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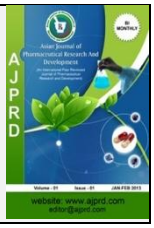

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Research Article

# Potential Extract Ethanol of *Aloe Vera Gel as a* Rejuvination Agent

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## A B S T R A C T

**Objective:** The aim of this study was to determine the effectiveness of aloe vera gel in inhibiting skin aging.

**Method:** The powder was extracted with ethanol in macerated method. Extract ethanol were analyzed for antioxidant activity with DPPH assay. *Aloe vera* extract that has been obtained then made variations of different extract concentrations namely 3% and 6% based on the orientation of researchers to determine the concentration, then in the formulation into gel. Anti-aging activity testing using skin analyzer tools with moisture parameters, collagen levels, pore, sensitivity before and after exposure to UV A and UV B rays.

**Results:** $IC_{50}$ value of aloe vera extract obtained by 138.65 ppm. Based on the classification of antioxidant activity shows that $IC_{50}$ value of aloe vera extract has moderate antioxidants that range from 101 to 250 ppm. The percentage of moisture content in week I to week IV, F3 has an increase of 26% i.e week 1 is 4% and week IV is 30%. The percentage of collagen levels in week I to week IV, F3 has an increase of 50% i.e week 1 is 30% and week IV is 80%. Increase in the percentage of elasticity in the week I to week IV. F3 had the highest increase of 25%, in week 1 it was 50% and week IV was 75%. A large decrease in pores occurs in weeks I through week IV. F3 had the highest decrease of 0.06 mm, in the week I was 0.07 mm and week IV was 0.01 mm.

**Conclusion:** Aloe vera extract gel preparation has activity as a rejuvenation agent at a concentration of 6%.

**Keywords**: Aloe vera, Gel, Anti-aging, Rejuvination

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## INTRODUCTION.

The face is the most noticed part of the body compared to other parts of the body, especially for women. Skin aging is an unavoidable natural process, in which humans will experience slowness in the process of skin cell renewal and collagen production, weakening of the internal support structure and the natural protective layer of skin nutrition [1].

The slowing of the skin regeneration process is caused by environmental and lifestyle factors. Intracellular and extracellular oxidative stress caused by reactive oxygen species (ROS), can accelerate skin aging, which is characterized by wrinkles and pigmentation [2].

Aging is a very complex process where some theories also explain that the cellular manifestation of the aging process is also influenced by reactive oxygen species (ROS) factors produced in cells. ROS is a byproduct of aerobic respiration involved in several modifications of cellular reactions such as exposure to heavy metals, ionizing radiation, and oxidants [3].

Protecting the face and body from sunlight containing UV rays can be done naturally and chemically, in a natural way such as wearing a hat, long-sleeved shirt, gloves, socks, or umbrella. While the chemical way is to use cosmetics that serve to protect the face and body against the negative effects of UV rays that at the same time also function or add beauty to yourself [4].

With the increased incidence of damage to a skin by the triggering factors of aging, it is necessary to develop chemoprevention strategies and therapeutic development. One way of development is by utilizing extracts of natural ingredients. The mechanism of extracting natural

ingredients in protecting the skin there are several ways such as reducing reactivity from ROS, inhibiting the oxidation process, absorbing UV rays, suppressing the activity of enzymes, reducing the formation of wrinkles on the skin and protecting the skin from aging [5].

Aloe vera contains several minerals, such as calcium, magnesium, potassium, sodium, iron, zinc, and chromium. Some of these vitamins and minerals can serve as natural antioxidant-forming, such as phenols, flavonoids, vitamin C, vitamin E, vitamin A, and magnesium. These antioxidants are useful to prevent premature aging, heart attacks, and various degenerative diseases [6].

