FORMULATION AND EVALUATION OF PHYSICAL PROPERTIES OF FACIAL WASH GEL FROM SRIKAYA LEAF EXTRACT (*Annona squamosa*) WITH GELLING AGENT CARBOPOL

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A B S T R A C T

Soursop plants are plants that are generally often found in closed places, these plants were originally found in tropical areas. Soursop is usually found on dry, rocky soil and exposed to direct sunlight. In addition to containing many substances that are beneficial for the body, soursop leaves have antioxidants that can help the skin avoid exposure to sunlight and delay the aging of skin cells. Soursop leaves (Annona squamosa) contain flavonoids that have antioxidant properties. Antioxidants are used as cosmetic formulations to prevent premature aging. Facial wash is a facial cleanser preparation that is intended to help remove dirt on the face or make up, help clean dead skin cells, eliminate microorganisms (bacteria) and reduce damage to the epidermis. The purpose of this study was to determine the physical ability of facial wash preparations of soursop leaf extract from several different concentrations of carbopol as a gel base (1%, 1.5%, and 2%). This study is a type of qualitative research and was conducted using a laboratory experimental method. Organoleptic tests showed that the parameters of aroma, color, and consistency of shape were not significantly different between formulas; formula 1 is liquid, formula 2 is thick slightly liquid, and formula 3 is thick. The results of the preparation evaluation produced formula 3 with a carbopol concentration of 2% as the best formula compared to formulas 1 and 2. Changes in carbopol concentration also have an impact on foam power, pH, and Viscosity.

INTRODUCTION

Indonesia has many natural resources including plants that can be used as a source of medicine, whether they are plants that live on their own or plants that are deliberately preserved (Mustiqawati et al., 2023). One of these plants is Srikaya. This plant comes from Latin America, namely Peru, since long ago British sailors named the srikaya plant with the name sugar apple or custard which means pudding that tastes like apples. In Indonesia this plant has a local name srikaya, in Malaysia it is called nona srikaya, in the Philippines it is known as atis while in Arabic it is called ghista. While the srikaya plant has different names in each region such as in Aceh (star pomegranate), Lampung (seraikaya), Madura (sarkaya), Central Java (srikaya) and Bugis (Sirikaya) (Wahyuni, 2016). Srikaya was first discovered in tropical areas and did not really like open areas, srikaya preferred to live in rocky, dry places and exposed to direct sunlight. This plant will change after 3-5 years. Srikaya is generally planted and maintained by people in their yards because in addition to the tree not being too big, the fruit is also delicious and rich in benefits (Haidah *et all*, 2024).

This plant has many benefits, one of which has many benefits besides its fruit is the soursop leaves. Soursop leaves contain many good substances for the body, such as vitamins, volatile acids, niacin and others. One of the contents of the soursop plant is an antioxidant that is good for the skin. Antioxidants are compounds that can neutralize free radicals by providing electron pairs to atoms that have unpaired electrons (Mustiqawati et al., 2022). Antioxidants can protect the skin from the dangers of sunlight and aging of skin cells. Soursop leaves are believed to cure various diseases both externally and internally. One of the benefits of soursop leaves is that they can treat skin diseases. Almost various types of skin diseases can be treated by using soursop leaves. The content is good for the skin, can cure skin diseases such as ulcers, scabies, ringworm, tinea versicolor, boils and others (Anggrianto, 2019). Soursop leaves also have antioxidants that can prevent the skin from the dangers of sun exposure and delay the aging of skin cells. The phenomenon of premature aging is known to be able to be attempted with modern or traditional medical therapy, one of the traditional treatments that can be used is the soursop plant (*Annona squamosa*) (Mubarokah et al., 2005).

The skin is the outermost organ of the human body which has many benefits, one of the main benefits is protecting the body from attacks by external microorganisms such as bacteria, viruses or germs (Riandari, 2017). Facial skin is the part of the body's skin that is most noticed compared to other skin surfaces, if there is a problem with the skin, it will affect a person's health and self-confidence. Commonly encountered facial skin problems such as acne wrinkles and aging. One of the causes of facial skin damage is the presence of free radicals that play a role in the process of skin damage, such as wrinkles, rough skin to acne (Marlina et al., 2022).

