



FORMULATION OF GEL ALOE VERA LINN (*Aloe vera Linn.*) TO PREVENT PREMATURE AGING

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Abstract

Objective: The study was to determine the effectiveness of aloe vera as an anti aging substance. **Sample of this research** includes volunteers over 25 years of age who regularly ride a motorcycle. **Method:** The research was conducted at the Pharmacetic Laboratory of the Sekolah Tinggi Ilmu Farmasi (STIFAR) Riau, and the Cosmetology Laboratory of the Universitas Sumatera Utara (USU). The tool allows for observation of several parameters, including moisture, evenness, pore size, and the number of spots and wrinkles. Changes in the skin conditions were measured for varying preparations, namely 0% aloe vera mucus gel (F0), 5% aloe vera mucus gel (F2) and 15% aloe vera mucus gel (F3) on the 7th, 15th, and 30th day of applying the preparations. Statistically analyzed using two-way ANOVA (analysis of variance). The Tukey test was then conducted to see the difference. Skin analyzer is a tool used for analyzing various skin conditions. **Result:** The study found that a gel with 15% concentration of aloe vera mucus gel (F2) produced faster results in increasing moisture and skin evenness, shrinking pore size, and reducing spots and wrinkles after 4 weeks of application. **Conclusion:** The study concludes that it is safe to use aloe vera linn for preventing premature aging.

Keywords: Aging, Anti-Aging, Aloe Vera, Mucous, Gel

Introduction

Skin is a human's outermost organ that shields internal organs from the human environment. The area of an adult's skin is about 1.5 square meters, and it accounts for about 15% of overall body weight. It is an essential organ that reflects one's state of health. It is also an elastic, sensitive, and incredibly complex organ. Human skin varies with climate, age, sex, race, and even different parts of the body¹.

Skin aging is caused by both intrinsic and extrinsic factors. The intrinsic factors that cause premature aging include increasing exposure to free radicals and DNA damage. On the other hand, UV rays and smoking are two important external factors that lead to premature aging. Of all these factors, free radicals are believed to be the primary cause of premature aging. A free radical is an atom or molecule that is highly reactive with unpaired electrons. In the skin, excessive free radicals damage the collagen in the skin cell membranes, rendering the skin less elastic and

thus developing wrinkles^{2,3}. Efforts have been made to prevent aging or reduce its effects. The use of antioxidants is one of the most common efforts to prevent aging⁴. A plant that is rich in antioxidants is aloe vera (*Aloe vera Linn*). Aloe vera contains nutrients that the body needs in a sufficient amount. Some of these vitamin and mineral elements such as vitamin C, vitamin E, vitamin A, magnesium, and zinc, function as natural antioxidants. These antioxidants are useful for preventing premature aging⁵.

Salawu et al. (2017) discovered that aloe vera mucus has an IC₅₀ value of 41.48 ppm, and the preliminary test results that we have conducted show an IC₅₀ result of 541.0985 ppm (categorically strong)⁷.

Based on the above background, this study sought to find out whether the aloe vera gel preparation can be used as an anti-aging

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substance, for which several anti-aging test parameters were conducted, including moisture, evenness, pores, spots, and wrinkles using a skin analyzer (Aramo Huvis) Huvis). Meanwhile, the purpose of this study was to obtain an optimum preparation of aloe vera mucus gel and to test its anti-aging activity using a skin analyzer.

Method
This study used aloe vera leaf mucus, which is thick and clear and has a distinctive smell. Aloe vera leaves were washed under running water and cut into two parts. The mucus of the leaves was then extracted, resulting in liquid with a lot of foam. It was then stored in the refrigerator for 15 minutes, after which sodium metabisulfite was added into the liquid. The mixture was heated at a temperature of 30-40°C for 15 minutes to activate the enzymes contained in the aloe vera mucus¹.

The next process was formulating the aloe vera gel preparation by using several additives intended to maintain the stability of the gel preparation. All active ingredients and additives used had been subjected to preliminary tests and considered to meet standard requirements set out in the 3rd and 4th editions of the Indonesian Pharmacopoeia book.

Table 1 outlines all ingredients used for the preparation. As much as ± 35 ml of water went through a distillation process in that it was heated to a temperature of ± 80° C, Once the heating was finished, HPMC was mixed with it for 15 minutes, followed by the addition of aloe vera mucus that had been previously mixed with sodium metabisulfite. Propylene glycol was then gradually added to the mixture and stirred until it became homogeneous. Once the gel preparation was ready, we conducted stability testing, including organoleptic test, dispersion test, adhesion test, homogeneity test, and stability tests. After all of the tests were carried out, the aloe vera gel preparation was declared to meet the requirements set in the Indonesian Pharmacopoeia¹⁰.

