Antiaging Cream Formula From Lemongrass Leaf Extract (*Chymbopogon Citratus*)

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Abstract.
This study aimed to determine the formula of anti-aging cream using lemongrass leaf extract. The treatment by giving respondents lemongrass leaf extract and using moisture, evenness, pore, spot, and wrinkle as parameters. Human skin provides protection on the surface of the body against the influence of the surrounding environment. Skin can experience aging, especially in areas that are often exposed to direct sunlight such as the face, neck, upper arms, and hands. Aging is a process experienced by humans in their 30s whose functions in the human body are decreasing, for example, thinning skin, wrinkles, rough skin, and dark spots on the face. Treatment to prevent aging of the skin by using an antioxidant product such as flavonoids because it has the function of preventing or neutralizing free radicals. In Indonesia, several species of plants can be found that function as food and cosmetic ingredients. The lemongrass leaf extract which contains antiaging are Alkaloids, Flavonoids, and Tannins. The data were analysed by using the Kolmogorov-Smirnov method to determine homogeneity and normality. Then, if the data is normal, it is continued to be analysed using the One-Way ANOVA method to determine the average difference between groups. There is a difference between treatments, and it is continued with the Post-hoc Tukey HSD test. The higher the concentration of extract used, the greater the anti-aging productivity formed. It is concluded, the best anti-aging effect is a concentration of 9% with increase in moisture, evenness, pore reduction, reducing spots and wrinkles.

Keywords: *Extract of Lemongrass Leaves, Skin and Anti-aging cream.*

I. INTRODUCTION

The process of premature aging is a physiological process that will occur in every living thing on the skin which will be exposed to environmental oxidative materials that can cause skin disorders where one of them is premature aging. Premature aging can occur due to environmental factors, namely sunlight, humidity, temperature, cigarette smoke, and air pollution [1].The skin aging process is caused by many factors (multifactorial). Based on the cause, skin aging can generally be divided into two, namely intrinsic aging and extrinsic aging. Clinical changes in intrinsic aging can be seen in the skin that is not exposed to direct sunlight, occurring as a result of the normal aging process. Changes that occur mainly in the form of reduced skin barrier function, slowed epidemic cell turnover, and reduced vascularity in the skin layer so that the skin looks atrophic.The cells most affected are keratinocytes and fibroblasts. All of that will cause skin function, as well as protection, excretion, secretion, absorption, thermoregulation, and sensory perception decreases. Extrinsic aging or photoaging is an aging process that occurs faster due to external factors, such as sun exposure, air pollution, cigarettes, alcohol, and poor nutrition.

Changes due to external factors can occur even before the intrinsic aging process. Epidermal changes occur in the form of increased pigmentation, hyperkeratosis, elastosis that replaces collagen fibres. Collagen is the main component in human skin that plays a role in skin strength [2].Antioxidants are important compounds that are very beneficial for skin health. This substance serves to ward off free radicals that can damage skin tissue. Free radicals are also suspected as the cause of premature aging of the skin because free radical attacks on tissues can damage fatty acids and eliminate elasticity so the skin becomes dry and wrinkled [3] As a tropical country, Indonesia has various kinds of biological natural resources, one of which can be found in several species of plants that function as food and cosmetic compositions. One of the plants that are used for food and cosmetic compositions is lemongrass leaves. Lemongrass (*cymbopogon citratus*) leaves and roots contain flavonoids, alkaloids, saponins, and polyphenols. Lemongrass has active compounds that can be used for treatment, one of which is anti-inflammatory, anti-fungal, anti-bacterial. The phytochemicals contained in the lemongrass plant consist of alkaloids, flavonoids, saponins, tannins, anthraquinones, steroids, phenolic acids, and flavone glycosides. This content has many benefits, one of which has a medicinal effect [4].

II. METHODS

Extraction for Lemongrass Extract

The required lemongrass leaf was collected to make lemongrass extract. Then it was dried and cut at the end of the leaf. Continued with airing at room temperature until it becomes smooth and has mild form so it can be blended until powder. It resulted in lemongrass extract. Next step is filtering the result powder and only taking the filtrate. Then, the filtrate put into the moisture balance, the temperature is set at 50℃, until the dissolved solid reaches 15%, which is in accordance with the industry standard itself. Finally, the lemongrass leaf extract is formed.

