


Formulation And Physical Quality Test Of Lip Balm Rosella Flower Extract (Hibiscus Sabdariffa L.) As A Lip Moisturizer And Natural Color

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Article Info	ABSTRACT
Keywords: Moisturizer, lips, formulation, physical quality	Lip balm, also known as lip balm, functions to moisturize the lips so they don't get dry and chapped by sunlight, pollution, temperature, and weather. One natural ingredient that functions as a lip moisturizer is the rosella flower (Hibiscus sabdariffa L.), which has many cosmetic benefits such as vitamin C, antioxidants, and anthocyanins, which can moisturize the lips and give them a natural color. Objective: This research is to determine how the concentration of rosella flower extract (Hibiscus sabdariffa L.) impacts the physical quality test and moisture test of rosella flower extract lip balm preparations with concentrations of 0%, 6%, 8%, and 10%. Results: Physical quality tests showed that the formulation was stable. The results of organoleptic, homogeneity, pH, irritation, stability, and moisture tests did not show significant differences in varying extract concentrations. In the moisture test, the percentage of moisture test for formulation 0 was 15.5%, formulation I was 22.4%, formulation II was 28.7%, and formulation III was 35.4%. Conclusion: The results of the physical quality test were not influenced by differences in the concentration of rosella flowers in each formulation. Formulation III has a concentration of 35.4%, which is the most moist.
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INTRODUCTION

“Cosmetics” comes from the word “cosmic”, which comes from Greek and means “ornamental”. Cosmetics have been known for a long time. According to the Head Regulations, cosmetics are materials or preparations used on the outside of the human body (epidermis, hair, nails, lips, especially to clean, perfume, change the appearance and improve body odor, or to protect or maintain the body in good condition). According to Head Regulations (BPOM RI, 2014)

Lip are defined as preparations consisting of oil, wax, fat, or extracts of natural ingredients (Kwunsiriwong, 2016). Lip balm functions to moisturize lips so they don't dry out easily and crack due to sunlight, pollution, weather, and temperature. Lip balm must contain moisturizing agents and vitamins, one of which can be obtained naturally from plants (Laila et al., 2019)

Rosella flowers are a natural ingredient that can be used as a moisturizer. Rosella flowers are usually only consumed as a drink. Rosella flowers contain vitamin C which can help care for the skin by helping maintain higher moisture levels and fighting signs of premature aging (Widyantari et al., 2021). It is known that rosella flower petals have a high antioxidant content, which makes them able to moisturize and tighten the skin. This finding is in line with previous research which found that the antioxidant activity of rosella flowers, which consists of vitamin C, can inhibit free radicals (Sari, 2015)

The chemical content of rosella flowers includes flavonoids, phenols, polyphenols, citric acid, saponins, tannins, and antioxidants such as kisspeptin, anthocyanin, and hibiscus guide. (Mahadevan et al., 2009). Rosella flowers are not only used as a moisturizer but are also used as a source of natural red lip balm coloring. This is due to the anthocyanin content, which is one of the most dominant secondary metabolic compounds in red rosella; Anthocyanins are included in the flavonoid group which functions as an antioxidant. Rosella flower petal extract (*Hibiscus sabdariffa* L.) contains anthocyanin, which makes it red, orange, purple, and blue when dissolved in water. (Nurchahyo, 2019) This research aims to determine the effect of the concentration of rosella flower extract (*Hibiscus sabdariffa* L.) on the physical quality test and moisture test of lip balm preparations.

METHODS

Research design is experimental research. The population and samples used in this research were lip balm formulations from rosella flower extract (*Hibiscus sabdariffa* L) and physical quality tests which included organoleptic tests, homogeneity, pH tests, melting point tests, stability tests, irritation tests, and moisture tests.

