

## **EFFECT OF USING MORINGA LEAVE (*MORINGA OLEIFERA L.*) AND PINEAPPLE (*ANANAS COMOSUS*) LEAF LOTION GEL LOTION ON SKIN MOISTURE**

**Ariyanti\*, Eni Masruriati, Dwi Setyowati, Filza Mazaya Nurulita**

Pharmacy Undergraduate Study Program, Sekolah Tinggi Ilmu Kesehatan Kendal, Jl. Laut No. 31, Kendal, Central Java 51311, Indonesia

\*[ariyanti@stikeskendal.ac.id](mailto:ariyanti@stikeskendal.ac.id)

### **ABSTRACT**

The compounds contained in Moringa leaves are rich in phenolic acids, flavonoids, alkaloids, tannins, glucosinolates and isothiocyanates, all of which are antioxidants. Moringa leaves contain B2 which is useful for treating and maintaining skin moisture. Pineapple fruit contains vitamin C and vitamin A, the second vitamin is known to have antioxidant activity that can stop the reaction of forming free radicals. Moringa leaves and pineapple contain antioxidant compounds which are useful as skin moisturizers which are formulated in the form of a gel lotion. This study aims to determine the effect of using moringa leaf extract gel lotion and pineapple fruit on skin moisture. This study was initiated by formulating lotion preparations with the addition of concentrations of moringa leaf extract and pineapple fruit, namely concentrations of 3% (F1) 4% (F2) 5% (F3). Lotion gel was evaluated for physical stability by testing pH, viscosity, adhesion, spreadability, irritation test, specific gravity test and skin moisture test. This study uses an experimental method. The results showed that the formula concentrations of 3%, 4% and 5% all met the requirements of the physical stability test as a skin moisturizing lotion gel preparation. The higher the concentration of the extract, the wider the spreadability and viscosity value obtained, has no effect on adhesion and pH value. Lotion preparations of moringa leaf and pineapple fruit extracts with a concentration of 5% have a high ability as skin moisturizers. The results showed that the formula concentrations of 3%, 4% and 5% all met the requirements of the physical stability test as a skin moisturizing lotion gel preparation. The higher the concentration of the extract, the wider the spreadability and viscosity value obtained, has no effect on adhesion and pH value. Lotion preparations of moringa leaf and pineapple fruit extracts with a concentration of 5% have a high ability as skin moisturizers.

**Keywords:** antioxidant compounds; moringa leaves; moisturizing gel lotion; pineapple fruit

### **INTRODUCTION**

The current era of globalization, back to nature, is sweeping the world in increasing research on cosmetic formulas using natural plants as active ingredients. Cosmetic preparations are no longer an additional need, but a basic need to obtain and maintain healthy skin as an external treatment (Iskandar et al., 2021). Many cosmetics that are circulating outside use chemicals in their contents, such as hydroquinone, retinoic acid, mercury and additional coloring agents which can cause irritation to the skin when used which causes the skin to become itchy, reddish, allergic and can also get skin cancer if used for a long time. long time (Kisworo, 2020). Materials from plants are a good alternative to use in cosmetic preparations because there are no side effects in long-term use, easy to process and ingredients can be found around the environment.

Indonesia has vast natural wealth and natural resources. Regions throughout Indonesia are known for their natural resource yields, both because they come from agriculture as well as fertile plantations (Mulyani et al., 2020). Plants that have not been optimally utilized in the cosmetic field

are moringa leaves and pineapple fruit because so far they have only been used for consumption, receiving less attention for their use as ingredients in cosmetics for body skin care. The compounds contained in Moringa leaves are rich in phenolic acids, flavonoids, alkaloids, tannins, glucosinolates and isothiocyanates, all of which are antioxidants.(Susanty et al., 2019). Moringa leaves also contain B2 which is useful for treating and maintaining skin moisture(Ulandari & Sugihartini, 2018). Pineapple also contains antioxidants, such as citric acid, tannins, saponins, flafonoida and polyphenols. Pineapple fruit also contains vitamin C and vitamin A, these two vitamins are known to have antioxidant activity which can stop free radical formation reactions that occur in the body.(Firdausi et al., 2021). The antioxidants found in Moringa leaves and pineapple are very good for use as cosmetic body care ingredients in the form of lotions.

