DETERMINATION OF FLAVONOID CONTENT ON CREAM COMBINATION OF ROSELLA FLOWER EXTRACT AND CORNCOB EXTRACT

Indri Kusuma Dewi, Susilo Yulianto, Indarto
Traditional Herbal Departement Poltekkes Kemenkes Surakarta, COE Jamu Indonesia

Abstract, **Background**: At present, the community's needs for aesthetics are increasing, such as the use of cosmetic products. Therefore, the production of cosmetics is formulated to enhance beauty, one of which is facial lightening. This study uses a combination of rosella flowers and corn cobs to increase tyrosinase inhibitory activity. The purpose of this study was to determine the physical evaluation and levels of flavonoid Lightening cream preparations extract of rosella and corn cobs with a ratio of 25%: 75%, 50%: 50% and 75%: 25%.
Method: This research is a laboratory experiment with descriptive properties because it describes the results of the evaluation of physical quality, and measurement of flavonoid levels
Results: The results showed that in formula I showed a light brown color, formula II showed a brownish yellow / brown color while the formula III showed a dark brown color. For homogeneity, the three formulas show homogeneity. The highest sample concentration results in formula I in the second replication with a concentration of 15,183ppm or 0,00015%, formula II in the third replication with a concentration of 12,772ppm or 0,000127% and formula III in the first replication with a concentration of 14,022ppm or 0,00014 %.
Conclusion: In conclusion, physical properties include organoleptic test, pH, homogeneity, dispersion, adhesion test and measurement of flavonoid lightening levels are by the standard. Suggestions for other researchers to conduct further research to analyze the levels of flavonoids on roselle extract and corn cobs using solvents and different methods.

Keywords: Flavonoids, Rosela Flower Extract, Corn Cob Extract

Background

At present, the needs of the community for aesthetics are increasing, such as the use of cosmetic products. Therefore, the production of cosmetics is formulated to enhance beauty, one of which is facial lightening. Communities in the Asian region are generally with yellowish undertone to light brown to very dark brown or black **skin color**. so this face lightening product is in great demand. Whereas white skin is considered as beauty imaging as it is continually intensified in the mass media with various kinds of advertisements to form a pseudo awareness that white is indeed beautiful (Purnamasari in Rohmah, 2013).

Cosmetic products that contain chemicals such as hydroquinone have the side effect of peeling on the skin of the epidermis and cause the skin to

become reddish and thinning (Zhu and Gao, 2008). BPOM has excluded the use of hydroquinone in cosmetics while allowing retinoic acid only for the treatment of hyperpigmentation (BPOM, 2008). Based on that, the selection of chemicals in cosmetics that can cause skin damage must be avoided.

Plants that can be used as cosmetics for skin lightening that contain flavonoid compounds because flavonoid compounds have the potential to inhibit tyrosinase, namely polyphenols that can brighten the skin. Research Regarding Composition that Inhibits Tyrosinase is a Composition of Flavonoids (Supriyanti, 1996). Flavonoids, one of the polyphenols, have a major role in tyrosinase inhibiting activity. This study uses a combination of rosella flowers and corncobs to increase tyrosinase inhibiting activity. Roselle is a plant that has medicinal properties having the Latin name Hibiscus sabdariffa Linn. This plant is a member of the Malaceae family (Ganjari, 2010). Important content contained in roselle calyx is anthocyanin pigment that forms flavonoids that contain antioxidants (Mardiah et al., 2009). Whereas Saleh et al. (2012) revealed the active components contained in corncob extract containing flavonoids so that it has a good ability to prevent free radicals

The use of formulas is needed to develop the ability of the activities of rosella flowers and corn cobs so so the utilization is more practical. The preferred dosage form is cream because the cream is spread evenly and easily cleaned, especially oil-in-water emulsion cream. Before formulation in a cream dosage form, rosella flowers and corncobs are extracted to take the flavonoid content. This cream formula uses three designs with a comparison of variations in concentration, namely the ratio of rosella flower extract to corncobs is 25%: 75%, 50%: 50% and 75%: 25%.

In a previous study, the dosage form of lightening cream from on combination of rosella flower extract and corncob have never been done. Therefore, based on the description and background above, the researcher is interested in researching the formulation of lightening cream dosage form on combination of rosella flower extract and corncob with tyrosinase enzyme inhibitory activity.

Method

This research is a laboratory experiment with a descriptive study because it explains about the results of evaluating physical quality, measurement of flavonoid levels for lightening cream products with a combination of rosella flower extract and corncobs. The comparison of concentration variations is 25%: 75%, 50%: 50% and 75%: 25%.

