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Formulation And Testing Of Flavonoid And Vitamin C Levels Of Clay Mask Of Chinese Bidara Leaf Extract (Ziziphus Mauritiana Lam) For Aging Skin Care

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ABSTRACT
Aging is a gradual process of tissue disappearance to repair or replace itself and maintain its normal structure and function. The aging process is caused by exposure to UV rays, daily habits, and improper facial skin care. In addressing aging, a good treatment is the use of clay masks. Facial skin aging can be treated by utilizing natural ingredients, one of which is Chinese date leaves (Ziziphus mauritiana Lam). Chinese date leaves contain anti-inflammatory and antioxidant properties as well as phytochemical compounds such as flavonoids and vitamin C. Clay mask formulations were designed by varying the concentration of Chinese date leaf extract, namely F0 (0%), F1 (2.5%), F2 (5%), and F3 (7.5%), with the aim of determining the best clay mask formulation. The Chinese date leaf extract was tested for flavonoid content using the UV-Vis spectrophotometer method and for vitamin C content using the titration method. The clay mask preparations were examined for organoleptic properties, pH, homogeneity, adhesive power, drying time, and hedonic test. The research results showed that Chinese date leaf extract had a flavonoid content of 1.5% and a vitamin C content of 82.6%. The results of the clay mask preparation met the requirements for organoleptic properties, pH, homogeneity, adhesive power, and drying time. Based on the results of various extract concentrations, satisfactory results were obtained, with formulations F1 and F2 meeting the requirements.

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INTRODUCTION

Skin, as the outermost layer of the body that functions as a wrapper and protector, is a major concern for many people, especially women, who want bright, healthy, clean, and well-groomed skin (Santi and Andari, 2019). Healthy facial skin is characterized by balanced oil levels, fine pores, high moisture, and freedom from problems such as acne. However, a lack of oil levels on the face can result in dry skin, which is one of the main problems that tends to worsen skin conditions over time (Prabandani et al., 2019). Skin aging, especially on dry facial

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skin, can lead to fine lines and, if not addressed, premature aging with the appearance of wrinkles and loss of skin elasticity (Darmawan, 2015).

Skin aging is a natural process that is divided into several phases, starting from the subclinical phase at the age of 25–35 years to the clinical phase at the age of 45 years and above (Darmawan, 2015). This process is accelerated by external factors such as UV rays and unhealthy living habits, as well as a lack of proper skincare. One popular form of skincare is the use of face masks, especially clay masks. Clay masks, which are made from minerals such as kaolin and bentonite, have been known to have skin-rejuvenating effects (Nurliani, Aryani and Darusman, 2020). In an effort to enhance the skincare benefits, natural plant extracts such as Chinese bidara leaves are used as active ingredients in clay masks. Chinese bidara leaves contain antioxidant and anti-inflammatory compounds (Haeria and Andi, 2016). The compounds present in Chinese bidara leaves (Ziziphus Mauritiana Lam) include flavonoids, saponins, tannins, vitamin A, vitamin C, and vitamin E as natural antioxidant substances that can help overcome various skin problems and provide protection from premature aging (Hidayati *et al.*, 2022).

Flavonoids are reducing compounds that can inhibit many oxidation reactions. Flavonoids have the ability to act as antioxidants because they are able to transfer an electron to free radical compounds (Haeria and Andi, 2016). Meanwhile, vitamin C contained in Chinese bidara leaves (Ziziphus Mauritiana Lam) also has high antioxidants, so it can overcome dry skin. Vitamin C is also useful for providing nutrients to dry skin and for preventing aging (Sakka and Muin, 2022).

Based on the literature review, previous studies have shown that Chinese bidara leaf extract can be used as an active ingredient in skin care products. Therefore, this study will explore the potential of Chinese bidara leaf extract as a clay mask for aging skin care. Based on this description, it is necessary to conduct research to determine the flavonoid and vitamin C levels of Chinese bidara leaf extract and to formulate a clay mask so as to get the best preparation.

