Risalah Fisika
Volume 5, Number 1, 2025 pp. 34-39
e-ISSN: 2548-9011
DOI: https://doi.org/10.35895/rf.v5i1.20

Caleso (Cassava Leaf Soap): Cassava Leaf Extract Herbal Soap as a Solution to Skin Problems

Ananda Aprilia[1] , Anissa' Nurrohmah[2], and Wipsar Sunu Brams Dwandaru[3]
[1,2,3]*Physics Education Department, Yogyakarta State University, Indonesia*
[1] anandaaprilia.2024@student.uny.ac.id

ARTICLE INFO

Article history:
Received 15 September 2024
Revised 18 December 2024
Accepted 28 December 2024
Available online 30 January 2025

ABSTRACT

Skin health is an important thing to always pay attention to. A person's lack of maintaining healthy skin can result in skin problems such as wounds and acne. Wounds and acne on the skin can be caused by the activity of Staphylococcus aureus bacteria. One effective way to treat acne and wounds is to use soap. Researchers had the idea to make herbal soap from cassava leaf extract (Manihot esculenta). So far, cassava leaves have not been used optimally. In fact, based on research, cassava leaves contain vitamin C, flavonoids, saponins and triterpenoids which are believed to have antibacterial activity and speed up the wound healing process. The aim of this research was to determine the effect of antiseptic herbal soap from cassava leaf extract (Manihot esculenta) on acne and skin wounds caused by Staphylococcus aureus bacteria. The type of research used is experimental research. The research was carried out by carrying out several tests, namely organoleptic tests, homogeneity tests, foam height tests, pH tests, and irritation tests. The research results show that cassava leaves can be used to make soap that can treat skin problems such as wounds and acne. Cassava leaf extract herbal soap is safe to use for Indonesian people who have skin problems such as acne and wounds because it contains natural ingredients that are suitable for use on all skin types.

***Keywords*:** *Caleso; Herbal soap; Cassava leaf extract*

ABSTRAK

Kesehatan kulit menjadi hal yang penting untuk selalu diperhatikan. Kurangnya seseorang dalam menjaga kesehatan kulit dapat mengakibatkan munculnya permasalan kulit seperti luka dan jerawat. Luka dan jerawat pada kulit dapat disebabkan karena aktivitas bakteri Staphylococcus aureus. Salah satu cara efektif untuk menangani jerawat dan luka adalah menggunakan sabun. Peneliti memiliki gagasan untuk membuat sabun herbal dari ekstrak daun singkong (Manihot esculenta). Selama ini daun singkong belum dimanfaatkan secara optimal. Padahal, berdasarkan penelitian daun singkong memiliki kandungan vitamin c, flavonoid, saponin dan triterpenoid yang dipercaya memiliki aktivitas antibakteri dan mempercepat proses penyembuhan luka. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh sabun herbal antiseptik ekstrak daun singkong (Manihot esculenta) terhadap jerawat dan luka pada kulit akibat bakteri Staphylococcus aureus. Jenis penelitian yang digunakan adalah penelitian eksperimen. Penelitian dilakukan dengan melakukan beberapa uji yaitu uji organoleptik, uji homogenitas, uji tinggi busa, uji pH, dan uji iritasi. Hasil penelitian menunjukkan bahwa daun singkong dapat dimanfaatkan menjadi sabun yang dapat menangani permasalahan kulit seperti luka dan jerawat. Sabun herbal ekstrak daun singkong aman digunakan bagi masyarakat Indonesia yang memiliki masalah kulit seperti jerawat dan luka karena mengandung bahan alami yang cocok digunakan pada semua jenis kulit.

Kata kunci: Caleso; Sabun herbal; Ekstrak daun singkong

1. INTRODUCTION

Skin health is an important factor that must be considered. Several skin problems such as acne, tinea versicolor, scabies, ringworm can occur due to a person's lack of maintaining healthy skin. Skin problems can occur due to bacterial infections which can cause diseases with characteristic signs, namely inflammation, *necrosis*, infection of hair follicles and formation of abscesses between organs that are often attacked by bacteria *Staphylococcus aureus* is skin that has wounds and can spread to other people who also have wounds (Razak, 2013).