Tools and materials

Tool; digital scale (Ohaus), glass tube (iwaki), measuring cup (iwaki), test tube (iwaki), stir bar, watch glass, water bath, pH meter (Mettler Toledo), skin analyzer, porcelain cup, watch glass, oven (Shellab). Material; rosella flower extract (*Hibiscus sabdariffa* L), Virgin Coconut Oil (VCO), propyl paraben, methyl paraben, glycerin (vegetable oil), cera alba, BHT, Vaseline Album, Magnesium Powder, concentrated HCL.

Data Collection Procedures

Plant Determination

Plant determination was carried out at the Materia Medika Laboratory in Batu City, Malang, East Java, determining the plants for this research to ensure that the plants were correct.

Making Rosella Flower Extract

After weighing 500 grams of rosella flower powder (*Hibiscus sabdariffa* L.), the rosella flower powder to be extracted was put into a heated vessel. Slowly pour 2.5 liters of 70% ethanol (with a ratio of 1:10) into a maceration vessel containing rosella flower powder (*Hibiscus sabdariffa* L). After that, let the filter liquid soak the simplicia powder for three days, stirring occasionally. For the next three days, macerate once again with 2.5 liters of solvent, and then filter it into a new container to get a liquid extract, the liquid extract is then evaporated with a rotational evaporator at a temperature of 400 C (Lestari, 2022).

Phytochemical Screening

Flavonoid Test

After boiling 0.5 gram of the sample with 10 mL of distilled water, 5 mL was taken and Mg powder was added. Next, 1 mL of concentrated HCl and 2 mL of amyl alcohol were added, and shaken. The amyl alcohol layer becomes red, yellow, or orange when flavonoids are present (Damora, 2023).

Polyphenol Test

Three drops of 1% FeCl₃ reagent were added to the ethanol extract of rosella flower petals. A reaction occurs between polyphenol compounds and ferric chloride (FeCl₃) which produces a green to blue complex. The results show bluish-green (Akuba, 2022).

Saponin Test

A total of 0.5 grams of sample and 10 mL of hot water were added and boiled for ten minutes. The extract was filtered, and 10 mL of the filtrate was taken and shaken for ten minutes. The formation of foam that does not disappear easily shows good results (Damora, 2023).

Tannin Test

1 gram of sample is mixed with ten mL of hot water and boiled for ten minutes before filtering. 10 mL of 1% FeCl₃ was added to the filtrate; the results show a blackish blue-green color (Damora, 2023).

Rosella Flower Extract Lip balm formulation (Hibiscus sabdariffa L)

Table 1. Rosella Flower Extract Lip balm formulation (Hibiscus sabdariffa L)

Formulation	Function	Formula (%)			
		F0	F1	F2	F3
Rosella flower extract	Active ingredients	-	6	8	10
VCO (Virgin Coconut Oil)	Fat base	30	30	30	30
Glycerin	Humectant	8	8	8	8
Cera alba	Hardener	15	15	15	15
Methylparaben	Preservative	0.2	0.2	0.2	0.2
Propylparaben	Preservative	0.2	0.2	0.2	0.2
BHT (Butyl Hydroxytoluene)	Stabilizer	0.1	0.1	0.1	0.1
Vaseline album ad	Fat base	100	100	100	100

Making Lip Balm Rosella Flower Extract (Hibiscus sabdariffa L)

Cera alba and album vaseline are weighed according to the required amount, then melted at a temperature of 62-650 degrees Celsius (mixture 1). In the second mixture, propyl paraben, methyl paraben, BHT, and glycerin are weighed and added to the base melt (mixture 2). Once the temperature is not too hot, add rosella flower extract while stirring. Then put it in a mold that has been smeared with glycerin and let it freeze at room temperature (Handayani, 2021).

Organoleptic Testing

Organoleptic testing uses human senses as the main tool to measure the acceptability of a preparation. Test color, smell, and shape (Ambari et al., 2020).

Homogeneity Testing

To ensure that the lip balm does not irritate the skin, this test is carried out to determine the acidity level of the product. This test involves the use of a pH meter, which is first calibrated with a standard buffer solution and neutral buffer. One gram of sample was weighed, dissolved in 100 mL distilled water, and then heated on a hot plate. The pH of the preparation meets the requirements if it is between 4.5 and 7.0, namely the lip pH range (Sarwanda et al., 2021).