Smooth and soft facial skin is everyone's dream, especially women. By cleaning the skin of the face, so that it can remain clean and protected from dirt. To clean the skin from dust, dirt and oil can be used facial cleanser or facial soap. Cleaning the face only with water is not able to lift dirt and remove oil completely from the face (Rohmani et al., 2022).

Various forms of facial soap preparations have been developed, for example gel form. One of the advantages of facial wash preparations in gel form is that it has a lot of water content so it is very helpful in hydrating the skin (Yurisca & Dewi, 2023). One of the factors that can affect the form of a gel facial cleanser is a gelling agent. Gelling agents are high-base molecular components consisting of a combination of several molecules and polymer coils that give a thick form to the gel. The type and amount of gelling agents greatly affect the physical properties of the preparation (Hamka et al., 2023). Based on the description above, researchers are interested in making a facial wash from soursop leaf extract with the aim of determining the physical properties of a good facial wash preparation by varying the concentration of carbopol.

METHODOLOGY

This research is included in qualitative research with laboratory experimental research methods. The soursop leaves used in this study came from Lamaninggara Village, West Siompu District, South Buton Regency, Southeast Sulawesi Province. This research was conducted from July 17 to August 12, 2024 at the Halu Oleo University Laboratory.The tools used are aluminum foil, stirring rod, blender, homogenizer, measuring flask, magnetic stirrer, analytical balance, oven, pH meter, viscometer and facial wash container.The ingredients used are distilled water, white rice, carbomer, citric acid, soursop leaf extract, glycerin, na4edta, nipagin, propylene glycol, sodium lauryl sulfate and triethanolamine.

Formula

Table 1. Facial Wash Gel Formula for Soursop Leaves (*Annona squamosa*)

Material	Concentration (%)			Utility
	F1	F2	F3	
Soursop leaf extract	8%	8%	8%	Active ingredient
White rice	1,2%	1,2%	1,2%	Scrub
EDTA-4Na	0,1%	0,1%	0,1%	Chelating agent
Glycerin	2%	2%	2%	Wetting agent
SLS	2,5%	2,5%	2,5%	Foaming agent
Propylene glycol	1%	1%	1%	Solvent
Nipagin	0,2%	0,2%	0,2%	Preservative
Carbopol	1%	1,5%	2%	Gilling agent
Tea	3%	3%	3%	Alkalizing agent
Citric acid	1%	1%	1%	Buffering agent
Aquadest	Ad 100%	Ad 100%	Ad 100%	Solvent

Source: Primary Data, 2024

Work Procedures

Sample Preparation

Soursop leaf samples were taken in the morning at 8-10 am. Soursop leaf simplicia was made using a simple method, namely drying with the help of sunlight, drying was carried out for 3 days until the sample was completely dry, then the sample was ground into a powder of 500 grams. The resulting simplicia was ready to be extracted.

Soursop Leaf Extract (*Annona squamosa*)

Weighed as much as 500 grams of powdered simplisia leaves of srikaya (*Annona squamosa*). Then stored in a maceration container and then added 96% ethanol solvent. Soaked for 2 x 24 hours in

a closed container. Filtered the extract of srikaya leaves using a filter to separate the residue and the filtrate. Put the filtrate obtained into a separating funnel to separate the sriksya extract from the solvent. An evaporator is used to obtain a thick extract.

Phytochemical Screening

Phytochemical screening was carried out to determine and identify the groups of compounds in soursop leaf extract (*Annona squamosa*) (Ningsih et al., 2018). Phytochemical tests consist of alkaloids, flavonoids, saponins, tannins, polyphenols, steroids, and terpenoids.

Making Facial Wash

Aquadest, nipagin, Na4EDTA, glycerin and propylene glycol are homogenized with a magnetic stirrer. Then SLS is added. Next, heat the solution to 40ºC. After that, add dye, perfume, citric acid, srikaya leaf extract. Then add the rice scrub gradually. Then mix carbopol and TEA.

