Test The Physical Stability And Irritation Power Of Oil Creams Moringa Seeds (Moringa oleifera L.)

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Abstract. The Moringa plant (Moringa oleifera, L.) is a tropical plant in Indonesia. the seeds can be made into oil and used as raw materials for cosmetics such as creams, but the addition of Moringa seed oil to cream preparations is thought to affect the physical stability of the preparations. This study aims to test the physical stability and irritating power of cream preparations containing Moringa seed oil in various concentrations (2%, 4%, 6%). The research method used in this research is a laboratory experimental method with descriptive analysis. Moringa seed oil is formulated in a vanishing cream preparation with varying concentrations of Moringa seed oil, namely F1 base, F2 2%, F3 4% and F4 6%. The vanishing cream preparation was evaluated for its physical properties using the cycling test method including organoleptic, homogeneity, pH, spreadability, stickiness, viscosity and irritation test using the draize method. The data obtained was analyzed statistically using bivariate correlation analysis. In this study, the cream showed stable spreadability, adhesive power decreased, viscosity remained stable and homogeneous at various levels. At various storage times, it shows that the cream remains homogeneous and does not experience physical changes. Moringa oleifera L. seed oil can be formulated into cream preparations that meet good physical stability, and the cream formulation of Moringa oleifera L. seed oil does not cause irritation.

Key words: Moringa Seed Oil (Moringa oleifera L.), Physical Stability, Cream, Irritation

INTRODUCTION

Indonesia is a country located in the tropics (Isnan and Nurhaedah, 2017), therefore the intensity obtained consists of several radiation spectrums, namely UV A rays (315-400 nm), UV B rays (290-315 nm), UV rays C (100-290 nm), infrared light (>760 nm), and visible light (400-760 nm). This kind of radiation poses a high risk and is dangerous for the skin (Oktaviasari and Zulkarnain, 2017). Skin is an organ covering the body which functions to reduce factors from sunlight, protect muscles, ligaments, lack of fluids and microorganisms (Sugihartini and Nuryanti, 2017; Rohmani and Kuncoro, 2019). The skin is always in contact with UV radiation rays by the stratum corneum from the reflection of the radiation so that the UV radiation exposure dose is reduced. This can reduce the absorption of UV radiation which can cause skin cancer incidents. To avoid this incident, you can use sunscreen cosmetics (Oktaviasari and Zulkarnain, 2017).

Sunscreen is a product that is specially formulated to absorb or block ultraviolet rays (Oktaviasari and Zulkarnain, 2017), while cosmetics are preparations of various active ingredients and chemicals that are formulated as products that react when applied to the skin (Nurul, 2013). By diligently using sunscreen, your skin will be safer and more secure, look fresher and avoid skin aging. Sunscreens on the market are usually made from synthetic chemicals. Natural ingredients are rarely used in the sunscreen industry. (Puspitasari and Setyowati, 2018). A natural ingredient that can be used as sunscreen cosmetics is the Moringa plant (Moringa oleifera, L.) (Soba, 2018). The Moringa plant (Moringa oleifera, L.) is a type of plant that often grows in tropical areas such as Indonesia (Isnan and Nurhaedah, 2017). The seeds found in the Moringa plant can be made into oil and used as raw material for cosmetics because they have antioxidant activity with an IC50 value of 9.0417% which can reduce free radicals in the body (Soba, 2018). One of the cosmetics that is often used by the public is cream preparations (Syahrani, 2015).

Cream is a semi-solid preparation in the form of an emulsion of oil in water (o/w) or water in oil (w/o) (Fatmawaty et al., 2016). Cream preparations are preferred by the public because they are easy to clean and easy to spread, provide a cool, radiant effect and moisturize the skin. For cream preparations, stability testing needs to be carried out so that we can find out how stable the preparation is during storage (Soba 2018). Stability is defined as the ability to survive a product so that it meets the quality specifications determined by the period of use and storage (Rismana et al., 2015). Apart from being tested for physical stability, the cream preparations were also tested for their irritability to prevent hypersensitivity reactions on the skin (Fatmawaty et al., 2016; Muthoharoh and Ratna Rianti, 2020).

