

Physical Evaluation of Facial Wash Gel Preparations with variation in Concentration of 96% Ethanol Extract of Kepok Banana Stem (*Musa paradisaca* L.)

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Abstract

Facial wash gel is a facial cleanser with a gel form containing foam that is recommended for sensitive, oily and acne skin because the gel formula is gentler on the skin so it does not cause irritation to acne-prone skin. This study aims to determine the physical evaluation of the best facial wash gel extract of kepok banana stem based on two different formulas of active ingredient concentration. The method used in this study is an experimental method carried out in the laboratory with descriptive analysis based on physical evaluation of organoleptic tests, homogeneity, pH, spreadability, viscosity, high foam, cleaning power. The results showed that the best formulation is Formula 2. Where the results of the physical evaluation of organoleptics include brown color, distinctive banana odor, thick texture, homogeneous preparation, pH 6, spreadability of formula 1 6.64 ± 0.944987 and formula 2 6.56 ± 0.502991 Viscosity 2,840 cP, high foam stability 91.6% and a better cleaning power test than formula 1.

Keywords : Banana, Facial Wash, Gel, Evaluation

Introduction

Facial wash preparations are cosmetic preparations for facial skin care that are routinely used every day as a cleanser. This preparation functions to address facial skin problems such as removing dead skin cells, rejuvenating the skin, removing dirt, oil and providing moisture. The choice of *facial wash* preparations is because the use of *facial wash* is more efficient in removing dirt on the surface of the skin, practical and easy to store (1). Gel *facial wash* is a facial cleanser in gel form that contains foam which is

recommended for sensitive, oily and acne-prone skin because the gel formula is gentle on the skin so it does not cause irritation to acne-prone skin (Jumardin W, 2023).

Natural *facial washes* are still rare on the market, with most still using chemicals as active ingredients. The effects of using *facial washes* with chemicals can damage facial skin, causing it to sting, develop redness, acne, pimples, and blackheads (Herawati et al., 2020).

One plant that can be used in the formulation of *facial wash* gel is the banana plant. Banana stems contain secondary metabolites in the form of flavonoids, saponins, tannins, and steroids, which were detected in the extract of the kepok banana stem. The secondary metabolites produced by the plant also have pharmacological effects on humans, one of which is as an antibacterial (Rahmawati, 2018). According to research conducted by Ningsih in 2013 stated that the antibacterial activity of kepok banana stem extract was higher than **the roots, stem, stem**, flowers, and fruit (Ningsih et al., 2013). In the Minimum Inhibitory Concentration (MIC) test conducted by Wenas in 2020, Kepok banana stem extract with a concentration of 5.25% had a stronger antibacterial effect against *Staphylococcus aureus* bacteria compared to Ambon banana stem extract and Raja banana. In addition, in the antibacterial activity test, *Staphylococcus aureus* at a concentration of 6.25% had an inhibitory diameter of 10.09 mm (Wenas et al., 2020).

Based on the causes of acne sufferers' conditions and the secondary metabolite content found in kepok banana stems, a study was conducted to determine the best physical evaluation results of *facial wash* gel preparations with kepok banana stem extract from the two formulas.

Material and Methods

This research is an experimental research with descriptive analysis to determine the best physical evaluation of *facial wash* gel with 96% ethanol extract of kepok banana stem originating from Manukan Village, Gayam District, Bojonegoro Regency based on differences in the percentage of active ingredients.

Tools

The tools used in this study include maceration vessels, stirring rods, *water baths* (*Thermostat Water Bath HH - 6*), dropper pipes, wooden clamps, knives, baking pans, mesh sieves no. 60, 50 mL porcelain cups, 90 mm funnels, ovens, aluminum foil, analytical scales (*Centralus Scale*), 250 mL beaker glass (*Herma*), rulers, flannel cloth, filter paper, thermometers, blenders (*Maspion*), 100 mL measuring cups (*Herma*), microscopes, cover

glasses, object glasses, pH indicators, *Brookfield viscometers*, weights, petri dishes, watch glasses, test tubes and stirrers.

Material

The materials used in this study were kepok banana stems originating from Desa Manukan, Kecamatan Gayam Kabupaten Bojonegoro, etanol 96% (*cosmetic grade*), HPMC (*cosmetic grade*), TEA (*cosmetic grade*), propilen glikol (*cosmetic grade*), *Sodium lauryl Sulfat* (SLS) (*cosmetic grade*), metil paraben (*cosmetic grade*), dan aquadest (*cosmetic grade*).

Research Procedures

1. Sample Preparation

Preparation was carried out using the method developed by Rahmawati (2018) with a combination of modified techniques. The banana stems were peeled, washed under running water, and drained. The banana stems were then cut into small pieces and air-dried. The obtained samples are ground using a blender and sieved with a 60 mesh sieve (Rahmawati et al., 2018).

