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The Effectiveness of 20% Moringa Leaf *(Moringa oleifera Lam)* peel-off Mask on Facial Skin Moisture

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ABSTRACT

Background: Indonesia's tropical climate creates a variety of skin problems, including dry skin. The ingredients for making masks can come from nature such as moringa leaves, which have high antioxidants and can moisturize facial skin. **Purpose:** To determine the effectiveness of 20% Moringa leaf (Moringa oleifera Lam) peel-off mask on facial skin moisture. **Methods:** This research is a double-blind quasi-experimental method with a pre-post design. The sample used in this research is workers and students in the Tadulako University area. **Result:** Based on the Friedman test, the use of 20% concentration moringa leaf extract peel-off mask for improving skin moisture was not significant in the positive control and treatment, and dercreasing insignificantly in negative control groups (with p values of 0.484, 0.538 and 0.981, respectively). Based on the Wilcoxon test, it was found that the results of skin moisture were not significant in the positive control, treatment and negative control groups from week 0 to week 2 (p= 0.301, p= 0.675, p= 0.916), week 2 to week 4 (p= 0.806, p= 0.53, p= 0.441), and week 0 to week 4 (p= 0.889, p= 0.529, p= 0.694). **Conclusion:** The 20% moringa leaf extract peel-off facial mask has potential effect to improve facial skin moisture, but not significant. The effect of 20% moringa leaf extract peel-off facial mask on facial moisture is still need to be investigated more.

Keywords: Facial Mask Peel-Off, Facial Skin Moisture, Moringa leaves.

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BACKGROUND

Facial masks that are used regularly can provide good results for skin health, such as softening, protecting the skin from premature aging, eliminating fine lines, and cleaning remaining cosmetic products on facial skin.[1] One of the most popular facial masks nowadays is the peel-off facial mask. This mask has many advantages compared to other masks, namely that it is more practical, can maintain skin youthfulness and softness and can increase skin elasticity. Skin care products with active compounds containing natural ingredients are considered safer compared to synthetic chemical compounds. Natural ingredients can be used in facial care without side effects [2]

One of the natural ingredients that can be used to make masks is moringa leaf. Moringa leaves have high antioxidants and are useful for preventing free radicals. Moringa leaves have many benefits and have been widely used in processing products. In the past, moringa leaves were only used as vegetables, but nowadays they can be used as tea and make the skin healthy as the main ingredient in making facial masks.[3] Moringa leaves have a very high vitamin content compared to other plants, minimal side effects, and are safe to use, so they are very suitable to be used as the main ingredient of masks.[4]

Dry skin can cause the skin to be less able to protect the body from the effects of free radicals and infections. Skin can be damaged due to exposure to ultraviolet rays that come from the sun when they shine on the earth. Ultraviolet light has an oxidizing effect, which can cause inflammation. The effects of exposure

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to ultraviolet light, which cause free radicals, can be prevented with antioxidants.[5] Antioxidants are substances that can prevent and slow down the oxidation process. Moringa leaf is one of natural component that has benefit to maintain healthy skin. Healthy facial skin is skin that is clean, healthy, bright, soft, supple, and not dry and moist.[6]

In Indonesia, the moringa plant is very easy to find and has been widely cultivated by the community. Moringa plants have been widely processed into drinks, food, and traditional medicine. Medicines derived from the moringa plant have been widely found in Indonesia in the form of creams, ointments, gels, powders, and others.[7] The skin functions as a protector to prevent the body from dehydration. The protective role is carried out by the most extensive layer of the epidermis, namely the stratum corneum, which separates the moist internal environment of the body from the relatively drier external environment of the body. One of the factors that influences the protective function of the stratum corneum is the hydration of the stratum corneum, which depends on the amount of water content in it. Skin contains 30% water and contributes to skin elasticity and durability.[8]

Based on the description above, research is aimed to evaluate the effectiveness of Moringa leaf extract peel-off facial mask on facial skin moisture.

METHODS

This research is a double-blind, quasi-experimental pretest-posttest study. The population was all workers and students in the Tadulako University area. The sampling technique used was non-probability sampling, namely a purposive sampling. This research consisted of three groups: positive control, treatment, and negative control. The positive control group was the group used a standard peel-off mask from FDF Skincare@. The treatment group was the group used a peel-off mask of Moringa leaf extract with 20% concentration. The negative control group was the group used a peel-off mask without extract. There were 39 samples collected (13 positive control groups, 13 treatment groups, and 13 negative control groups). The Friedman and Wilcoxon tests were used to analyze data collected from primary sources, namely facial skin moisture levels.

