Is pressing technique required in the application on aloe vera leaf pulp for skin moisture?

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Abstract. Although Aloe vera has been investigated to contain mucopolysaccharides that are beneficial for moisturizing the skin, the technique for its use is still not widely studied. This study aimed to analyze the effects of skin moisture from the use of aloe vera leaf pulp by patting and pressure rubbing techniques on facial skin. This is an experimental research on 50 women aged 18-20 years. Moisture observation techniques were carried out using photo analysis from a microscope on the skin with 600x magnification. The results showed that the patting technique was better in improving the roughness and shine of skin (p <0.05). As for the repair of cracks and skin scrapes both tapped and rubbed together gave the same good results. Pressing technique on the skin is not needed to moisturize the skin using aloe vera.

1. Introduction
In general, the condition of unhealthy facial skin will affect psychosocial development, including decreased self-confidence so that it disturbs someone to actualize their potential. Aloe vera is one of the oldest medicinal plants for healthy skin ever known. This plant is often mentioned used in herbal medicines since the beginning of the first century AD [1]. Since ancient times, Aloe Vera (AV) gel has been used in the treatment of wounds, burns, insect stings, and skin inflammation. AV is a plant that belongs to the Liliaceae family (one family with onions, garlic, asparagus, tulips, lilies, and water hyacinth), where there are more than 200 species found throughout the world. Aloe vera is the common name for Aloe barbadensis, which is the most widely used aloe vera species[2,3]. The leaves of this plant have anti-inflammatory, antiseptic and antimicrobial properties, which are very important for wound healing applications [4].

AV is effective for wound healing through various mechanisms such as maintaining moist wounds, increasing cell migration, increasing collagen production, and reducing inflammation [5]. AV has been studied as having exceptional moisturizing activity. The content of mucopolysaccharides helps bind moisture into the skin. AV stimulates fibroblasts which in turn produce collagen and elastin fibers making the skin more elastic and reducing wrinkles [6,7]. AV is used to fight skin irritation, skin exposure to UV and gamma radiation, burns, burns, eczema, psoriasis, acne, dermatitis, ulcers, to stimulate cell regeneration [8].

AV plants are plants without stems that grow 60-100 cm (24-39 in) tall and have thick, fleshy leaves, green to gray-green, with some varieties showing white patches on the surface of the upper and lower stems. Some varieties show white spots on the upper and lower surfaces of stems and bitter yellow exudates that are born by perimetric bundle casings. Each flower is pendulous with a yellow tubular
corolla 2 to 3 cm long [9,10]. Aloe barbadensis Miller, commonly referred to as Aloe vera, is an Aloe species from the Liliaceae family originating from South Africa. Usually live in subtropical and dry tropical climates, including the southern United States [8]. The turgid green leaf consists of mesophyll (gel) and thick epidermis of the skin [11].

AV gel contains various vitamins such as vitamin B12, vitamin A, other B-group vitamins, vitamin C, vitamin E, folic acid, and 19 of the 20 amino acids needed by the human body [9]. AV has more than 75 active ingredients that contain enzymes, vitamins, sugars, minerals, lignin, amino acids, and salicylic acid, and most constituents appear to have cosmetic and biological importance as anti-tumor, antioxidant, anti-inflammatory, and laxative properties [3].

Mahof and Ali stated that there are important AV contents for humans, as follows twelve types of anthraquinone, Vitamins A, C, E, Amino acids, enzyme, and mineral [8].

