Jurnal Eduhealth
Volume 16, Number 01 2025 DOI 10.54209/eduhealth.v16i01
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

Formulation And Evaluation Of Anti-Aging Face Spray Preparation With Ethanol Extract Of Shoe Flower (Hibiscus Rosa-Sinensis L.) And DPPH Method Antioxidant Activity Test

Syafa Nadira Ashiilah[1], Rafita Yuniarti[2], Minda Sari Lubis[3], Zulmai Rani[4]
Program Studi Farmasi, Fakultas Farmasi, Universitas Muslim Nusantara Al Washliyah, Medan, Indonesia, Jl. Garu II A No.93, Harjosari I, Kec. Medan Amplas, Kota Medan, Sumatera Utara 20147[1,2,3,4]

Article Info
Keywords:
Hibiscus
Face Spray
Antioxidant
Anti-Aging

ABSTRACT
Beauty is one of the aspects pursued by women, particularly in terms of skin care. Among the skincare products commonly used by Indonesians is face spray, which offers various benefits, such as protecting against free radicals from ultraviolet rays, preventing premature aging, and addressing dry skin. Antioxidant effects are more effective when formulated in topical preparations, such as cosmetics, compared to oral administration. Hibiscus flower is a plant that contains flavonoids, which function as antioxidants capable of protecting the skin from free radical damage, moisturizing, and enhancing skin circulation. This research is experimental in nature. In this study, ethanol extract face sprays from hibiscus flowers were prepared with concentrations of 0.1%, 0.3%, 0.5%, and 0.7%. The face sprays underwent evaluations for physical quality, preference tests, irritation tests, antioxidant activity tests, and anti-aging effectiveness tests. The anti-aging effectiveness data were analyzed using SPSS with a parametric ANOVA test. Based on the physical quality evaluation, the best formulation was the face spray with a 0.5% extract concentration. It exhibited stable organoleptic characteristics, a pH within the skin's range of 5–7.26, good spreadability, no coarse particles or clumps, and stability during a 28-day stability test at room temperature (25°C) and a cycling test over 6 cycles. Moreover, it did not irritate the skin. The antioxidant activity test revealed that face sprays with 0.1% and 0.3% extract concentrations showed moderate antioxidant activity, while those with 0.5% and 0.7% concentrations demonstrated strong antioxidant activity. In the anti-aging effectiveness test, all formulations exhibited anti-aging effects.

Corresponding Author:
Rafita Yuniarti
Universitas Muslim Nusantara Al Washliyah
Jl. Garu II A No.93, Harjosari I, Kec. Medan Amplas, Kota Medan, Sumatera Utara 20147
rapitayuniarti@gmail.com

INTRODUCTION

Hibiscus flower (Hibiscus rosa-sinensis L.) is a shrub from the Malvaceae family that thrives in several tropical and subtropical countries, including Indonesia, where it is widely used as an ornamental plant, hedge plant, cut flower, and herbal medicine. Its beauty and variations have earned it the nickname "queen of flowers." The hibiscus flower is characterized by

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attractive colors, diverse shapes, nectar content, a pleasant fragrance, and mucilage from its leaves (Efendi et al., 2021).

Hibiscus plants offer health benefits, particularly in treatments for gonorrhea, irregular menstruation, fever, childhood fevers, mouth ulcers, coughs, goiters, and headaches. Its flowers, leaves, and roots contain flavonoids, while the leaves also contain saponins and polyphenols. The roots are rich in tannins, saponins, scopoletin, cleomiscosin A, and cleomiscosin C. Additionally, the flowers contain polyphenols, compounds responsible for the refreshing taste of hibiscus tea (Silalahi, 2019).

Other benefits of hibiscus (Hibiscus rosa-sinensis L.) include its antibacterial, antioxidant, antitumor, antihypertensive, and wound-healing properties. It also offers skin protection against free radicals due to its antioxidant content, promotes circulation, and aids in removing dead skin cells (Silalahi, 2019). Previous research by Suhaima (2020) demonstrated that ethanol extract of hibiscus flowers exhibits antioxidant activity against free radicals.