METHODS

This research is experimental research carried out at the Pharmaceutical Technology Laboratory of ITEKES Scholar Utama Kudus. The ingredients used in this research are Moringa seed oil "Kelorina", stearic acid, cetyl alcohol, methyl paraben, propyl paraben, distilled water, liquid paraffin, glycerin, moringa seed oil, span 80, tween 80, Parfum (Ol. Rosae), adeps lanae. The tools used are equipment such as measuring cups (Herma), analytical scales (Ohaus), pipettes, hair clippers, volume pipettes, spatulas, stir sticks, water baths (Eyela SB-1000), evaporating dishes, pH paper, transparent glass, mortar, stamper, spreadability test equipment, adhesion test equipment, Brookfield viscometer.

Table 1. Formulation of Sunscreen Cream Preparations

Material	Function	Formulation (%)			
		F1	F2	F3	F4
Moringa seed oil	Active substance	-	2	4	6
Liquid paraffin	Emollient	5	5	5	5
Span 80	Emulsifying Agent	8.1	8.1	8.1	8.1
Tween 80	Emulsifying Agent	1.8	1.8	1.8	1.8
Stearic acid	Emulsifying Agent	5	5	5	5
Cetyl alcohol	Emulsifying Agent	5	5	5	5
Glycerin	Humectant	15	15	15	15
Adeps lanae	Consistency Enhancer	5	5	5	5
Methyl paraben	Preservatives	0.18	0.18	0.18	0.18
Propyl paraben	Preservatives	0.02	0.02	0.02	0.02
Perfume (Ol. Rosae)	Fragrance Ingredients	qs	qs	qs	qs
Aquadest ad	Solvent Material	100	100	100	100

Information:
F1: Cream base
F2: Moringa seed oil cream formula 2% concentration
F3: Moringa seed oil cream formula 4% concentration
F4: Moringa seed oil cream formula 6% concentration
S.0-6: Cycle 0 to 6

Cream Making

Cream formulations use oil-in-water or O/W type creams. The cream is made by first melting the oil phase, namely a mixture of stearic acid, cetyl alcohol, span 80, liquid paraffin, and adeps lanae over a bath to 70°C, then adding propyl paraben. The water phase was made by dissolving methyl paraben with a volume of hot water, then adding Tween 80, and with the remaining volume of water, maintaining the temperature at 70°C. Then put the oil phase and water phase into a hot mortar and grind until a creamy mass is formed. Then add Moringa seed oil and sufficient perfume, and grind until homogeneous.

Organoleptic Test

Organoleptic analysis was carried out by visual observation by looking at the shape, color and odor of the Moringa seed oil cream preparation.

Cycling test

To determine the stability of a cream, use the cycling test method. This method is carried out by accelerating the stability evaluation by storing it for several periods (time). The stability test was carried out using the cycling test method. The cream is stored at ± 4°C for 24 hours and then at ± 40°C for 24 hours. Testing was carried out for 6 cycles (Lumentut, Jaya and Melindah, 2020).

Organoleptic Test

Organoleptic analysis was carried out by visual observation by looking at the shape, color and odor of the Moringa seed oil cream preparation (Husni, Pratiwi and Baitariza, 2019).

Homogeneity test

Homogeneity is one of the requirements for cream preparations. Cream homogeneity can be observed by visually seeing whether there are particles and whether the color is even or not in the cream preparation (Oktaviasari and Zulkarnain, 2017).

Viscosity test

The cream viscosity test was carried out using a viscometer. A total of 100 grams of cream is put into a glass container, then the spindle that has been installed is lowered until the spindle is immersed in the cream. The speed of the tool is set at 10 rpm and 20 rpm, then the centripoise value printed on the tool is read and recorded (Soba, 2018).