Melting Point Test

To test the melting point, the lip balm was placed in a porcelain cup and melted in the oven at 500 degrees Celsius for fifteen minutes. Then, increase the temperature to 10 degrees Celsius every fifteen minutes and observe the temperature at which the lip balm begins to melt. Based on SNI 16-4769-1998, a good melting point for lip balm is 50–70°C (Haque, 2019).

Irritation Testing

This irritation test uses an open patch technique, or open patch, on the inner forearm of twelve panelists who are willing and write a statement letter. An open patch test is carried out by applying the preparation to the adhesive area (2.5 x 2.5 cm) and leaving it open to see the reaction. The inspection process is carried out three times a day for two consecutive days. To be included in the irritation test, women must be between 20 and 30 years old, physically and mentally healthy, have no previous history of allergies, and express willingness to be tested. Observed reactions included erythema, papules, vesicles, or edema (Ambari et al., 2020).

Stability Test

During 14 days of observation, test lip balm preparations from rosella flower extract at room temperature. Organoleptic observation of changes in the dosage form (shape, color, and odor) is one of the parameters of this physical stability test. The shape observation results showed that the lip balm made had good shape and consistency and did not melt during 14 days of storage at room temperature (15–30°C) (Zuhriyah & Retno, 2021).

Humidity Test

This test used 12 panelists, the grouping was divided into 4 groups. 3 panelists used the F0 formula, 3 panelists used the F1 formula, 3 panelists used the F2 formula, and 3 panelists used the F3 formula. Panelist inclusion criteria are as follows:

- a. Woman
- b. Healthy
- c. Age 20-25 years
- d. There is no history of diseases related to skin allergies
- e. Willing to become a panelist by filling out the willingness form as a panelist.

To test the lip balm preparation, the preparation was applied to the forearm of each panelist every morning and evening. Before testing, each panelist measured the moisture on their forearms with a skin analyzer for six days, and the results were observed by looking at physical changes and measuring skin moisture. (Yusuf et al., 2019).

Data Processing and Data Analysis

Data from formulation research and physical quality tests of rosella flower extract lip balm (*Hibiscus sabdariffa* L.), namely moisture test, pH test, and melting point test, were analyzed using the SPSS (Statistical Product and Service Solution) program. If the results of research data on the formulation and physical quality test of Lip balm rosella flower extract (*Hibiscus sabdariffa* L.) are normally distributed and homogeneous then proceed with the Oneway Anova test (one-way ANOVA) to determine the average differences between the groups, followed by the Post Hoc test LSD (Least Significant Difference) to see the differences between treatments. If it is not normally distributed and homogeneous, the data is analyzed followed by the Kruskal-Wallis Test to determine the effectiveness of moisture on the lips between the formulas.

RESULTS AND DISCUSSION

Results of Determination of Rosella Flowers (*Hibiscus sabdariffa* L.)

Plant determination is carried out before conducting research to know and ensure the authenticity of the plant. With key determination:

1b-2b-3b-4b-6b-7b-9b-10b-11b-12b-13b-14a-15a-109b-119b- 120b-128b-129b-135b-136b-139b-140b-142b-143b-146b- 154b-155b-156b-162b-163b-167b-169b-171a-172b-173b-174b-176a:Malvaceae-1a-2b-3b-5b:Hibiscus-5-1b-2b 4a:H. sabdariffa.

Rosella Flower Extraction Results(*Hibiscus sabdariffa* L)

To make rosella flower simplicia extract, 70% ethanol must be added in a ratio of 1:10. Then it was left for three days, stirring occasionally, and then remaceration was carried out again for three days with 2.5 liters of solvent. After that, the extract is filtered and thickened using a rotational evaporator at a temperature of 400 C degrees Celsius to obtain 100 grams of thick extract from 500 grams of powder, which has a yield of 20%(Ministry of Health, 2017).

