

(RESEARCH ARTICLE)



Utilization of mangrove peel (*Xylocarpus granatum*) extract as an active ingredient in the making of hand body lotion

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International Journal of Biological and Pharmaceutical Sciences Archive, 2023, 05(01), 017–021

Publication history: Received on 09 December 2022; revised on 19 January 2023; accepted on 21 January 2023

Article DOI: <https://doi.org/10.53771/ijbpsa.2023.5.1.0012>

Abstract

The fruit of *Xylocarpus granatum* has been used empirically by the community as a traditional medicine, the fruit peel is used as skin medicine. The results of the phytochemical analysis of *Xylocarpus granatum* rind simplex contain flavonoids, tannins, saponins, hydroquinones and steroids. This study aims to develop a hand body lotion product based on *Xylocarpus granatum* fruit peel extract. In this study, *Xylocarpus granatum* fruit peel extract was formulated into a lotion preparation. *Xylocarpus granatum* fruit peel extract was prepared by maceration method using 70% ethanol solvent. The extract is formulated with a composition of 0.5 ml (FI). The lotion was then tested for its physical properties including pH, viscosity, homogeneity, spreadability and stability of color, odor and texture. The results showed that the lotion containing *Xylocarpus granatum* fruit peel extract was stored for 14 days for physical stability test. The results of the stability test showed that the lotion had a pH of 10.55, a viscosity of 1120000 mPas, the lotion did not change shape, smell, color, and did not cause skin irritation.

Keywords: Lotion; *Xylocarpus*; Skin; Fruit; Maceration

1. Introduction

North Maluku Province is one of the provinces that has the longest coastline and is a coastal area that is strung together from a cluster of small islands that have high potential for mangrove vegetation. The distribution of this vegetation distribution includes the coastal waters of South Halmahera, West Halmahera, East Halmahera, Central Halmahera, North Halmahera, City of Tidore Islands, Morotai Island Regency and Sula Regency. This typical type of mangrove is the type of *Xylocarpus granatum* and *Xylocarpus molucensis* which are often found in mangrove habitats in coastal areas which are heavily influenced by tides, and in coastal areas which are coveted with calm sea waves [1].

MP3EI research [2] found that North Maluku as a whole has mangrove land and coastal borders with a buffer of 100 m with an area of ± 55,322.61 Ha. Specifically, the area of mangrove forests in North Maluku Province is ± 46,259.41 Ha. Of the mangrove area, mangroves in the dense category are ± 29,848.83 Ha while the less dense category are ± 16,410.58 Ha. Furthermore, the research by MP3EI [3] found that mapping the potential for alternative food development from mangrove fruit in South Halmahera, West Halmahera, Tidore Islands, East Halmahera and Central Halmahera Regencies. Based on the development of alternative food from mangrove fruit, flour from mangrove fruit has been produced which is suitable for consumption organoleptically and analysis of nutritional and chemical content of food.

Mangrove plants have benefits in the health sector where most parts of these plants can be used as ingredients for natural medicines, besides that several species of mangrove plants can also be used as natural insecticides and

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pesticides [4]. Mangrove plants are abundant in coastal and brackish areas. Research results from [5] and [6] show that some mangrove species can function as antimicrobials, especially against *Vibrio Sp.* bacteria.

The genus *Xylocarpus* is a mangrove found in Indonesia, East Africa, India, Bangladesh, Southeast Asia, South China and Northern Australia. Based on the phytochemical analysis of *Xylocarpus granatum* rind simplicia, it indicated that *Xylocarpus granatum* rind contains flavonoids, tannins, saponins, hydroquinones and steroids. So far, coastal communities have only used the seeds of *Xylocarpus granatum* by peeling the skin of the fruit and then throwing the rest away as waste. Empirically, coastal communities only use *Xylocarpus granatum* fruit seeds by peeling the fruit skin, then the rest is simply thrown away as waste. The community has not made any innovations regarding the use of *Xylocarpus granatum* fruit seeds as a cosmetic ingredient that can be commercialized. This study aims to scientifically prove the active ingredient content in *Xylocarpus granatum* as an additive for making hand body lotion products for skin care and health.

Skin care and health is needed so that the skin does not become dry, rough, and dull. One way to overcome this problem is to use a moisturizer, namely hand and body lotion. One of the active substances contained in hand and body lotion preparations is an antioxidant. *Xylocarpus granatum* fruit peel contains Gedunin, Procyanidin, catechins, limonoids, fotogedunin, xylocensin, Xylomexicanins, Andirobin, mexicanolide, phragmalin, cipadesin, xylocarpins, xylogranatin xylocartin [7],[8],[9]. Furthermore, the benefits of these active compounds are explained as astringents, febrifuge, malaria, canker sores, cholera, dysentery, diarrhea, anti-diabetic, anti-inflammatory and anti-dislipidemic [10],[11]. Based on the research of [12], a physical stability study of lotion preparations from the ethanol extract of cacao peel with a stable lotion base, namely 2.0% stearic acid and 0.2% TEA was found during storage. White dragon has the potential to be used as a physically stable hand and body lotion preparation material. This study aims to develop a hand body lotion product based on *Xylocarpus granatum* fruit peel extract.