Spreadability test

A total of 0.5 grams of formulated cream was placed on a petri dish covered with graph paper and the petri dish was left on top for 1 minute, the area covered by the preparation was calculated. Given a load of 50, 100 and 150 grams respectively, leave it for 60 seconds and calculate the area of the resulting preparation (Kurniasih, 2016).

Adhesion Test

Weigh 0.5 grams of cream, spread it on a glass plate and give it a weight of 250 grams for 5 minutes. The load is lifted and the two attached glass plates are released while the time is recorded until the two plates are separated from each other. The standard for good cream adhesion is no less than 4 seconds or >4 seconds (Lumentut, Jaya and Melindah, 2020).

pH Test

Weigh 1 gram of cream extract and dilute with 10 ml of distilled water. pH good preparation suits the skin's pH, namely 4.5-8 (Lumentut, Jaya and Melindah, 2020).

Irritation test

The Draize method of skin irritation testing in this study used 3 adult albinone rabbits as test animals. The rabbit's back is shaved until clean, divided into 6 parts which will be treated with a cream preparation, negative control (Moringa oleifera L.) and positive control (SLS/Sodium Lauryl Sulfate).

Data analysis

Data obtained from the stability test were analyzed using a bivariate correlation statistical test to see the effect of varying concentrations of Moringa oleifera L. seed oil cream and storage time on the physical stability of Moringa oleifera L. seed oil cream.

The irritation score data obtained is semi-quantitative data, then the irritation score obtained is averaged compared to the total irritation index.

RESULTS AND DISCUSSION

Cycling Test

Table 2. Cycling Test Results

Concentration	ConditionInitial Color	Cycle6 Colors	Phase Separation
F1	White bone	White bone	No Separation Occurs
F2	White bone	White bone	No Separation Occurs
F3	White bone	White bone	No Separation Occurs
F4	White bone	White bone	No Separation Occurs

Cream storage stability test results at a low temperature of 4°C and a high temperature of 40°C. The results of homogeneity observations at low storage temperatures of 4°C and high temperatures of 40°C, the four cream formulas remained homogeneous. The results of organoleptic observations of the four formulas after 12 days of storage were that the color of the cream remained the same, there was no phase separation and the smell remained the same, which is typical of oleum rosae. The pH measurements of the four formulas generally had a stable pH during 12 days of storage at 4°C and 40°C.

Organoleptic Test

Table 3. Organoleptic Test Results

Formulas	Color	Smell	Texture
F1/S.0-6	White bone	Typical of oleum rosae	Soft and not sticky
F2/S.0-6	White bone	Typical of oleum rosae	Soft and not sticky
F3/S.0-6	White bone	Typical of oleum rosae	Soft and not sticky
F4/S.0-6	White bone	Typical of oleum rosae	Soft and not sticky

Based on table 3, it can be seen that the Moringa seed oil cream preparations with variations F1, F2, F3 and F4 are stable during storage. The color, smell and texture of the cream did not change from the initial observation until storage for 6 cycles (12 days). Organoleptic observations showed that all creams at low temperatures/refrigerator 4°C and high temperatures/oven 40°C did not experience significant changes. All creams are bone white in color, the smell remains the same, namely the distinctive smell of oleum rosae and does not produce a rancid odor and remains stable during 12 days of storage. at all three temperatures. This shows that the oil phase in the cream does not undergo oxidation. All these creams were declared organoleptically stable.

Homogeneity Test

Table 4. Homogeneity Test Results

Cycle	Homogeneity				Fulfills/not
	F1	F2	F3	F4	
0	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Fulfil
1	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Fulfil
2	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Fulfil
3	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Fulfil
4	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Fulfil
5	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Fulfil
6	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Fulfil

In this study, the results of the homogeneity test can be seen in table 4. where the preparation of Moringa oleifera L. seed oil cream with variations F1, F2, F3 and F4 still remained homogeneous during 6 storage cycles. The research carried out gave homogeneous results for each preparation, as seen by the absence of lumps or coarse grains in the Moringa oleifera L. seed oil cream preparation.