Indonesia is a tropical country that only has two seasons, rain and dry. The tropical zone is above 20 °C. In the dry season, Indonesia produces very high temperatures so that the impact resulting from the sun gives a change in skin color becoming browner and the structure of the skin itself which becomes coarser and drier. Dry skin is smooth, brittle, and dry skin with various scales on the cheeks. The lower part of the skin is less flexible, the pores are not seen clearly due to lack of oil production and sebaceous glands. Dry skin causes discomfort and sometimes results in stress and sleep disorders [12]. Dry skin can reduce the body's defense against radical effects received from outside. Dry skin has sebum or oil content that is low and sensitive. Dry skin can cause a decrease in insensitivity to pain, pressure, shear, and friction [13]. Skin lines or skin become very visible when our skin is dry, especially around the eyes, lips, and cheeks, the condition of dry skin can be worse when exposed to wind or when there is a drastic change in weather from hot to cold or from cold to hot.

AV has unique uses. The AV polysaccharide component is responsible for penetration and lubrication ability. Enzymes are useful in processing nutrients in food. Protein is useful for repairing body tissues. As cosmetics, AV is very good at maintaining moisture, tightening, and smoothing the skin [14]. Various studies have revealed the content of AV and its benefits for dealing with dry skin. However, up to now, it has not been reported how the right technique is used to face with mildly dry skin conditions. This study aims to analyze the effects of skin moisture from the use of aloe vera leaf pulp by patting and pressure rubbing techniques on facial skin.

2. Methods

2.1. Research design
This study uses a quasi-experimental research method. The technique that was tested was the technique of patting and rubbing in the application of aloe vera juice. The subjects of this study were 50 women aged 18-20 years. The part of the skin tested is cheek skin. Both patting and rubbing are done for 5 minutes. Skin changes observed were roughness, shines, cracks, and skin scrapes.

2.2. Research subject
Characteristics of subjects in this study as follows:
- Women aged 18-20 years
- Has mild dry skin criteria, characterized by rough and / or scaling, no or mild itching, no pain, no or minimal erythema, and no fissures [13]
- Get enough sleep at least 2 days before testing
- In good health, do not suffer from chronic or acute illness

2.3. Research procedure
First the subjects were asked to clean their face from makeup and dirt, then dry them using a soft clean towel. The face of the cheek area of the subject was photographed using a 600x magnification skin analyzer microscope that was connected to a laptop. After that, the subjects were asked to apply AV on both
cheeks with different techniques, namely the technique on the right cheek and the technique rubbed on the left cheek. The time spent waiting for the product to absorb is 5 minutes, after which the subject's face is re-photographed using a skin analyzer microscope.

2.4. Research instrument
Data collection techniques used in this study include the assessment of roughness, shines, cracks, and scrapes through a skin analyzer microscope. This microscope consists of an objective lens and an ocular lens with a light source that comes from the electricity that is connected through a laptop. This skin analyzer microscope has a magnification power of up to 600x and is connected directly to the laptop so that the laptop functions as a camera mirror.

2.5. Statistical analysis
To assess the significance of the difference between tapping and rubbing techniques on the subject, a Kruskal walls analysis was performed.

3. Results and discussion
The results of the increase in skin moisture after the use of AV with tapping and pressure rubbing techniques are presented in Figure. 1.

![Figure 1](image-url)

**Figure 1.** The average score of repair in tapping and pressure rubbing group.

Fig. 1 shows that there are improvements to all observation items on skin treated with AV in both techniques. To see the difference between tapping and pressure rubbing techniques to improve roughness, shine, cracks, and scrapes, a separated Mann Whitney analysis test is presented in Table 1.

| Observation Item | Techniques         | N  | Mean Rank | Asymp. Sig. (2-tailed) |
|------------------|--------------------|----|-----------|------------------------|
| Roughness        | Tapping            | 50 | 66.16     | 0.000                  |
|                  | Pressure rubbing   | 50 | 34.84     |                        |
| Shine            | Tapping            | 50 | 63.59     | 0.000                  |
|                  | Pressure rubbing   | 50 | 37.41     |                        |
| Cracks           | Tapping            | 50 | 51.36     | 0.746                  |
|                  | Pressure rubbing   | 50 | 49.64     |                        |
| Scrapes          | Tapping            | 4  | 4.5       | 1.000                  |
|                  | Pressure rubbing   | 4  | 4.5       |                        |
Table 1 shows that there are significant differences between tapping and pressure rubbing techniques in the roughness, shine observation items. On the other hand, cracks and scrapes are not significantly different. Some improvements to the skin's moisture texture can be seen in figure 2.

