

STABILITY TEST OF NATURAL HAIR GROWTH TONIC: AVE MOR (*Aloe vera* and *Moringa oleifera*) FOR THICKENING HAIR AND ANTI-LICKNES

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ABSTRACT

Aloe vera (*Aloe vera*) and Moringa leaf (*Moringa oleifera*) is a combination of natural ingredients that contain chemical compounds that are useful for reducing hair loss. Aloe vera (*Aloe vera*) contains chemical compounds such as: vitamin A, vitamin C, lignin, amino acids, Cu, inositol, enzymes, minerals. Lignin substances contained in aloe vera (*Aloe vera*) function as a prevention of hair loss and scalp care. Moringa leaf (*Moringa oleifera*) contain chemical compounds such as: minerals, essential amino acids, antioxidants, vitamin C, flavonoids, tannins which are known to nourish the scalp and hair and the antioxidant content can be used as an anti-licknes. It can be seen at what concentration the hair tonic preparation has good physical stability. The physical stability test of hair tonic was carried out for 6 storage cycles using the Cycling Test method. The results of the organoleptic test of hair tonic preparations were obtained: Golden yellow color, clear; The distinctive aroma of Moringa leaf extract; Liquid dosage forms; and Homogeneous. The pH test from the last cycle of Formula 1 to 4 is 6; Formula 5 is 4.5; still in the skin pH range of 4.5-6.5. Viscosity test from the last cycle of Formula 1: 3.74 cPs; Formula 2: 4.05 cPs; Formula 3: 4.47 cPs; Formula 4: 1.64 and Formula 5: 2.71; still in the hair tonic viscosity specification, which is < 5 cPs. The results of the hedonic test of hair tonic preparations carried out on 20 panelists obtained the following results: The preferred color and aroma of Formula 3; Formula 1's preferred texture; Preferred cooling sensation Formulation 1 and 3.

KEYWORDS: Aloe vera, *Moringa oleifera*, hair tonic, physical stability.

INTRODUCTION

Hair is a structure derived from the skin that shows the character traits of humans.^[1] Hair loss is experienced by many women and men, this causes loss of the biological function of hair to protect the scalp from sunlight and reduces character traits in humans. These characteristics include dull/not shiny hair, tangled hair, dandruff hair, oily hair, split ends, easily broken hair and the most frequently questioned is hair loss.^[2] Factors causing hair loss are divided into two, the first is endogenous factors in the form of systemic disease, hormonal, nutritional status, intoxication, and genetic disorders. The second factor is exogenous in the form of stimuli from the environment and hair cosmetics.^[3]

Hair loss can be prevented through external and internal treatments. Treatment from within can be done through taking drugs and injections to stop hair loss, and help accelerate the growth of new hair. External treatment can be done by means of topical therapy, such as the use of ointment/gel/solution therapy or hair care cosmetics to

nourish and treat hair loss.^[4] Hair care requires a variety of cosmetics, ranging from cosmetic hair cleansers, hair conditioners, cream baths, to hair tonic.^[5] One of the hair care preparations that can overcome this problem is hair tonic. Hair tonic is a cosmetic preparation used to treat hair growth.^[6] The function of hair tonic is to increase blood circulation to the scalp so that it can increase hair growth, prevent hair loss, prevent dandruff and itching and provide freshness to the scalp.^[7]

At present conditions there has been an increasing interest in back to nature, natural ingredients derived from plants that can be used as active ingredients for making hair tonics, namely a combination of aloe vera (*Aloe vera*) and Moringa leaf (*Moringa oleifera*). Aloe vera contains chemical compounds such as: vitamin A, vitamin C, lignin, amino acids, Cu, Inositol, enzymes, minerals. The lignin substance contained in aloe vera functions as a hair loss prevention and scalp treatment, with a 7.5% aloe vera concentration showing good results.^[8] Moringa leaf contain chemical compounds

such as: minerals, essential amino acids, antioxidants, vitamin C, flavonoids, tannins which are known to nourish the scalp and hair and the antioxidant content can be used as an anti-licknes, with concentrations of Moringa leaf 2%, 4%, and 6 % shows good results.^[9]

