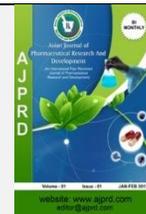


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Research Article

The Potency of *Artocarpus Heterophyllus* Leaf as a Facial Skin Care Ingredient in Clay Mask Formulation

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ABSTRACT

Artocarpus heterophyllus (Ah), common name as nangka, has been reported to have antidiabetic, antihyperlipidemia, antimicrobial and antioxidant activity. Balinese women used its leaves for facial treatment. This study aims to evaluate its leaf potency for facial skin care. Ethanol extract of Ah (EEAh) that obtained by maceration was prepared into 3 clay mask formulations (FI: 1%, FII:3% and FIII:5%). F0 was used as control group. A total of 12 volunteers were treated with clay mask to evaluate its effect on moisture and pores size after intervention. The data were analysed using Kruskal Wallis and Mann Whitney test. The results showed that skin moisture increased after intervention (FI:3.7%; FII:4.7%;FIII:7.3%). Pores size decreased in FI (6.3%) and FII (13.4%). Statistically, there were significant different between F0-F1 (p=0.043), F0-F2 and F0-F3 (p=0.046 of each). The present study conclude that clay mask containing *A. heterophyllus* leaf ethanol extract have potency to be used as facial skin care.

Keywords: *Artocarpus heterophyllus*, clay mask, leaf, extract

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INTRODUCTION

Facial skin health is an important part to get more attention¹ as it is an important aspect of aesthetics². Natural ingredients have been used traditionally for dermatologic disorder which over the last 20 years, clinical and laboratory studies have identified the benefit of natural ingredient for skin care³. Facial masks are common products utilized for skin rejuvenation. One of the most popular facial mask preparations is the wash-off type with a clay base, which is often called as clay facial masks².

Artocarpus heterophyllus (*A. heterophyllus*), commonly known as the jackfruit tree or nangka in local name, is a plant that easy found in Indonesia. This plant originating from Southeast and South Asia⁴. Phytochemical studies have reported that this plant contains compounds that may have been responsible for their pharmacological activities like the sterol, prenylflavones, carotenoids, tocopherols and

flavonoids⁷. Traditionally, many Balinese women in Indonesia use its leaves for facial treatments⁶. Siregar et al, 2018⁷. compared the antioxidant activity of the leaves and stems of this plant in a peel-off mask preparation which showed that the antioxidant activity of the stem parts was higher than the methanol extract leaf. Thus, based on the literature, studies of the clay masks containing ethanol extract of *A. heterophyllus* leaves as a skin care ingredient have not been reported yet.

MATERIAL AND METHODS

The study was conducted during April to September 2019 and has been approved by Health Research Ethical Committee, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia: No.652/TGL/KEPK FK USU-RSUP HAM/2019.

Materials

The leaves were collected from Galang, Deli Serdang, Indonesia during. The plant was authenticated by *Herbarium Medanense*, FMIPA, Universitas Sumatera Utara.

The raw material was prepared by washing the leaves and dried under temperature room. The dried leaves then were grinded followed with maceration using ethanol 96% to obtain *A. heterophyllus* ethanol extract (EEAh). EEAh then were prepared into 3 concentration in clay mask formulations (F1:1%; F2:3%; F3:5%). F0 contained a basic clay formulation was prepared as control.

Methods

After signing informed consent, a total of selected 12 female volunteers were divided into 4 groups. Each group were masked with:

F0 : basic clay formulation

F1 : basic clay formulation + EEAh 1%

F2 : basic clay formulation + EEAh 3%

F3 : basic clay formulation + EEAh 5%

Skin test was conducted before mask application. The volunteers that have no irritation signs only were included to the study. Skin moistures and pores size were measured using skin analyser (Aroma, SG) before and after masking. Skin moistures was classified as: dehydration:0-29%; normal:30-50%; hydration:51-100% while pores size was divided to: small: 0-19; large: 20-39 and very large:40-100.