Antioxidants are compounds that can neutralize or mitigate the harmful effects of oxidants. They work by donating an electron to oxidant compounds, thereby inhibiting their activity. Antioxidants protect the body by neutralizing free radicals, both endogenously and exogenously. Skin care requires special attention as the skin is sensitive to treatments and stimuli. One major issue related to the skin today is premature aging. The use of antioxidants is expected to inhibit the skin aging process and prevent bodily damage that could lead to degenerative diseases (Salsabila et al., 2021). Antioxidant effects are more effective when formulated as topical preparations, such as cosmetics, rather than oral forms, as the active ingredients interact longer with facial skin (Rompis et al., 2019).

Beauty, especially skin beauty, is a significant concern for women. Many Indonesian women strive to maintain smooth and hydrated skin. Historically, natural materials found in the surrounding environment were used to enhance beauty. Nowadays, cosmetics are made not only from natural ingredients but also synthetic ones to enhance beauty further (Maria et al., 2023). Premature aging is a process where the skin ages faster than its natural time. It can occur in anyone, particularly in tropical regions like Indonesia, where sunlight exposure is abundant. Degenerative processes happen more quickly on skin frequently exposed to ultraviolet rays. Aging is usually marked by the appearance of fine lines or facial wrinkles (Aizah, 2016).

Face spray is a type of cosmetic preparation designed to refresh the skin and provide moisture. Frequent exposure to ultraviolet rays can cause dry facial skin. One way to moisturize the face is by spraying face spray. In addition to moisturizing, face spray contains antioxidants that prevent damage from free radicals caused by ultraviolet rays. Research on face spray formulations using natural ingredients remains limited. However, as the demand for such products increases, there is a growing need to develop face spray formulations. Face sprays can be enhanced with natural ingredients rich in antioxidants. Currently, natural antioxidants are widely applied in topical preparations to minimize damage and prevent oxidative stress (Hutahaen & Saputri, 2022).

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Based on the explanation above, I am interested in researching the Formulation and Evaluation of Anti-aging Face Spray Preparations with Ethanol Extract of Hibiscus Flower (Hibiscus rosa-sinensis L.) and Antioxidant Activity Testing Using the DPPH Method. This method was chosen due to its high sensitivity, simplicity, speed, and practicality (Aryanti et al., 2021

METHODS

The type of research conducted is experimental. The study begins with sample collection, preparation of simplicia, and extraction of hibiscus flower (Hibiscus rosa-sinensis L.) ethanol extract using the maceration method. The process includes phytochemical screening, formulation of hibiscus flower ethanol extract face spray, physical evaluation of the face spray (organoleptic tests, pH tests, homogeneity tests, clinical tests, and spreadability tests), and testing the antioxidant activity of the face spray using the DPPH method with UV-Vis spectrophotometry.

The data collected in this study is processed descriptively and presented in tables. Descriptive data is obtained from observations on organoleptic characteristics, pH tests, spreadability tests, homogeneity tests, stability tests, and irritation tests. Data collection techniques involve observing the physical quality of the formulation. Antioxidant testing with the DPPH method calculates the IC50 value using a linear regression equation to determine the strongest, moderate, and weakest IC50 values of the face spray across five concentration variations of the hibiscus flower ethanol extract.

Hedonic data is analyzed using the non-parametric Kruskal-Wallis test via statistical software. Data from each anti-aging parameter is analyzed using statistical programs employing the ANOVA method, followed by Tukey's test to compare differences between treatment groups.

RESULTS AND DISCUSSION

Results of Formulating Face Spray with Hibiscus Flower Ethanol Extract

Face spray is a type of cosmetic preparation that functions to refresh and moisturize the skin. One alternative for facial moisturizing is by applying a face spray. The prepared formulations were divided into five different formulas: F0 as a blank without the addition of the extract, F1 containing 0.1% extract, F2 containing 0.3% extract, F3 containing 0.5% extract, and F4 containing 0.7% extract. The excipients used included propylene glycol, phenoxyethanol, glycerin, and distilled water.