2. Extraction Kepok Banana Stem

Extraction kepok banana stem was carried out using the modified method from Fitri (2021). The dry powder of kepok was weighed at 600 grams in a maceration vessel. The sample was added with 96% ethanol at a ratio of 1:4 on the surface of the sample in a glass jar with stirring once every day. Maceration for 3 days (Fitri and Rohmah, 2021). Then filtered and the resulting yield was evaporated using a water bath at a temperature of 40 °C until a thick extract was obtained.

3. Manufacture of Facial Wash Gel

The formulation for making facial wash gel from kepok banana stem extract is in Table 1.

Tabel 1 Formulasi *Facial Wash* Gel Ekstrak Bonggol Pisang Kepok

Materials	Function	Concentration Range (%)	Concentration %	
			F1	F2
Ekstrak Bonggol pisang kepok	Active ingredient	-	5,25	6,25
HPMC	Gelling agent	2-10	2	2
TEA	Stabilizer agent	2-4	2	2
Propilen glikol	Humectant	<15	10	10

Sodium lauryl Sulfat (SLS)	Surfactant	0,5-2,5	1,5	1,5
Metil Paraben	Preservative	0,02-0,3	0,18	0,18
Aquadest	Solvent	Ad 50 ml	Ad 50 ml	Ad 50 ml

The *facial wash* gel formula is made as shown in Table 1. The initial step in making it is to weigh All the necessary ingredients. Put HPMC into a mortar containing hot distilled water, stir until it expands. Dissolve methyl paraben in propyl glycol then add it to the mortar, stir until homogeneous. Add TEA to the mortar. Add SLS that has been dissolved in distilled water into the mortar, stir until homogeneous. Then add the kepok banana stem extract, stir and add the remaining distilled water, stir again until homogeneous.

4. Evaluation of *Facial Wash* Gel Preparations

Organoleptic Test

Organoleptic testing is carried out visually, namely by directly observing the *facial wash* preparation with the components being evaluated including smell, color and texture.

Homogeneity Test

As much as 1 gram of the gel that has been made is smeared on a glass object. Then it is closed with another glass object and viewed using a microscope (Nurdianti, 2018).

pH test

Universal pH is used for pH measurement. Dip the pH paper into the preparation then match the color of the pH paper to the pH color indicator (Rohiyati et al., 2020).

Spread Power Test

The preparation is weighed 1 gram, then placed on the middle of the round glass, a weight is placed on top as a load and left for 1 minute. Next, the diameter of the spread is measured. Weights of 50, 100, 150, 200, and 250 grams are used as loads (Roslianizar, 2021).

Viscosity Test

The method of measuring viscosity is by placing an emulsion or gel or emulgel preparation on the bottom of the test tool on the viscometer, then dipping the spindle until it sinks into the preparation. Set the speed used and the viscometer is run, then the viscosity value of the emulsion, gel, emulgel is read (Chandra, 2022).

Foam Height Measurement

The purpose of the foam test is to see the foam power of *the facial wash*. Test the foam height in distilled water by dissolving 1 gram of sample in a test tube, then adding 10 ml of distilled water and shaking. After shaking, it is measured and left for 5 minutes, then measured again (Rizkiana, 2025).

$$\text{Foam stability} = \frac{\text{Final foam height}}{\text{initial foam height}} \times 100 \%$$

Cleaning Power Test

The cleaning power test was carried out by applying 4 cm of lipstick to the back of the hand, then applying the *facial wash* gel preparation until it foams for up to 1 minute, then rinsing with 100 ml of water, and measuring the cleanliness indicator. The parameter was assessed from whether the lipstick that had been applied to the hand was clean or not after washing, which was assessed with the following criteria of numbers 1-3 (Dewi, 2023).

- 1 = Not clean
- 2 = Clean
- 3 = Very clean

Results and Discussion

The resulting extract from the Kepok banana stem yielded a thick, dark brown liquid with a distinctive banana odor. The resulting kepok banana stem extract weighed 10.856 grams.

Evaluasi Fisik *Facial Wash* Gel

The *facial wash* formulations were made with two concentration variations of kepok banana stem extract: 5.25% and 6.25%. A 50 ml volume of each formula was prepared. The kepok banana stem extract *facial wash gel* formulations were subjected to physical evaluation to determine the best formula. The results of the physical evaluation of the *facial wash* gel preparations are shown in Table 2.

