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Original Article

Formulation and Effectiveness Testing of Moringa Leaf (Moringa Oleifera) Ethanol Extract Lotion as A Skin Moisturizer

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ABSTRACT

This study delves into the formulation of a lotion using different concentrations (0.5%, 2%, and 5%) of Moringa oleifera leaf ethanol extract, aiming to address the constant exposure of the skin to a prooxidant environment. In Indonesia, the rising interest in exploring natural plants for traditional skincare formulations is attributed to their perceived lower side effects compared to chemical substances. Employing an experimental research approach with a pre-test and post-test control group design, the study focuses on observing and controlling the formulation and effectiveness of Moringa oleifera leaf extract lotion in various skin-enhancing aspects.The research findings reveal that the formulated lotions exhibit distinctive aroma, soft texture, ease of spread, and semi-solid or gel consistency without stickiness. Physical homogeneity suggests a well-blended composition, and the pH values (6.32 for 0.5%, 6.30 for 2%, and 6.28 for 5%) fall within the ideal range, ensuring skin compatibility. Spreadability tests show the 5% concentration has the highest spreadability, while adhesive strength analysis indicates all concentrations meet the criteria for good cream adhesive strength.Furthermore, the efficacy of the lotion is assessed for moisturizing, smoothing, pore-shrinking, wrinkle-reducing, and collagen fiber density-increasing properties. Results indicate the 5% concentration is the most effective across these parameters.In conclusion, the ethanol extract lotion formulated from Moringa oleifera leaves holds promise for enhancing skin health, with the 5% concentration demonstrating the highest efficacy. This research contributes valuable insights to the development of natural skincare products with potential applications in dermatology and cosmetology, aligning with the growing interest in sustainable and effective skincare solutions.

Keywords: *Lotion Preparation, Moringa Leaves, Skin Moisturizer.*

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INTRODUCTION

Skin or also called integumentary tissue, which consists of epithelial, mesenchymal, glandular and neurovascular elements, is not only the covering of the body. The skin plays an important role in maintaining homeostasis. Integumentary tissue has a membrane with the lowest water permeability, thereby preventing skin dehydration in dry weather conditions [1].

As the body's outermost organ, the skin is directly exposed to a pro-oxidant environment and triggers the formation of free radicals which are also called reactive oxygen species (ROS). The mechanism of damage caused by free radicals is quite complex, through a chain reaction that causes oxidative stress which causes cell damage and skin disorders [2].

Dry skin or xerosis cutis is a skin condition that experiences a lack of water

content in the stratum corneum to below 10%. Dry skin is a problem that is often encountered, but is often ignored. Dry skin that is not cared for properly can become a source of infection, disrupt sleep due to itching, and even depression [3]. Dry skin will also look dull, feel rough, scaly, wrinkled, and less elastic than normal skin. In dry skin, a natural protection factor is available, namely Natural Moisturizing Factor (NMF). However, in certain conditions natural skin protection factors are not sufficient so additional non-natural protection is needed, namely by providing moisturizer. Moisturizers, also known as emollients, are the addition of water to the skin and increase the water binding capacity of the stratum corneum [4]. The stratum corneum layer is an interactive and dynamic structure, its function is to protect and maintain skin moisture. Moisturizer works effectively to treat dry skin and maintain smooth skin. Moisturizer is one of the products that is in great demand, even now moisturizing products have been developed using natural ingredients, such as plants and vitamins. In Indonesia itself, there are many natural plants that can be used as traditional ingredients. Recently, traditional ingredients have been widely used and are starting to be developed because the side effects caused by natural ingredients as ingredients for health and beauty are smaller compared to those from basic ingredients. chemicals. Apart from low side effects, using traditional ingredients can save costs because the price is more affordable [5].

One natural ingredient that can be used as an anti-oxidant is Moringa oleifera leaves. In previous research it was reported that Moringa leaves contain seven times more vitamin C than oranges, ten times more vitamin A than carrots, seventeen times more calcium than milk, nine times more protein than yoghurt, fifteen times more potassium than bananas and iron are twice as large as spinach. The content of ascorbic acid, ß-carotene, tocopherol acid, flavonoids, phenolics, carotenoids, hydroxynamite acid derivatives, and flavonoids means that Moringa leaves can be used as a source of natural antioxidants. This antioxidant activity causes Moringa leaves to be used as antiaging[6].

