FORMULATION OF MELON WATER CREAM PREPARATION (*Curcumis melo* L.) AS A SKIN MOISTURIZER

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Abstract: Environmental factors such as extreme sunlight may disrupt skin's moisture balance and cause tthe skin to dry out. The skin is a part of the human body that acts as a protector from external stimuli and disturbances. A common skin problem is dry skin. The problem of dry skin can be overcome by using skin care products such as moisturizing cream preparations. Melon fruit contains sucrose humectant compounds that can attract water to the epidermis layer of the skin and hydrate the skin, and have antioxidant properties that prevent the negative effects of free radical formation. This study aims to determine the formulation of melon water cream preparations (Cucumis melo L .) as a moisturizer by varying the concentration of melon water and knowing the physical quality evaluation of melon water cream preparations (Cucumis melo L.). In this study, the concentration of melon water used was 0% (FI), 15% (FII), 25% (FIII), and 35% (FIV).
Evaluation of the preparation includes physical quality tests (organoleptis, pH, dispersion, adhesion, emulsion type, humidity and stability). An increase in the water concentration of melon fruits was able to add increased humidity. The best formula that meets the test specifications both before and after the cycling test is FII (Melon juice 15%) with pH 6.4, dispersion 6cm, adhesion 07.24 seconds, cream type M/A, humidity 52.3%. The conclusion of the research results that melon water cream (Cucumis melo L.) is able to moisturize the skin.

1 INTRODUCTION

Indonesia is a tropical country with excessive sun exposure that puts the skin at high risk of various skin damages. One of the impacts of excessive sun exposure is the evaporation of water on the surface of the skin which causes the skin to become dry and the prevalence of dry skin in Indonesia is 50%-80% (Sinulingga, *et al*. 2018).

Dry skin is the most common skin problem and if left untreated will lead to other skin problems such as irritation, cracked skin, acne, and dull skin, thus accelerating premature aging. Dry skin can be caused by endogenous factors (such as genetics, age, and gender) and exogenous factors (such as temperature, air humidity, chemical exposure and lack of skin nutrition). Naturally, the skin tries to protect itself from dry skin by the hydrophilic material contained in the stratum corneum called Natural Moisturizing Factor (NMF). NMF is a humectant (moisturizer) and natural protection that can effectively maintain the consistency of water in the stratum corneum to prevent cracking, partitioning, and flaking of the skin. However, under certain conditions (such as in winter, excessive sun exposure, or detergent sensitivity), NMF may be less able to provide adequate protection, so an additional non-natural protection for the skin is needed, namely the use of moisturizing creams (Danny, 2021).

One of the treatments to keep the skin moisturized is a cosmetic moisturizer.

Melon (Cucumis melo L.) is a fruit that contains several vitamins and minerals that are beneficial for the health of the body. Cantaloupe melon is a source of vitamin C, vitamin A, potassium, vitamin B6, folic acid, and niacin. The content of vitamin A and vitamin C in melons.

Based on previous research by Mellisa, et al. (2022), formulated a moisturizing preparation of

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orange melon fruit extract (Cucumis melo var. Reticulatus) in the form of a cream. In this study the results obtained were orange melon contains sucrose as a moisturizing agent and antioxidant substances that can help normalize the skin. Orange melon fruit contains various antioxidant compounds, vitamin C, and secondary metabolites from the terpenoid and flavonoid groups that are efficacious against the formation of free radicals.

According to previous research by Nadia, et al. (2022), formulated a moisturizing cream preparation of Citrulluslanatus fruit water extract with varying concentrations of tween 80 and span 80 emulgators. Emulgators are additives used to reduce the interfacial tension between oil and water with the aim of preventing the separation of dispersed phases. Cream can be formed and stabilized if using emulgators, the group used is surfactants. The surfactant group was chosen because it is able to reduce the interface tension, able to increase viscosity so that it can form a semi- solid preparation that is stable and effective at low concentrations. So this study uses nonionic tween 80 and span 80 emulgators that are able to form and produce more stable emulsions because they have a combination of water-soluble and fat-soluble emulsifiers.