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Figure 1. Face Spray Results (F1, F2, F3, F4)

Physical Quality Evaluation of Face Spray

The prepared formulations were differentiated into five formulas: F0 as a blank without extract, F1 with 0.1% extract, F2 with 0.3% extract, F3 with 0.5% extract, and F4 with 0.7% extract. Evaluation of the preparation was conducted to determine the values and quality of the resulting formulations. The evaluation included organoleptic tests, pH tests, homogeneity tests, spreadability tests, and hedonic tests. The results are presented in the following table:

Table 1. Results of Organoleptic Tests, pH Tests, Homogeneity Tests, and Spreadability Tests

Formula	Organoleptic Test Results	pH Test	Homogeneity Test	Spreadability Test
	Color	Aroma	Form	
F0	Clear	Odorless	Liquid	7.26
F1	Yellow	Characteristic smell	Liquid	6.98
F2	Reddish Brown	Characteristic smell	Liquid	6.76
F3	Reddish Brown	Characteristic smell	Liquid	6.30
F4	Brownish Red	Characteristic smell	Liquid	5.97

Based on Table 1, the addition of hibiscus flower ethanol extract in the face spray preparation affected the color of the resulting formulation. The higher the concentration of extract added, the darker the color of the preparation, due to the naturally reddish-brown color of the hibiscus flower extract. The pH test in Table 1 shows that the pH decreases as the extract concentration increases, but it remains within the normal skin pH range of 4.5–8.0. Therefore, the face spray preparation meets the pH requirements for topical preparations. From the data, it can be concluded that all formulas of hibiscus flower extract face spray meet the homogeneity test requirements, as all formulations produced homogeneous preparations.

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The spreadability test results for the face spray with hibiscus flower extract (Hibiscus rosa-sinensis L.) across the five formulas were as follows: F0 = 7 cm, F1 = 8 cm, F2 = 10 cm, F3 = 10 cm, and F4 = 11 cm.

In this study, a hedonic test was conducted using 30 adult panelists, where the parameters of interest were aroma, color, and texture. The panelists were provided with a questionnaire and asked to fill it out based on their observations using a scale of 1 to 5. The assessment categories were as follows:

Table 2. Hedonic Test Results (Safety Level)

Parameter	Formula	Value Interval	Value	Description
Color	F0	3.36 - 3.7	3	Dislike
	F1	3.44 - 3.81	4	Like
	F2	3.80 - 4.00	4	Like
	F3	3.60 - 3.94	4	Like
	F4	3.25 - 3.6	3	Dislike
Aroma	F0	3.80 - 4.13	4	Like
	F1	3.15 - 3.6	3	Dislike
	F2	3.74 - 4.0	4	Like
	F3	3.44 - 3.81	4	Like
	F4	3.48 - 3.85	4	Like
Texture	F0	3.93 - 4.26	4	Like
	F1	3.40 - 3.8	3	Dislike
	F2	3.71 - 4.08	4	Like
	F3	3.64 - 4.0	4	Like
	F4	4.20 - 4.45	4	Like

The stability results in the organoleptic examination of the formulation can be seen in Table 3.

Table 3. Stability Test Results of Organoleptic Examination on the Physical Characteristics of the Formulation

Formula	Parameter	Day 0	Day 7	Day 14	Day 21	Day 28
F0	Color	Clear	Clear	Clear	Clear	Clear
	Odor	Odorless	Odorless	Odorless	Odorless	Odorless
	Form	Liquid	Liquid	Liquid	Liquid	Liquid
F1	Color	Yellow	Yellowish Brown	Yellowish Brown	Yellowish Brown	Yellowish Brown
	Odor	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic
	Form	Liquid	Liquid	Liquid	Liquid	Liquid
F2	Color	Reddish Brown	Reddish Brown	Reddish Brown	Reddish Brown	Reddish Brown

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	Odor	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic
	Form	Liquid	Liquid	Liquid	Liquid	Liquid
F3	Color	Reddish Brown	Reddish Brown	Reddish Brown	Reddish Brown	Reddish Brown
	Odor	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic
	Form	Liquid	Liquid	Liquid	Liquid	Liquid
F4	Color	Brownish Red	Brownish Red	Brownish Red	Brownish Red	Brownish Red
	Odor	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic
	Form	Liquid	Liquid	Liquid	Liquid	Liquid