Research by Susanty et al (2019) on testing the antioxidant activity of Moringa oleifera leaf extract using the DPPH method stated that Moringa leaf extract has very strong antioxidant activity[7]. The beta carotene content in Moringa leaf extract also has potential as an antioxidant because it protects lipid membranes from peroxidation and at the same time stops chain reactions from free radicals. The mechanism of beta carotene as an antioxidant occurs indirectly, namely preventing lipid peroxidation in cell membranes by protecting cell membranes and maintaining cell membrane integrity with free radicals.

METHOD

This type of research is experimental research using a pre-test and post-test control group design. Experimental research is a research activity to control and observe research . Experiments were carried out to determine the formulation and effectiveness of Moringa oleifera leaf extract lotion in moisturizing, smoothing, shrinking pores and reducing skin wrinkles and to see the density of collagen fibers. The sample for this research was Moringa oleifera leaf extract lotion obtained from the online shop Shopee.

Making an extract from 600 grams of Moringa leaves soaked in 96% ethanol. In the percolation process, 600 grams of dry Moringa leaf powder were weighed and soaked first in ethanol solvent. Extraction is preceded by soaking the sample for at least 3 hours in a closed vessel, then the extraction process is continued in the percolator for 2 days, until the liquid dripping from the percolator is clear. Then a liquid extract is obtained. This liquid extract is vacuum distilled and then with the help of a rotary evaporator at a temperature of 70^0 C a thick extract is obtained.

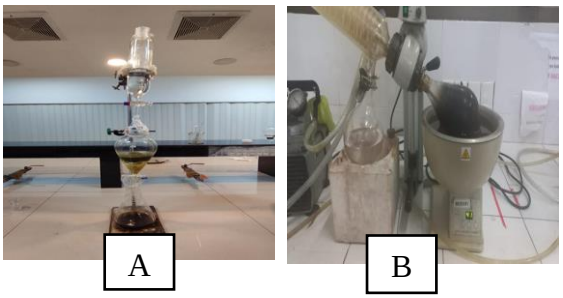

Figure 1. Image (A) is the percolation process and image (B) is the rotary evaporator process

The test animals that will later be used are male Wistar rats obtained from the

Laboratory of the Faculty of Pharmacy, University of North Sumatra, 25 rats weighing 150-250 g. Mice were kept in the Laboratory of the Faculty of Pharmacy, University of North Sumatra. The next treatment on the test animals was that the rat's hair was cut first, then shaved until the rat's skin was visible, and cleaned with 70% alcohol. Then the next step, after the mice were cleaned, the mice were treated with several concentrations of Moringa leaf lotion extract and positive and negative controls. Treatment was given every day during the research process. The procedures and procedures are: Each formula is tested for its effectiveness on the skin of rat test animals, within a period of 6 hours for 2 days of using the skin lightening lotion preparation. The cream application technique is that each formulation tested is taken in the amount of 1 fingertip unit (FTU) as a standard size, smeared on the skin of the test animal at each concentration. Every time you start applying, the skin of the test animal is measured first and then recorded, all measurement results are recorded in a table.

RESULTS AND DISCUSSION

Test Results of Moringa Leaf Ethanol Extract Lotion Formulation (Moringa oleifera)

The following are the results of lotion formulation tests from ethanol extract of Moringa oleifera leaves which include organoleptic tests, homogeneity tests, pH tests, spreadability tests, and adhesiveness tests.

Organoleptic Test Results

The following are the results of organoleptic test observations on the Moringa leaf ethanol extract formulation in terms of color, aroma and shape.

Table 1. The result of organoleptic test observations on the preparatory formulation of kelor leaf ethanol extract (Moringa oleifera)

Testing	0,5%	2%	5%
Organoleptis -Color	Green	Green	Green
Organoleptis -Aroma	Characteristic smell	Characteristic smell	Characteristic smell
Organoleptis -Shape	Gel	Gel	Gel

Organoleptic examination did not show any color differences in the cream preparations with concentrations of 0.5%, 2% and 5%, all three of which had a green color due to Moringa leaf extract. The three concentrations of Moringa oleifera leaf ethanol extract produced produce a distinctive aroma. has a soft texture, spreads easily, forms a semi-solid or gel consistency, and does not feel sticky.