One of the plants that is believed to be able to treat skin problems is cassava leaves (*Manihot esculenta*). Cassava plants grow widely in Indonesia, especially in Yogyakarta. However, the use of cassava in Yogyakarta is less than optimal, limited to the fruit being consumed, the leaves as vegetables and fresh vegetables, and the stems being used as firewood. The benefits are more than just for consumption but can also be used for skin health, including the leaves. Cassava leaves contain lots of protein, several minerals, vitamin B1, vitamin B2, vitamin C and carotene. In previous research, vitamin C can speed up the wound healing process. Cassava leaves also contain lots of carbohydrates, fat, iron, phosphorus, calcium and water, flavonoids, saponins and triterpenoids. Flavonoids and saponins are known to have antimicrobial and antiviral activity. Likewise, triterpenoids are known to have antiviral and antibacterial activity, and can treat skin damage. Flavonoids have antibacterial activity by binding to nucleophilic amino acids in proteins and inactivating enzymes. Saponin compounds cause a decrease in cell surface tension and cause cell lysis. Tannin compounds work by binding to protein walls so that the formation of bacterial cell walls is hampered (Saraswati, 2015).

One way to maintain healthy skin is to clean your skin regularly using soap. Cassava leaves contain saponins and vitamin C so they have potential as an antiseptic herbal soap to treat skin tissue damage such as acne and skin wounds caused by bacteria. *Staphylococcus aureus*. Everyone has different skin sensitivities. Soap that contains too many chemicals will cause skin damage such as dry skin, redness and a sore feeling. Cassava leaf herbal soap is considered safer for skin health. Based on the description above, researchers took the initiative to prove that cassava leaves can be used as herbal soap to treat skin problems such as acne, not only on the face but also throughout the body.

Figure 1. Cassava leaves.

Based on this background, it can be formulated (a) What is the content of cassava leaf extract (*Manihot esculenta*) as an antiseptic herbal soap. (b) How does antiseptic herbal soap affect cassava leaf extract (*Manihot esculenta*) on the skin? The objectives to be achieved in this research are (a) Knowing the content of cassava leaf extract (*Manihot esculenta*) as an antiseptic herbal soap. (b) Knowing the effect of antiseptic herbal soap cassava leaf extract (*Manihot esculenta*) on the skin. The expected output from this research is antiseptic herbal soap from cassava leaf extract (*Manihot esculenta*) which can treat acne and skin wounds caused by bacteria *Staphylococcus epidermis* thus producing a scientific article regarding antiseptic herbal soap cassava leaf extract (*Manihot esculenta*) as a natural solution for treating acne and wounds. The results of this research will be published in seminars and scientific journals which will be useful for readers and the general public.

Cassava leaves contain routine flavonoids, saponins, tannins, vitamin C, vitamin A, vitamin B1, iron, charcoal hydrate, calcium, phosphorus, fat and contain protein, namely the amino acid methionine (Agoes, 2010). Flavonoids, saponins and tannins in cassava leaves have potential antibacterial activity. Saponin is also known to work as an antimicrobial, this compound is able to inhibit the prostaglandin dehydrogenase pathway (Robinson, 1995).

Soap is a carboxylic alkali salt (RCOONa). The R group is hydrophobic because it is nonpolar and COONa is hydrophilic (polar). The process that occurs in making soap is called saponification (Girgis, 2003). The alkali used is NaOH, other ingredients used in making bath soap are triglycerides in the form of oil or fat, for example palm oil, cotton seed oil and peanut oil are used (Oluwatoyin, 2011). There are 2 types of soap known, namely solid soap (bar) and liquid soap (Hambali, 2005).