METHODS

This research was conducted at the Chemistry Laboratory, FMIPA, Padang State University. The research method used is a quantitative method with an experimental approach to determine the formulation and levels of flavonoids and vitamin C in Chinese bidara leaves. The extraction method of Chinese bidara leaves uses 70% ethanol (500 gr/5000 mL), followed by maceration in a glass jar until the solvent becomes clear. All macerates are collected and concentrated, and then evaporated using a rotary evaporator until a thick extract is obtained. The thick extract was divided into various concentrations (2.5%, 5%, and 7.5%).

Test the vitamin C content using the titration method. The sample is put into an erlemeyer, then the indicator drops as much as 9.70 ml, 9.20 ml, and 10.00 ml, and finally NaOH, so that there is a color change. Positive test for yellow-colored knot. For flavonoids using the UV-Vis spectrometry technique. A spectrophotometer is a tool to measure the

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transmittance, or onserban, of a sample as a function of group length. The method used for measurements using a spectrophotometer is often called spectrometeri. The presence of flavonoid compounds was due to yellow discoloration after the addition of Mg powder reagent and concentrated HCl.

Table 1. Chinese thistle leaf extract clay mask formulation

Material Name	Formulation (%)			
	F1	F2	F3	Control
Bidara Leaf Extract	2,5	5	7,5	-
Bentonite	1	1	1	1
Xanthan Gum	0,8	0,8	0,8	0,8
Kaolin	34	34	34	34
Glycerin	2	2	2	2
Sodium Laurine Sulfate	1	1	1	1
TiO2	0,5	0,5	0,5	0,5
Nipagin	0,1	0,1	0,1	0,1
BHT	0,2	0,2	0,2	0,2
Aquadest ad	100	100	100	100

Source: (Yanti, 2019)

In the process of making the clay mask base, distilled water was poured into a mortar and mixed with bentonite. After the bentonite dissolved, xanthangum was added and crushed until completely dissolved. Kaolin was then added gradually while being crushed, accompanied by the addition of TiO2 and glycerin. In addition, BHT and nipagin were dissolved in hot water (solution A), and sodium lauryl sulfate was dissolved in distilled water (solution B). Solution A was poured into the mortar mixture and crushed, followed by slowly pouring solution B while continuing to crush. Finally, the ethanol extract of Chinese thistle leaves was added and crushed until a homogeneous paste was formed. The final stage is testing the clay mask preparation, namely the pH test, homogeneity test, adhesion test, and drying time test.

The pH test was carried out as much as 1 g of the preparation was put in a medicine pot and dissolved using distilled water, then the calibrated electrobes using pH 4 and pH 7 dapar were dipped in the container. The number shown on the tph meter is the pH of the Chinese bidara leaf extract clay mask preparation. pH that meets the standard is pH in accordance with the pH of the face, namely 4.5-7 (Safilla, Ardana and Rijai, 2022). Evaluation of the homogeneity test of the physical characteristics of the clay mask preparation of Chinese bidara leaf extract by looking directly at the preparation, whether it has been mixed homogeneously (Safilla, Ardana and Rijai, 2022).

The adhesion test is carried out to see the ability of the clay mask preparation to adhere to the skin surface; the longer the adhesion ability, the longer it can provide effective results (Jiman and Hadiwibowo, 2017). In the drying time test, as much as 0.5 g of preparation at each concentration is applied to the skin surface and observed to see how long it takes for

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the preparation to dry. The drying time requirement for clay mask preparations is 15-20 minutes (Safilla, Ardana and Rijai, 2022).

RESULTS AND DISCUSSION

Based on the test results of flavonoid and Vitamin C levels of Chinese bidara leaf extract can be seen in table 2.