Because of this above, researchers are interested in evaluating the potential of aloe vera gel as a rejuvenation agent on the skin as an anti-aging preparation based on moisture, evenness, pore, spot, and wrinkle parameters on the skin

## MATERIALS AND METHOD

### MATERIALS

The tools used in this study include: glassware, mixer rod, cotton, evaporator, lumpang and pestle, water bath, porcelain cup, cream container, pH meter, petri dish, transparent glass, filter paper, horn spoon and analytical scales, UV-Vis spectrophotometer, UVA lamp and UVB Repti Glo 13 W from Exoterra® mice, holder, EH 900 U Skin Analyzer.

The materials used in this study include: aloe vera leaves, mice, ethanol 96%, filter paper, aquades, liquid paraffin, cera alba, sorbitol monostearat and triethanollamin.

### Preparation extract of Aloe vera

Aloe vera meat extract is made by maceration method using a solution of the liquid that is ethanol mixture solution of 96%: acetone by comparison (4:1) Aloe vera meat that has been finely soaked in a mixture solvent and chloroform until the aloe vera meat is submerged by solvents. Then, it is silenced for 1 day with continuous stirring. The result of maceration is then filtered with a funnel. The liquid extract obtained is tightened with the evaporator, until thick extract is obtained [7].

### Animals

Experiments were conducted using five adult white mice with a weight of around 150-200 gr to test skin irritation. Animal trials had treated with caution following the period of the 7-day acclimatization to ensure the suitability of the test animal for research. The test animals had stored in rounder facilities with environmental conditions set at 25 ± 2ºC, humidity 60-90% RH, and 12-watt/12hour dark cycle lamps. Animals had given food place and drinking water.

### Phytochemical Screening

The Phytochemicals: Alkaloids, Flavonoids, Glycosides, Saponins, Tannins, Steroids were determined using standard procedur [8].

### Free Radical Scavenging Activity Test

The free radical scavenging activity was measured by 1,1-diphenyl-2-picrylhydrazyl (DPPH•) method. 0.2mM solution of DPPH• in methanol was prepared and 100µl of this solution was added to various concentrations of EE. After 60 minutes, absorbance was measured at 516 nm [9].

### Preparation of Gel Extract *Aloe vera*

Formulas are made in two formulations which are modifications of other gel formulas (F1, F2, F3). All two formulas ethanol extract of *Aloe vera*. HPMC that serves as a gelling agent. The number of gelling agents plays a role in influencing the physical properties of a gel supply, including viscosity and spread the power of the gel with the basic formula. HPMC was developed in distilled water 25 ml (half of the total distilled water on the formula) (a). methylparabens added (b). The ethanol extract of *Aloe vera* is dissolved in the remaining distilled water (c). Then the mixtures a, b, and c are mixed using a mortar and stamper for 1 minute at a constant speed until it forms a gelling period.

### Activity of Anti-aging

Mice that met the inclusion criteria were randomly selected, then weighed their weight, all mice were cremated for 7 days with the aim that the test animals were able to adapt to the environmental conditions that would be occupied during the study.

The entire group of mice shaved their fur on the back of a 2x2 cm back using an electric hair shaver and manual barber. UV A (315 – 400 nm) and UV B (280 – 325) irradiation of all mice was carried out 10 minutes daily for 4 weeks. The dose of UVA irradiation of 630 µW/cm and UVB 105 µW/cm with a distance of dorsal skin of mice with UV lamp is 15 cm.

Each group is treated as follows:

- Group I: on the back of mice given F1 (gel base/control), applied 2 times a day
- Group II: on the back of mice given F2 (3% aloe vera gel extract), applied 2 times a day
- Group III: on the back of mice given F3 (aloe vera gel extract 6%), applied 2 times a day

Measurement of anti-aging activity test parameters on the skin of test animals after treatment that is after 4 weeks with Skin Analyzer EH 900 U includes sensitivity, moisture content, collagen levels, elasticity, and large pores [10].

### Statistical analysis

All data were analyzed with regression analysis using SPSS 22. After the use of the data normalization test using the Kolmogorov method – Smirnov obtained that the data is distributed normally [11].

