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Formulation And Evaluation of Moringa Leaves Extract *(Moringa oleifera* L. *)* Lotion With Variation Concentration Of Triethanolamin

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ABSTRACT

The Indonesian people know the moringa plant as a plant for consumption as a vegetable, a fetid decoction as well as animal feed. However, the Moringa plant, especially in the leaves, has another benefit , namely as an antioxidant. Antioxidants in Moringa leaves contain tannins, flavonoids, saponins, alkaloids, steroids and terpenoids. The purpose of this study was to determine a good formulation for the preparation of moringa leaf extract *lotion* with variations in the concentration of triethanolamine. The research method used is the experimental method. Data analysis was performed using the *One Way Anova* and *Kruskal Wallis Test statistical methods* . The results showed that the organoleptic test of slightly thick texture preparations for formula I, thick texture for formulas II and III; typical preparation odor of Moringa leaf extract; the color of the preparation is yellow. Homogeneity test of formula I was not homogeneous, formula II was not homogeneous in the third replication, formula III was homogeneous. The average viscosity test for formula I was 1,800 c.Ps, formula II was 8,300 c.Ps, formula III was 1,666 c.Ps. The average pH test for formula I was 6, formula II was 7, formula III was 8. The average adhesion test for formula I was 02.76 seconds, formula II was 02.02 seconds, formula III was 01.37 seconds. The average spreadability test for formula I was 3.9 cm, formula II was 6.6 cm, formula III was 6.9 cm. Based on the evaluation results obtained, it can be concluded that the triethanolamine concentration of 2.5% produces a good formulation for *lotion preparations*.

Keywords : antioxidant, moringa leaves, *lotion*

INTRODUCTION

Medicinal plants have long been used according to their properties from generation to generation, which until now have been developing following increasingly rapid technology. *The trend back to nature* is increasingly being encouraged in the field of aesthetics, one of which is by looking for formulations of cosmetic preparations that are durable, practical, easy and fast to apply to today's modern humans (Sayuti, AS, & Suhendriyo, 2016) . Moringa leaves are plants that are known to have antioxidant activity. Antioxidants contained in Moringa leaves have activity to neutralize free radicals thereby preventing oxidative damage to most of the biomolecules and providing significant protection against oxidative damage (Hardiyanthi, 2015) . Skin that is exposed to the effects of free radicals will experience premature aging, marked by wrinkled skin and black spots on the skin (Susanty *et al.* , 2019) .

Based on this, the use of Moringa leaves as an antioxidant can be utilized in the form of lotion preparations . Lotions are cosmetic preparations that are applied to the skin of the hands and body. The lotion itself can be a suspension or an oil-in-water type emulsion with a suitable surfactant (Saidar, 2012) .

The choice of lotion preparations is because it is an emulsion preparation that is easily washed off with water and is not sticky compared to other topical preparations, the use of lotion preparations is also fast and easily distributed on the skin, the more water content is advantageous in the preparation because it becomes easy to apply, it also has the power of spreading and penetration is quite high and does not give a greasy feeling when used (Wula, 2018) . Triethanolamine is used commonly in topical preparations as an emulsifier and alkalizing agent . As an emulsifier, the concentration of triethanolamine used in topical preparations is 2-4%. The pH of triethanolamine as an alkalizing agent is 10.5 (Rowe, Sheskey, & Quinn, 2009) . Triethanolamine belongs to the class of water-soluble anionic surfactants. So the purpose of this research is to find out the evaluation of *lotion preparations* and to obtain the triethanolamine concentration that produces the best formula.

TOOLS AND MATERIALS

The tools used are evaporating cup (*pyrex*), mortar and stamper, stirring rod (*pyrex*), measuring cup (*pyrex*), *beaker glass* (*pyrex*), pipette (*pyrex*), analytical balance (*mini digital scale* 1-2000), glass object (*pyrex*), universal pH paper (*merck*), viscometer (NDJ-5S viscometer), blender (*phillips*), funnel (*pyrex*), *lotion bottle.*

The materials used are Moringa leaf extract, cetyl alcohol, stearic acid, lanolin, glycerol, triethanolamine, methyl paraben, lime perfume, *distilled water.*

METHODS

Preparation of Moringa Leaf Extract

The extraction method used was maceration method with 96% ethanol solvent. As much as 300 grams of Moringa leaf simplicia powder was soaked in a glass container with 1,700 ml of solvent, then covered with aluminum foil, the soaking was left for 3 days while stirring occasionally. The soak was squeezed out using a croton cloth, the maserate that had been squeezed was allowed to stand and the simplicia powder dregs were soaked again with 1,200 ml of new solvent, then left for two days. The marinade is squeezed again and the maserate is evaporated using a cup over a saucepan over low heat .