| Before Tapping | Before Pressure Rubbing | After Tapping | After Pressure Rubbing |
|----------------|------------------------|---------------|-----------------------|
| ![Image](image1.png) | ![Image](image2.png) | ![Image](image3.png) | ![Image](image4.png) |
| ![Image](image5.png) | ![Image](image6.png) | ![Image](image7.png) | ![Image](image8.png) |
| ![Image](image9.png) | ![Image](image10.png) | ![Image](image11.png) | ![Image](image12.png) |
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| ![Image](image29.png) | ![Image](image30.png) | ![Image](image31.png) | ![Image](image32.png) |

**Figure 2.** Various improvements in skin moisture after being given AV.

AV has unique uses. The AV polysaccharide component is responsible for penetration and lubrication ability. Enzymes are useful in processing nutrients in food. Protein is useful for repairing body tissues. As cosmetics, AV is very good at maintaining moisture, tightening, and smoothing the skin [15]. Mucopolysaccharides from AV have agents that help bind moisture into the skin. Amino acids also soften hardened skin cells and zinc acts as a substance to tighten pores. Aloe gel provides a cooling effect and also acts as a moisturizing agent. It also has a role in gerontology and skin rejuvenation [8]. This can increase the water level of the stratum corneum by pulling water from the dermis below and keeping this water binding to the stratum corneum. Besides, the presence of mucopolysaccharide also helps bind moisture that will make skin moist [15]. Mucopolysaccharides moisturize the skin and mucosa with water retention. Hyaluronic acid, heparin, and acemannan are the main mucopolysaccharides found in AV [16].

AV can increase skin moisture and hydration through a humectant mechanism. Humectants hydrate the stratum corneum through a hygroscopic effect increasing its elasticity [17]. Humectants function to maintain stability by absorbing moisture from the environment and reducing water evaporation from preparations. In addition to maintaining dose stability, a humectant can also indirectly maintain skin
moisture so the skin does not dry out. This is what causes an increase in all observations of roughness, shines, cracks and skin scrapes both in tapping and pressure rubbing techniques.

The stratum corneum layer consists of protein-enriched corneocytes and lipid-enriched intercellular. Visual changes in the impression of dryness are formed by visible, tactile, and sensory changes in the skin. Corneocytes and cohesive structures between cells are prerequisites for the function of the stratum corneum as a physical/chemical barrier between the interior and exterior of the body. The mechanical strength of corneocytes comes from solid keratin bonds and proteins from cornified envelopes. The structure of the corneocyte envelope consists of two parts: (i) a thick layer (about 15 nm) adjacent to the cytoplasm composed of structural proteins and (ii) a thin layer (about 5 nm) on the outside of the protein portion composed of lipids. AV extract contains water-soluble substances such as Aloe-emodin, Chrysophonal, and Helminthospor [9].

The clear gel in Aloe vera leaves consists of 99% water and the rest is made of more than 75 bioactive compounds including polysaccharides, sugars, minerals, proteins, lipids, and phenolic compounds [5]. Water maintains the stratum corneum tenderness and flexibility. Water in the stratum corneum will bind to the hydrophilic portion of the intercellular lipids and the keratin fibers in the corneocytes [18]. The application technique of AV by tapping provides more water than pressure rubbing. This results in greater roughness improvements in tapping techniques. Apart from that, the emphasis on the stratum corneum can interfere with corneocytes and the cohesive structure between cells.

4. Conclusion

AV improves skin moisture seen from the texture of roughness, shines, cracks, and scrapes. Pressing technique on the skin is not needed to moisturize the skin using aloe vera.

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