Homogeneity Test Results

The following are the results of observations for the homogeneity test on the ethanol extract formulation of Moringa leaves (Moringa Oleifera)

Table 2. Results of homogeneity test observations on Moringa leaf ethanol extract preparation formulations (*Moringa oleifera)*

Testing	Result		
	0,5%	2%	5%
Homogeneous	Homogeneous	Homogeneous	Homogeneous

The homogeneity examination at the three concentrations of Moringa leaf ethanol extract formulation aims to observe the presence of coarse particles on the slide. The observation results showed that the three concentrations of cream formulation formulations were physically homogeneous, this shows that the ingredients used in making the cream were mixed perfectly.

pH Test Results

Testing the pH of the preparation is carried out with the aim of determining the

acidity level of the preparation. If the pH of the preparation is low or acidic it will cause irritation to the skin, if the pH of the preparation is high or alkaline it will cause dry skin when applied. The results of testing the pH of the Moringa leaf ethanol extract formulation can be seen in Table 4.3 below.

Table 3. pH Examination Results

Setup	pH Measurement Results			
	pH			Average ±STD
0,5%	6,32	6,32	6,31	6.32±0.06
2%	6,30	6,30	6,29	6.30±0.06
5%	6,28	6,28	6,28	6.28±0.00

Table 3 explains the results of the pH test on the Moringa leaf ethanol extract preparation formulation. From the table it can be seen that the 0.5% concentration has an average pH and STD value of 6.32 ± 0.06, a 2% concentration has an average pH value and The STD is 6.30 ± 0.06, and the 2% concentration has an average pH and STD value of 6.28 ± 0.00. From these results it can be said that the pH value is still within the ideal pH range. According to SNI 16-4399-1996 in, the ideal pH of a cream formulation is in accordance with the pH of the skin, which is in the range of 4.5 - 8.0. If the pH of the cream does not match the pH of the skin, it will cause skin irritation.

Spreadability Test Results

The spreadability test is carried out to determine the base's ability to spread on the skin surface when applied. A good base spreading ability will make it easier when the cream preparation is applied to the skin. The spreadability test results can be seen in table 4 below.

Table 4. Spread Force Test Results on Kelor Leaf Ethanol Extract Preparation (*Moringa oleifera*)

Load mass	Dispersion Force Diameter (cm)		
	0,5%	2%	5%
0	4,2	4,4	4,8
100	4,7	5	5,2
125	5	5,3	5,5

Table 4 explains the results of the spreadability test on Moringa leaf ethanol extract preparations. From the results of observations it can be seen that the 5% concentration has the most dominant or greatest spreadability value compared to concentrations of 0.5% and 2%. From these results it can be concluded that the more The greater the concentration of Moringa leaf ethanol extract preparation, the greater the resulting distribution area due to an increase in viscosity. The wider the spreading area produced by a cream, the better the spreading ability of the cream will be when applied.

Adhesion Test Results

The adhesion test is intended to determine the ability of the Moringa leaf ethanol extract preparation to adhere to the applied area, namely the skin. The adhesive strength test results of the three concentrations can be seen in table 5 below.

Table 5. Adhesion Test Results

Concentration	Adhesion (Seconds)			Average
	1	2	3	
0,5%	42,57	41,31	42,29	42,05
2%	55,55	54,62	57,35	55,84
5%	77,68	79,91	75,58	77,72

Table 5 explains the results of the adhesion test on the ethanol extract of Moringa leaves. From the results of the observations it was found that the average value of adhesion at a concentration of 0.5% was 42.05, at a concentration of 2% the average was 55.84 and at a concentration of 5% the average was the average is 77.72%. From the results of the average value obtained from the three concentrations above, the three concentrations in this study fall into the adhesive strength range of 2.00 – 300.00 seconds. The requirement for good cream adhesion is 2.00 – 300.00 seconds (Roosevelt et al., 2018). From these results, the three concentrations in this study meet the requirements to be a preparation for moisturizing the skin, the greater the concentration, the greater the adhesive power.

Table 6. Results of Observation of the Effectiveness of Moringa oleifera Ethanol Extract Lotion Formulation in Moisturizing the Skin

Group	Mean + SD	*p-Value*	Information
Concentration: 0.5%	18,00 + 1,000	0,119	Data Normal
Concentration: 2%	26,42 + 1,304	0,421	Data Normal
Concentration: 5%	27,50 + 4,000	0,125	Data Normal
Negative Control	10,87± 1,208	0,814	Data Normal
Positive Control	26,58 + 3,775	0,814	Data Normal

Information :
Negative control: Base cream or no treatment
Positive control: Citra Hand Body Lotion

Table 6 shows the results of the moisture test of the Moringa leaf extract lotion, it can be seen that the 0.5% concentration had a percent increase of 18%, the 2% concentration had a percent increase of 26.42% and for the concentration 5% has a percent increase of 27.50%. From these results, it can be seen that the highest percent increase in the effectiveness of skin moisture from the Moringa leaf extract lotion preparation was at a concentration of 5% with a standard deviation value of 4,000.