Phytochemical Screening of Moringa Leaf Extract

As much as 1 gram of Moringa leaf extract was put into *a beaker glass* , added 10 ml of 96% ethanol, stirred until dissolved, then filtered. Take 1 ml of the filtrate and put it in a test tube, add 10% NaOH reagent and change the color to orange or yellow if it is positive for flavonoid compounds.

Lotion Formulation procedure

Preparation of lotion preparations by melting the oil phase and the water phase. The formulation of Moringa leaf extract lotion can be seen in table 1. The oil phase (cetyl alcohol, stearic acid, lanolin), the water phase (glycerol, triethanolamine, methyl paraben, distilled water). The oil phase is added slowly to the water phase and then stirred until homogeneous. The two mixtures were added with 10 drops of moringa leaf extract and perfume, stirred until homogeneous, added distilled water little by little until a 100 ml ad emulsion was formed.

Table 1. Formulation

Material Name	Formulation (grams)			Function
	FI	FII	FIII	
Moringa Leaf Extract	3	3	3	Active substance
Cetyl Alcohol	3	3	3	Thickener
lanolin	2	2	2	Softener
Stearic Acid	6	6	6	Emulsifier
glycerol	4	4	4	Moisturizer
Triethanolamine	0	2,5	5	Emulsifier
Methyl Paraben	0.1	0.1	0.1	Preservative
Fragrance (Lime)	10 drops	10 drops	10 drops	deodorizer
Aquadest	Add 100	Add 100	Add 100	Solvent

Preparation Evaluation consists of:

1. Organoleptic Test
   Organoleptic test was carried out as a preliminary test which included texture, odor and color of *lotion* preparations .
2. Homogeneity Test
   The lotion homogeneity test was carried out by taking a small sample of the lotion, placing it between two glass objects and then observing it .
3. Viscosity Test
   The viscosity test was carried out by placing the entire lotion preparation into *a beaker glass* , then rotor number 4 was attached to the device. The viscosity value appears when the number on the tool has stabilized.
4. pH test
   1 gram of lotion sample was taken and dissolved in 10 ml of *aquadest , shaken until dissolved, then tested* using *universal pH paper and the test results were compared with the pH indicator.*
5. Stickiness Test
   Lotion as much as 0.25 grams is placed on the object glass. Another object glass is placed on top of the lotion, given a load of 1 kg for 5 minutes. The object glass is attached to the tool, then the 80 gram load is released , the time when the two object glasses are released is the result of stickiness.
6. Spreadability Test
   0.5 ml of lotion is placed in the middle of a tool with a diameter of 9 cm, another glass is placed on top and then left for 1 minute. The diameter of the lotion that spreads is measured, then 50 grams of additional weight is added, let stand for 1 minute. The spreading diameter is measured.

RESULTS

1. Preparation of Moringa Leaf Extract
   The extract is made in the form of a concentration of 78.4 grams with a yield value of 26.13%.
2. Screening of Moringa Leaf Extract
   The tests carried out were flavonoid compounds. 10% NaOH reagent is used with a color change to orange or orange (Ikalinus, Kayati Widyastuti and Eka Setiasih, 2015) .

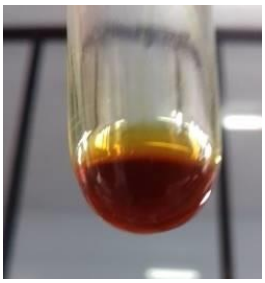

Table 2. Organoleptic test results

Observation	Formulas			K(+)
	I	II	II	
Texture	Slightly thic(separate)	Thick	Thick	Thick
Smell	Plant extracts	Plant extracts	Plant extracts	Plant extracts
Color	Dark yellow	Dark yellow	Dark yellow	White

Table 3. Homogeneity test results

Replication	Formula I	Formula II	Formula III	Positive Control
I	Inhomogeneous	Homogeneous	Homogeneous	Homogeneous
II	Inhomogeneous	Homogeneous	Homogeneous	Homogeneous
III	Inhomogeneous	Inhomogeneous	Homogeneous	Homogeneous

Table 4. Viscosity Test Results

Replication	Formula I	Formula II	Formula III	Positive Control
I	1,800 c. Ps	7,000 c. Ps	1,900 c. Ps	23,700 c. Ps
II	1,700 c. Ps	9,400 c. Ps	1,500 c. Ps	23,600 c. Ps
III	1,900 c. Ps	8,500 c. Ps	1,600 c. Ps	23,600 c. Ps
Mean ± SD	1800 ± 100	8300 ± 1212	1.666 ± 208	23,633 c. Ps