This homogeneous cream preparation indicates that the mixture of the Moringa seed oil used is good so that there are no lumps or coarse granules in the preparation. A cream preparation must be homogeneous and even so that it does not cause irritation and is evenly distributed when used (Naibaho, Yamlean and Wiyono, 2013).

Viscosity Test

Table 5.1 Results of Statistical Tests for Levels and Viscosity

Level >< Power Viscosity	Correlation
Cycle 0	-0.728
Cycle 1	-0.445
Cycle 2	-0.467
Cycle 3	-0.193
Cycle 4	0.341
Cycle 5	-0.706
Cycle 6	-0.559

Table 5.2 Statistical Results of Storage Time on Viscosity

Level >< Power Viscosity	Correlation
F1	-0.072
F2	-0.323
F3	0.070
F4	0.354

The results of measuring the viscosity of Moringa seed oil cream were analyzed using bivariate correlation test statistics so that it could be seen how the relationship was between various variations in Moringa seed oil content and cream viscosity as well as between storage time and cream viscosity.

In the bivariate correlation test, between variations in cream content and viscosity, the r value obtained in cycles 0 to 6 respectively was -0.728; -0.445; -0.467; -0.193; 0.341;-0.706; 0.559. From the r value data, it can be seen that storage in cycles 0 to 3 is negative, meaning the viscosity decreases. In the 4th cycle the results were positive, meaning the viscosity increased. In the 5th cycle it returns negative, meaning the viscosity decreases further. In the 6th cycle it returns positive, meaning that the viscosity increases. There is a weak relationship between various variations in cream content and viscosity during 6 storage cycles so it does not affect the spreadability of the Moringa seed oil cream. The r value shows that there is a correlation that is in the same direction but not strong, and the average is inversely proportional, meaning that the influence of temperatures of 4°C and 40°C affects the correlation, because not all correlations are negative.

In the bivariate correlation test, between storage time and cream viscosity, the r value was obtained for Formulations 1 to 4 respectively. is -0.072; -0.323; 0.070; 0.354. Judging from the r value, the relationship between storage time and cream viscosity is that the longer the storage, the lower the cream viscosity. The greater the concentration, the smaller the viscosity.

Spreadability Test

Table 6. 1 Statistical Test Results for Levels and

Level >< Spread Power	Correlation
Cycle 0	0.129
Cycle 1	-0.605
Cycle 2	0.210
Cycle 3	-0.022
Cycle 4	0.524
Cycle 5	-0.789
Cycle 6	-0.400

Table 6. 2 Statistical Results of Storage Time on Spreadability

Long storage >< Spreadability	Correlation
F1	-0.113
F2	-0.547
F3	0
F4	-0.445

In the bivariate correlation test, between variations in moringa seed oil content and cream spreadability, the r value was obtained in cycles 0 to 6 respectively is 0.129; -0.605; 0.210; -0.022; -0.524; -0.789; -0.400. From the r value data, it can be seen that the various variations in moringa seed oil content and the spreadability of the cream during 6 storage cycles have a weak relationship so that it does not affect the spreadability of the moringa seed oil cream. In cycles 0, 2, and 4, it shows that the r value is positive, meaning that the more the moringa seed oil content increases, the spreadability of the cream will increase. A negative r value shows the relationship that the lower the oil content of Moringa seeds, the greater the spreadability decrease. The r value shows that there is a correlation that is in the same direction but not strong, and the average is inversely proportional. The greater the concentration, the smaller the dispersion power.

In the bivariate correlation test, between the storage time and the spreadability of the cream, the r value was obtained at F1 = - 0.113; F2 = -0.547; F3 = 0; and F4 = -0.445. Judging from the r value, the relationship between storage time and the spreadability of the cream is that the longer the storage, the lower the spreadability of the cream.