The normality test using the Shapiro Wilk test. From the results of the normality test on the skin moisture data, it can be seen that the p value for all research groups has a p value > 0.05, which means that the data for all skin moisture concentration groups is normally distributed.

Table 7. Test Results of the Effectiveness of Moringa oleifera Ethanol Extract Lotion Formulation in Moisturizing the Skin

Group	*p-Value*
Concentration: 0.5%	0,000
Concentration: 2%	0,000
Concentration: 5%	0,011

Table 7 is the result of testing the effectiveness of the Moringa oleifera (Moringa oleifera) ethanol extract lotion formulation in moisturizing the skin. The research results show that the p value for each group in this study, namely concentrations of 0.5%, 2% and 5%, are all <0. 05 which shows that the ethanol extract of Moringa oleifera leaves at concentrations of 0.5%, 2% and 5% is effective in moisturizing the skin.

Table 8. Results of Observation of the Effectiveness of Moringa Oleifera Ethanol Extract Lotion Formulation in Smoothing the Skin

Group	Mean + SD	*p-Value*	Information
Concentration: 0.5%	22,02 + 1,000	0,083	Data Normal
Concentration: 2%	30,46 + 1,304	0,135	Data Normal
Concentration: 5%	44,44 + 4,000	0,146	Data Normal

Negative Control	11,69±1,466	0,314	Data Normal
Positive Control	48,13 ± 5,988	0,076	Data Normal

Description
Negative control: Base cream or no treatment
Positive control: Citra Hand Body Lotion

Table 8 shows the results of the mice's skin smoothness, it can be seen that all formula groups showed an increase in skin smoothness with an average percentage increase, concentration 0,5% of 22.02%, concentration 2% of 30.46%, and concentration 5% of 44.44% where at a concentration of 5% showed higher average increase in skin smoothness than other concentration, namely 44.44% with a standard deviation value of 4,000.

The results of the normality test using the Shapiro Wilk test. From the results of the normality test on skin smoothness data, it can be seen that the p value for all research groups has a p value > 0.05, which means that the data for all concentration groups in skin smoothing is normally distributed.

Table 9. Test Results of the Effectiveness of Moringa oleifera Ethanol Extract Lotion Formulation in Smoothing the Skin

Group	***p-Value***
Concentration: 0.5%	0,000
Concentration: 2%	0,000
Concentration: 5%	0,000

Table 14 is the result of testing the effectiveness of Moringa oleifera lotion formulation in smoothing the skin, from the results of the study showed that the p value of each research group was 0.5%, 2% and 5% concentrations < 0.05 which showed that Moringa leaf ethanol extract (Moringa oleifera) at concentrations of 0.5%, 2% and 5% had effectiveness in smoothing the skin.

Table 10. Results of Observation of the Effectiveness of Moringa Oleifera Ethanol Extract Lotion Formulation in Shrinking Skin Pores

Group	**Mean + SD**	***p-Value***	**Information**
Concentration: 0.5%	22,03 + 0,548	0,106	Data Normal
Concentration: 2%	30,05 + 0,894	0,096	Data Normal
Concentration: 5%	37,22 + 2,191	0,607	Data Normal
Negative Control	8,23±0,993	0,967	Data Normal
Positive Control	44,51 + 6,304	0,490	Data Normal

Information :
Negative control : Base cream or no treatment
Positive control : Citra Hand Body Lotion

Table 10 explains the results of observations on the effectiveness of ethanol extract of Moringa oleifera leaves in shrinking the skin. After using the Moringa oleifera (Moringa oleifera) ethanol extract lotion formulation, all formula groups showed skin pore reduction with an average percentage, concentration 0,5% of 22.03%, concentration 2% of 30.05%, and concentration 5% of 37.22% where in a concentration of 5% showed the highest average skin pore reduction, namely, 37.22% with a standard deviation of 2.191.

The results of the normality test using the *Shapiro Wilk* test, from the results of the normality test on skin pore reduction data, it can be seen that the p value of all research groups has a p value of > 0.05 which means that the data on all concentration groups in the skin pore are normally distributed.