*Lotions* is one of the cosmetic preparations in the emollient or softener class, which contains more water(Pradiningsih et al., 2022). Lotion is used to maintain skin moisture, clean the skin, prevent dehydration of the skin and to maintain the active ingredients in it(Azzahra et al, 2023). The constituent components of the lotion, namely emulsifiers, moisturizers, active ingredients, cleansers, solvents, fragrances and preservatives(Sari et al., 2021). Lotion has advantages compared to other topical preparations because it is easy to spread evenly, easy to use or easily applied to the skin, direct action on local tissues, easy to achieve the desired therapeutic effect, relatively high penetration, does not give a greasy feeling when smeared and easy to wash off use water(Sudewi et al., 2021). Skin moisturizing preparations from moringa leaf extract and pineapple fruit are made in gel lotion preparations. Gels are semi-solid systems consisting of suspensions made up of small inorganic particles or large organic molecules, interpenetrated by a liquid(Siva & Afriadi, 2019). Based on the background above, a development research was carried out, one of which was the preparation of a gel lotion preparation, a combination of Moringa leaf extract and pineapple fruit which is efficacious as a skin moisturizer. The formulation of lotion gel preparations of moringa leaf extract and pineapple fruit is expected to keep the body's skin moist.

## **METHOD**

The research method used was an experimental research method in the Kendal STIKES pharmaceutical laboratory. The methods used in this study include:

### **Preparation of Plant Extracts**

1. Preparation of Moringa leaf extract

Moringa leaves were obtained from one of the farmers who cultivates Moringa leaves in Kendal City, Central Java. The obtained moringa leaves are dried in the sun until dry, then crushed using a blender to become a fine powder. Moringa leaf powder was weighed and put in a maceration vessel as much as 35 grams. The extraction process is carried out in a container, using a solvent in the form of 70% ethanol with a ratio of moringa leaves and ethanol as much as 1:10(Hasanah & Khumaidi, 2017). Maceration was carried out for 3 x 24 hours protected from sunlight and tightly closed while stirring occasionally. The maceration results were filtered, then concentrated using a rotary evaporator until the desired thick extract was obtained.

2. Preparation of pineapple fruit extract

Pineapple fruit is obtained from plantations in the City of Kendal, Central Java. The pineapple fruit obtained was peeled from the skin, then washed and chopped as much as 450 grams.

Pineapple fruit is mashed using a blender with 70% solvent as much as 4500 ml. Pineapple fruit that has been mashed is extracted by maceration method. The fine extract of pineapple fruit is put in the maceration container, closed tightly and left for 3 x 24 hours protected from sunlight while often stirring occasionally.(Widyanto et al., 2020). The maceration results were then filtered using filter paper and concentrated using a rotary evaporator until the desired thick extract was obtained.

### Research Tools and Materials

1. The tools used include:  
 Glassware, pH meter, mortar and stamper, beaker glass, measuring cup, digital balance, rotary evaporator, spatula, stir bar, pipette, filter paper, blender, knife, parchment paper.
2. The materials used include:  
 Moringa leaf extract, pineapple fruit extract, HPMC, methyl paraben, propylene glycol, propyl paraben, disodium EDTA, glyceryl monostearate, aquadest.

### Lotion Gel Preparation Formulation

The gels were prepared in 3 formulations which were differentiated by HPMC concentration. HPMC with various concentrations, namely 5%, 10%, 15%, and negative control. Each as much as 100 grams in the same base composition.

According to Saryanti et al., (2019) gel standard formula, including:

gelatin	4 gr
Sodium Alginate	2 gr
Glycerol	20 gr
Nipagin	0.2 gr
Distilled water ad	100 gr

The formulation of lotion gel preparations can be seen in table 2.1.

Table 1  
 Formulation of Moringa and Pineapple Leaf Extract Lotion Gel

Material name	Unit	Negative control	FI	FII	FIII	Positive control	Function
Moringa leaf extract	g	15	15	15	15	Hanasui Body	Active substance
Pineapple extract	g	15	15	15	15	Serum Gel Vitamin C	Active substance
HPMC	%	0	3	4	5		Gelling agent
Methyl paraben	g	0.04	0.04	0.04	0.04		Preservative
Propylene Glycol	g	20	20	20	20		humectants
Propyl paraben	g	0.02	0.02	0.02	0.02		Preservative
Disodium EDTA	g	0.06	0.06	0.06	0.06		Chelating agent
Glyceryl monostearate	g	0.2	0.2	0.2	0.2		Emulsifying agent
Aquadest	g	100	100	100	100		solvent

Information :

F1 : HPMC Concentration 3%

F2 : HPMC Concentration 4%

F2 : HPMC Concentration 5%

Negative Control: Gel without Moringa leaf extract and pineapple fruit

Positive Control: Hanasui Body Serum Gel Vitamin C

### **Making lotion gel preparations**

All the necessary ingredients are weighed. Prepare a clean mortar, add HPMC, then stir in hot water until homogeneous. Add methyl paraben and propylparaben into the beaker glass, dissolve with hot water. Once dissolved, add propylene glycol, and gradually add disodium EDTA dissolved in distilled water. Then add glycerol monostearate as a lotion base and add the remaining distilled water little by little. Then mix the moringa leaf extract and pineapple fruit extract with the other additional ingredients. Then stir and grind gently to form a homogeneous gel base. Place the preparation in the container provided. Do the same for each formula.