## RESULTS AND DISCUSSION

**Table: 1**. Result of Phytochemical

| No | Phytochemical | Result |
|---|---|---|
| 1. | Alkaloid | - |
| 2. | Flavonoid | + |
| 3. | Terpenoid | - |
| 4. | Tanin | - |
| 5. | Saponin | + |
| 6. | Glycoside | + |

Descriptive: (+): Positive; (-): Negative

From Table 1 it was obtained that aloe vera extract was shown to contain active compounds in the form of flavonoids, saponins, and glycosides. Flavonoids are antioxidant compounds because they have phenolic hydroxy groups in their molecular structure that have free radical capture and as metal encodings. the number of OH clusters in flavonoids greatly affects the antioxidant activity [12].

Saponins have the ability as a cleanser and antiseptic that serves to kill germs or prevent the growth of microorganisms that commonly arise in wounds so that the wound does not have a severe infection [13].

Glycoside compounds have significant aqua properties that facilitate their journey in the metabolic system because human cells contain 42 liters of water and 3 liters of which are substantial solvents for blood. This property will accelerate the journey of a molecular to achieve receptors as well as to the elimination [14].

**Table: 2.** Inhibition Percent Measurement Data

| No | Concentration ppm) | Absorbance | % Inhibition |
|---|---|---|---|
| 1. | 6.25 | 1.418 | 12.08 |
| 2. | 12.5 | 1.381 | 14.36 |
| 3. | 25 | 1.261 | 21.82 |
| 4. | 50 | 1.194 | 25.98 |
| 5. | 100 | 0.988 | 38.73 |

The antioxidant activity of the extract is expressed in its inhibition percent against DPPH radicals. This inhibition percentage is obtained from the difference in absorption between DPPH absorbant in methanol and sample absorbant measured by UV-Vis spectrophotometer at a wavelength of 517 nm [15].

Based on table 2 looks the greater the concentration the smaller the absorbance because the greater the concentration of the solution, the higher the antioxidant activity, this is characterized by the greater the value of % inhibition.

$IC_{50}$ value of aloe vera extract obtained by 138.65 ppm. Based on the classification of antioxidant activity shows that $IC_{50}$ value of aloe vera extract has moderate antioxidants that range from 101 - 250 ppm [16]. Solvent differences used also affect the antioxidant content contained in aloe vera leaf meat affects the antioxidant content contained in aloe vera leaf meat. The use of aloe vera is also influenced by the length of life of the plant to determine the levels of antioxidants contained in it [17].

**Table 3.** Result of Anti-aging Activity use Skin Analyzer with formula 1, 2 and 3

| No | Parameter | Formula | | | | | |
|---|---|---|---|---|---|---|---|
| | | Week I | | | Week IV | | |
| | | F1 | F2 | F3 | F1 | F2 | F3 |
| 1. | Moisture | 3% (Dry) | 4% (Dry) | 4% (Dry) | 4% (Dry) | 20% (Normal) | 30% (Higher) |
| 2. | Colagen | 30% (Serious Lack) | 30% (Serious Lack) | 30% (Serious Lack) | 45% (Serious Lack) | 55% (Reduce) | 80% (Normal) |
| 3. | Elasticity | 50% (Normal) | 50% (Normal) | 50% (Normal) | 60% (Normal) | 70% (Better) | 75% (Best) |
| 4. | Pore (mm) | 0.06 (Normal) | 0.07 (Normal) | 0.07 (Normal) | 0.05 (Normal) | 0.03 (Small) | 0.01 (Smooth) |
| 5. | Sensitivity | Skin | Skin | Skin | Skin | Skin | Skin |

In table 4 above the results of this study, there was an increase in the percentage of moisture in week I to week IV, F2 has a 26% increase i.e. one week is 4% and week IV is 30% because this aloe vera plant has antioxidants and has functions for skin moisturizers, wound healers, antioxidants, and anti-aging [18].