Table 1
Formulation Table

Material	Formula (%)			Function
	1	2	3	
Mucus of aloe vera leaf	0	5	15	Active substance
HPMC	3.5	3.5	3.5	Gelling agent
Natrium metabisulfite	0	0.5	0.5	Antioxidants
Propylene Glycol	18	18	18	Preservatives, humectants, and penetration accelerator
Aquadest	ad 100	ad 100	ad 100	for water stage

The sample of this research includes volunteers over 25 years of age who regularly ride a motorcycle. An anti-aging activity test was carried out on 3 volunteers. The initial condition of the skin of each volunteer was firstly analyzed using a skin analyzer, including moisture content, evenness, pore size, and the number of spots and wrinkles. A skin analyzer is a tool used for analyzing skin's health condition. The initial analysis was conducted on the backside of the volunteers' hands. After the initial analysis, the volunteers applied each preparation (gel) evenly to the back of their hands. The preparation was applied on their hands 2 times a day for 4 weeks: in the morning before they commence activities outside and at night before they have a rest. Changes in the skin condition were measured using a skin analyzer for a different amount of aloe vera mucus gel in the preparation, namely 0% (F0), 5% (F2), and 15% (F3) on the 7th, then 15th, and the 30th day of their application.



and women, so the preparation was deemed safe for use¹.

Results of ANOVA test showed a significant difference ($p < 0.05$) in the percentage of pore size recovery on two variables (concentration and time). The results of the Tukey test on the effect of different concentrations of aloe vera mucus gel on the pore size showed that the effect of the formula without any aloe vera mucus gel (F0) was significantly different ($p < 0.05$) from that of F1 and F2. There was no significant difference ($p > 0.05$) between the effect of F1 and that of F2 on pore size, but the effect of F1 was significantly different ($p < 0.05$) compared to that produced by F0. Similarly, the effect of F2 was significantly different ($p < 0.05$) when measured against that of F0. With regards to the variable of time, the results of the Tukey test suggested significant change ($p < 0.05$) in pore size between day 0 on the 7th day, the 15th day, and the 30th day. The effect of the gel preparation on the pore size was significantly different ($p < 0,05$) between the 7th day of application and the day before the preparation was used, and between the 7th day and the 30th day; however, the difference between the effect on the 7th day and that on the 15th day was not significant ($p > 0,05$).

When compared against the pore size before the application of the preparation, the effect of the preparation on the 15th day was different significantly ($p < 0,05$), but it was not the case with the effect between the 15th day and the 7th day and the 15th day and the 30th day. Similarly, the effect of using the gel preparation on pore size on the 30th day was different significantly in comparison to the effect before using the preparation and the effect on the 7th day, but was not significantly different to that on the 15th day.

Like previous measurements, measurement of wrinkles was conducted using a skin analyzer but with 10x magnification lens and a blue sensor light. Before applying the preparation, the vast majority of volunteers' skin demonstrated notable amount of wrinkles (20-

52) on the back of their hands. However, after initial use of the preparation without any concentration of aloe vera mucus gel (F0), the amount of wrinkles was minimal (0-19). After 30 days of use, the amount of wrinkles on the backs of the volunteers' hands significantly dropped to the extent that no wrinkles were identified. After a week of their applications, each formula of preparation with some concentration of aloe vera mucus was able to reduce the amount of wrinkles. F1 reduced wrinkles by 10.91%, while F2 by 25.81%. The formula without aloe vera mucus (F0), however, did not produce noticeable improvement on wrinkles on the 7th day. Improvement was only seen after the 15th day where F0 reduced wrinkles by 10.53%. After 30 days of application, all formulas were found to produce significant results. F0 reduced wrinkles by 15.79%, F1 by 40.00%, and F2 by 58.06%. Results of ANOVA test also suggested a significant difference ($p < 0.05$) in the percentage of reduced wrinkles as a result of the aloe vera mucus concentration in the preparation and the time of application. Results of the Tukey test on the time variable showed a significant difference ($p < 0.05$) between the amount of wrinkles on day 0 and that on day 7, day 15, and day 30.

Evaluation of physical stability and anti-aging activity after applying the three formulas of preparation showed that F2 produced the best physical stability and anti-aging activity compared to that of F1 and F0, which was noticeable from the results of the gel adhesion evaluation test (F2 produced the longest adhesion). The longer the gel preparation was in contact with the skin, the more active substances penetrate into the skin, resulting in a more optimal therapeutic effect.

Conclusion

The study concludes that the formula producing better anti-aging activity on the skin was F2 with a concentration of 15% aloe vera mucus compared to F0 (0%) and F1 (5%). It was proven by the highest percentages of recovery in the volunteers' skin condition for all parameters of evaluation (moisture content,

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evenness, pores, spots and wrinkles). Statistical analyses proved that F2 produced significantly different ($p < 0.05$) recovery, when compared to F0 and F1, did throughout the 30 days of observation. The physical stability test of the three formulas showed that the base of F2 produced the best physical stability when compared with F0 and F1.

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