Table 11. Test Results of the Effectiveness of Moringa oleifera Ethanol Extract Lotion Formulation in Shrinking Skin Pores

Group	*p-Value*
Concentration: 0.5%	0,000
Concentration: 2%	0,000
Concentration: 5%	0,000

Table 11 is the result of testing the effectiveness of Moringa oleifera lotion formulation in shrinking skin pores, from the results showed that the p value of each study group was 0.5%, 2% and 5% concentrations < 0.05 which showed that Moringa oleifera ethanol extract at concentrations of 0.5%, 2% and 5% had effectiveness in shrinking skin pores.

Table 12. Results of Observation of the Effectiveness of Moringa Oleifera (Moringa oleifera*) Ethanol Extract Lotion Formulation* in Shrinking Wrinkles

Group	Mean + SD	*p-Value*	Information
Concentration: 0.5%	18,32 + 1,095	0,135	Data Normal
Concentration: 2%	27,13 + 1,140	0,814	Data Normal
Concentration: 5%	34,92 + 1,517	0,144	Data Normal
Negative Control	6,60± 0,944	0,135	Data Normal
Positive Control	43,43+ 6,898	0,814	Data Normal

Description
Negative control: Base cream or no treatment
Positive control: Citra Hand Body Lotion

Table 12 describes the effectiveness of *Moringa oleifera* ethanol extract in reducing wrinkles. After the use of *Moringa oleifera* lotion formulation, all formula groups showed a reduction in wrinkles on the skin with an average percentage, concentration 0,5% by 18.32%, concentration 2% by 27.13%, and concentration 5% by 34.92% where at a concentration of 5% showed the highest average reduction in skin wrinkles, namely, 34.92% with a standard deviation value of 1.517.

The results of the normality test using the *shapiro wilk* test, from the results of the normality test on the data reducing skin wrinkles, it can be seen that the p value of all research groups has a p value of > 0.05 which means that the data on all concentration groups in reducing wrinkles are normally distributed.

Table 13. Test Results of the Effectiveness of Moringa oleifera Ethanol Extract Lotion Formulation in Reducing Wrinkles

Group	*p-Value*
Concentration: 0.5%	0,000
Concentration: 2%	0,000
Concentration: 5%	0,000

Table 13 is the result of the test of the effectiveness of Moringa oleifera lotion formulation in reducing skin wrinkles, from the results of the study showed that the p value of each study group was a concentration of 0.5%, 2% and 5% in total < 0.05 which showed that Moringa leaf ethanol extract (Moringa oleifera) at concentrations of 0.5%, 2% and 5% had effectiveness in reducing skin wrinkles.

Table 14. Test Results of the Effectiveness of Moringa oleifera *Ethanol Extract Lotion Formulation* in Increasing the Density of Collagen Fibers

Group	Mean + SD	*p-Value*
Concentration: 0.5%	3,60 + 0,548	
Concentration: 2%	4,00 + 0,000	0,001
Control 5%	4,40 + 0,548	

Table 26 shows the results on the effectiveness of Moringa oleifera lotion formulation in increasing collagen fiber density known P – *Value* 0.001 < 0.05, so it can be concluded that Moringa *oleifera* ethanol extract in concentrations of 0.5%, 2% and 5% is effective in increasing collagen fiber density, *and the effectiveness of each Moringa* leaf ethanol extract group differs in Increasing the density of collagen fibers, judging from the average value for Moringa leaf ethanol extract, the most effective in increasing collagen fiber density is Moringa leaf ethanol extract with an average concentration of 5% of 4.40 with a standard deviation value of 0.548.