Formulation the anti-aging cream

Firstly, Leaf lemongrass extract was prepared for making the base cream for anti-aging cream. Then, all of the ingredients consist of Oil and Water phase where the oil phase contain stearic acid and water phase from sorbitol, propylene glycol, triethanolamines, glycerine, nipagin and Aquadest. These two phases melted above water bath at the 70-75 ℃ temperature. In the result, Bulk A (from the oil phase) and Bulk B (from the water phase) was formed, continued by putting mass A into the mortar. Then, slowly add Mass B into a mortar containing Mass A while constantly grinding it until it's homogeneous. Cream base was formed from these mixed ingredients. Add the lemongrass leaf extract left and add few drops of coffee scent perfume. Lastly, put the formed cream into the bottle.

Treatment for Respondents

This research was located in Pharmacy Laboratory University of North Sumatera and this research also has fulfilled the medicine ethics required by the committee of Prima Indonesia University. This study is experimental laboratory research and used Pre and Post Test Control Group Design model. The treatment was given by giving respondents lemongrass leaf extract applied to respondent’s face and neck and using moisture, evenness, pore, spot, and wrinkle as parameters.Anti-aging effectiveness test begins with volunteer’s initial skin condition measurements and the treatment is done by applying the cream evenly over the marked area. Changes in skin condition measured for 4 weeks using a skin analyzer. The measured parameters include moisture, evenness, pore, spot, and wrinkle. After 1-month treatment, the effect has shown positive result. Then, the data obtained continued analyzed statistically with SPSS program by using the Kolmogorov-Smirnov method to determine homogeneity and normality.Then, if the data is normal, it is continued by being analysed using the One-Way ANOVA method to determine the average difference between groups. There is a difference between treatments, and it is continued with the Post-hoc Tukey HSD test.

III. RESULT AND DISCUSSION

Anti-aging activity testing using Aramo skin analyser, where the test parameters include: measurement of moisture content (moisture), smoothness (evenness), pore size (pore), measurement of the number of stains (spots) and measurements of wrinkles (wrinkles). Measurement of anti-aging activity begins by measuring the initial condition of the skin in the facial area, namely around the cheeks and near the eyes before treatment, the aim is to be able to see how much influence the cream has in restoring skin that has started to wrinkle.The humectant composition of the moisturizer works by drawing water into the skin. Natural humectants play a role in maintaining adequate hydration of the skin.

Natural moisturizers are natural skin protectors against dehydration [5]. A humectant type moisturizer will not make the skin oily and become more water soluble. That is why this type of moisturizer is more suitable for normal to oily skin types. As it shown at the Figure 1.Skin that is kept moisturized can protect itself against the aging process. The humectant composition of the moisturizer works by drawing water into the skin. Natural humectants play a role in maintaining adequate hydration of the skin. Natural moisturizers are natural skin protectors against dehydration [5]. According to the research journal by Masaki [4], the weather which includes temperature and humidity, exposure to chemicals and microorganisms, aging, physiological and genetic stress are some of the other factors that cause dry skin.

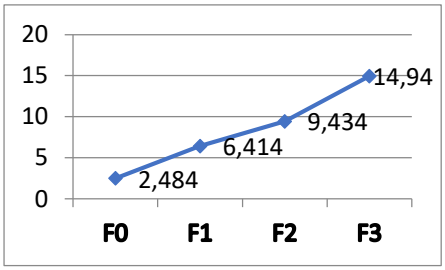

Fig 1. Graph of the percentage increase in water content (moisture)

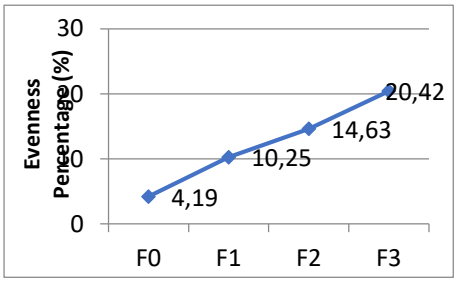

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Fig 2. Graph of the percentage increase in smoothness (evenness) on facial skin