Adhesion Test

Table 7. 1 Statistical Test Results for Levels and Stickness

Level >< Stickness	Correlation
Cycle 0	-0.762
Cycle 1	-0.769
Cycle 2	-0.766
Cycle 3	-0.773
Cycle 4	-0.779
Cycle 5	-0.766
Cycle 6	-0.774

Table 7. 2 Statistical Results of Storage Time on Stickiness

Storage Time >< Stickiness	Correlation
F1	-0.939
F2	0.329
F3	-0.318
F4	-0.303

In the bivariate correlation test, between variations in content and cream stickiness, the r value obtained in cycles 0 to 6 respectively was -0.762; -0.769; -0.766; -0.773; -0.779; -0.766; -0.774. From the r value data, it can be seen that the various variations in levels and adhesive strength of the cream during 6 storage cycles have a weak relationship so that it does not affect the adhesive strength of the Moringa seed oil cream. The r value shows that there is a correlation in the same direction but not strong, and the average is inversely proportional, meaning that if it is stored for a long time, the adhesive strength will decrease.

In the bivariate correlation test, between storage time and cream adhesion, the r values obtained in Formulations 1 to 4 were -0.939, 0.329, -0.319, -0.303, respectively. Judging from the r value, the relationship between storage time and the adhesion of the cream is that the longer the storage, the lower the adhesion of the cream. The greater the concentration, the smaller the sticking power.

Test pH

Table 8. pH test results

Cycle	Test pH				Parameter	Fulfills/not
	F1	F2	F3	F4		
0	5±0	5±0	5±0	5±0	4.5-8	Fulfil
1	5±0	5±0	5±0	5±0	4.5-8	Fulfil
2	5±0	5±0	5±0	5±0	4.5-8	Fulfil
3	5±0	5±0	5±0	5±0	4.5-8	Fulfil
4	5±0	5±0	5±0	5±0	4.5-8	Fulfil
4	5±0	5±0	5±0	5±0	4.5-8	Fulfil
5	5±0	5±0	5±0	5±0	4.5-8	Fulfil

The pH test carried out on each preparation of Moringa seed oil cream obtained the same pH value for each preparation. pH measurement uses a pH indicator which is carried out by matching the color obtained with the existing color table. Moringa seed oil cream has a pH that meets the criteria. Apart from that, there is no change in pH stability during storage so it cannot damage the product during storage or use.

Irritation Test

Table 9. Irritation test results

Test Group	Irritation Index (12 Hours)	
	Edema	**Edema**
F1 (base)	0	0
F2 (2% Concentration)	0	0
F3 (4% Concentration)	0	0
F4 (6% Concentration)	0	0
SLS	1	1
Moringa Seed Oil (Moringa oleifera L.)	0	0

This observation used 3 rabbit test animals, with 3 kinds of concentrations of Moringa Seed Oil (Moringa oleifera L.) cream preparations, namely 2%, 4% and 6%, apart from that it also used a positive control (SLS, negative control namely cream base (F1) and Moringa Seed Oil (Moringa oleifera L.). Observation of erythema and edema on the rabbit's skin was left for 24 hours to observe the presence of erythema and edema. After calculating the irritation index, the irritation index result from the SLS positive control was 1, meaning slightly irritating according to SLS itself which can cause irritation, while from the negative control (F1), Moringa oleifera L. seed oil, and Moringa oleifera L. cream preparation at concentrations of 2% (FII), 4% (FIII), 6% (FIV) is 0 meaning not irritating.

CONCLUSION

From the results of the research and discussion described in the previous chapter, the following conclusions can be drawn: Moringa seed oil (Moringa oleifera L.) can be formulated into cream preparations with good physical stability. The formulation of Moringa oleifera L. seed oil cream does not cause irritation.

SUGGESTION

After seeing the research results of the physical stability test of seed oil cream Moringa (Moringa oleifera L.) and irritating properties, so in conducting further research the author suggests that further research needs to be carried out regarding activity tests during the storage period.

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