The inclusion criteria in this research were active workers and students at Tadulako University, active workers and students at Tadulako University who are willing and have signed informed consent for the research and also active workers and students at Tadulako University who have passed the irritation test as an initial screening test for the research. The exclusion criteria in this study were subjects who were in using other peel-off masks, undergoing medical treatment on face at the clinic (facial laser rejuvenation, intense pulse light, etc), were using steroid drugs, and were using high collagen and gluconate supplements. This research was conducted from May to August 2023. This research already has a research ethics certificate with ethics committee statement number : 6546 / UN 28.1.30 / KL / 2023. The sample used in this research was 42 people; however, there were 3 drop-out samples, 1 person each in the negative control, treatment, and positive control groups. The sample that cony completely follow the research were 39 people. The collection of moringa leaves was carried out in Kalukubula Village, Sigi Biromaru District, Sigi Regency, Central Sulawesi Procince, and the collection time was in the morning and evening. The moringa leaves obtained were made into an extract with a concentration of 20%. At the Phytochemistry Laboratory, Faculty of Mathematics and Natural Sciences, Tadulako University which already has certification and good accreditation.

The calculation formula for moringa leaf extract concentration is:

$$\%\text{Rendeman} = \frac{\text{extract weight}}{\text{leaf powder weight}} \times 100\%$$

Moringa leaves are extracted to produce a concentration of 20% and then used to produce a homogenized 100-gram mask formulation. The Faculty of Mathematics and Natural Sciences Pharmacy Laboratory, Tadulako University, produced a 20% concentration Moringa leaf extract peel-off powder mask, while the Biochemistry Laboratory of the Faculty of Medicine, Tadulako University, weighed it into 10 grams with a mask-to-water rasio of 10:24. The masks were used twice a week, and the percentage of facial skin moisture levels was assessed at the Carsya Beauty Clinic using a skin analyzer. The skin analyzer uses a software application called Magic Mirror Skin to assess the moisture level of facial skin. Ultraviolet moisture is the parameter that the magic skin analyzer measures. The moisture level of facial skin was assessed at weeks 0, 2, and 4, with an increase in moisture as indicated by soft, elastic skin.

RESULT

Table 1. Subject characteristics based on gender, age, and skin type

Variable	Categoy	n	%
Gender	Male	15	38.5
	Female	24	61.5
	Total	39	100
Age	19	5	12.8
	20	8	20.5
	21	17	43.6
	22	4	10.3
	24	1	26
	29	1	2.6
	32	2	5.1
	55	1	2.6
	Total	39	100
Skin Type	Normal	22	56.4
	Dry	3	7.7
	Oily	12	30.8
	Combination	2	5.1
	Total	39	100

Table 1 shows that the total number of participants in the research was 39. The most common subject characteristics based on gender were women (24 people, 61.5%), the most common age was 21 years (17 people, 3.6%), and the most common skin type was normal (22 people, 56.4%).

Table 2. Pre and post intervention of skin moisture

Group	n	Week 0 (mean ± SD)	Week 2 (mean ± SD)	Week 4 (mean ± SD)	P Value
Positive Control	13	71.08 ± 14.86	70.77 ± 14.02	72 ± 9.92	0.484
Treatment	13	70.62 ± 15.54	69.69 ± 15.91	71.77 ± 17.22	0.538
Negative Control	13	72.38 ± 16.34	73.07 ± 13.51	69.85 ± 14.54	0.981

Table 2 exhibits that, based on the results of the Friedman Test, in the positive control, treatment, and negative control groups have p > 0.05, which means there is no significant different on facial skin moisture.

Table 3. Post Hoc Wilcoxon Test Result

Group	Week	Nilai p
Positive Control	0 to 2	0.301
	2 to 4	0.806
	0 to 4	0.889
Treatment	0 to 2	0.675
	2 to 4	0.53
	0 to 4	0.529
Negative Control	0 to 2	0.916
	2 to 4	0.441
	0 to 4	0.694

Table 3 reveals that the post hoc Wilcoxon test results for the positive control, treatment, and negative control groups from week 0 to week 2, week 2 to week 4, and week 0 to week 4 have a p value > 0.05, which means there is no significant difference on facial skin moisture. The following images show the average humidity value in each group to see whether there is a change from week 0 to week 2, week 2 to week 4, and week 0 to week 4 is as follows.