Table 2. Flavonoid and vitamin c content of Chinese thistle leaf extracts

No	Testing	Result (100 gr Sample)	Test Method
1.	Vitamin C	82,6 % (82,6 gr/100 gr)	Titration
2.	Flavonoid	1,5 % (1,5 gr/100 gr)	Spectrophotometry

Vitamin C testing of samples was carried out by the titration method, with a result of 82.6% of Chinese bidara leaf extract. Vitamin C is the most dominant antioxidant in the skin and has the benefit of accelerating collagen formation. Vitamin C is an important nutrient obtained from exogenous intake, functioning as an antioxidant that can ward off free radicals and form collagen, which is important for maintaining skin structure and has the potential to act as an anti-inflammatory. Vitamin C contained in Chinese Bidara leaves (Ziziphus Mauritiana Lam) has a high antioxidant content so that it can overcome dry skin. Vitamin C is also useful for providing nutrients to dry skin and is useful for preventing aging.

Flavonoid levels amounted to 1.5567% in 100 grams of Chinese bidara leaf extract. According to the Ministry of Health (2014) the range of total flavonoid levels based on the observation value ranges from 0.2 to 0.8. And the consecutive observation values obtained in the ethanol extract sample of Chinese bidara leaves are 0.2086, 0.4016, 0.5816, 0.7400, and 0.9413. The results obtained from Chinese bidara leaf extract contain flavonoid levels of 1.5567%. Flavonoids have the ability to act as antioxidants because they are able to transfer an electron to free radical compounds.

Table 3. pH test levels of Chinese thistle leaf extract

Formulation	pH-range	pH
F0	4,5 – 6,5	5,5
FI	4,5 – 6,5	5
F2	4,5 – 6,5	5
F3	4,5 – 6,5	5

The results of the pH test that has been carried out show that the clay mask formulation F0 (base without Chinese bidara leaf extract) has a pH of 5.5. The pH value in the F1 formulation is 5, the pH value in the F2 formulation is 5, and the pH value in the F3 formulation is 5. The pH value is included in the vulnerable pH standard. The skin requires beauty products

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with a pH range of 4.5–6.5. A Chinese bidara leaf extract clay mask has a pH value that falls into the standard pH range for skin care.

Table 4. Homogeneity test of Chinese thistle leaf extract clay mask

Formulation	Result
F0	Homogeneous
F1	Homogeneous
F2	Homogeneous
F3	Homogeneous

The homogeneity test results show that the formulation F0 (0%), F1 (2.5%), F2 (5%), and F3 (7.5%) is homogeneous. The mask preparation has a thick concentration; there are no fibers or coarse grains when applied to the glass object. The homogeneity test results of the Chinese bidara leaf extract clay mask indicate that the composition of the F0 mask (base material without extract mixture) and the composition of the F1, F2, and F3 masks are homogeneous. After being examined with a microscope and magnified 10x10, with visual observation, it is known that F0, F1, F2, and F3 are homogeneous.

Table 5. Drying time test of Chinese bidara leaf extract clay mask

Formulation	Time to Dry	Documentation
F0	15.20.00	
F1	19.09.72	
F2	19.09.72	
F3	25.05.09	

Measurement of drying time is carried out at a temperature of ± 25ºC by taking ± 2 gr of the mask preparation and applying it to the volunteer, marked by measuring the time when the preparation dries (Yanti, 2019). The drying time of the four preparations is ± 20 minutes until they dry and can be rinsed with water. All preparations meet the drying time requirements of 10–25 minutes for clay mask preparations.

CONCLUSION

Chinese bidara leaf extract can be formulated as a clay mask preparation that meets the requirements of clay mask preparations with formulations F1 2.5%, F2 5% and F3 7.5%. Based on the results of research and discussion and the conclusions described above, the formulations with the highest ratings, according to clay mask standards, are formulations F1 and F2. Based on the results of the above research, the researcher provides suggestions for further research to conduct stability tests for clay mask preparations of Chinese bidara leaf extract and add other ingredients suitable for aging facial skin care.

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