Result

Development of lightening cream dosage form on combination of rosella flower extract and corncob explained on following table with test results of physical properties as listed in the table below:

Table 1. Result of Organoleptic Test

Formula	Organoleptic Test		
	Replication 1	Replication 2	Replication 3
Formula 1	Color: light brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth	Color: light brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth	Color: light brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth
Formula 2	Color: brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth	Color: brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth	Color: brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth
Formula 3	Color: dark brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth	Color: dark brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth	Color: dark brown Smell: typical corn cobs Shape: semi-solid Flavor (skinned): smooth

Table 2. Result of pH test

Formula	Ph		
	Replication 1	Replication 2	Replication 3
Formula 1	3	3	2
Formula 2	5	3	3
Formula 3	3	3	3

For homogeneity tests, these three formulas show homogeneous results for all replications performed.

Tabel 3. Result of Scatter Test

No	Formulasi	Replication	Absorption	Consentration(ppm)	% *flavonoid*
1	Formula I	1	0,114	13,888	0,000138
		2	0,143	15,183	0,00015
		3	0,121	14,200	0,000142
2	Formula II	1	0,071	11,968	0,00011
		2	0,065	11,700	0,000117
		3	0,089	12,772	0,000127
3	Formula II	1	0,117	14,022	0,00014
		2	0,099	13,218	0,000132
		3	0,101	13,308	0,000133

Formula	Replication 1	Replication 2	Replication 3
Formula 1	3798	4162	4333
Formula 2	4321	4275	4531
Formula 3	4805	4611	4800

Tabel 4. Results of Stickiness Test

Formula	Replication 1	Replication 2	Replication 3
Formula 1	00 : 05 : 1	00 : 02 : 4	00 : 02 : 2
Formula 2	00 : 02 : 4	00 : 02 : 5	00 : 02 : 7
Formula 3	00 : 01 : 4	00 : 01 : 6	01 : 10 : 8

Determination of Flavonoid Levels by UV-VIS Spectrophotometry.

The results of standard absorbance measurements at a wavelength of 326 nm can be seen as follows:

Table 5. Results of Standard Absorbance Measurement

No	Concentration (ppm)	Absorption
1.	0	0
2.	10	0,001
3.	20	0,260
4.	30	0,500
5.	40	0,727
6.	50	0,888

Based on table 5. above, the highest absorbance measurement results are at a concentration of 50 ppm and the lowest is at a concentration of 10 ppm.

The concentration obtained from the results of the equation y = 0.0224 x –0.171 then is converted into the percentage of flavonoids in a sample of roselle flower lightening cream and corncob extract using the formula calculation:

$$\%\ \text{Flavonoid} = \frac{\text{Concentration of spectrophotometer results} \times \text{weight of recorded sample}}{\text{The extract concentration recorded} \times \text{sample}}\ x\ 100\%$$

Table 6. Results of Flavonoid Percentage in Lightening Cream Samples

The results of this study indicate that the contents of lightening cream dosage form on combination of Roselle flower extract and corncob extract in formula I with three times replications obtained concentrations result of 13,888 ppm, 15,183 ppm, 14,200 ppm obtained a percentage of flavonoids by 0,000138%, 0,00015%, 0,000142%. Formula II with three times replications obtained concentrations result of 11,968ppm, 11,700ppm, 12,772ppm obtained a percentage of flavonoids by 0,00011%, 0,000117%, 0,000127%, whereas in formula III with three times replications obtained concentrations result of 14.022ppm, 13.218 ppm, 13,308ppm obtained a percentage of flavonoids by 0,00014%, 0,000132%, 0,000133%.

Discussion

Examination of lightening cream dosage form on combination of rosella flower extract and corncob was conducted to determine the cream quality parameters including physical tests and SPF tests.

Organoleptic test of a combination of rosella flower extract cream and corncob which includes color, odor, and shape when applied on skin (Dewi, 2015). Organoleptic test results showed F1, FII and FIII have a light brown color, with a distinctive odor of corncobs.

Homogeneity test results of the three formulations of rosella and corncob combination of extracts of cream were found that the three formulas were homogeneous. This was indicated by the absence of small particles when applied to transparent glass. Ulaen et al (2012) said that semi-solid dosage form have good homogeneity are dosage form that do not show the presence of particles when the dosage form are applied on transparent glass. It is known that the more homogeneous a dosage form means better because the content in the dosage is evenly distributed (Nugraha, 2012).

The pH testing of dosage form cream on combination of rosella flower extract and corncob cream was done using a pH meter. The results of pH testing for FI, FII, and FIII with Ph 3. pH testing is carried out to determine the acidity value of the lotion dosage form that was made. If cream of dosage form has a pH that exceeds or less than skin pH, it will cause skin irritation (Karina, 2014). A good cream of dosage form has a pH similar to the pH of the skin between 4.5 - 6.5 (Jayadi, 2013).

pH determination result of concentration cream variation of corncobs, sleigh, and sandalwood shows that the dosage form cream hasn't been able to meet the skin's pH standard so that it can irritate the skin.