MATERIALS AND METHODS

Collection and Authentication of Plant Material

Making aloe vera gel by finding and collecting Aloe vera leaf in Sleman, Yogyakarta, Indonesia. Moringa leaf extract was obtained from the Javaplant medicinal plant extraction center Jl. Raya Solo – Tawangmangu, Km. 32, No. 33, Karangpandan, Karanganyar, Central Java, Indonesia.

Chemical material

The ingredients used in this study were aloe vera gel, Moringa leaf extract, sodium metabisulfite, 96% alcohol, propylene glycol, propyl paraben, methyl paraben, menthol, aquadest, and lavender essential oil.

Preparation and Extraction of Plant Materials

Take aloe vera which is green, long, full/large leaf, then washed with clean running water by cleaning one by one. Peel the aloe vera on both sides and then slice the leaves open. Take aloe vera gel using a clean spoon from the

leaf and put it in a beaker. The aloe vera gel was soaked in distilled water after which the water was removed and the gel was heated at 45°C for 15 minutes. After that, the aloe vera gel was blended until smooth and then filtered using filter paper to separate the gel and aloe vera pulp. Moringa leaf extract obtained from the Javaplant medicinal plant extraction center is in the form of a dry extract that is ready to be used.

Procedure for Making Hair Tonic

Hair tonic made by weighing the ingredients used. Dissolved Moringa leaf extract with some aquadest, sodium metabisulfite with the remaining aquadest until dissolved. Menthol, propyl paraben, and methyl paraben were dissolved in 90% ethanol until dissolved. Aloe vera gel was dissolved in propylene glycol until completely mixed, then the Moringa leaf extract solution was added, sodium metabisulfite solution and finally a solution of menthol, propyl paraben, methyl paraben and 96% ethanol, stir until completely mixed. After that, the solution is filtered using filter paper so that the preparation is free from residues of the ingredients used. The filter results are then added with lavender fragrance to cover the very strong characteristic smell of the extract. Natural Hair Growth Tonic Formula : AVEMOR can be seen in Table 2.1.

Table 2.1 Formulation of Natural Hair Growth Tonic : Avemor.

| Material Name | Concentration (%) | | | | | Function |
|------------------------|-------------------|--------|--------|---------|---------|--|
| | F1 | F2 | F3 | F4 (K-) | F5 (K+) | |
| Aloe vera gel | 7.5 | 7.5 | 7.5 | - | - | Active substance |
| Moringa leaf extract | 2 | 4 | 6 | - | - | Active substance |
| Sodium metabisulfite | 0.1 | 0.1 | 0.1 | 0.1 | - | Antioxidant |
| Alcohol 96% | 15 | 15 | 15 | 15 | - | Solvent, antimicrobial and viscosity control |
| Propylene glycol | 30 | 30 | 30 | 30 | - | Cosolvent, stabilizer |
| Propyl paraben | 0.02 | 0.02 | 0.02 | 0.02 | - | Preservative |
| Methyl paraben | 0.2 | 0.2 | 0.2 | 0.2 | - | Preservative |
| Menthol | 0.3 | 0.3 | 0.3 | 0.3 | - | Cool sensation |
| Lavender essential oil | qs | qs | qs | qs | - | Fragrance |
| Aquadest | Ad 100 | Ad 100 | Ad 100 | Ad 100 | - | Solvent |
| Sample product X | - | - | - | - | 100 mL | Positive Control |

Physical Evaluation of Avemor Hair Tonic: Aloe vera and Moringa oleifera

1. Organoleptic Test

The organoleptic test was carried out by observing the preparation in the form of: shape, smell, and color of the hair tonic made.^[10]