Table 2 Results of Physical Evaluation of Facial Wash

Test Type	Observation	Condition	Formula 1	Formula 2
Organoleptic	Color	Brown	Light brown	Brown
	Smell	Banana	Banana	Banana
	Texture	Lumpy	Sedikit kental	Kental
Homogenitas	-	Tidak ada gumpalan	Tidak ada gumpalan	Tidak ada gumpalan
pH	-	4,5-7	6	6
Daya Sebar	-	5-7 cm	6,64 ± 0,944987	6,56 ± 0,502991
Viskositas	-	2.000 -5.000 cP	2.320 cP	2.840 cP

Stabilitas Tinggi Busa	Stabilitas busa setelah 5 menit	60%	77,2%	91,6%
Daya Bersih	-	-	Kriteria 1	Kriteria 2

Based on the results of organoleptic tests on *facial wash* gel preparations with kepok banana stem extract which can be seen in Figure 1, formula 1 has a light brown color with a distinctive banana aroma and a thick *facial wash* gel texture. While in formula 2, the *facial wash* gel preparation with kepok banana stem extract has a darker brown color than formula 1, for the aroma of the preparation has a distinctive banana smell with a thick texture. The concentration of the extract used affects the concentration of the gel made, the more extract used, the thicker the gel preparation.

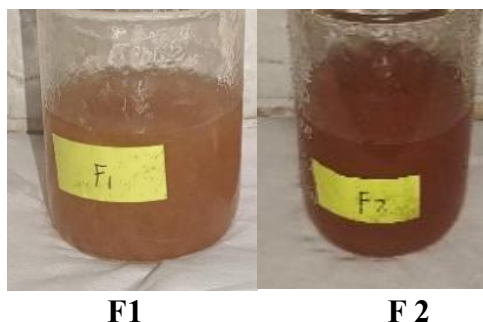


Figure 1. Hasil Sedian Organoleptis F1 & F2

The homogeneity test aims to see and determine whether the gel preparation ingredients are mixed so that no coarse grains are visible. Both preparations meet the requirements of the Indonesian Pharmacopoeia, edition VI, where *facial wash* gel preparations must be homogeneous and free of coarse grains so that the active substance and other additional ingredients are mixed evenly (Dekpes RI, 2023).

pH measurement is a parameter to determine the acidity or alkalinity of a *facial wash* preparation to ensure the preparation made does not cause irritation and make the skin dry. Both formulas have a pH value of 6, this indicates that both preparations meet the specified specifications. *Facial wash* preparations must match the skin's pH value, which is 4.5-7.0 (Ginting et al., 2025).

Spreadability testing was conducted to ensure even distribution of the gel when applied to the skin. The requirement for good spreadability for the skin according to SNI No. 06-2588 is 5-7 cm (Wahidah,2024). In the *facial wash* gel preparation with banana stem extract, both formulas met the required spreadability limit with an average value of 6.64 in

formula 1 and 6.56 in formula 2. This is in line with Astuti's 2021 study which stated that higher amounts of extract cause an increase in extract concentration so that spreadability becomes low (Astuti, 2021).

In the viscosity test, formula 1 has a lower viscosity (2,320 cP) so it is easier to spread, while formula 2 which is thicker (2,840 cP) spreads more slowly. Both preparations of *facial wash* gel with banana stem extract meet the requirements. The viscosity of the preparation has an inverse relationship with the spreading power, the greater the viscosity, the smaller the spreading power because the preparation is thicker (Nasyanka, 2021). The greater the concentration of the extract added, the thicker the consistency of the preparation, thus affecting the decrease in spreading power and increasing the viscosity value.

In foam stability tests, Formula 2 demonstrated better foam retention, with a foam stability percentage of 91.6%, compared to only 77.2% for Formula 1. The higher the extract concentration in the *facial wash*, the higher the saponin content in the kepok banana stem extract, thus increasing the amount of foam produced. These results have met the requirements because they have a value above 70% (20). The higher the extract concentration in the *facial wash* preparation, the higher the saponin content in the kepok banana stem extract, thereby supporting the amount of foam produced. Based on aesthetic value, in general, people prefer soap that produces a lot of foam because they assume that good soap produces a lot of foam (Nasyanka, 2021).



F 1

F 2

Figure 2. Cleanliness Test F1 and F2

The results of the cleaning power test in Figure 2 show that formula 2 has the ability to clean stains with a criterion assessment of 2 compared to formula 1 which only cleans stains that still contain lipstick marks with a criterion assessment of 1. This is because formula 2 has a higher extract concentration.

Conclusion

Based on the physical evaluation of *facial wash* with kepok banana stem extract, the best results were obtained by formula 2. These results include organoleptic tests of brown color, distinctive banana odor, thick texture, homogeneous preparation, pH 6, viscosity 2,840 cP, high foam stability of 91.6% and a better cleaning power test than formula 1.

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