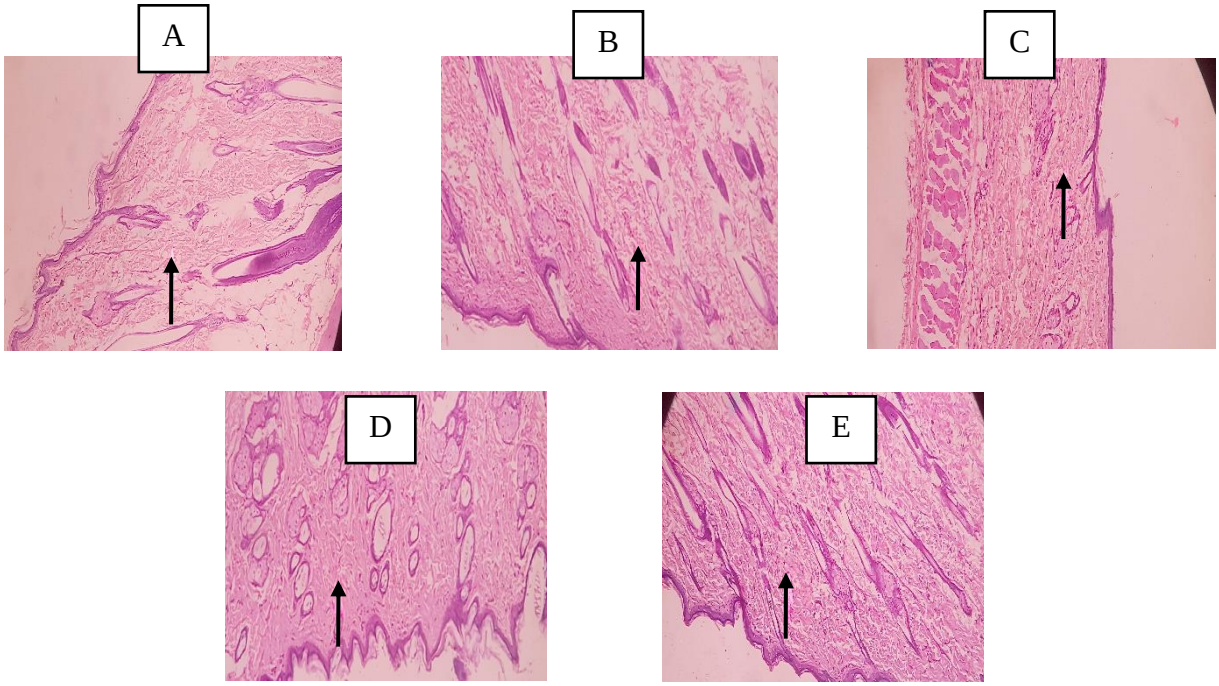

Figure 2. Differences in histopathological features in groups of negative control (A), mice using 0.5% concentration extract lotion (B), mice using 2% concentration extract lotion (C), mice using 5% extract lotion (D) and mice with positive control (E). (A) In these mice, the collagen structure in the dermis is very thin and spread with a collagen density ranging around 10-20%. (B) In this mouse model, the collagen fibers are still thin but the distribution of the collagen density is starting to become denser at around 40-50%. (C) In this mouse model, collagen fibers appear to begin to thicken and spread densely, ranging from 50-60%. This picture is similar to the histopathological picture in mice (D), collagen fibers look thicker with distribution around 80-90%. (E) the collagen fibers are thick and very densely distributed with collagen distribution >90%.

The Effectiveness of Moringa oleifera Ethanol Extract Lotion Formulation in Moisturizing the Skin

The results of research regarding the effectiveness of Moringa oleifera (Moringa oleifera) leaf ethanol extract lotion formulations in moisturizing the skin show that the highest percent increase in the effectiveness of skin moisture from the Moringa leaf extract lotion preparation was at a concentration of 5%.

The results of the research show that the p value of each research group <0.05, which indicates that the ethanol extract of Moringa oleifera leaves at a concentration of 0.5%, 2% and 5% is effective in moisturizing the skin. Based on the ANOVA output extract with a concentration of 5% has an average of 27.50 with a standard deviation value of 4.000. The same results were also obtained from research conducted by Sausan (2020) entitled using Moringa leaf extract lotion on skin moisture, where the results showed that there was an influence between using Moringa leaf extract lotion on skin moisture [8].

From these results, it can be concluded that the greater the amount of extract added to

the cream base, the greater the vitamin E content in the Moringa leaf extract cream. Vitamin E is able to maintain water bonds in the skin, so that skin elasticity and flexibility is maintained. Apart from that, vitamin E also provides protection to the skin from the bad effects of ultraviolet rays, so that moisture is maintained and the skin does not dry out. Moringa leaves can also treat dry skin due to insufficient intake of nutrient B2. Moringa leaves contain nutrient B2 which is useful for treating dry skin, maintaining skin moisture so that regular consumption of Moringa leaves can maintain skin moisture [9].