From the Figure 2 as it shown, obtained after using anti-aging cream for four weeks, then it was analyzed using the Kruskal Wallis non-parametric test to determine the effectiveness of the formula on the percent change in skin smoothness of volunteers and it was obtained a p value <0.05, indicating a significant difference between the formulas. To find out which formula is different, the data is then tested using Mann-Whitney. The results of the Mann-Whitney test can be concluded that there is a significant difference in the increase in skin smoothness ($p<0.05$) between all formula concentrations. The natural moisturizing factor plays a major role in the physical properties of the outermost layer of the skin, the horn layer. Good moisturizing of this layer is very important for smoothness [5]. Moisturizers are generally used to relieve dry skin.According to Simion et al., 2005 [6], moisturizers can reduce trans epidermal water loss (TEWL) by enhancing barrier repair, creating temporary artificial barriers, and restoring skin softness. The basic components of a moisturizer consist of occlusives, humectants and emollients. Occlusives are substances that are useful for coating the stratum corneum and reduce Transepidermal water loss (TEWL), humectants are useful for the skin hydration process, and emollients are substances added to make the skin smooth and soft [7]. The effect of cream into pore measurement shown at Figure 3.

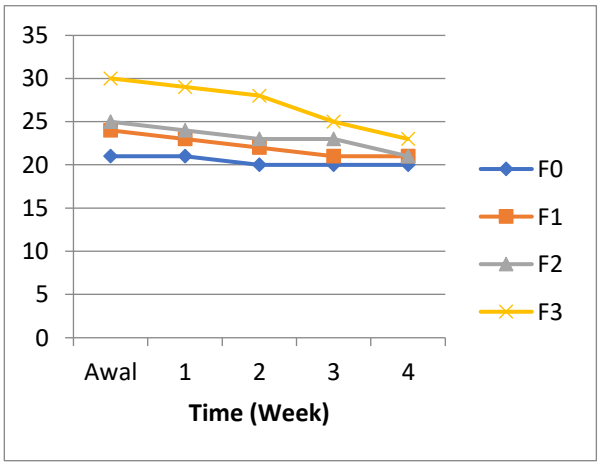

Fig 3. Graph of the results of pore measurements on the volunteer's facial skin

Besides being caused by aged which makes the pores broaden due to reduced skin elasticity, it is also due to frequent contact to sunlight. The most common cause is exposure to free radicals in the form of ultraviolet light. One of the efforts to capture free radicals is antioxidants [8]. The mechanism of action of antioxidants is by donating one electron to other compounds that are oxidants so that the activity of these oxidant compounds can be inhibited [9]. Antioxidants "sacrifice" to be oxidized by free radicals so that they can protect proteins or amino acids that make up collagen and elastin [10] (Aizah, 2016). According to Sunarno's research, antioxidants contained in lemongrass leaf have a good role in repairing skin tissue [11]. Figure 3 shown the percentage reduction in respondents spots.

Based on the graph above, the data were analyzed using the Kruskal Wallis non-parametric test and obtained p value <0.05 at 14 days, 21 days and 28 days of using anti-aging cream lemongrass leaf extract which showed significant differences between formulas in reducing spots on the volunteers. In general, these black spots appear on body parts that are often exposed to direct sunlight [8]. When exposed to sunlight, the formed melanin goes up to the surface of the skin, causing black spots. Black spots (hyperpigmentation) appear on skin that is starting to age or skin that is not aging due to various reasons [12]. Minerals sourced from lemongrass leaf flesh, such as zinc (Zn) function in the synthesis of the antioxidant glutathione which plays a role in protecting cells. Zn minerals together with albumin can accelerate the process of tissue repair [11].