### **Evaluation of Lotion Gel Preparations**

1. Organoleptic test

The gel preparations of moringa leaf extract and pineapple fruit extract were observed physically which included odor, color, homogeneity and concentration of the preparations.

2. pH test

Test the pH using a universal pH stick. pH measurements were carried out 3 times. The pH test aims to determine whether the nanoemulgel preparations made are in accordance with the pH of the gel preparations or not, the nanoemulgel preparations must have a skin pH value in accordance with the provisions of the Indonesian National Standard (1996), namely a pH value ranging from 4.5-8. So it does not cause irritation to the skin when used (Purwaningsih et al., 2020).

3. Viscosity test

The viscosity of the gel lotion was measured using the RION viscometer rotor no. 1 and rotor no. 2. The gel sample was put in a pot to be tested. The rotor is placed in the middle of the pot containing lotion, then the device is turned on. The numbers obtained will appear on the screen, after they are stable, the scale on the viscometer is read. The test was carried out 3 times.

4. Stickiness test

*Lotions* 0.15 gram of gel was placed on the object glass and affixed to another glass object, then pressed with a load of 1 kg for 5 minutes. The object glass is mounted on the test kit and 80 grams of load is released. The time required until the glass object is released is recorded. The test was repeated 3 times.

5. Spreadability test

Good gel spreadability, which is around 5-7 cm (Kharisma & Safitri, 2017). The lotion gel sample was weighed as much as 0.5 gram and placed in the center of the first petri dish that had been given a millimeter block. The second petri dish is placed on top of the first petri dish as an initial load for 1 minute. Measure the diameter of the spread of the nanoemulgel on 4 sides of the petri dish. The spreadability test was repeated with an additional load of 50 grams every 1 minute until the load was 300 grams. Spreadability test was carried out 3 times.

6. Irritation test on volunteers

There were 10 volunteers who were used as panelists for the irritation test and moisture test.

Inclusion criteria, among others:

- a) Healthy woman
- b) Age between 17-25 years
- c) There was no history of allergies or skin irritation
- d) Volunteers are the closest people and are often around, so it's easier and it's easier to observe if there is a reaction that occurs on the skin being tested.

To find out whether there are side effects or not, a skin irritation test is performed. The gel was applied to the arm with a diameter of 3 cm and left for 3 hours, then observed the changes that occurred.

7. Moisture test

The moisture test lasted for 1 week before the gel preparations were subjected to the irritation test on the panelists. Moisture on the skin of the panelists was first measured using a Skin Analyzer FCM-1. Panelists were asked not to use other topical preparations for 1 week before and during the study. The test location was smeared on the arm with a diameter of 4 cm by using the gel 2x a day after bathing. There were 10 panelists. Moisture measurements were carried out using a Skin Analyzer using the % parameter, namely dehydration around 0-29, normal 30-20, dehydration 51-100(Firdausi et al., 2021).

**RESULTS AND DISCUSSION**

The product in the form of a moisturizing gel lotion was made in 2 kinds, namely with and without Moringa leaf extract and pineapple fruit extract as a test and as a test control. In the gel preparation formula for moringa leaf extract and pineapple fruit extract, various gelling agents of Hydroxy Propyl Methyl Cellulose (HPMC) are used. Formulas I, II, and III with concentrations of 3%, 4% and 5% respectively. The gel lotion formula for Moringa leaf extract and pineapple fruit extract consists of Moringa leaves and pineapple fruit as active ingredients, HPMC as a gelling agent, methyl paraben and propyl paraben as preservatives, propylene glycol as a humectant, glyceryl monostearate as an emulsifying agent, disodium EDTA as a chelating agent. , and aquadest as a solvent. The results and discussion of the physical stability test in this study include:

Table 1  
 Organoleptic Test Results of Lotion Gel combination of Moringa Leaf Extract and Pineapple Fruit Extract

Lotion Formulas	Organoleptic			
	Color	Aroma	Homogeneity	Texture
F0	Purplish blue	Fresh specialty	Homogeneous	Semi solid easy to pour
F1	Purplish blue	Fresh specialty	Homogeneous	Semi solid easy to pour
F2	Purplish blue	Fresh specialty	Homogeneous	Semi solid easy to pour
F3	Purplish blue	Fresh specialty	Homogeneous	Semi solid easy to pour

Table 1 It can be seen organoleptic that all formulas are purplish blue in color, homogeneous, with a semi-solid texture with a fresh distinctive aroma, because the formula contains pineapple extract which has a strong odor which will give a fresh sensation.