Aloe vera is very beneficial to increase the moisture of the skin. Dry skincare can be done using ingredients containing substances that can increase its moisture. The use of aloe vera as a natural ingredient to rejuvenate the skin that has been done in this study is proven to be able to effectively increase the moisture content of UVB-lit skin through the use of aloe vera gel [19]

In the results of this study, there was an increase in the percentage of collagen levels in week to week, F3 has an increase of 50% i.e. one week's 30%, and four weeks is 80%. Because aloe vera gel content has flavonoids can help to stimulate fibroblasts that produce collagen so that the skinless skin damage caused by UV B, it is according to the literature is mucopolysaccharide content in aloe vera can help in binding moisture to the skin, stimulating fibroblasts that produce collagen and elastin to make the skin more elastic [20].

Aloe vera has vitamin C which has a function for collagen biosynthesis, which serves as a cofactor for prolisil enzymes, and hydroxyl lisil which is an enzyme responsible for stabilizing the crosslinks of collagen molecules [21].

Increase in the percentage of elasticity in one week to four weeks. F3 had the highest increase of 25%, in one week, it was 50% and week IV was 75%. Because antioxidant activity of aloe vera is associated with anti-inflammatory activity and decreased activity of free radicals that cause the skin more elastic and not easily wrinkled, this is according to the study showed that polysaccharides, especially mannose-6-phosphate play a role in the wound healing process also plays a role in increasing the anti-aging effect through the induction of fibroblast activity that makes elastin fibers and collagen stronger, which eventually causes the skin to become more elastic and not easily wrinkled [22].

A large decrease in pores occurs in weeks I through week IV. F3 had the highest decrease of 0.06 mm, in one week was 0.07 mm and four weeks was 0.01 mm. Aloe vera is

one of the most widely used ingredients for skin care because it can soften, hydrate, nourish, and regenerate new skin tissues.

Aloe vera is an active substance that is very beneficial for skin health. Mineral elements and astringent properties (shrinking substances) in aloe vera can shrink pores on the face. Flavonoids as antioxidants can inhibit lipid peroxidation reactions and are good reducing compounds. Flavonoids act as a good antidote to hydroxyl radicals and superoxides so that lipid membranes are protected. This can lead to reduced pore size and improve skin texture [23].

Sensitivity measurement using Skin Analyzer EH 900 U device and polarizing reading mode with sensor lamp color. Skin sensitivity in the Skin Analyzer EH 900 U tool has no parameter value, indicated only by the number and diameter of sensitive areas of the skin [24].