The evaluation of the quality of lightening cream on combination of rosella flower extract and corncob in this study used rosella flower petals in the form of extract as the main active ingredient that has antioxidant activity by absorbing UV light which has wavelengths between 290-320 nm at intervals of 5.

Simplisia powder of roselle calyx and corncob was extracted by maceration using 96% ethanol extraction liquid. This method is used because it is very easy to do and using simple tools. This study uses an extraction method within 7 days.

In the maceration process the solvent liquid will penetrate the cell wall and enter the cell cavity which contains the active substance that will dissolve, and because of the difference in concentration between the solution of the active substance inside and outside the cell, the concentrated solution will be pushed out, the event will repeat so that a balance is reached between the solution inside and outside the cell (Rohmah, 2016). Maceration method carried out at room temperature so that it can prevent free radical formation reactions (Lolo et al., 2017)

Analysis of the level of flavonoids in rosella flower extract lightening cream and corncob with maceration method was performed using a UV-Vis spectrophotometer. This study uses a wavelength of 326 nm because flavonoids are phenolic compounds which have absorption at wavelengths between 320-380 nm (Rahmat, 2009), but it is better to scan the maximum wavelength to get maximum sensitivity so that the change in absorbance for each unit of concentration is the biggest and the risk of error is smaller if repeated measurements (Gandjar, 2011).

The standard solution in this study used a standard solution of routine flavonoids with a concentration of 100 ppm and then dilution was carried out with various concentrations of 0.10, 20, 30, 40, and 50 ppm. Dilution is done to minimize errors. This is following the *Lambert-Beer* law which states that a dilute solution will facilitate light to penetrate it. The concentration of 0 ppm above is a blank solution in the form of pure methanol which serves to determine the amount of absorption by substances that are not analyte (the solution to be analyzed). After that, the standard solution of flavonoids with various concentrations of absorbance is measured using a UV-Vis spectrophotometer to find out the standard curve.

Absorbance is the amount of light or energy absorbed by particles in solution. Based on the *Lambert-Beer* law, absorbance will be directly proportional to concentration, but several factors cause absorbance with non-linear concentration, namely the absorption of solvents and absorption by cuvettes. Absorption by solvents can be surmounted by using blanks, at the same time, absorption by cuvettes can be surmounted by choosing cuvette from quartz because it has better quality than glass cuvettes.

The absorbance value of routine flavonoid standard solution in this study has different results from each dilution concentration and produces a calibration linear regression equation y = 0.0224x - 0.1971 with a value of r = 0.99329 which shows a linear relationship between absorbance and concentration. The magnitude of the linearity value approaching the value of one. It can be interpreted that the magnitude of the absorbance value is directly proportional to the concentration.

The results of the flavonoid test from the preliminary test and UV-Vis spectrophotometer differ because the maceration method of the sample is heated twice, that is when the extract and evaporation, It is different from the percolation method which only heated during evaporation. the statement of Monache, 1996 which said that flavonoid compounds are unheat-resistant compounds and flavonoid compounds are easily oxidized at high temperatures.

The highest absorbance of the sample in formula I in the second replication of 0.143 with a concentration of 15.183 ppm or 0.00015%. Formula II the highest absorbance in the third replication is 0.089 with a concentration of 12.777 ppm or 0.000127%

and for formula III the highest absorbance in the replication first 0.117 with a concentration of 14.022ppm or 0.00014% Based on these results it can be concluded that the results of a large absorbance also show the results of a large concentration. This is following the *Lambert-beer* law which states that the amount of absorbance of a sample will be directly proportional to its concentration.

Conclusion

It was concluded that physical properties included organoleptic test, pH, homogeneity, dispersibility, adhesion test and measurement of flavonoid lightening levels by standards. It is recommended that other researchers conduct further studies on the analysis of levels of flavonoids on roselle flower extracts and corncobs using different solvents and methods.

Competing Interests

the first researcher has expertise in pharmaceutical technology that is mixing, identifying, combining, analyzing, and standardizing drugs and treatments as well as the nature of drugs and their safe distribution and use**.** Second and third researcher have expertise in the field of processing plants or plants that have more use or value in medicine so that various complaints about health can be treated with natural ingredients.

Author's Contributions

(First Researcher) Indri Kusuma Dewi and (second Researcher) conceived of the presented idea. (Third researcher) developed the theory and performed the computations. First researcher verified the analytical methods. First researcher encouraged second researcher and third researcher to investigate Plants that can be used as cosmetics for skin lightening that contain flavonoid compounds and supervised the findings of this work. First researcher and second researcher designed and performed the experiments, derived the models and analyzed the data. Third researcher measurements and helped carry out the experiment. Second researcher wrote the manuscript in consultation with first researcher and third researcher. All authors discussed the results and contributed to the final manuscript.

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