Based on the above background, researchers are interested in formulating melon fruit (Cucumis melo L.) as a skin moisturizing cream.

2 RESEARCH METHODS

This study is an experimental research method using melon fruit water (Cucumis melo L.) to test skin moisture.

3 MELON FRUIT WATER MAKING

Weighed 3000 grams of fresh melon fruit, then mashed it using a juicer, then extracted the melon juice.

4 PHYTOCHEMICAL SCREENING

a. Flavonoids

To 2 ml of sample, 0.1 gram of magnesium powder, 1ml of concentrated hydrochloric acid and 5ml of amyl alcohol were added. The solution was then shaken and allowed to separate. The red or orange color formed indicates the presence of flavonoids.

b. Alkaloids

A sample of 2 ml was tested with 3 alcohol reagents, namely dragendrof reagent and mayer reagent. Positive test results are obtained if a red to orange precipitate is formed with dragendrof and a yellowish white precipitate with mayer reagent.

c. Tannin

Test tannins as much as 2 ml of sample in a test tube add 2-3 drops of FeCl 1%. Positive results if a blue-green-black color is formed.

d. Steroids / Triterpenoids

2 ml was added 1 drop of anhydrous acetic acid reagent and 1 drop of concentrated sulfuric acid, observed the changes that occur, if the powder is positive for steroid/triterpenoid compounds, it will be marked by the formation of purple or red color which turns brownish red.

e. Phenol

FeCl3 1% is added to the sample until a color change occurs, then the color is compared to the pure sample, it will appear blacker if positive.

f. Saponin

A 2 ml sample is cornered vigorously. If there is foam let stand for 10 minutes then add 1 drop of HCl 2N if the foam is still stable then it is positive for saponins.

g. Quinone

A 2 ml sample was put into a test tube and then added 1 drop of 1N Sodium Hydroxide. if a red color is formed, it indicates the presence of quinone content.

Melon Fruit Water Moisturizing Cream Formulation

Table 1. Cream Formulation

Materials Name	Cream Formulation(%) F1	F2	F3	F4	Usability
Fruit Water	0	15	25	35	Active Substances
Cetyl Alcohol	7	7	7	7	Stiffening
Adeps Lanae	10	10	10	10	Bases
Glycerin	5	5	5	5	Humectant
Propyleng Lycol	10	10	10	10	Stabilizing
Tween 80	3	3	3	3	Emulgator
Span 80	3	3	3	3	Emulgator
Metyl Paraben	0,15	0,15	0,15	0,15	Preservative
Propyl Paraben	0,2	0,2	0,2	0,2	Preservative
Aquadest	ad100	ad100	ad100	ad100	Solvent

(Source: Safitri, et al. 2022)

Cream Making Method

The oil phase of span 80, cetyl alcohol, and adeps lanae were melted together at 70°C. methyl paraben and propyl paraben were dissolved in propylenglycol. The aqueous phase, namely tween 80, glycerin, distilled water, propylenglycol, was heated at 70 °C. The oil phase and aqueous phase were mixed into a hot mortar and then crushed to form a creamy mass. Melon fruit water was added slowly to the cream base that had been formed, then stirred until homogeneous.

Cream Preparation Evaluation Test

a. Organoleptical Test

Organoleptical test is intended to see the physical appearance of the preparation which includes the shape, color and odor of the cream preparation containing melon fruit water (Wulandari, *et al.* 2019).

b. Homogeneity Test

The homogeneity test is carried out using two glass objects, where the sample is placed on one of the objects and placed evenly. The cream preparation must show a homogeneous composition (evenly mixed) and no coarse particles are visible (Mulyani T,*et al.* 2018).