Based on test results, Moringa Oleifera leaves with a concentration of 7.5% have an SPF value of 39.89, which is a good value for skin care against sunlight. Moringa leaves (Moringa Oleifera) contain phenolics which include flavonoids, flanolol, chlorogenic acid, elagic acid, and ferulic acid, and antioxidants which include vitamin A, vitamin B, vitamin C. Phenolics provide the best protection against enzymes that damage collagen and elastin in skin, β-carotene has been able to increase protein and collagen as well as DNA content and increase the thickening of the epidermis. Vitamin B can maintain skin moisture by drawing water into the stratum corneum to soften the skin [10].

Effectiveness of Moringa Leaf (Moringa oleifera) Ethanol Extract Lotion Formulation in Smoothing Skin

The results of research regarding the effectiveness of Moringa oleifera (Moringa oleifera) leaf ethanol extract lotion formulations in smoothing the skin showed that all formula groups showed an increase in skin smoothness where the 5% concentration showed the highest average increase in skin smoothness, namely 44.44% with a standard deviation value of 4,000.

The results of the research show that the p value of each research group, namely concentrations of 0.5%, 2% and 5%, are all <0.05, which indicates that the ethanol extract of Moringa oleifera leaves at a concentration of 0.5%, 2% and 5% is effective in smoothing the skin. B The results of this study are in line with research which shows that ethanol extract cream formulas can be used to soften the skin. [11].

Moringa leaves contain various chemical compounds which are classified as antioxidants consisting of tannins, flavonoids, steroids, alkaloids and quercetin which are beneficial for body and skin health [12]. Apart from its antioxidant content, Moringa leaves also have a variety of nutritional content consisting of protein, minerals and beta carotene which are beneficial for skin health [13].

Effectiveness of Moringa Leaf (Moringa oleifera) Ethanol Extract Lotion Formulation in Shrinking Pores

The results of research regarding the effectiveness of the Moringa oleifera leaf ethanol extract lotion formulation in shrinking skin pores showed that after using the Moringa oleifera leaf ethanol extract lotion formulation, all formula groups showed skin pore reduction where at a concentration of 5% it showed the highest average skin pore reduction, namely, 37.22% with a standard deviation value of 2.191.

The results of the research show that the p value of each research group, namely concentrations of 0.5%, 2% and 5%, is all <0.05, which shows that the ethanol extract of Moringa oleifera leaves at a concentration of 0.5%, 2% and 5% is effective in shrinking skin pores. The results of this study are in accordance with research which shows that Moringa leaves also contain vitamins A, B1, B2, C and E. Such as the benefits of Moringa leaves, namely hydrating dry skin, treating acne, reducing excess oil on the face, reducing signs of aging, forming collagen. natural on the skin, removes dead skin cells, shrinks skin pores, removes black spots [14].

The Moringa plant (Moringa oleifera) is a type of tropical plant that is easy to grow in tropical areas like Indonesia. Moringa leaves grow easily in a variety of soil conditions. Moringa leaves contain many high antioxidants because Moringa leaves contain ascorbic acid, flavonoids, phenolics and caratenoids. Moringa leaves can be used as a basic ingredient in making cosmetics. Masks are one of the cosmetics to make facial skin brighter.

Pores can become enlarged due to sun exposure, acne scars and so on. To keep your face clean, apply a Moringa leaf mask to shrink the pores so that they don't become a place for dirt and blackheads to accumulate, or even become a place for acne to grow [15]. The anti-inflammatory and antibacterial content in Moringa leaves helps reduce acne. Moringa

leaves also help clean pores and reduce excess oil production, so the skin becomes cleaner and free from acne. Moringa leaves are effective in shrinking pores on the face. This is because the content of vitamin A and vitamin C in Moringa leaves is quite large. These two vitamins will then help remove dirt from the pores and help reduce blockages. So the skin pores will become smaller [16].

Effectiveness of Moringa Leaf (Moringa oleifera) Ethanol Extract Lotion Formulation in Reducing Wrinkles

The results of research regarding the effectiveness of the Moringa oleifera leaf ethanol extract lotion formulation in reducing skin wrinkles showed that after using the Moringa oleifera leaf ethanol extract lotion formulation, all formula groups showed a reduction in skin wrinkles where at a concentration of 5% it showed the highest average reduction in skin wrinkles, namely, 34.92% with a standard deviation value of 1.517.