2. METHOD

The type of research used was experimental research which aimed to determine the effect of cassava leaf extract antiseptic herbal soap (*Manihot esculenta*) against acne and skin wounds caused by bacteria *Staphylococcus epidermis.* The research location will be carried out at the Chemistry Research Laboratory, FMIPA UNY, while the time for this research will be carried out for 2 months. The subject of this research is cassava leaves (*Manihot esculenta*). The cassava leaves that will be used in this research are old cassava leaves because old cassava leaves contain more chlorophyll, saponins, vitamin C, flavonoids and other chemical contents. The object of this research is the formulation of cassava leaf content and anti-bacterial activation *Staphylococcus epidermis* in treating acne and skin wounds. The tools used in this research include a stir stick, clean cloth, gloves, wash basin, measuring cup, beaker glass, dropper pipette, analytical balance, and mold. The materials used in this research include cassava leaves, distilled water, olive oil, palm oil, cooking oil and NaOH.

The process of making cassava leaf extract herbal soap begins with weighing 15 grams of dried cassava leaves using an analytical scale. Select good quality cassava leaves, then wash them using clean water. The prepared cassava leaves are ground until smooth, then filtered using a thin cloth until cassava leaf extract is obtained. To get more optimal extract results, the juice is filtered again using filter paper. The process of making cassava leaf extract can be described through a flow diagram as given in Figure 2.

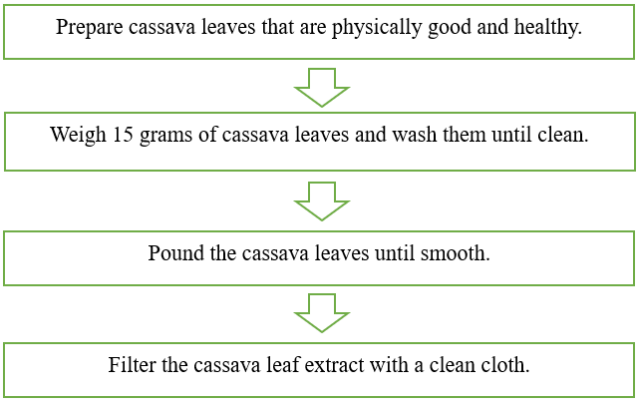

Figure 2. Steps for making cassava duan extract.

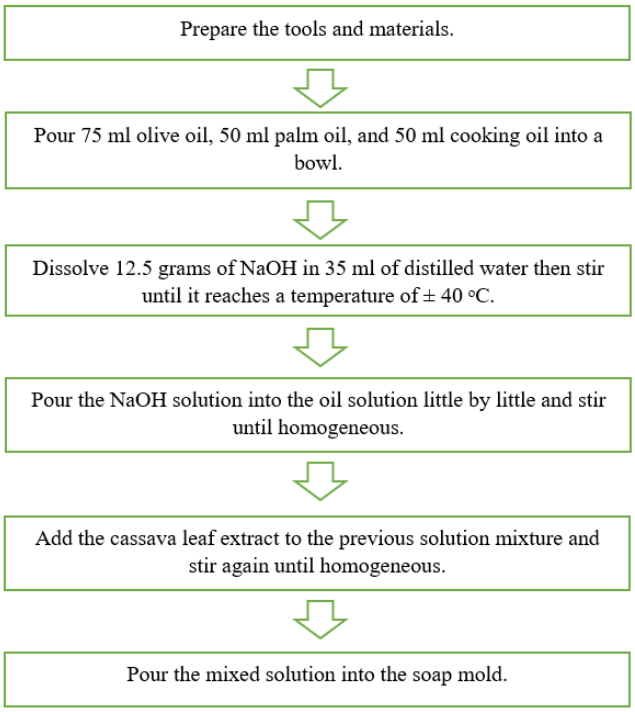

Figure 3. Making Caleso soap.

Making solid soap begins with preparing the tools and materials needed, next is making the soap base, which begins by pouring 75 ml of olive oil, 50 ml of palm oil and 50 ml of cooking oil into the basin. Dissolve 12.5-gram NaOH in 35 ml of distilled water, stir until dissolved and reach a temperature of ±40°C. Then pour the NaOH solution into the olive oil little by little and stir until it is homogeneous and thickened. The last ingredient added is cassava leaf extract. After adding the extract, the mixture was stirred again until homogeneous. Once everything is mixed, put it into the mold. Then the soap is left in a closed place at room temperature to enter the curing period and saponification process. The process of making cassava leaf extract herbal soap can be described through the flow diagram as given in Figure 3.

