		41,8	39,4	37	34,8	31,8	23,89
F2	1	44	41	38	34	31	29,54
	2	42	39	36	32	29	30,95
	3	40	37	33	29	26	35
	4	43	38	37	34	30	30,23
	5	43	39	37	33	29	32,55
Average		42,4	38,8	36,2	32,4	29	31,65
F3	1	45	41	38	34	28	37,7
	2	44	41	37	34	25	43,18
	3	41	38	34	26	22	46,34
	4	44	40	35	32	27	38,63
	5	43	39	35	31	24	44,18
Average		43,4	39,8	35,8	31,4	25,2	42,00
F4	1	44	39	29	27	20	54,54
	2	46	40	36	31	23	50
	3	44	37	30	26	22	50
	4	43	34	28	23	16	62,79
	5	45	39	35	29	20	55,55
Average		44,4	37,2	31,6	27,2	20,2	54,57

F5	1	43	34	27	22	14	67,44
	2	43	32	27	23	15	65,11
	3	45	36	33	27	18	60
	4	44	35	28	26	20	54,54
	5	44	35	28	27	21	52,27
Average		41	34,8	31	28,6	23,2	57,17

Information: F0: Negative Control (Lotion preparation without rosella flower extract)
F1: Lotion preparation with rosella flower extract concentration 2%
F2: Lotion preparation with rosella flower extract concentration 2,5%
F3: Lotion preparation with rosella flower extract concentration 3%
F4: Lotion preparation with rosella flower extract concentration 5%
F5: Positive Control (Citra Hand Body Lotion)

From the results of the data obtained, it can be seen that the initial condition of the smoothness of the rat skin ranged from normal conditions. After the use of lotion preparations, all formula groups showed an increase in skin smoothness with an average percentage increase, namely, F1 23.89%; F2 31.65%; F3 42% and F4 showed the highest average increase in skin smoothness, namely, 54.57%.

4.4.7. Research Data Normality Test Results

In this study, the normality test used the Shapiro Wilk test because the number of samples in this study was less than 50 samples, the results of the normality test for humidity data can be seen in Table 11.

Table 11. Normality Test Results of Research Data Smoothness

Group	P-Value	Information
Negative Control	0,314	Normal Data
Concentration 2%	0,314	Normal Data
Concentration 2,5%	0,453	Normal Data
Concentration 3%	0,899	Normal Data
Concentration 5%	0,502	Normal Data
Positive Control	0,549	Normal Data

Based on the results of the normality test that has been carried out using Shapiro Wilk, the p-value for the entire treatment group is > 0.05, from these results it can be concluded that the data is normally distributed.

4.4.8. Result of Homogeneity Test of Research Data

In this study, the homogeneity test was used as reference material to determine the next statistical test decision, for the results of the homogeneity test in this study can be seen in Table 12 below.

Table 12. Results of Homogeneity Test of Smoothness Research Data

Group	P-Value	Information
Negative Control Concentration 2% Concentration 2,5% Concentration 3% Concentration 5% Positive Control	0,217	Homogeneous

Based on the output of Table 12, it is known that the p-value for each group in this study is 0.076, because the p-value is 0.076 > 0.05, it can be concluded that the variance of the data for all groups is homogeneous. With the results of the research data being normal and homogeneous, the data analysis can be continued by using the ANOVA statistical test.

4.4.9. Average Similarity Test of Rosella Flower Extract in Smoothing Skin

Tabel 13. ANOVA Test Results Average Similarity of Rosella Flower Extract in Smoothing Skin

Kelompok	Mean ± SD	P Value
Ekstrak Bunga Rosella 2%	23,89 ± 2,626	0,000
Ekstrak Bunga Rosella 2,5%	31,65 ± 2,179	
Ekstrak Bunga Rosella 3%	42,01 ± 3,702	
Ekstrak Bunga Rosella 5%	54,58 ± 5,251	

Based on the ANOVA output above, it is known that the P-Value 0.000 < 0.05, so it can be concluded that the average of each group of rosella extracts was significantly different in smoothing the skin, as seen from the average value for the most effective rosella flower ethanol extract. in smoothing the skin is rosella flower extract with a concentration of 5% the average is 54.58 and the standard deviation is 5.251.

4.4.10. Test Results of the Effectiveness of Rosella Flower Ethanol Extract Lotion in Smoothing Skin

The following are the results of testing the effectiveness of rosella flower extract lotion preparations in smoothing the skin.

Tabel 14. Test Results of the Effectiveness of Rosella Flower Ethanol Extract Lotion in Smoothing Skin

Treatment Group	P-Value
Rosella Flower Extract 2%	0,000
Rosella Flower Extract 2,5%	0,000
Rosella Flower Extract 3%	0,000
Rosella Flower Extract 5%	0,000

Table 14 describes the results of the test of the effectiveness of the lotion preparation of rosella flower ethanol extract in smoothing the skin, from the results of the study the p-value of each concentration group was 0.000 <0.05, which means that rosella flower ethanol extract had effectiveness in smoothing the skin with the most effective concentration in the study. this is the 5% concentration group.

V. CONCLUSION

Based on the results and discussion of the research, it can be concluded:

1. The entire concentration group of Rosella flower (Hibiscus Sabdariffa L.) ethanol extract in this study was effective in moisturizing the skin.
2. Ethanol extract of rosella flower (Hibiscus Sabdariffa L.) which is most effective in moisturizing the skin is ethanol extract with a concentration of 5%.
3. The entire concentration group of Rosella flower (Hibiscus Sabdariffa L.) ethanol extract in this study was effective in smoothing the skin.
4. The ethanol extract of rosella flower (Hibiscus Sabdariffa L.) which was most effective in smoothing the skin was ethanol extract with a concentration of 5%.

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