Based on Table 3, it shows that F0 (blank), F1, F2, F3, and F4 observed for 4 weeks (28 days) demonstrated unstable physical characteristics, including color and odor changes. The physical characteristics that are considered stable and good are those that do not experience any changes in color and odor. The stability of the formulation is not only evaluated based on the physical characteristics, but also by the pH value. If the pH of the formulation changes and falls outside the normal pH range for the skin, there is a concern that the formulation could cause skin irritation. Therefore, in the stability test, the pH value of the formulation is also monitored at each testing cycle.

Table 4. Stability Test Results on the pH Value of the Formulation

Formulation	Cycle I	Cycle II	Cycle III	Cycle IV
F0	7.26	7.24	7.23	7.23
F1	6.98	6.96	6.65	6.65
F2	6.76	6.64	6.56	6.29
F3	6.30	6.09	5.86	5.73
F4	5.97	5.81	5.60	5.41

The stability test was conducted using the cycling test method over six cycles, where one cycle consisted of storing the formulation in a refrigerator at 4° ± 2°C for 24 hours, followed by placing it at 40° ± 2°C for 24 hours, so each cycle lasted two days. After each cycle, any changes in organoleptic characteristics, pH, and homogeneity of the formulation were observed.

Table 5. Stability Test Results Using the Cycling Test Method

Formulation	Parameter	Before	After
F0	Color	Clear	Clear
	Odor	Odorless	Odorless
	Form	Liquid	Liquid
F1	Color	Yellow	Yellowish Brown

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Formulation	Parameter	Before	After
	Odor	Characteristic	Characteristic
	Form	Liquid	Liquid
F2	Color	Reddish Brown	Reddish Brown
	Odor	Characteristic	Characteristic
	Form	Liquid	Liquid
F3	Color	Reddish Brown	Reddish Brown
	Odor	Characteristic	Characteristic
	Form	Liquid	Liquid
F4	Color	Brownish Red	Brownish Red
	Odor	Characteristic	Characteristic
	Form	Liquid	Liquid

Based on Table 5, it shows that F0 (blank), F1, F2, F3, and F4 observed during the test exhibited stable physical characteristics or met the required standards, as there were no changes in color or odor. The physical characteristics considered good and stable are those that do not experience any changes in color and odor.

Table 6. Stability Test Results of the Cycling Test on the pH Value of the Formulation

Formulation	Cycle I	Cycle II	Cycle III	Cycle IV	Cycle V	Cycle VI
F0	7.10	7.09	7.06	7.03	7.01	7.01
F1	6.98	6.84	6.79	6.72	6.64	6.57
F2	6.04	5.90	5.76	5.71	5.65	5.62
F3	5.58	5.50	5.47	5.35	5.37	5.36
F4	5.19	5.15	5.11	5.03	5.00	4.98

The irritation test on the formulation was conducted as a safety test by spraying the formulation [F0 (0%), F1 (0.1%), F2 (0.3%), F3 (0.5%), and F4 (0.7%)] on the inner forearm of 15 volunteers. Reactions or symptoms on the skin were then observed. The results of the irritation test are presented in Table 7 below.

Table 7. Irritation Test Results (Safety Level) for 15 Panelists

Formula	Panelis														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note:
– : No reaction
+ : Redness on skin
++: Redness and itching on skin
+++: Swelling on skin

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Next, a phase separation test was conducted, marked by the appearance of a color difference at the bottom of the formulation in the centrifuge tube. In the phase separation test, F1, F2, and F4 showed sedimentation, while F3 showed no color difference or sediment. This indicates that the solution has reached a condition where the substance is no longer dissolved due to temperature or pressure changes. This is illustrated in Figure 2 below.