2. Homogeneity Test

The homogeneity test was carried out by applying the preparation to the glass, to see whether there were particles that were not evenly dispersed or not. If there are no particles, it can be stated that the hair tonic preparation is homogeneous.^[10]

3. pH Test

The pH test was carried out to determine whether the pH of the hair tonic made was in accordance with the pH of the skin, namely 4.5-6.5.^[11] This pH test is carried out by dipping the pH stick into the hair tonic preparation, waiting for a while until it changes color and then matching it with the appropriate indicator so that it shows the pH of the sample.^[10]

4. Viscosity Test

Viscosity test is carried out using an Oswald viscometer, this test is carried out to find out how long the preparation flows past 2 marks.^[10] In hair tonic preparations, the specified specifications are < 5 cPs.^[12]

5. Stability Test

The stability test was carried out using the Cycling Test method. Samples were stored at 4°C for 24 hours and then transferred to an oven at 40°C± 2°C for 24 hours (one cycle), the test was carried out for 6 cycles and physical evaluation was carried out (which included organoleptic tests, homogeneity tests, pH tests, and viscosity).^[10]

and Moringa leaf extract (*Moringa oleifera*) namely F1 (7.5%:2%), F2 (7.5% 4%), F3 (7.5%:6%), F4 as negative control and F5 as positive control. From the research results of Avemor hair tonic formulation containing aloe vera gel (*Aloe vera*) and Moringa leaf extract (*Moringa oleifera*) the following results were obtained.

RESULTS AND DISCUSSION

1. Organoleptic Test

Natural Hair Growth Tonic: AVEMOR is made into 5 formulas with a combination of aloe vera gel (*Aloe vera*)

Table 3.1: Organoleptic Test.

| Formula | Organoleptic Test | | |
|---------|----------------------|---------------------------------------|-------------|
| | Color | Smell | Dosage Form |
| F1 | Golden yellow, clear | Typical aromatic Moringa leaf extract | Liquid |
| F2 | Golden yellow, clear | Typical aromatic Moringa leaf extract | Liquid |
| F3 | Golden yellow, clear | Typical aromatic Moringa leaf extract | Liquid |
| F4 (K-) | Clear white, clear | No smell | Liquid |
| F5 (K+) | Golden yellow, clear | Aromatic | Liquid |

Avemor hair tonic organoleptic test results were used to describe the color, aroma, and dosage form as shown in Table 3.1. In the organoleptic test, it was found that the hair tonic base (F4 negative control) was initially white and clear before adding Moringa leaf extract. After the Moringa leaf extract was added to the hair tonic preparation (F1-F3), it turned golden yellow, clear with different color intensities, namely bright and dark colors for each formula depending on the amount of extract concentration added. The aroma and shape are in accordance with what is added, which has a distinctive aromatic aroma of Moringa leaf extract and is in liquid form. The higher the concentration of the added extract, the darker color and more pungent aroma will be produced.

powder grains or stains. Meanwhile, F4 (negative control) and F5 (positive control) showed that they were free from foreign particles and were homogeneous.

2. Homogeneity Test

The results of the homogeneity test of the three formulas that have made hair tonic preparations with a combination of aloe vera gel and Moringa leaf extract can be seen in Table 3.2. The homogeneity test on F1-F3 was declared homogeneous because there were no

Table 3.2: Homogeneity Test.

| Formula | Homogeneity |
|---------|-------------|
| F1 | Homogeneous |
| F2 | Homogeneous |
| F3 | Homogeneous |
| F4 (K-) | Homogeneous |
| F5 (K+) | Homogeneous |

3. pH Test

Avemor hair tonic pH test results can be seen in Table 3.3. Hair tonic must have a pH that is in accordance with the pH of the skin, which is 4.5-6.5.^[11] pH is a parameter that can affect the absorption of the preparation into the skin. The pH examination aims to see the degree of acidity of the hair tonic preparation. pH that is too alkaline can cause the skin to become scaly, while if the pH is too acidic it can cause skin irritation.^[8]