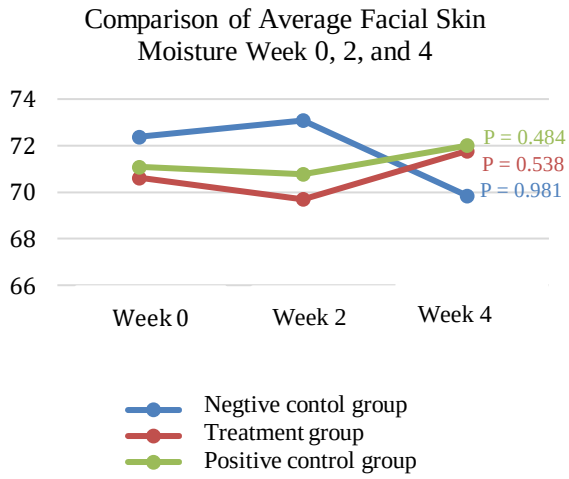

Figure 1. Comparison of average facial skin moisture for weeks 0, 2, and 4

The graphic image above shows that the average value of facial skin moisture level for weeks 0, 2, and 4, respectively, in the positive control group was 71.08, 70.77, and 72. In the treatment group, it was 70.62, 69.69, 71.77, and in the negative control group, it was 72.38, 73.07, and 69.85. The graph above reveals that the treatment group and positive control group experienced a decrease in facial skin moisture in week 2 and an increase in week 4. The negative control group

experienced an increase in facial skin moisture in week 2 and a decreased in week 4. The next graphic image displays the average value of facial skin moisture for normal, dry, oily, and combination skin types in the positive control, treatment, and negative control groups. The graph of the average value of facial skin moisture for skin types is as follows.