Table 5. pH test results

Replication	I	II	III
FI	acid	acid	acid
FII	Neutral	Neutral	Neutral

FIII	Acid	acid	acid
K(+)	Neutral	Neutral	Neutral

Table 6. Stickiness Test Results

Replication	Formula I	Formula II	Formula III	K(+)
I	02.50 sec	02.78 sec	01.60 sec	01.00 sec
II	03.42 sec	02.00 sec	01.31 sec	01.12 seconds
III	02.36 sec	01.82 sec	01.21 sec	00.80 seconds
Mean ± SD	02.76 ± 0.575	02.02 ± 0.510	01.37 ± 0.202	00.97 seconds

Table 7. Spreadability Test Results

Replication	Formula I	Formula II	Formula III	Positive Control
I	3.5cm	6.3cm	6.5cm	5.5cm
II	4.9cm	6.9cm	6.9cm	6.6cm
III	3.5cm	6.6cm	7.4cm	5.9cm
Mean ± SD	3.9 ± 0.808	6.6 ± 0.300	6.9 ± 0.450	6.0cm

Table 8. pH Stability Test Results

Storage	Formula I	Formula II	Formula III
Cold temperature			
Before (H 1)	acid	Neutral	Alkali
After (H 30)	acid	acid	Neutral
Humid Place			
Before (H 1)	acid	Neutral	Alkali
After (H 30)	acid	acid	Neutral
Direct Heat			
Before (H 1)	acid	Neutral	Alkali
After (H 30)	acid	acid	Neutral

DISCUSSION

Preparation of Moringa Leaf Extract

Making Moringa leaf extract uses the cold method, namely the maceration method because it is simple and the most widely used (Rahmi Latif, Sugihartini and Guntarti, 2020) . The maceration process was carried out for 5 days with solvent changes on the third day.

The maserate that has been filtered is then concentrated over low heat in order to avoid damage to the flavonoid compounds in the Moringa leaf extract.

Phytochemical Screening

10% NaOH reagent is used with a color change to orange or orange (Ikalinus, Kayati Widyastuti and Eka Setiasih, 2015) . Flavonoid compounds in Moringa leaf extract react with NaOH to form red quinoid compounds shown in Figure 1 (Sri Mulyani and Toga Laksana, 2011) .

Lotion Making

In the preparation of preparations there are differences in variations of triethanolamine so that in formulas II and III there is an emulsifying reaction between stearic acid and triethanolamine by forming a saponification reaction (Patihul, Alika Nuansa, & Ardian, 2019) . Making *lotion* , mortar and stamper preparations must be hot because to maintain the temperature in mixing compounds with higher melting points not to solidify again (Christina, 2009) .

The preparations made are included in the oil-in-water (O/W) emulsion type. Determining the type of emulsion can be seen from the use of an emulsifier, namely triethanolamine, which is more soluble in water and supported by the solvent used is water (Megantara *et al.* , 2017)

Organoleptic test can be seen from table 2. The texture of *lotion* formula I is different from formulas II and III because more *aquadest is used so that the texture of formula I is rather thick and there is a separation of the oil and water phases.* The odor produced in the *lotion preparation* is typical of Moringa leaf extract with a yellow color.

Homogeneity Test

Table 3 shows that formula I is not homogeneous, there is a separation of the oil phase and the water phase because the formula does not contain triethanolamine as an emulsifier. Formula II replication III is not homogeneous because the homogeneity of the preparation is also influenced by the method of stirring when mixing, such as stirring which must be constant (Noer and Sundari, 2016)

The viscosity requirement test for lotion preparations is 2000-50000 c.Ps, with test results obtained in the range from 1500 – 9400 c.Ps (Rahman, Astuti, & Dhiani, 2013) . Table 4 shows that all replication formulas did not meet the requirements because the preparation formed a

liquid emulsion so that it did not meet the minimum requirements for the preparation. Formula II meets the viscosity requirements and formula III does not meet the viscosity requirements because the preparation needed for testing is insufficient, namely the rotor is not completely submerged, which affects the results.

Data were tested statistically using *Shapiro Wilk* with normality results of 0.002 (<0.05). Data testing was continued using *Kruskal Wallis* with a significant value of 0.055 (> 0.05) so that variations or increases in the concentration of triethanolamine did not significantly affect the viscosity of the lotion. This is because the function of triethanolamine in the preparation is not a thickener but as an emulsifier.