Figure 2. Results of Phase Separation Test

IC50 Face Spray Test Results

Table 7. Antioxidant Test Results

No.	Sample Name	IC50 (Replicate 1)	IC50 (Replicate 2)	IC50 (Replicate 3)	Average	Average ± SD	Category
1	F0 (0.0)	859.9524	1007.0186	906.8581	924.6097	924.6 ± 75.122	Very Weak
2	F1 (0.1)	112.2890	112.1971	112.3672	112.2844	112.2 ± 0.0851	Moderate
3	F2 (0.3)	109.9489	109.9626	110.5231	110.1448	110.0 ± 0.3276	Moderate
4	F3 (0.5)	85.7294	86.0054	86.1064	85.947	85.94 ± 0.1951	Strong
5	F4 (0.7)	71.7046	71.7234	71.3413	71.5897	71.58 ± 0.2153	Strong

Category:
Very Strong: <50
Strong: 50-100
Moderate: 101-150
Weak: 151-200
Very Weak: >200

Results of Antioxidant Activity of Vitamin C as a Comparison

The antioxidant activity of ascorbic acid as a comparison was measured with varying concentrations of 1, 2, 3, 4, and 5 µg/ml. The antioxidant activity was measured using the DPPH method with a UV-Vis spectrophotometer, repeated three times, at the maximum absorbance wavelength of 516 nm with a stability time.

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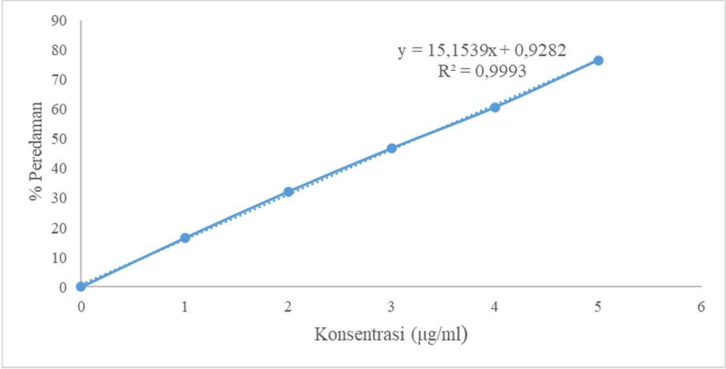

Figure 3. Graph of Comparison Antioxidant Activity Test Results

The stability time obtained during the operational time determination was at the 10th minute. The absorbance values obtained were then plotted in a graph showing the percentage of free radical scavenging results.

Results of Anti-aging Effectiveness Test

The anti-aging effectiveness test was conducted using the Skin Analyzer EH-900U by measuring the initial skin condition of the volunteers, including sebum, pigment, elasticity, and moisture, before using the face spray. The volunteers' skin was then analyzed immediately after using the hibiscus flower face spray. Measurements were taken once a week for three weeks after using the face spray to observe the effects of the hibiscus flower face spray on skin care.

Results of Sebum Test

The results of the sebum test showed that all groups of panelists did not experience instability or visible reactions on the skin. This can be seen in **Figure 4**.

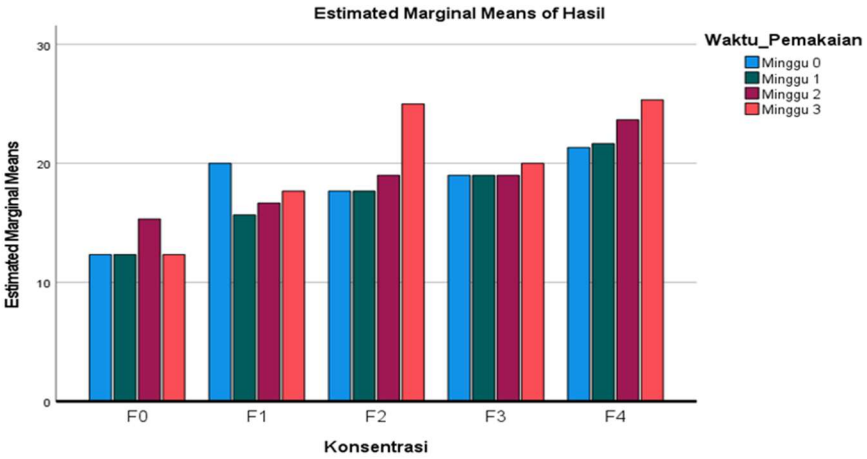

Figure 4. Graph of Sebum Test Results

Based on the obtained results, it can be observed that almost all formulas did not cause any sebum reaction on the skin, as sebum regulation is more influenced by internal body factors and hormonal regulation than by the topical application of hibiscus flower face spray.