The test carried out to test the suitability of cassava leaf extract herbal soap can be explained as follows.

1. Organoleptic Test. On formulations that have been formulated, observations of the preparation are carried out including aroma, color and dosage form. Testing was carried out for 28 days and observed every 7 days.
2. Homogeneity Test. This test is carried out by taking a small amount of each soap preparation that has not solidified from the preparation and etching it on a piece of glass or other transparent material. Homogeneous soap contains no lumps or coarse grains.
3. Foam Height Test. The foam height test was carried out by taking a sample of 1 mL, placing it in a test tube, then adding distilled water to 10 mL, shaking by turning the test tube for 20 seconds, then immediately measuring the height of the foam produced. Then, the tube was left for 5 minutes, then the height of the foam produced was measured again after 5 minutes (Sari & Ferdinan, 2017).
4. Test pH. The pH test for solid soap is carried out with a pH meter. The standard pH range for solid soap is 9. Testing was carried out for 28 days and observed every 7 days.
5. Irritation Test. The irritation test was carried out by trying solid soap on the palm of the hand and leaving it for 5 minutes. This examination was carried out on researchers for each formula for three consecutive days.

3. RESULT AND DISCUSSION

The organoleptic test results of the extract showed a distinctive aromatic odor, a slightly thick consistency, a deep green color, and a slightly bitter taste. Cassava leaves contain routine flavonoids, saponins, tannins, vitamin C, vitamin A, vitamin B1, iron, charcoal hydrate, calcium, phosphorus, fat and contain protein, namely the amino acid methionine (Agoes, 2010). Flavonoids, saponins and tannins in cassava leaves have potential antibacterial activity. The flavonoid, saponin and tannin content in cassava leaves is known to have antibiotic activity which kills bacteria. Cassava leaves contain flavonoids which are thought to have anti-inflammatory and analgesic effects (Sukrasno, 2009). Flavonoids function as anti-inflammatory by inhibiting the enzymes cyclooxygenase and lipoxygenase so they can provide hope for treating symptoms of inflammation and allergies. The mechanism of flavonoids in inhibiting inflammation occurs in two ways, namely inhibiting the metabolism of arachidonic acid via the lipoxygenase pathway, and the secretion of lysosomal enzymes from endothelial cells thereby inhibiting the proliferation and exudation phases of the inflammatory process. Saponin has the ability to act as a cleanser and antiseptic which functions to kill or prevent the growth of microorganisms that appear in wounds so that the wound does not experience serious infections (Robinson, 1995).

This experiment resulted in two soap formulas, with each formula having a different NaOH mass and olive oil concentration, palm oil concentration, and cooking oil concentration. This can be seen in Table 1. The first formula uses a mass of 17.5-gram NaOH with an olive oil concentration of 27.6%, a palm oil concentration of 20.7%, and a cooking oil concentration of 20.7%. The second formula uses a 12.5-gram mass of NaOH with an olive oil concentration of 34.1%, a palm oil concentration of 22.7%, and a cooking oil concentration of 22.7%.

Table 1. Cassava Leaf Extract Herbal Solid Soap Formula

Formula	Mass of NaOH (grams)	Olive Oil Concentration (%)	Palm Oil Concentration (%)	Cooking Oil Concentration (%)
Formula 1	17,5	27,6	20,7	20,7
Formula 2	12,5	34,1	22,7	22,7

In the organoleptic test, the herbal soap preparation of cassava leaf extract and the soap base showed that it was a solid preparation which was a form of soap. Cassava leaf extract herbal soap gives a distinctive smell from cassava leaves, but in this study the aroma of cassava leaves was covered by the aroma of olive oil, and the color of this soap was brown which was a mixture of the color of cassava leaves and oil. A herbal soap preparation is declared homogeneous if the soap base, active ingredients and other additional ingredients are mixed evenly. It can be observed that there are no lumps or coarse granules in the cassava leaf extract herbal soap preparation. A homogeneous soap preparation indicates that the mixing of the soap ingredients and cassava leaf extract used is good enough so that there are no lumps or coarse granules in the preparation. A soap preparation must be

homogeneous and even so that it does not cause irritation and is evenly distributed when used. To find out whether a soap preparation is homogeneous or not, you can find out by taking a small amount of the preparation and etching it on a piece of glass or other transparent material.