c. pH test

The pH test was carried out using a pH meter. The cream preparation weighed as much as 3 grams was diluted with 30 ml of distilled water in a beaker glass. The electrode is dipped in the solution. The formula must meet the pH criteria of the skin, which is in the internal 4.5 - 6.5 (Yuniarsih, et al. 2020).

d. Adhesion Test

The adhesion test was carried out by placing the cream on the glass object with the bottom side of the rope attached to tie the load. Then attached to another glass object. The load used is 50 grams and then observed the time until the two glass objects are separated. The standard of good adhesion is 2-300 seconds (Ashar, 2016).

e. Spreadability Test

Weigh 0.5 grams of cream, then place the cream on the glass. Then cover with a small glass that was previously weighed. Give a load of 150 grams and then let stand for 1 minute. Then note the diameter of the spread. The requirement for good spreadability ranges from 5-7 cm (Octavia, 2016).

f. Moisture Test

The moisture test was carried out by applying the cream preparation on the forearm of the researcher. Observation of the results was carried out by observing physical changes and measuring the absorption with a Skin Analyzer tool, good moisture for the skin ranges from 40-65% (Naibaho et al., 2013).

g. Cream Type Test

A number of cream preparations are placed on the glass object, then add 1 drop of methyl blue stirred with a stirring rod. If the methyl blue is spread evenly, it means that the type of cream produced is oil in water (M/A). if blue spots appear, the type of cream produced is water in oil (A/M) (Agoes, 2012).

h. Stability Test with Cycling Test method

Cycling test is a test used to see the physical stability of the cream for 24 hours. The test is considered as one cycle and is carried out for 9 days. The cream samples were stored at a refrigerator temperature of 4°C - 8°C for 24 hours then room temperature for 24 hours then put into the oven at 40°C for 24 hours. This cycling test was conducted for 3 cycles (Aryani, 2015).

4 RESULTS AND DISCUSSION

4.1 Melon Fruit Water Preparation Results

Water melon (Cucumis melo L.) obtained as much as 3kg, then peeled melon skin first, then peeled melon fruit then melon fruit is cut like the size of a dice, melon fruit that has been cut then washed with running water so that the dirt that sticks is lost. Then the melon fruit is mashed using a juicer to separate the water and pulp. Fruit water is obtained from 3 kg of melon fruit as much as 300ml of fruit water.

Results of Phytochemical Screening

Table 2. Phytochemical screening

Compound Groups	Result
Flavonoid	Positive
Alkaloid	Negative
Tannin	Negative
Saponin	Negative
Steroid/Terpenoid	Negative
Phenol	Negative
Quinone	Negative

4.2 Cream Formulation Quality Test Results

a. Organoleptical Test

Organoleptical test is an examination by looking at the physical appearance of a preparation which includes shape (texture), color and odor. In organoleptic test creams are carried out to determine any changes in the preparation which include color, shape and odor. Based on the results of the study, there were no changes in texture and odor in each formula during storage for 9 days (3 cycles) with the Cycling Test.

b. Homogeneity Test

Homogeneity test is carried out to determine the homogeneity of the preparation which is intended by not having coarse grains or no particles in the preparation. The homogeneity test aims to see the uniformity of particles in the cream preparation so that it provides good and maximum quality when used.

Table 3. Homogeneity Test Results

Formula	Homogeneity		
	Cycle1	Cycle2	Cycle3
I	Homogen	Homgen	Homogen
II	Homogen	Homgen	Homogen
III	Homogen	Homgen	Homogen
IV	Homogen	Homgen	Homogen

The homogeneity test results showed that the preparation of melon fruit water cream (Cucumis melo L.) all formulas met the preparation requirements because the preparation did not contain particles or coarse grains.

3.4 pH test

The pH test is carried out to determine the pH of the preparation in accordance with the pH of the skin so as not to irritate the skin during use. If the preparation has a low pH or <4.5 it can irritate the skin, on the other hand, if the pH of the preparation is too high or >6.5 it will cause the skin to dry out (Firdausi *et al.*, 2021).