2. Material and methods

This type of research is development research. The production of hand body lotion is carried out in four steps, namely preparing the water phase, preparing the oil phase, mixing the oil and water phases and adding local ingredients in the form of *Xylocarpus granatum* extract. The tools and materials used are: 1) Tools a. Chemical Glass b. Stirring Rod c. Measuring Cup d. Electric Heater e. Petri dish 2) Material a. Cocoa Oil 2.5 grams b. Stearic Acid 6 grams c. Cetyl Alcohol 3 grams d. Dimeticone 10 grams e. Niacinamide 3 grams f. Methyl Paraben/Nipagin 0.2 gram g. TEA 2 grams h. Glycerin 20 gram i. *Xylocarpus* peel extract 10 drops/0.5 ml, j. Aquades 22 mL.

The procedure for making lotion goes through the following stages: 1) Process for Making the Water Phase a. Put 0.2 g of methyl paraben/nipagin into a beaker, then dissolve it in 30 mL of hot water on a water bath, stir until dissolved. b. After the methyl paraben/nipagin dissolves, add 2 grams of TEA and 20 grams of glycerin, stir until dissolved and homogeneous; 2) Oil Phase Manufacturing Process a. Put 2.5 cocoa oil into a beaker, heat on a water bath until dissolved, then add 6 grams of stearic acid, 3 grams of cetyl alcohol and 10 grams of dimethicone while stirring until dissolved; 3) mixing the water phase into the oil phase, while still hot, stirring until homogeneous and a cream mass is formed; 4) dissolve 3 grams of niacinamide with 22 mL of distilled water in a different beaker; 5) Mixing the niacinamide solution into the cream mass, stirring until homogeneous; 6) Add 10 drops of *Xylocarpus granatum* fruit peel extract into the cream mass, stir until homogeneous; 7) Put the cream into the container and close it tightly.

Data analysis: pH and viscosity of the lotion were measured and the stability of the lotion was measured for 14 days. Data were analyzed by descriptive qualitative.

3. Results

3.1. Research Products

Lotion is a form of cosmetic class of softener which is made of two phases, namely the oil phase and the water phase which are stabilized by an emulsion system. The product resulting from the manufacture of hand body lotion is presented in Figure 1 below.

In Figure 1. Shows the appearance of a hand body lotion made with the addition of *Xylocarpus granatum* fruit peel extract to this lotion which is able to provide added value to product excellence. Based on empirical facts, mangrove fruit skin is used as an itchy powder on the skin, so this lotion is expected to have that added value.



Figure 1 Appearance of hand body lotion made with the addition of *Xylocarpus granatum* extract

3.2. Product quality analysis of *Xylocarpus granatum* hand body lotion extract

The results of the hand body lotion product analysis consist of: 1) pH test, 2) viscosity; 3) homogeneity test; 4) spreadability test; 5) product stability (color, smell, texture) during 2 weeks of storage at room temperature, the preparation has no change in shape, color and smell or is said to be stable. Data analysis of product quality lotion with *Xylocarpus granatum* fruit peel extract is shown in table 1 below:

Table 1 Results of product quality analysis of lotion with *Xylocarpus granatum* fruit peel extract

Hand body lotion	Lotian measurement results on the 14th day							description
	pH	viscosity (mPas)	homogeneity	spreading power (cm)	color	smell	texture	
Extract Formulas Xylocarpus	10.55	1120000	Homogen	4 - 5,5	cream (unchanged)	original (unchanged)	stable	qualify

3.3. Product safety analysis Hand body lotion

The safety test of the *Xylocarpus granatum* extract lotion product was carried out by applying the product to the skin and observing whether there was irritation on the skin. The irritation test was carried out on 5 panelists who applied it to the skin and observed it for 4-12 hours. Of the 5 panelists, they did not experience symptoms of irritation in the form of itching, heat, redness and soreness on the skin surface after being smeared with lotion because the resulting pH was 10.55 and the ingredients contained in the formula did not cause skin irritation.

4. Discussion

The results of the pH analysis of the product, it is known that the results of measuring the pH of a lotion containing *Xylocarpus granatum* extract obtained a pH of 10.55. In this preparation, the pH measurement shows that the pH reaches 10.55, this is due to the composition of the TEA material. In accordance with the theory of [13] that TEA is an Alkalizing agent, when mixed in the same molar proportions with fatty acids, such as stearic acid or oleic acid, triethanolamine forms anionic soap with a pH of about 8 and produces fine granules so that will stabilize the type of oil-in-water emulsion [14]. In accordance with the theory of [15], that changes that occur in pH during storage are caused by the characteristics of the extract, which has a relatively acidic pH. The acidity value (pH) is one of the important parameters of a cosmetic product. The pH of a cosmetic product should be close to the pH of the skin, which is around 5.5 [16]. Cosmetics that have an acidity level that is too far from the body's acidity will potentially irritate the skin. However, the change in pH of each formula is still within the pH range of topical preparations, namely 4.5-8 SNI 16-4952-1998.