Table 3.3 pH Test.

| Cycle | SNI Reference | pH Hair Tonic | | | | |
|-------|---------------|---------------|----|----|---------|---------|
| | | F1 | F2 | F3 | F4 (K-) | F5 (K+) |
| 0 | (4.5 – 6.5) | 6 | 6 | 6 | 6 | 4.5 |
| 1 | | 6 | 6 | 6 | 6 | 4.5 |
| 2 | | 6 | 6 | 6 | 6 | 4.5 |
| 3 | | 6 | 6 | 6 | 6 | 4.5 |
| 4 | | 6 | 6 | 6 | 6 | 4.5 |
| 5 | | 6 | 6 | 6 | 6 | 4.5 |
| 6 | | 6 | 6 | 6 | 6 | 4.5 |

The pH test is one of the chemical tests in determining the stability of hair tonic preparations during storage. The results obtained showed that the pH of the F1-F4 preparations for each cycle showed the same pH results, namely 6 while F5 showed pH 4.5 results which were still included in the normal skin pH range of 4.5 - 6.5. This shows that the hair tonic preparation has a stable pH at high temperature, room temperature, and low temperature.

4. Viscosity Test

The results of the viscosity test can be seen in Figure 3.1. This viscosity test chart is useful for knowing the

viscosity of a preparation, where the preparation is declared to have good viscosity if it meets the specified specifications. In hair tonic preparations, the specified specifications are < 5 cPs.^[12] The results of the viscosity test can be seen in Table 3.4. The results obtained are the viscosity test from the last cycle of Formula 1: 3.74 cPs; Formula 2: 4.05 cPs; Formula 3: 4.47 cPs; Formula 4 (negative control): 1.64 cPs, and Formula 5 (positive control): 2.71 cPs. Still in the hair tonic viscosity specification, which is < 5 cPs.

Table 3.4: Viscosity Test.

| Cycle | SNI Reference | Hair Tonic Viscosity (cPs) | | | | |
|-------|---------------|----------------------------|------|------|---------|---------|
| | | F1 | F2 | F3 | F4 (K-) | F5 (K+) |
| 0 | (4.5 – 6.5) | 3.77 | 3.96 | 4.88 | 2.21 | 2.71 |
| 1 | | 3.97 | 3.99 | 4.49 | 2.68 | 3.76 |
| 2 | | 3.49 | 3.87 | 4.40 | 1.77 | 2.64 |
| 3 | | 3.68 | 4.05 | 4.99 | 1.73 | 2.87 |
| 4 | | 3.61 | 4.00 | 4.10 | 1.66 | 2.56 |
| 5 | | 4.67 | 4.33 | 4.74 | 1.66 | 1.85 |
| 6 | | 3.74 | 4.05 | 4.47 | 1.64 | 2.71 |

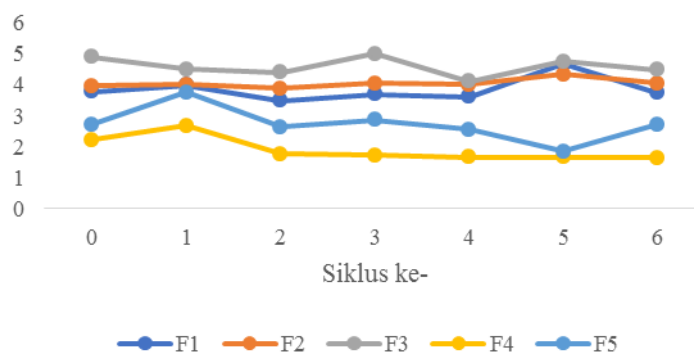


Figure 3.1: Viscosity Test Graph.