The pH test is carried out to determine the acidity and basicity of the preparation so that the preparation can be known whether it is safe or not when used. The pH requirements for topical preparations are 4.5-8.0 (Pujiastuti, Kristiani, & Mangunwijaya, 2019) . The test uses a universal pH with a range between 5-8. The pH results obtained can be seen in table 5. All formulas showed different results due to the addition of different triethanolamine in each formula. This is because the pH of triethanolamine is 10.5 so that if the concentration of triethanolamine is higher, the pH of the preparation will increase (Saryanti, Setiawan, & Safitri, 2019)

The adhesion test is carried out to determine how long the lotion sticks to the skin with a standard of less than 4 seconds (Handayani, 2017) . The average result for each formula is 02.76 seconds; 02.02 seconds; 01.37 sec. The difference in results is caused when pulling the lever on the tool the speed and strength given are different so that the results of calculating the time are also different.

Statistical testing for the normality test used *Shapiro Wilk* with a significant result of 0.825 (> 0.05) . Subsequent data testing used *ANOVA* with a significant value of 0.028 (<0.05) so that variations in triethanolomaline concentration had an effect on the adhesion test.

Spreadability Test

Performed to show the lotion spread at the site of administration on the skin with the condition that the spread is 5-7 cm. Lotions that have good spreading power can ensure that the active compounds are spread evenly on the skin (Voight, 1995) . The data were tested normally

using *Shapiro Wilk* with a significant value of 0.038 (< 0.05) then the data were tested using *Kruskal Waliis* with a significant result of 0.054 (> 0.05) so that variations in triethanolamine concentration did not show any significant differences in the spreadability test. This is because the more triethanolamine used, the higher the spreading power of the preparation (Saryanti et al., 2019) .

pH Stability Test of Preparations

The pH stability test of the preparation was carried out to see the difference in pH value after the preparation of the preparation with a storage time of one month. The pH results obtained decreased with a range of 4-7. The pH tolerance for lotion preparations is 4.0-7.5 so that the pH of storage at various temperatures for one month can still be tolerated for use on the skin (Rusli & Pandean, 2017) .

The stability of the pH of the preparation is carried out to ensure the safety of using *the lotion* after being stored for ± 1 month. The pH parameter of the preparation itself is important to keep control over its safety, because the use of *lotion* is on the skin. Products that are too acidic or alkaline can damage the skin (Tranggono and Latifah, 2007).

CONCLUSION

Moringa leaf extract can be formulated as a *lotion* and and based on the results of the preparation evaluation test showed that the best formula was a lotion preparation with a 2.5% triethanolamine concentration.

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REFERENCES

Agus Setiani, Lusi, Bina Lohita Sari, Lusi Indriani, and Jupersio. 2017. Determination of Flavonoid Content of 70% Ethanol Extract of Shallot Skins Using Maceration and Mae Methods (Microwave Assisted Extraction). *Fitofarmaka: Scientific Journal of Pharmacy* 6(2): 5–9.

Christina, I. 2009. Optimization of mixing temperature and rotational speed in the cream formulation process. *Thesis.* Yogyakarta: Sanata Dharma University .

Fitria, V., Ismail, R., & Nugraha, D. (2017). Uji Aktivitas Mukolitik Infusa Daun Karuk (Piper Sarmentosumroxb. Ex. Hunter) Pada Mukus Usus Sapi Secara In VitrO. DII Farmasi Stikes Muhammadiyah: Ciamis, 9-11Handayani, Y. 2017. Formulation and Evaluation of Hand And Body Lotion Sari Tumbi Carrot (Daucus Carota L) With Triethanolamine Concentration Variations As An Emulgator. *KTI.* Ciamis: STIKes Muhammadiyah Ciamis.

Hardiyanthi, F. 2015. Utilization of Antioxidant Activity of Moringa Leaf Extract (Moringa oleifera) in Hand and Body Cream Preparations . *Thesis* . Jakarta: Syarif Hidayatullah State Islamic University.

Ikalinus, Robertino, Sri Kayati Widyastuti, and Ni Luh Eka Setiasih. 2015. Phytochemical Screening of Ethanol Extract of Moringa Stem Bark (Moringa Oleifera). *Indonesia Medicus Veterinus* 4(1): 71–79.