Preparation Characteristics Test

Organoleptic Test

Viewed directly from the three components of the preparation, namely odor, color and consistency (Pertiwi et al., 2020).

pH Test

The pH test is carried out using a pH meter and it is hoped that the test results will match the skin's pH (Utami et al., 2019), In a glass cup, 3 grams of sample is mixed with 30 milliliters of distilled water. The electrode is mixed with the solution. Next, the stable pH value is recorded in the instrument.

Foam Power Test

The sample was dissolved in water in a measuring cup to measure the ability of the gel facial cleanser foam to form. Weighed 1 gram of sample, then put into a test tube, added distilled water up to 10 mL, and shaken by inverting the test tube. After that, the foam began to disappear immediately. For five minutes, the tube was left alone. The height of the foam produced was then recorded (Syahrana et al., 2022).

Viscosity Test

Viscosity test of facial wash gel with soursop leaf extract (*Annona squamosa*) was measured using a viscometer (Rasyadi et al., 2023). Approximately 30 grams of sample was loaded into the cone. To perform the measurements, the shear rate was increased from 0.5 seconds to 100 seconds, and the viscosity was measured at each revolution per minute.

RESULTS AND DISCUSSION

In the study of facial wash gel formulation, the sample used was an extract from srikaya leaves (*Annona squamosa*). Samples were taken in Lamaninggara village. Furthermore, it was wet sorted then washed with running water then the sample was chopped then dried by drying it in the sun and covered with a black cloth for 3 days until the sample was completely dry. After that, dry sorting was carried out, ensuring that there were no foreign objects in the sample. After dry sorting, the simplicia was blended until smooth until 500 grams of srikaya leaf powder (*Annona squamosa*) was obtained, then the simplicia powder was extracted using the maceration method. The simplicia was stored in a maceration container then 96% ethanol solvent was added. Soaked for 2 x 24 hours in a closed container. After that, the soursop leaf extract was filtered using a filter to separate the residue and the filtrate. Then the obtained filtrate was put into a separating funnel to separate the soursop extract from the solvent and an evaporator was used to obtain a thick extract of soursop leaves (*Anonna squamosa*).

Making facial wash extract of soursop leaves in this study, variations in carbopol concentration were carried out. The purpose of this concentration change was to achieve a carbopol concentration that could provide optimal facial wash gel characteristics. Phytochemistry of soursop leaf extract was the first test carried out.

Table 1. Phytochemical Screening Results

Chemical Content	Reagent	Results	Information
Alkaloids	dragendroff	+	Brick red
Flavonoids	Mg Powder + Concentrated HCl	+	Yellowish
Polyphenols	FeCl3 5%	+	Black
Saponin	Foam test (10 mL of distilled water + 2 drops of 1 N HCl) shaken for 1 minute	-	No foam stable < 7 minutes
Tannin	FeCl3 10%	+	Black
Steroids	Lieberman burchard	+	Dark greenish

Source: Primary Data, 2024

Information :
+ = Contains compounds
- = Does not contain compounds

Phytochemical screening is a process to find out and identify the group of compounds in the extract of soursop leaves (Annona squamosa). This test includes alkaloids, flavonoids, saponins, tannins, polyphenols, steroids or terpenoids. To find out the alkaloid compounds in soursop leaves (Annona squamosa) using dragendroff reagent, the color change that occurs is to change to brick red which means positive containing alkaloid compounds. Furthermore, the flavonoid compound test is reacted with Mg powder + concentrated HCl, the color change that occurs is yellowish which means positive containing flavonoid compounds. The polyphenol compound test is reacted with 5% FeCl3, the color change to black which means the result is positive containing polyphenol compounds. The saponin compound test is reacted with 10 mL of distilled water + 2 drops of 1 N HCl) Shaken for 1 minute the reaction obtained does not form stable foam <7 minutes which means the result is negative does not contain saponins. Testing of tannin compounds is reacted with 10% FeCl3, the color changes to black which means positive containing tannin compounds. The last test of terpenoid/steroid compounds is reacted with lieberman burchard, the color changes to dark greenish which means positive containing terpenoid/steroid compounds.