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Results of Pigment Test

The results of the pigment test showed that F1, F2, F3, and F4 had a reduction in pigment levels, except for the panelists using F0 (blank). This can be seen in Figure 5.

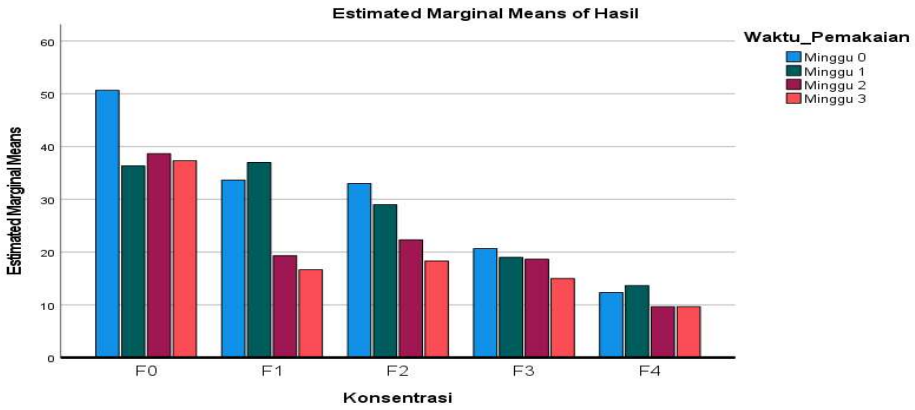

Figure 5. Graph of Pigment Test Results

Results of Elasticity Test

The results of the elasticity test over 3 weeks (21 days) showed that all groups of panelists experienced an increase in skin elasticity, except for the panelists using F0 (blank). This can be seen in Figure 6.

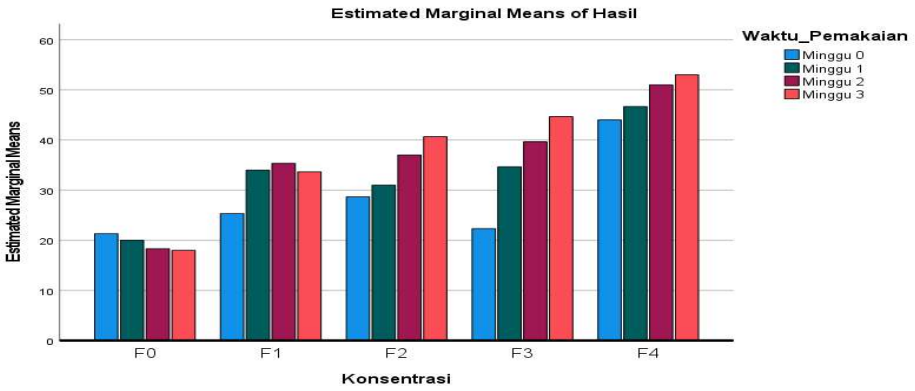

Figure 6. Graph of Elasticity Test Results

Results of Moisture Test

The results of the moisture test over 3 weeks (21 days) showed that all groups of panelists experienced instability or no visible reactions on the skin. This can be seen in Figure 7.

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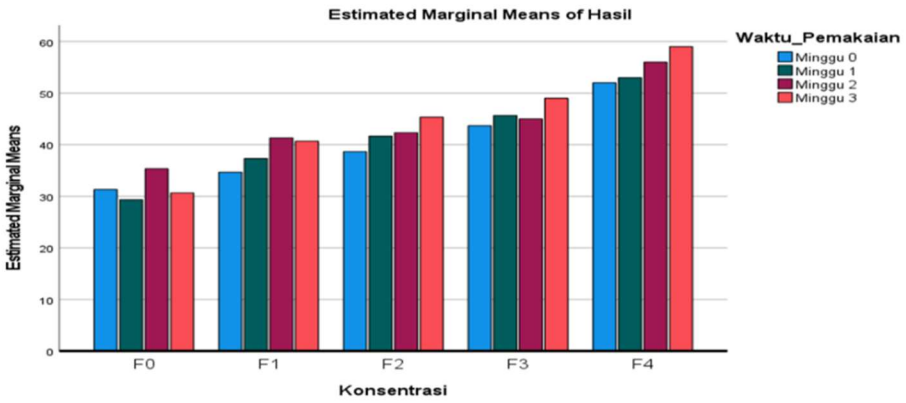