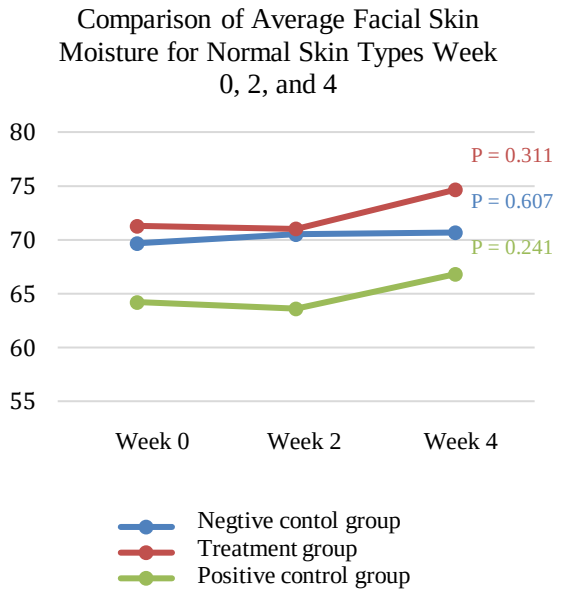

Figure 2. The average value of facial skin moisture for normal skin types

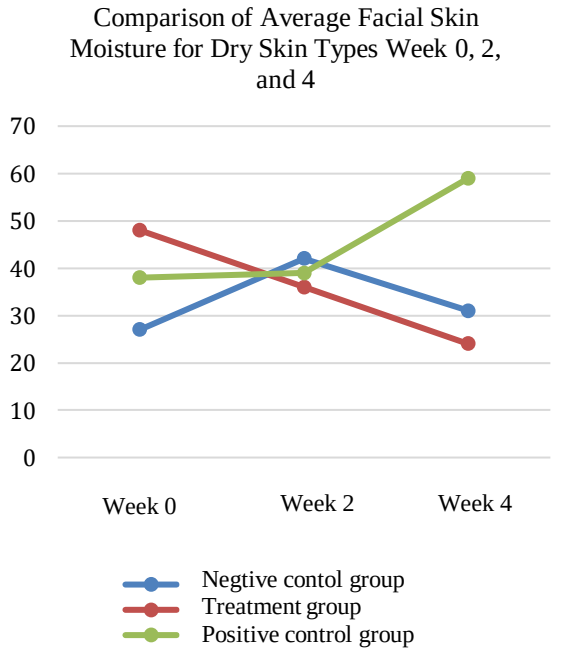

Figure 3. The average value of facial skin moisture for dry skin types

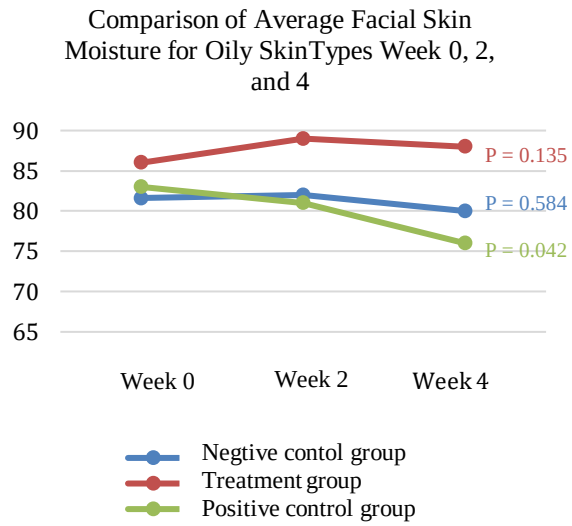

Figure 4. The average value of facial skin moisture for oily skin types

The graphs above show that the average value of facial skin moisture levels for weeks 0, 2, and 4 for normal skin positive control group was 64.2, 63.6, and 66.8. Meanwhile, in the treatment group, it was 71.27, 71, and 74.64; and in the negative control group, it was 69.67, 70.5, and 70.67. The average value of facial skin moisture level at week 0, week 2, and week 4 in the dry skin positive control group was 38, 39, and 59; meanwhile, in the treatment group, it was 48, 36, and 24, and in the negative control group, it was 27, 42, and 31. For dry skin, statistical tests cannot be carried out because the subjects does not sufficient. The average value of facial skin moisture level for weeks 0, 2, and 4in the oily skin of the positive control group was 83, 81, and 76. Meanwhile, in the oily skin treatment group, had 86, 89, and 88, while the negative control group got 81.6, 82, and 80.

DISCUSSION

Moringa leaves work as antioxidants, inhibiting free radicals such as ultraviolet rays, cigarette smoke, and vehicle fumes, which can damage the moisture of the facial skin. Moringa leaves are antioxidant that containt flavonoids and vitamin B. Flavonoids operates as inhibitors of collagenase enzyme activity, while vitamin B acts as a humectant. Vitamin B then inhibits the increase in transepidermal water loss, affecting skin hydration. This will have an effect on the moisture levels in the facial skin

According to the Friedman and Wilcoxon test, this study found no significant differencesin the positive control, treatment, or negative control groups on facial moisture.

Factors that cause dry skin are age, not consuming enough nutritious food, and often being in an air-conditioned room.[9] As you get older, skin hydration decreases. This is because, as we age, there are changes in collagen and elastin.[10] Using a moringa leaf mask on dry skin types has significant association with facial skin moisture.[11] Factors influencing skin moisture are air humidity, weather, temprature, and sunlight.[12] The temperature in Palu City is quite high, with an average temperature of 32ºC.[13] Environmental conditions are one of the elements affecting skin hydration. Low air humidity and high exposure to sunlight can increase transepidermal water loss.[14] In terms of nutrition, vitamins can be found in food and can act as antioxidants, affecting skin health. [15] In this research, daily activities were not given enough attention, making skin hydration difficult to control. In Figure 3 which shows a decreasing graph, this is caused by the difficulty of controlling activities that can affect skin moisture, such as using air-conditioned rooms and prolonged exposure to sunlight.

The moringa leaf extraction method used in this research is maceration. Soxhletation is the extraction process with the highest flavonoid concentration. Thus, this method yields the highest antioxidant activity in moringa leaves. The absorbance spectrophotometer method is one way to measure flavonoid levels; however, equipment constraints prevented this research from being conducted.

Research on the effectiveness of a peel-off facial mask with Moringa oleifera Lam leaf extract with a concentration of 20% on facial skin moisture had insignificant results. The study's findings became insignificant due to a number of factors, including the subjects' different skin types, the mask's short application duration without the use of any additional creams, the intense heat in Palu during the research period, the lack of availability of flavonoids, which prevented the levels from being determined. Due to equipment availability constraints, the absorbance spectrophotometer method was used to test flavonoid levels. In this study, skin moisture is not affected by the use of 20% moringa leaf peel-off mask. The benefits of moringa leaf mask on skin moisture need to be studied further in future research. In normal and oily skin, the facial moisture is not statistically significant. In dry skin, the statistical test cannot be used because the subject insufficient. Future studies should perhaps take into account variables that affect the hydration of facial skin, extend the duration of mask application, and quantify the amount of flavonoids present in moringa leaf extract.

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