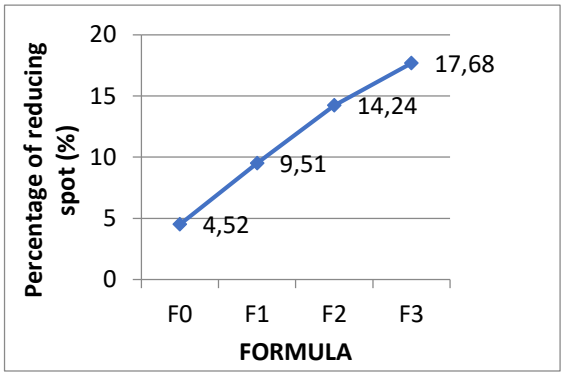

Fig 3. Percentage reduction in spots (spots) on the facial skin of group volunteers

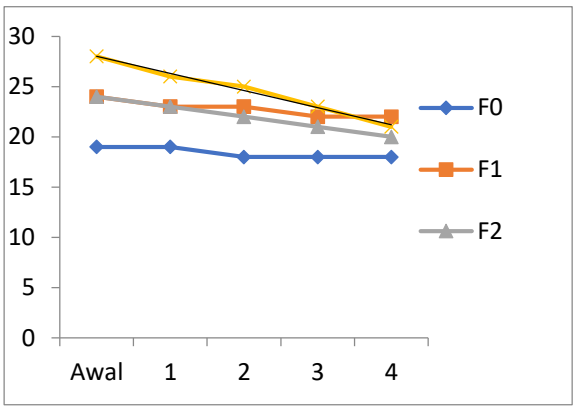

Fig 4. Graph of the effect of using anti-aging creams in reducing wrinkles

At 14 days, 21 days and 28 days of treatment that showed a significant difference between the formulas in reducing wrinkles on the facial skin of volunteers. Thus, the data were tested using Mann-Whitney to find out which formula was different. From the results it can be concluded that there are significant differences between the blanks with F1, F2 and F3; F1 with F2 and F3; F2 with F3.The aging process is a process where there is a decline or degeneration that causes the body to lose its capabilities and competencies, which include causing the appearance of wrinkles and best strains on the face or other body parts. Skin aging is as natural or inner aging which is then stimulated by changes in skin elasticity. Collagen is a protein found in the top layer of human skin that functions to attach connective tissue that is found in the extracellular matrix (ECM).

If this protein is damaged, it causes changes in the composition of skin tissue so that it can cause the aging process. According to a study conducted by Kesuma and Yenrina, there are several ways to protect the skin from the aging process, namely the use of antioxidants that can be consumed through foods such as vitamins A, C, E from vegetables or fruits [13]. Then, other natural ingredients, one of which comes from the content of lemongrass leaves. Lemongrass leaf flesh is a source of the amino acid's glutamate, cysteine, and glycine which can be used as antioxidant precursors. The role of several nutrients and antioxidants contained in lemongrass leaf has a better role in repairing skin tissue. These antioxidants function as anti-aging [11].

***Anti-aging* Parameter**	**% Recovery**
Moisture	14,94%
Evenness	20,42%
Pore's	20,93%
Spot	17,68%
Wrinkle	20,23%

Table 1. Result % recovery on Concentration 9% (F3)

The anti-aging cream of lemongrass leaf extract with a concentration of 9% (F3) showed the greatest anti-aging effect on the facial skin conditions of volunteers. The skin condition of the volunteers showed a change in the percentage of skin conditions for the better, for four weeks using an anti-aging cream with lemongrass leaf extract. This can be seen from the average percentage increase in moisture (14,94%), increase in evenness (20,42%), reduction of pores (20,93%), reduction of spots (17,68%), and reduction of wrinkles (20,23%).

IV. CONCLUSION AND SUGGESTIONS

Lemongrass leaf extract can be formulated in the form of an anti-aging cream with several different concentrations, namely 0%, 3%, 6%, and 9% concentrations. The anti-aging cream of lemongrass leaf extract has a pH of 7.3-7.9, o/w emulsion type, homogeneous, non-irritating and stable in storage for 12 weeks at room temperature. Based on the data obtained, the higher the concentration of extract used, the greater the anti-aging productivity formed. It is concluded, the best anti-aging effect is a concentration of 9% with increase in moisture, evenness, pore reduction, reducing spots and wrinkles.

Suggestions

It is hoped that further research can construct lemongrass leaf extract in other cosmetic dosage forms such as serum preparations or face masks. And it is hoped that further researchers can formulate a combination of leaf extracts lemongrass leaves and basil leaves.

V. ACKNOWLEDGMENTS

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