Figure 7. Graph of Moisture Test Results

Evaluation of Physical Quality of Face Spray

Face spray is a type of cosmetic formulation that functions to refresh the face and provide moisture to the skin. One alternative to moisturize the face is by spraying a face spray. The formulation of Hibiscus flower ethanol extract face spray was created in five different formulas: F0 as a blank without extract addition, F1 with 0.1% extract, F2 with 0.3%, F3 with 0.5%, and F4 with 0.7% extract. According to Table 1, the addition of Hibiscus ethanol extract in the preparation of face spray affects the color of the resulting formulation. The higher the concentration of the extract, the more intense the color of the formulation. This is due to the red-brown color of Hibiscus flower extract (Siregar, 2012).

The pH test was conducted to measure the acidity of the face spray. The testing was performed using a pH meter. According to SNI 164399-1996, the pH of products applied to the skin ranges from 4.5 to 8.0. As shown in the pH test results in Table 1, the pH decreased as the extract concentration increased, but it remained within the normal skin pH range of 4.5–8.0. Therefore, the face spray formulation meets the pH requirements for topical preparations. This aligns with Dzulasfi (2022), who stated that overly acidic formulations can trigger skin irritation, while overly alkaline formulations can cause dry, flaky skin.

The homogenization test showed that all three face spray formulations with Hibiscus flower extract met the homogenization test requirements, with all formulas being homogeneous. The homogenization test, using a microscope on the five formulas, showed that the formulations were homogeneous with evenly distributed particles. A formulation is considered homogeneous if there are no solid particles or clumping (Fauziah et al., 2023).

In the spreading power test of Hibiscus flower (Hibiscus rosa-sinensis L.) face spray, the results were as follows: F0 spread 7 cm, F1 spread 8 cm, F2 spread 10 cm, F3 spread 10 cm, and F4 spread 11 cm. The ideal spreading power for face mist formulations is in the range of 5–7 cm. Formula F0 meets the required spreading power (Noena et al., 2024), while F1, F2, F3, and F4 do not. However, based on the SNI standards, greater spreading power indicates that the active ingredients can spread and make more contact with the skin (Yati et al., 2018).

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In this study, the preference level (hedonic scale) of 30 panelists was used to assess the shape, color, and fragrance of the formulation. Based on Table 2, the average panelist preference for color showed that F2 was the most liked. This indicates that Hibiscus flowers can provide a natural color to the face spray formulation, which is preferred by the panelists. The color of a product formulation can affect consumer attraction. The resulting color of the formulation was reddish-brown. The hedonic test for fragrance indicated that F0, without extract, was the most liked because the distinct aroma of Hibiscus flower extract was quite strong. Based on Table 2, the texture parameter most liked was F4, which was perceived as moisturizing when applied, meaning the face spray adhered well and was absorbed by the skin.

The irritation test involved 15 female panelists aged 20-30 years. The forearms of the panelists were cleaned, dried thoroughly, and skin moisture was measured before applying the face spray using a skin analyzer, and the results were recorded. The face spray was then sprayed on the forearm and left to absorb. The application was repeated twice daily, in the morning and evening, for 21 days. Skin condition changes were measured using a skin analyzer (Wulandari et al., 2022).

The purpose of the irritation test was to check for any skin irritation after applying the face spray, such as redness, itching, or swelling. The test results showed that none of the five formulas caused symptoms of irritation such as itching, redness, or swelling, as the face spray formulation fell within the skin's pH range and did not contain toxic or harmful substances, making it safe for use. Phase separation was marked by the formation of color differences at the bottom of the test tube during centrifugation. The phase separation test results showed that F1, F2, and F4 formed precipitates, while F3 showed no color change or precipitation. This indicates that the solution reached a point where the substance no longer dissolved, due to changes in temperature or pressure.