The results of the research show that the p value of each research group, namely concentrations of 0.5%, 2% and 5%, is all <0.05, which shows that the ethanol extract of Moringa oleifera leaves at a concentration of 0.5%, 2% and 5% is effective in reducing skin wrinkles. This research is in line with research conducted by Baldisserotto et al., (2018) which states that Moringa oleifera leaves can be used as a UV filter, antioxidant and antihyperproliferative as well as reducing wrinkles on the skin, so Moringa leaves can be used to protect against skin aging, brightens the skin, protects against radiation exposure, protects against skin damage, moisturizes the skin and can also be used to rejuvenate the skin. These various uses make Moringa leaves suitable for use as an additional ingredient in moisturizers [17].

Moringa oil and Moringa leaves can be used for facial masks because they can prevent wrinkles on the face and fight skin damage due to free radicals. Moringa leaves can tighten the skin and make the face youthful [18]. Moringa leaves show extraordinary anti-aging effects, Moringa leaf extract is a very promising natural source of anti-aging skin ingredients, which can be further explored in the cosmetics industry and cosmetics that combat skin aging and wrinkles [19].

Effectiveness of Moringa Leaf (Moringa oleifera) Ethanol Extract Lotion Formulation in Increasing Collagen Fiber Density

The results of research on the effectiveness of the ethanol extract lotion formulation of Moringa oleifera leaves in increasing the density of collagen fibers have been completed, the results of which show that the effectiveness of the ethanol extract lotion formulation of Moringa oleifera leaves in increasing the density of collagen fibers is known to have a P value of 0.001 < 0, 05, so it can be concluded that the ethanol extract of Moringa oleifera leaves in concentrations of 0.5%, 2% and 5% is effective in increasing the density of collagen fibers, and the effectiveness of each group of Moringa leaf ethanol extract is different in increasing the density of collagen fibers, as seen From the average value for Moringa leaf ethanol extract, the most effective in increasing collagen fiber density is Moringa leaf ethanol extract with a concentration of 5%, the average is 4.40 with a standard deviation value of 0.548.

That giving ethanol extract of Moringa oleiferadose 50 mg/day and 100 mg/day can increase density. Collagen fibers 5 days after incision in deep wounds of Rattus novergicus. Moringa oleifera is a plant that is often found in Indonesia and is one of the traditional medicines. In Indonesia, Moringa oleifera is usually used as a hedge plant to border the land. Moringa oleifera has therapeutic properties and has been used by ancient people to care for the skin and also has properties in the wound healing process. Moringa oleifera can speed up the process of compacting collagen fibers and closing wounds [20].

CONCLUSION

The three concentrations of Moringa oleifera leaf ethanol extract produced produce a distinctive aroma, have a soft texture, spread easily, form a semi-solid or gel consistency, and do not feel sticky. The observation results show that the three cream formulation concentrations are physically homogeneous, this shows that the ingredients used in making the cream are mixed perfectly. The 0.5% concentration has an average pH and STD value of 6.32 ± 0.06, a 2% concentration has

an average pH and STD value of 6.30 ± 0.06, and a 2% concentration has an average value The pH and STD are 6.28 ± 0.00. From these results it can be said that the pH value is still within the ideal pH range. A concentration of 5% has the most dominant or greatest spreadability value compared to concentrations of 0.5% and 2%. From these results it can be concluded that the greater the concentration of the Moringa leaf ethanol extract preparation, the greater the area of distribution produced due to an increase viscosity. The average adhesion value at a concentration of 0.5% is 42.05, at a concentration of 2% the average is 55.84 and at a concentration of 5% the average is 77.72%. From the results of the average value obtained from the three concentrations above, the three concentrations in this study fall into the adhesive strength range of 2.00 - 300.00 seconds, where this adhesive strength is a requirement for good cream adhesive strength. Lotion formulation of ethanol extract of Moringa leaves (Moringa oleifera) in 0.5%, 2% and 5% preparation are effective in moisturizing the skin. The 0.5%, 2% and 5% ethanol extract lotion formulation of Moringa oleifera leaves are effective in smoothing the skin. Lotion formulation of ethanol extract of Moringa leaves (Moringa oleifera) in 0.5%, 2% and 5% preparation are effective in shrinking pores. The 0.5%, 2% and 5% ethanol extract lotion formulation of Moringa oleifera leaves are effective in reducing wrinkles. Lotion formulation of ethanol extract of Moringa leaves (Moringa oleifera) in 0.5%, 2% and 5% preparation iare effective in increasing the density of collagen fibers. The concentration of Moringa oleifera leaf extract in the lotion formulation that are effective in moisturizing the skin, smoothing the skin, shrinking skin pores, reducing wrinkles and increasing collagen fibers are a concentration of 5%.

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