Table 4. pH Test Results

Formula	Average pH		
	Cycle1	Cycle2	Cycle3
I	5,9	6,4	5,8
II	6,3	6,2	6,0
III	6,4	6,1	6,0
IV	6,0	6,2	6,0

Based on the results of the table above, it can be concluded that the pH of the cream preparation shows that the cream meets the skin pH requirements of 4.5-6.5.

d. Spreadability Test

Scatterability testing is done to determine the ability of the speed of spread of the cream on the skin when applied to the skin. The greater the spreadability given, the wider the ability of the active substance to spread on the skin. The smaller the spreadability given, the smaller the ability of the active substance to spread on the skin.

Table 5. Results of Spreadability Test

Formula	Average Spreadability		
	Cycle1	Cycle2	Cycle3
I	6,0	5,8	5,8
II	5,3	5,8	5,5
III	5,3	5,6	5,8
IV	5,3	5,3	5,5

in formula I with an average of 5.8cm, formula II with an average of 5.5cm, formula III with an average of 5.8cm, and formula IV with an average of 5.5cm. It can be concluded that the cream preparation meets the requirements of cream spreadability well and remains in the range of 5-7cm.

e. Adhesion Test

The adhesion test aims to determine the time it takes for the cream to adhere to the skin. The longer the adhesion adheres to the skin, the better because the active substances released in the cream base will be absorbed more and more.

Table 6. Results of Adhesio Test

Formula	Average Adhesio		
	Cycle1	Cycle2	Cycle3
I	6,66	4,88	5,69
II	4,62	5,21	6,16
III	4,35	5,85	3,94
IV	4,69	5,55	4,15

Based on the table above, the average results of the adhesion test of formula I cream preparations with an average of 5.69 seconds, formula II with an average of 6.16 seconds, formula III with an average of 3.94 seconds, and formula IV with an average of 4.15 seconds. It can be concluded that the adhesion test meets the requirements, because the requirements for good cream adhesion are 2-300 seconds. (Ashar, 2016).

f. Cream Type Test

A stable emulsion is able to maintain its initial properties and is able to be evenly distributed into the external phase.

Table 7. Cream Type Results

Formula	Cream Type		
	Cycle1	Cycle2	Cycle3
I	M/A	M/A	M/A
II	M/A	M/A	M/A
III	M/A	M/A	M/A
IV	M/A	M/A	M/A

Based on the results of the table above, during the cream type test, the cream preparation after the cycling test results remained the same, namely M/A.

g. Viscosity Test

Table 8. Viscosity Results

Formula	Measurement of Viscosity
FI	2068Cps
FII	2132Cps
FIII	2269Cps
FIV	2530Cps

Based on the table above, the viscosity test results of formula I cream preparation of 2068 Cps, formula II of 2132 Cps, formula III of 2269 Cps, and formula IV of 2530 Cps show that the viscosity test is good, because the requirements for good cream viscosity are 2000-4000 Cps (Wulandari, et al. 2019).

h. Moisture Test

The results of the percentage of moisture using a skin analyzer obtained then processed on a scale: dry (<40%), moist (40-65%), very moist (>65%).

Based on the results of the moisture test of the cream preparation from melon fruit water, it shows that the skin moisture increases when the cream is applied from melon fruit water. It is known that formula I with an average moisture value of 51.1%, formula II with an average moisture value of 51.7%, formula III with an average value of 52.5%, formula IV with an average moisture value of 55%. It can be concluded that the formula with the highest moisture value is formula IV with a concentration of 35%.

5 CONCLUSIONS

1) Based on the results of the study that melon fruit water cream (Cucumis Melo L.) is able to moisturize the skin.
2) Based on the results of the study that melon fruit water cream is able to moisturize the skin with concentrations of 15%, 25% and 35%.
3) Based on the results of the physical preparation evaluation of the cream including organoleptical test, homogeneity, pH test, spreadability test, adhesion test, cream type test and moisture test all meet the requirements of a good cream.

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