Lip Balm Physical Quality Test Results

Organoleptic Test

Organoleptic tests were carried out by observing the color, shape, and odor of each formula.

Table 1. Organoleptic Test Results

Organoleptic test	Repitation	Form	Color	Smell
Formulation 0 (0% Extract)	1	Semi-solid	White	Typical
	2	Semi-solid	White	Typical
	3	Semi-solid	White	Typical
Formulation 1 (Extract 6%)	1	Semi-solid	Pale red	Typical of rosella
	2	Semi-solid	Pale red	Typical of rosella
	3	Semi-solid	Pale red	Typical of rosella
Formulation 2 (Extract 8%)	1	Semi-solid	Red	Typical of rosella
	2	Semi-solid	Red	Typical of rosella
	3	Semi-solid	Red	Typical of rosella
Formulation 3 (Extract 10%)	1	Semi-solid	Red	Typical of rosella
	2	Semi-solid	Red	Typical of rosella

Organoleptic test	Repetition	Form	Color	Smell
	3	Semi-solid	Red	Typical of rosella

Organoleptic tests are carried out to check the shape, color, and odor of the preparation. The results showed that the four preparations had the same form, with a weak vaseline odor in the F0 formulation, while the roselle odor in the FI, FII, and FIII formulations was the same. For color, formulation 0 produces white, FI produces pale red, and formulations FII and FIII have the same color, namely red. Differences in the concentration of rosella flower extract in the preparations cause differences in the color of the preparations.

Homogeneity Test

Table 2. Homogeneity Test Results

Repetition	Formulation 0 (0% Extract)	Formulation 1 (Extract 6%)	Formulation 2 (Extract 8%)	Formulation 3 (Extract 10%)
1	Homogeneous	Homogeneous	Homogeneous	Homogeneous
2	Homogeneous	Homogeneous	Homogeneous	Homogeneous
3	Homogeneous	Homogeneous	Homogeneous	Homogeneous

The homogeneity test is carried out to determine whether there are particles or coarse grains in the preparation. Based on the results in the table, show that the four lip balm preparations at all concentrations were made homogeneous, and there were no particles or coarse granules in the preparations. (Mashitah, 2021).

Test pH

Table 3. pH Test Results

Formulation	Repetition	Results	Mean ± SD
Formulation 0 (0% Extract)	1	6,8	6.9±0.10
	2	6.9	
	3	7.0	
Formulation 1 (Extract 6%)	1	6.3	6.3 ± 0.10
	2	6.2	
	3	6.4	
Formulation 2 (Extract 8%)	1	5.8	5.7±0.10
	2	5.7	
	3	5,6	
Formulation 3 (Extract 10%)	1	5.8	5.6 ± 0.25

According to the treatment results, the pH at F0 was 6.9, the pH at FI was 6.3, the pH at FII was 5.6, and the pH at FIII was 5.7. The pH value is influenced by differences in the concentration of rosella flower extract in each preparation; the higher the extract concentration, the lower the pH. Preparations made with a pH that is too acidic will irritate the skin, while preparations with a pH that is too alkaline will make the skin dry. (Sayuti, 2015). The pH test results showed that the four formulations were within the required skin pH range. There was no significant effect between varying concentrations of rosella flower

extract and normal concentrations. The One Way Anova test results show a sig value of 0.267, which means sig>0.05.

Melting Point Test

Table 4.Melting Point Test Results

Formulation	Repitation	Melting point results	Time (seconds)	Mean ± SD
Formulation 0 (0% Extract)	1	500	7.04	6.4 ± 0.54
	2	500	6.13	
	3	500	6.09	
Formulation 1 (Extract 6%)	1	500	3.43	4.3 ± 1.05
	2	500	5.47	
	3	500	4.04	
Formulation 2 (Extract 8%)	1	500	2.57	3.0±0.46
	2	500	3.49	
	3	500	3.07	
Formulation 3 (Extract 10%)	1	500	3.02	2.7 ± 0.27
	2	500	2.55	
	3	500	2.57	

The test results show that all formulations are the same, namely melting at a temperature of 500 C by melting point requirements. However, the resulting times for F0, F1, FII, and FIII increased. This is because more extracts are used reducing the amount of album vaseline used, which in turn causes the texture of the preparation to become softer (Isnaini et al., 2020). The One Way Anova test produces a sig value of 0.000 which means sig <0.05, which indicates that there is a significant difference in influence. Followed by the LSD method showing significant differences between formulations 0, I, II, and III. it can be concluded that, due to variations in the extract concentration of each of the four formulations, there is a significant difference in the melting point temperature.