Listiana, L., Wahlanto, P., Ramadhani, S. S., & Ismail, R. (2022). Penetapan Kadar Tanin Dalam Daun Mangkokan (Nothopanax scutellarium Merr) Perasan Dan Rebusan Dengan Spektrofotometer UV-Vis. Pharmacy Genius, 1(1), 62–73

Megantara, INA. *et al.* 2017. Lotion Formulation of Raspberry Fruit Extract (Rubus Rosifolius) With Variation of Triethanolamine Concentration as an Emulgator and Hedonic Test for Lotion, *Udayana Pharmacy Journal* , 6(1), pp. 1–5.

Noer, H. Benjamin M, and Sundari. 2016. Hand and Body Lotion Formulation of White Dragon Fruit Skin Extract (Hylocereus Undatus) and Its Physical Stability Test. *Health* XI(1): 101–14.

Patihul, H., Alika Nuansa, P., & Ardian, B. 2019. Cream Formulation of Moringa Leaf Ethanol Extract (Moringa oleifera Lamk) . *2* (2).

Pujiastuti, A., Kristiani, M., & Mangunwijaya. 2019. Formulation and Mechanical Stability Test of Hand and Body Lotion Tomato Juice (Licopersicon esculentum Mill.) as an Antioxidant. *Indonesian Pharmacy Journal* , *16* (1), 42–55

Rahman, AG, Astuti, IY, & Dhiani, BA 2013. Lotion Formulation of Bangle Rhizome Extract (Zingiber purpureum Roxb) with Triethanolamine Concentration Variations as Emulgator and Irritation Test. *Pharmacy* , *10* (01), 41–54.

Rahmi Latif, Auliah, Nining Sugihartini, and Ani Guntarti. 2020. Physical Properties of A/M Type Cream with Variation of Concentration of Moringa Oliefera Moringa Leaf Ethanol Extract Using Tween 80 and Span 80 Emulgators. *Pharmaceutical Media of Makassar Poltekes* XVI(1): 9–17.

Rowe, C., Sheskey, P., & Quinn, M. 2009. *Handbook of Pharmaceutical Excipient Sixth Edition* . London: Pharmaceutical Press.

and body lotion formulation with antioxidants and young cashew leaf extract (Anacardium ocidentale L.). *Warta Pharmacy* , *6* (1), 57–64.

Saidar. 2012. Formulation and Physical Stability Test as well as Anti-Mosquito Effect Test of Fennel Oil Lotion (Foeniculum Vulgare Mill). *Thesis* . Makassar: Alauddin State Islamic University.

Saryanti, D., Setiawan, I., & Safitri, RA 2019. Optimization of M/A Cream Preparation Formula From Kepok Banana Peel Extract (Musa acuminata L.). *Indonesian Journal of Pharmaceutical Research* , *1* (3), 225–237.

Sayuti, NA, AS, I., & Suhendriyo. 2016. Hand & body lotion antioxidant formulation with traditional lulurus extract. *The Integrated Journal of Health Sciences* , *5* , 110–237.

Sri Mulyani and Toga Laksana. 2011. Analysis of Flavonoids and Tannins Using Microscopy-Microchemical Methods Flavonoids and Tannins Analysis With Microscopy – Microchemical. *Traditional Medicine Magazine* 16(3): 109–14.

Susanty, Naufal Abiyu Ridnugrah, Alfan Chaerrudin, and Sri Anastasia Yudistirani. 2019. Antioxidant Activity of Moringa Leaf Extract (Moringa Oleifera) as an Additive for Making Moisturizers. *Science And Technology* : 1–7.

Tranggono, Retno Iswari, Latifah, Fatmah. 2007. *Handbook of Cosmetic Science* . Jakarta: PT. Main Library Gramedia.

Voight, R. 1995. *Textbook of Pharmaceutical Technology* . Yogyakarta: Gajah Mada University Press.

Wula, MRW (2018). Characteristics and Stability of Ethanol Extract of Faloak (Sterculia sp) Stem Bark Lotion . In *Kti* . Kupang: Ministry of Health Polytechnic of Kupang.

Yuliani, W., & Ismail, R. (2023). Uji Aktivitas Antijamur Fungi Endofit Tanaman Sarang Semut (Myrmecodia pendans) Terhadap Jamur Candida albicans. Pharmacy Genius, 2(1), 31–42.

Yusuf, A. L., Nugraha, D., Wahlanto, P., Indriastuti, M., Ismail, R., & Himah, F. A. . (2022). Formulasi Dan Evaluasi Sediaan Gel Ekstrak Buah Pare (Momordica Charantia L.) Dengan Variasi Konsentrasi Carbopol 940. Pharmacy Genius, 1(1), 50–61.