Table 2. pH test results

Formula	pH
1	13
2	9,5

The pH of the soap preparation must be adjusted to the pH of human skin, namely 9 so that it is safe to use. A pH that is too acidic can irritate the skin, while a pH that is too alkaline can make the skin scaly. pH measurements are carried out using a pH meter. Skin irritation test examination of soap preparations is carried out by applying soap directly to the palms of the hands for 5 minutes. If the examination results show that there is no redness and itching, it means that there is no irritation reaction. The pH test results in Table 2 show that herbal soap with formula 1 has a pH of 13 and causes the skin to become scaly because the soap is too alkaline. On the other hand, herbal soap with formula 2 has a pH of 9.5 and does not cause irritation.

Table 3. Foam Height Test Results

Formula	Foam height before 5 minutes (cm)	Foam height after 5 minutes (cm)
1	2,4	0,9
2	3,8	2,1

The results of the foam height test can be seen in Table 3. From Table 3 it can be observed that formula 2 had an initial foam height of 3.8 cm, and after leaving it for 5 minutes the foam height became 1.2 cm. Meanwhile, for formula 1 soap, the initial foam height was 2.4 cm and after waiting 5 minutes it reduced to 0.9 cm. Thus, the best foam height is obtained for soap preparations with formula 2.

4. CONCLUSION AND RECOMMENDATION

Based on the results of the research that has been carried out, it can be concluded as follows. Cassava leaves (*Manihot esculenta*) contain ingredients such as flavonoids, saponins, tannins, vitamin C, vitamin A, vitamin B1, iron, charcoal hydrate, calcium, phosphorus, fat, and contains protein, namely the amino acid methionine. The flavonoids, saponins and tannins in cassava leaves have activity as antibiotics which kill bacteria so they have potential as raw materials for making soap. Two soap formulas were obtained, soap with formula 1 when used caused scaly skin because the pH was too alkaline, while soap with formula 2 when used did not show an irritating effect. Based on the results of this research, it shows that soap with formula 2 is safer to use.

ACKNOWLEDGEMENT

The authors would like to thank the Faculty of Mathematics and Natural Sciences, Universitas Negeri Yogyakarta for funding this study.

REFERENCES

Agoes, H. A. (2010). *Indonesian Medicinal Plants: Book 1*. Jakarta: Selemba Medika Publishers.

Girgis, A. Y. (2003). Production of High-Quality Castile Soap from High Rancid Olive Oil. *Gracasy Aceites*, *54*(3), 226-233.

Hambali, E., Suryani, A. & Rifai, M. (2005). Making Transparent Soap for Gifts and Beauty. Jakarta: Self-Help Spreader.

Oluwatoyin S. M. (2011). Quality Soaps using Different Oil Blends, Journal of *Microbiology and Biotechnology Research*, 1(1), 29-34.

Razak, A., Djamal, A., & Revilla G. (2013). Test of the Inhibitory Power of Lime Juice (Citrus aurantifolia) on the Growth of Staphylococcus aureus Bacteria In Vitro. *Andalas Health Journal*, 2(1), 05-08.

Robinson, T. (1995). *High Plant Organic Content*. Bandung: ITB.

Saising, J., Hiranrat, A., Mahabusarakan, W., Ongsakul, M. & Voravuthikunchai, S. P. (2008). Rhodomyrthone

from Rhodomyrtus tomentosa (Aiton) Hassk. as a Natural Antibiotic for Staphylococcus Cutaneous Infection. *Journal of Health Science*, *54*(5) 589-595.

Sari, R., & Ferdinan, A. (2017). Antibacterial Activity Assay of the Liquid Soap from the Extract of Aloe vera Leaf Peel. *Pharmaceutical and Science Research*, *4*(3), 111–120.

Sukrasno. (2009). Immunomodulatory Effects of Water Extract of Temulawak (Curcuma xanthorrhiza Roxb). Indonesian Herbal Medicine Forum.