5. Hedonic Test

The hedonic test was carried out to measure the level of preference for the Natural Hair Growth Tonic: Avemor preparation. The level of preference used includes; like very much (5), like (4), normal (3), dislike (2), dislike

very much (1). The hedonic test was carried out to 20 panelists by giving an overall preference score for the preference test product. The parameters used are color, aroma, texture, cold sensation.^[13]

Table 3.5 Hedonic Test Results on F1, F2 and F3.

| Parameters | Subset | | | Most preferred formula |
|-----------------------|--------|------|-------|------------------------|
| | F1 | F2 | F3 | |
| Color | 3.60 | 3.65 | 3.75* | Formula 3 |
| Aroma | 3.40 | 3.50 | 3.55* | Formula 3 |
| Texture | 3.80* | 3.75 | 3.55 | Formula 1 |
| Cold sensation | 3.65* | 3.60 | 3.65* | Formula 1 and 3 |

The hedonic test was carried out using the Two Way Anova analysis method so that the color parameter obtained a significance result of > 0.05, namely 0.826 which indicated there was no significant difference between variations in the concentration of Moringa leaf

extract 2%, 4%, and 6% color parameters in the hedonic test. While the aroma parameter obtained a significance value of > 0.737 which indicates that there is no significant difference between variations in the concentration of Moringa leaf extract 2%, 4%, and 6% of

the aroma parameters in the hedonic test. Texture parameters obtained results > 0.05 , namely 0.176 which indicates there is no significant difference between variations in the concentration of Moringa leaf extract 2%, 4%, and 6% of the texture parameters in the hedonic test. The cold sensation parameter obtained results > 0.05 , which is 0.909 which indicates there is no significant difference between variations in the concentration of Moringa leaf extract 2%, 4%, and 6% of the cold sensation parameter in the hedonic test.

The most preferred color parameter is at F3, with a subset value of 3.75. The most preferred aroma parameter was F3 with a subset value of 3.55, the most preferred texture parameter in F1 with a subset value of 3.80, and the most preferred cold sensation parameter F1 and F3 with a subset value of 3.65.

6. Stability Test

The stability test was carried out using the Cycling Test method. The test is carried out by accelerating the stability evaluation during storage for some time at a higher than normal temperature. Samples were stored at 4°C for 24 hours then transferred to an oven at 40°C \pm 2°C for 24 hours (one cycle), the test was carried out for 6 cycles and physical evaluation was carried out (which included organoleptic, homogeneity, pH test, and viscosity). In this study, observations showed that the preparation was stable, there was no precipitate, the pH value produced at F1-F4 was constant, namely 6, while at F5 (positive control) the pH value was 4.5 and there was no color change, odor and clarity. The viscosity of the hair tonic preparation fluctuated due to the temperature difference during the test, but the results show that it is below 5 cPs, which means it is still in a good viscosity range, which is < 5 cPs [12]. So it can be concluded that the test results on the Avemor hair tonic stability test have met the requirements in all formulas.

CONCLUSIONS

Formulation of Natural Hair Growth Tonic: Avemor (Aloe vera and Moringa oleifera) to thicken hair and anti-leak produces a good hair tonic preparation as evidenced by research results with the concentration of aloe vera gel: Moringa leaf in Formula 1 (7.5%: 2%), Formula 2 (7.5% : 4%), Formula 3 (7.5% : 6%), Formula 4 (negative control), and Formula 5 (positive control). The physical characteristics of the hair tonic preparation after the cycling test obtained observations which showed that the preparation was stable, there was no precipitate, the pH value produced in F1-F4 was constant, namely 6, while in F5 (positive control) the pH value was 4.5 and no change in color, odor and clarity. The viscosity of the hair tonic preparation fluctuated due to the temperature difference during the test, but the results showed that it was below 5 cPs, which means it was still in a good viscosity range of < 5 cPs, so it can be concluded that the preparation is stable and still in accordance with the required conditions. This shows that hair tonic preparations have good characteristics and can

withstand extreme temperature conditions (hot and cold).

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