### 1. pH test

A pH test is obtained to determine whether the lotion is too acidic or too alkaline. The pH of the lotion that is too acidic or too alkaline can cause skin irritation, the acceptable pH of the lotion on the skin varies between 4.5 and 8. The pH measurement is carried out 3 times from adjacent locations and the average pH results are determined from the two lotions with each each of these formulas. The results of the pH test can be seen in table 3.2.

Table 2

pH Test Results of Lotion Gel Lotion Gel combination of Moringa Leaf Extract and Pineapple Fruit Extract

Lotion Formulas	pH (3 repetitions)			pH Range	Information
F0	5.0	5,1	5.0	5.0-5.1	Qualify
F1	5,3	5,3	5,2	5,2-5,3	Qualify
F2	5,5	5,5	5,5	5,5	Qualify
F3	5,9	6.0	6.0	5.9-6.0	Qualify

Note: pH requirements = 4.5-6.5

The results of the pH test are based on table 2 all formulas meet the requirements.

### 2. Spreadability Test

This test is carried out to then show the spread of the lotion on the skin.

Measurements are made by applying cream to the glass in the middle, then covered with the same glass. Then measuring using a ruler with a diameter of 4x/4 will give the average diameter.

Then different loads are given starting from 50 grams to 2000 grams and always 4 diameters.

The results of the spreading power test can be seen in table 3

Table 3

Test Results of Spreadability of Lotion Gel of Moringa Leaf Extract and Pineapple Fruit Extract

Lotion Formulas	Deployment diameter (cm) (3 repetitions)			Average	Information
F0	6,9	6,9	7.0	6.9-7.0	Qualify
F1	6,8	6,8	6,8	6,8	Qualify
F2	6,5	6,5	6,5	6,5	Qualify
F3	5,4	5,3	5,3	5,3-5,4	Qualify

Note: Requirements 5-7 cm

The results of the spreading power test are based on table 3 all formulas meet the requirements.

### 3. Specific Gravity Test

The results of the specific gravity test can be seen in table 4

Table 4

Specific Weight Test Results for Lotion Gel of Moringa Leaf Extract and Pineapple Fruit Extract

Lotion Formulas	Specific Weight (g/ml)	Information
F0	0.9785	Qualify
F1	1.0256	Qualify
F2	0.9874	Qualify
F3	0.9941	Qualify

Note : Requirements 0.95-1.05 g/ml

Specific gravity test results based on table 4 all formulas meet the requirements.

4. Viscosity Test

Viscosity test was carried out to determine the thickness of the lotion with a viscometer. Viscosity affects the viscosity of how much of the material dissolves in the water or oil used. The more the material dissolves in water, the lower the viscosity. Good viscosity value is about 50-80%.

Test results viscosity can be seen in table 5

Table 5

Viscosity Test Results for Lotion Gel, Moringa Leaf Extract and Pineapple Fruit Extract

Lotion Formulas	Viscosity(cps)	Information
F0	1997	Not eligible
F1	2001	Qualify
F2	3650	Qualify
F3	2778	Qualify

Note: Requirements 2000-50000 cps

The results of the viscosity test are based on table 5 all formulas meet the requirements, except F0 which does not meet the requirements.

5. Stickiness Test

This test is carried out to determine the strength of the lotion to stick to the skin and achieve the right results. The stronger the strength, the sticky nature of the lotion can make it difficult for the skin to breathe, so it's not good for the skin. If it is too weak, the effect will be reduced the most. This test is carried out by applying lotion to a glass object then covering it with another jar and letting it sit for 1 minute with the load above, after that a new measurement is made with a pulley and the distance between the two glasses is recorded.

Table 6.

Stickiness Test Results of Moringa Leaf Extract Gel Lotion and Pineapple Fruit Extract

Measurement	<i>Lotions</i> Test	<i>Lotions</i> Control
I	0.085 sec	0.06 sec
II	0.096 sec	0.043 sec
III	0.12 sec	0.041 sec
X (average)	0.1 sec	0.04 sec

Test results adhesive power can be seen in table 6.

From table 6 it can be concluded that lotions made from moringa leaf extract and pineapple fruit extract have stronger adhesion compared to control lotions. This shows that the lotion with the extract has a maximum effect compared to the control lotion (without moringa leaf extract and pineapple fruit extract).

## CONCLUSION

Based on this research, it can be concluded that the lotion made does not cause significant side effects, because the preparations made from natural ingredients used are moringa leaf extract and pineapple fruit extract which are rich in antioxidant compounds so that they can be formulated as skin moisturizing products. Formula concentrations of 3%, 4% and 5% all meet the requirements of the physical stability test as skin moisturizing gel lotion preparations. The higher the concentration of the extract, the wider the spreadability and viscosity value obtained, has no effect on the stickiness and pH value. Lotion preparations of moringa leaf extract and pineapple fruit with a concentration of 5% have a high ability as skin moisturizers.

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