Antioxidant Activity Test

A compound is considered a strong antioxidant if the IC50 value is less than 50 µg/ml, strong if 50-100 µg/ml, moderate if 100-150 µg/ml, and weak if 151-200 µg/ml. Table 4.14 shows that formulas 3 and 4 produced strong antioxidants, with IC50 values ranging from 50-100 µg/ml. The IC50 value indicates the concentration of a sample that can scavenge free radicals. The results showed that formulations 3 and 4 had the strongest IC50 values, while the weakest IC50 value was found in F0, which does not contain Hibiscus extract. Formulations 1 and 2 showed moderate IC50 values. These findings suggest that the Hibiscus flower extract formulations exhibit antioxidant properties. This aligns with Febriani et al. (2016a), who stated that Hibiscus flowers are rich in phenolic compounds and flavonoids that possess antioxidant properties.

Anti-Aging Effectiveness Test

The anti-aging effectiveness test was conducted using the Skin Analyzer EH-900U, measuring the initial skin conditions of volunteers, including sebum, pigmentation, elasticity, and moisture. The skin was analyzed again after using the Hibiscus flower face spray.

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Measurements were taken once a week for three weeks to observe the effects of Hibiscus flower face spray on skin care.

The sebum test showed instability or no visible reaction on the skin for all groups of panelists. It was found that nearly all formulas did not affect sebum production on the skin because sebum regulation is more influenced by internal factors and hormonal regulation than by the topical application of Hibiscus flower face spray (Maryanto, 2020). Additionally, panelists using the Hibiscus flower face spray formulation showed no significant effect on sebum balance.

The skin elasticity test over three weeks revealed an increase in skin elasticity for all panelists except those using the blank formulation (F0). The test results showed that F1, F2, F3, and F4, which contained active antioxidant compounds, significantly improved skin elasticity. This is because antioxidants help capture free radicals that can damage collagen, leading to skin sagging due to UV exposure (Cahnia et al., 2022). These results indicate that Hibiscus flower face spray is effective in improving skin elasticity.

Lastly, skin moisture increased over the three weeks, with all panelist groups showing improvement except for the blank formulation, which had irregular results. Panelists using F4 showed the highest moisture levels, indicating that the Hibiscus flower face spray effectively increases skin moisture. The increase in moisture was more pronounced with higher extract concentrations in the formulation.

CONCLUSION

Extraction can be used as an ingredient in the formulation of face spray preparations. Plant extractions, such as herbal or flower extracts, can be utilized in cosmetic products for their benefits to the skin, such as providing a refreshing effect, moisturizing, and treating the facial skin quickly and easily. Based on the quality test results for face spray preparations containing ethanol extract of hibiscus flowers, it was found that the F3 formulation exhibited good quality. The antioxidant activity test results for the hibiscus flower face spray indicated that F3 and F4 exhibited strong antioxidant activity (50-100). The hibiscus flower extract in the face spray formulation demonstrates antioxidant activity. Hibiscus flowers are rich in phenolic compounds and flavonoids, which have antioxidant properties. These compounds help protect the skin from damage caused by free radicals and oxidative stress, providing protective and rejuvenating benefits for the skin. Using hibiscus flower extract in face spray can support efforts to maintain healthy and youthful skin for a longer time.

ACKNOWLEDGEMENT

We would like to express our gratitude to all parties who have contributed to the research and development of the face spray formulation with hibiscus flower extract. We appreciate the support provided in quality testing and antioxidant activity testing, which showed satisfactory results in formulations F3 and F4. This research proves that hibiscus flower extract, rich in phenolic compounds and flavonoids, offers protective and rejuvenating benefits for the skin through its antioxidant properties. We hope that the results of this study

will provide significant benefits in the development of cosmetic products that can maintain skin health and beauty, as well as naturally prolong the skin's youthful appearance.

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