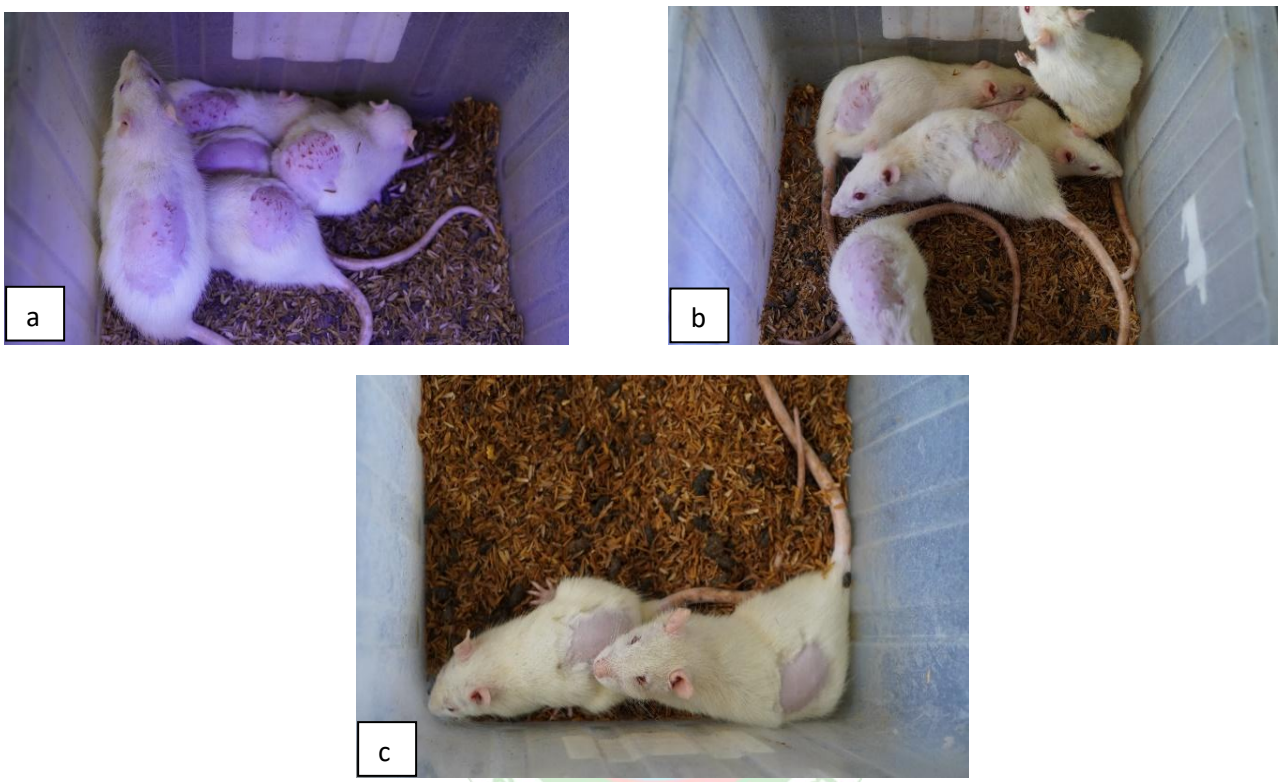


**Figure. 1:** Sensitivity Rats Skin with Gel Control (a); Sensitivity Rats Skin with Gel 3% (b); Sensitivity Rats Skin with Gel 6% (c)

It can be seen the level of damage to the skin of mice after treatment with aloe vera gel the worst level of skin in the control treatment (Blanko gel) is because there is no coating or protection after exposure by UVB so that the rat skin damage is not protected, in contrast to the treatment with the concentration of aloe vera gel 6% the level of damage to the skin of mice has been recovered or there are no traces of exposure to UVB rays because of aloe vera gel with tannins and phenol content that can accelerate the healing of damage by UVB rays.

Tannins serve as astringents that can cause shrinkage of skin pores, harden the skin, stop minor bleeding, to cover the wound, and prevent bleeding that usually arises in the wound. Phenols have the ability as an antiseptic to protect the skin from infection of the skin. Prevent damage due to oxidation reactions that occur in cosmetics and are beneficial for tissue regeneration [25].

The healing process takes place within 12 days. Where the inflammatory phase lasts on the first to the third day, the proliferation phase occurs on days four to eight and on the 12th day the wound is healed [26].

Then testing statistically followed by using the One-way ANOVA, obtained the value of sig. 0.001. It can then be concluded that there is a significant difference ($P < 0.05$) between each formula.

## CONCLUSIONS

Measurement of absorbance and inhibition in aloe vera gel is the greater the concentration the smaller the absorbance because the greater the concentration of the solution, the higher the antioxidant activity, it is characterized by the greater the value of % inhibition, $IC_{50}$ value of aloe vera extract has moderate antioxidants that range from 100 to 150 ppm. *Aloe vera* extract is proven to contain active compounds in the form of flavonoids, saponins, and glycosides. Anti-aging activity test using mice with aloe vera gel treatment concentration of 6% affects all parameters namely moisture, collagen levels, pore elasticity, and sensitivity.

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