Irritation Test

Table 7.Irritation Test Results

Formulation	Repitation	Erythema	Papules	Vesicles	Edema
Formulation 0 (0% Extract)	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
Formulation 1 (Extract 6%)	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
Formulation 2 (Extract (8%)	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
Formulation 3 (Extract 10%)	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-

Description: (-) : no reaction; (+) : a reaction occurs

The results of the irritation test showed that all panelists did not show erythema, papules, vesicles, or edema. This means the lip balm is safe to use.

Stability Test

Table 8. Stability Test Results

Formulation	Formulation 0 (0% Extract)	Formulation 1 (Extract 6%)	Formulation 2 (Extract 8%)	Formulation 3 (Extract 10%)
Day – 1	Form	Semi Solid	Semi Solid	Semi Solid
	Color	White	Pale red	Red
	Smell	Typical Rosella	Typical Rosella	Typical Rosella
Day – 7	Form	Semi Solid	Semi Solid	Semi Solid
	Color	White	Pale red	Red
	Smell	Typical Rosella	Typical Rosella	Typical Rosella
Day – 14	Form	Semi Solid	Semi Solid	Semi Solid
	Color	White	Pale red	Red
	Smell	Typical Rosella	Typical Rosella	Typical Rosella

From the results of the stability test of lip balm preparations, rosella flower extract did not show changes in the color, odor, and shape of the lip balm preparations during storage at room temperature from day 1 to day 14. The results of the stability test of lip balm preparations, showed that all preparations made remained stable. stable in storage at room temperature for 14 days of observation.

Humidity Test

Table 5. Humidity Test Results

Formulation	Repetition	Results Average Difference (%)	Total Average Difference (%)
Formulation 0 (0% Extract)	1	13.1	15.5%
	2	16.6	
	3	16.8	
Formulation 1 (Extract 6%)	1	21.1	22.4%
	2	23.1	
	3	22.9	
Formulation 2 (Extract 8%)	1	31.3	28.7%
	2	31.0	
	3	23.7	
Formulation 3 (Extract 10%)	1	37.5	35.4%
	2	35.5	
	3	33.2	

The results of the moisture test for formulations I, II, and III of the Hibiscus sabdariffa L. rosella flower extract lip balm preparation showed the final value of the average difference between the moisture tests was 15.5%, 22.4%, 28.7%, and 35.4%, respectively. each. Shows that the higher the concentration of extract used, the better the lip balm moisture test results. The One Way Anova test shows a sig value of 0.000, or sig <0.05, which indicates that there is a significant difference between the moisture test of rosella flower extract lip balm and the

added rosella flower extract. Continuing with the LSD method, it was found that there was no significant difference between formulation 0 and formulations I, II, and III because the value was ($\text{sig} < 0.05$). Therefore, it can be concluded that there is no significant difference.

CONCLUSION

Organoleptic, homogeneity, pH, stability, irritation and moisture tests on Rosella (*Hibiscus sabdariffa* L) flower extract lip balm preparations with concentrations of 0%, 6%, 8%, and 10% did not show significant changes. On the other hand, the melting point test shows changes. With concentrations of 6%, 8%, and 10%, the moisture activity of Rosella Flower (*Hibiscus sabdariffa* L.) lip balm was not significant. The results showed that compared with F0, F1, and FII, the moisture activity of rosella flower extract lip balm (*Hibiscus Sabdariffa* L.) was stronger in increasing moisture. The average total score of FIII is 35.4%.

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