Furthermore, the results of the analysis of the viscosity of the lotion preparation using a Brookfield viscometer for 14 days of storage obtained results of 1120000 mPas. In accordance with the theory of [13], that TEA as an emulsifier in the water phase is hygroscopic. Therefore, the greater the TEA concentration, the thinner the preparation. This happens because when the preparation is made of foam, it is melted again, but does not add to the loss of water that evaporates due to melting, so that the viscosity of the preparation increases. In this *Xylocarpus granatum* extract lotion product, the viscosity value during storage is still included in the required viscosity range, namely 2000-50,000 cp (SNI 16-4399-1996).

Furthermore, for homogeneity data analysis of lotion products containing *Xylocarpus granatum* extract. The results of observations on the *Xylocarpus granatum* extract lotion product found that the lotion was physically homogeneous. In lotion products, there is no clumping until the 14th day. Clumping that occurs in lotion products is usually due to the presence of aerosil which is not mixed at the beginning of making the lotion. This happens because when the lotion is made, there is no perfect saponification process. Due to the granular and amorphous nature of aerosil, it should be crushed first and then sifted, added little by little to a lotion base, then crushed until homogeneous. In accordance with the theory of [17], the homogeneity of the emulsion system is influenced by the technique or method of mixing used and the tools used in the process of making the emulsion.

In testing the spreadability of *Xylocarpus granatum* extract lotion for 14 days of storage in table 1, it was found that the spreadability of the three formulas ranged from 4 - 5.5 cm. In accordance with the theory of [18], that the higher the viscosity, the lower the spreading power and vice versa, in accordance with the theory of [17], the smaller and uniform the droplet shape, the more stable the emulsion will be. Emulsion formation is affected by the rate of stirring during the emulsification process. In accordance with [18], the most important factor in stabilizing an emulsion is the physical properties of the emulsifying layer or interfacial film produced by the emulsifying agent. For this reason, a good emulsifying agent or combination of emulsifying agents will form a strong interfacial film so as to prevent phase separation from occurring.

Furthermore, the results of the stability test using indicators of changes in color, odor and texture can be explained as follows:

4.1. Color

Color test was carried out to test the physical quality of the lotion organoleptically. This parameter plays an important role because it is directly related to consumer acceptability. The results of the color test are expected to have a color that does not change. Color test was conducted on 5 respondents. Respondents were asked to first look at the color of the lotion for each formula, then were asked to fill out a questionnaire that had been provided. Color tests are grouped into two categories, namely changing and not changing.

4.2. Smell

The odor test was carried out the same as the color and texture test to test the physical quality of the lotion organically. This parameter plays an important role because it is directly related to consumer acceptability. The results of the odor test are expected that this lotion formula has an odor that does not change. Smell test was conducted on 5 respondents. Respondents were asked to first smell the lotion, then asked to fill out a questionnaire that had been provided. Odor tests are grouped into two categories, namely changed and unchanged.

4.3. Texture test

The texture test was carried out the same as the color and odor test to test the physical quality of the lotion organically. This parameter plays an important role because it is directly related to consumer acceptability. As a result of the texture test, it is hoped that this lotion formula will have an unchanged texture. Texture test was carried out on 5 respondents. Respondents were asked to first hold and apply lotion, then asked to fill out a questionnaire that had been provided. Texture tests are grouped into two categories, namely changed and unchanged.

5. Conclusion

Based on the results of the research and discussion that the hand and body lotion formula with *Xylocarpus granatum* fruit peel extract has been tested for physical stability for 14 days of storage, it can be concluded that the lotion formula product with *Xylocarpus granatum* fruit peel extract has the characteristics and feasibility of the product based on compliance with standards (SNI 16- 4399-1996). As for some of the criteria that have been measured for feasibility, the pH of the *Xylocarpus granatum* fruit peel extract lotion does not meet the requirements. While the results of the Viscosity test, homogeneity, spreadability and stability (smell, color and texture) of the *Xylocarpus granatum* fruit peel extract lotion formula met the requirements.

Compliance with ethical standards

Acknowledgments

We gratefully acknowledge LPPM Universitas Khairun and PPS Universitas Khairun for providing research funding through PKUPT level in PPS research funding 2022 program years.

Disclosure of conflict of interest

The authors declare no conflict of interest.

Authors declaration

The authors hereby declare that the work presented in this article is original and that they will bear any liability for claims relating to the content of this article.

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