Data were analysed with Kruskal Wallis and Mann Whitney test using IBM SPSS Statistic 22.

RESULTS

Effect of clay mask containing Artocarpus heterophyllus leaf ethanol extract on skin moisture

Table 1 showed the effect of clay mask containing EEAh on skin moisture. It showed that the skin moisture before and after treatment was in normal range (27-30%). All extracts showed the ability to increase the moisture level as follows: F1 from $27.0 \pm 1.73\%$ to $28.0 \pm 1.73\%$; F2 from $28.3 \pm 0.57\%$ to $29.7 \pm 0.57\%$; while F3 from $27.7 \pm 0.57\%$ to $29.7 \pm 0.57\%$. Statistically, there were no significant different among groups and intra groups ($p > 0.05$). However, Mann Whitney test showed that the distribution between F0-F1 different significantly ($p = 0.043$ two tailed).

Table 1. Effect of clay mask containing EEAh on skin moisture

Group	Moisture (%)		P^a
	Before	After	
F0	30.3 ± 0.57	30.7 ± 0.57	0.317
F1	27.0 ± 1.73	28.0 ± 1.73	0.083
F2	28.3 ± 0.57	29.7 ± 0.57	0.102
F3	27.7 ± 0.57	29.7 ± 0.57	0.109
<i>KW test</i>	Chi square = 8.23, $p = .041$, $df = 3$		Chi square = 7.607, $p = .055$, $df = 3$

(a. Wilcoxon signed rank test; KW: Kruskal Wallis)

Furthermore, we evaluated the changes of volunteer skin moisture by calculating the percentage increase as shown in Fig.1. The results showed that the percentage of skin

moisture increased following increasing concentration ie F1: 3.7%; F2:4.7% and F3: 7.3%. The highest improvement was found in F3.

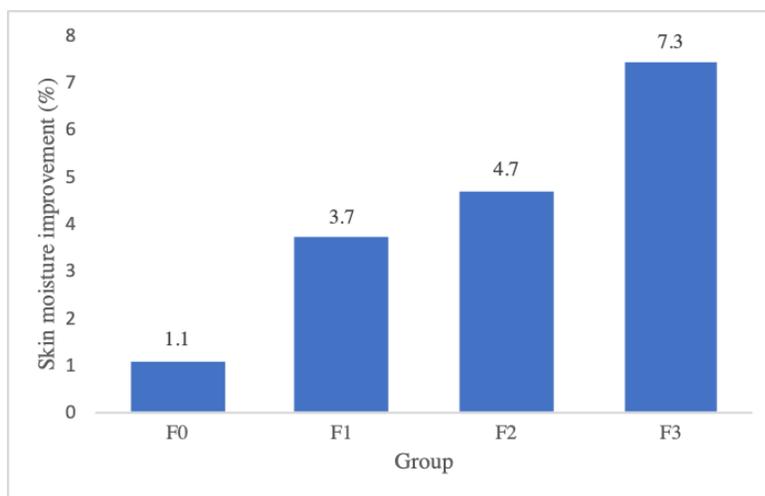


Figure1. Skin moisture improvement after clay mask contained EEAh administration

Effect of clay mask containing EEAh on pores size

The effect of EEAh in clay mask formulation on pores size can be seen at Table 2 and Fig.2. Table 2 showed that the pores sizes of volunteer were categorized as large and very large. Thus, after application of mask, they decreased. F1 decreased pores size from 53.0 ± 6.08 to 49.7 ± 5.77 ; F2 from 47.7 ± 1.52 to 41.3 ± 5.03 and F3 from 36.0 ± 3.60 to 34.7 ± 3.78 . There were significant different in pores size among groups after clay mask treatment. Significant different was found in F0-F2 ($p=0,046$) and F0-F3 ($p=0.046$).