Table 2. Organoleptic Test Results

Formula	Parameter	Results	Information
F1	Color	Greenish yellow	Not eligible
	Smell	Typical extract	
	Shape	Liquid	
F2	Color	Greenish yellow	Qualify
	Smell	Typical extract	
	Shape	Thick, slightly runny	
F3	Color	Greenish yellow	Qualify
	Smell	Typical extract	
	Shape	Thick	

Source: Primary Data, 2024

Organoleptic test aims to see the facewash preparation in terms of color, odor and consistency. Organoleptic test on formula I has a slightly clear yellow color, homogeneous, distinctive odor, liquid form without coarse particles, easy to pour and foam and in formula II has a slightly clear yellow color, homogeneous, distinctive odor, thick form, slightly liquid without coarse particles, easy to pour and foam while in formula III has a slightly clear yellow color, homogeneous, distinctive odor, thick form without coarse particles, easy to pour and foam.

Table 3. pH Test Results

Formula	pH value	Information
F1	6,61	Not eligible
F2	6,25	Not eligible
F3	5,75	Qualify

Source: Primary Data, 2024

The pH test was conducted to determine whether the pH value of the facewash preparation made was in accordance with the specified skin pH. It is known that the pH of the face ranges from 5.4 to 5.9. If the pH value is less than 4.5, it can cause skin irritation, while if the pH is greater than 6.5, it can cause scaly skin (Lestari et al., 2018). The pH measurement uses a pH meter, in a glass cup, a 3 gram sample is mixed with 30 milliliters of distilled water. The electrode is mixed with the

solution. Furthermore, the stable pH value is recorded in the instrument. The first was carried out on the soursop leaf facial wash preparation (*Annona squamosa*), namely for formula I it has an acidity value of 6.61, formula II has an acidity value of 6.25, while formula III has the most acidic level of formulas I and II, namely 5.75. Based on the acidity level of each formula, the best for the face is formula III.

Table 4. Foam Power Test Results

Formula	Carbopol Concentration	Foam Height
F1	1%	60 mm
F2	1,5%	35 mm
F3	2%	18 mm

Source: Primary Data, 2024

The foaming power of the preparation was tested by pouring the preparation into a measuring cup to measure how much foam can be made to wash the face. Weighed as much as 1 gram of sample then stored in a test tube, added distilled water up to 10 mL, and shaken by inverting the test tube. After that, measure the height of the foam that begins to disappear. Let stand for 5 minutes. The height of the foam formed is then recorded. In formula I the foam height reaches 60 mm and formula II the foam height is 35 mm while formula III the foam height is 18 mm.

Table 5. Viscosity Test Results

Formula	Value (cPs)	Information
F1	2014,93	Not eligible
F2	3275,02	Qualify
F3	3311,06	Qualify

Source: Primary Data, 2024

Viscosity test shows the thickness of the preparation. Lower viscosity value means faster flow of the preparation. The viscosity quality requirements for gel preparations are 2000 cp – 4000 cp (Rasyadi et all, 2023). Viscosity test of facial wash gel extract of srikaya leaves (*Annona squamosa*) was measured using a viscometer. The sample was placed about 30 g on the cone. Measurements were made by increasing the shear rate from 0.5 / second to 100 / second and the viscosity was read at each rotation per minute. The viscosity of formula 1 is 2014.93cP, formula II is 3275.02cP and formula III is 3311.06. The results of measuring the viscosity of the facial wash gel preparation of srikaya leaf extract can be seen in the table. The viscosity of the resulting gel preparation shows that the higher the concentration of carbopol, the viscosity of the preparation increases. Increasing the amount of gelling agent can strengthen the gel composition, resulting in an increase.

CONCLUSION

According to the results of phytochemical screening and physical properties, which include organoleptic, pH, and viscosity tests, each preparation has different physical properties. The results of phytochemical screening of soursop leaf extract (*Annona squamosa*) showed secondary metabolite compounds such as alkaloids, flavonoids, polyphenols, tannins, and terpenoids or steroids. Formula III, which has a carbopol concentration of 2%, has the best physical properties, pH, foaming power, and viscosity of the three formulas that have variations in carbopol concentration. The best facial cleanser gel with soursop leaf extract (*Annona squamosa*).

The limitation of this study is that it focuses more on the evaluation of physical properties rather than the clinical effectiveness of facial wash gel on certain skin conditions. Therefore, further research is needed to assess its benefits in long-term use on human skin.

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