Table 2: Effect of clay mask containing EEAh on pores size

Group	Pores size		p^a
	Before	After	
F0	51.0 ± 2.00	49.7 ± 0.57	0,18
F1	53.0 ± 6.08	49.7 ± 5.77	0,102
F2	47.7 ± 1.52	41.3 ± 5.03	0,109
F3	36.0 ± 3.60	34.7 ± 3.78	0,102
<i>KW test</i>	Chi square = 7.682, $p = .046$, $df = 3$	Chi square = 8.403, $p = .039$, $df = 3$	

(a. Wilcoxon signed rank test; KW: Kruskal Wallis)

As seen in Fig 2, the higher concentration of EEAh enhanced the pores size reduction. The highest effect was found in F2 (13.4%).

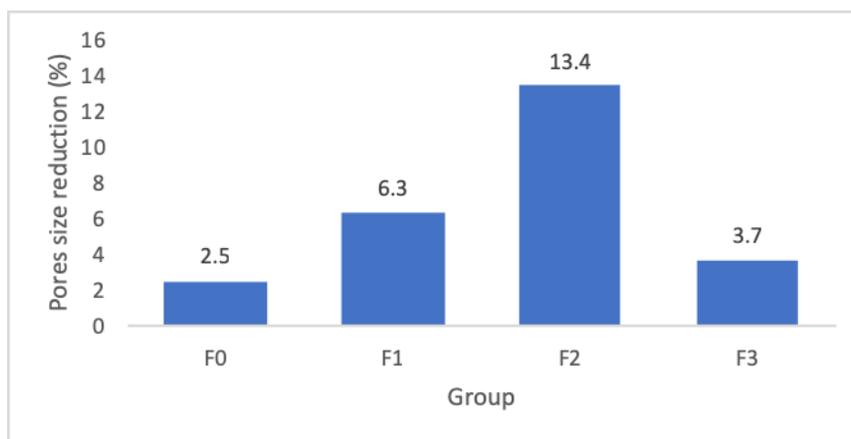


Figure 2. Pores size improvement after clay mask contained EEAh administration

DISCUSSION

Facial masks are the most prevalent cosmetic products utilized for skin rejuvenation². They may function as carriers of active ingredients that are useful for skin health⁸. The active ingredient activity that believed to possess as skin care is an antioxidant. It is known that natural antioxidants obtained from plants have been developed to decrease the damaging effects in the body⁹. Thus, pharmacological investigations have been conducted on *A. heterophyllum*, including as anti-inflammatory¹⁰, antifungal¹¹, antibacterial¹², and antioxidant¹³⁻¹⁴. These activities could be beneficial for skin care.

Clay facial masks have become of special interest due to specific properties presented by clays¹⁵. At the present study, the selection of base components based on stability and compatibility with ethanol extract of *A. heterophyllum* leaves. The basic components consist of bentonite, xanthan gum, kaolin, glycerin, sodium lauryl sulfate, TiO₂, nipagin, sodium metabisulfite and aquadest. The amount of each component was determined based on Harry, 2000 with modification¹⁶.

The present study showed that before mask application, the volunteer facial skin was in the dehydration-normal skin level (27-30%). After using clay mask, it became normal (29-30%). As we know, that the skin needs fat and water for physiological functions, one of which is skin moisture¹⁷. Skin moisture is a condition that is affected by various endogenous and exogenous factors¹⁸. If the level of skin moisture is low or the water level is inadequate, it can cause dry skin¹⁹. Three concentrations of the masks in this study showed their ability to increase the skin moisture. This condition suggests that the extract has potency to improve skin hydration. Furthermore, it will be beneficial for facial skin health.

One of the most common skin health problems is aging. This condition can be identified by the enlargement of pores size. Skin pores become enlarged as a result of accumulation of dead skin cells²⁰. The present study showed that F1 (1%) and F2 (3%) were able to reduce the pores size. It indicated that the ingredient in the clay mask of this study, EEAh, has potency for preventing aging process.

CONCLUSION

A.heterophyllus leaf ethanol extract improve skin moisture and pores size, therefore it has potency to be used as facial skin care.

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