P-ISSN : 2775-4510
E-ISSN : 2809-1973
JIFS : Jurnal Ilmiah Farmasi Simplisia, Juni 2025 Vol 5 Nomor 1:55-65

Development And Evaluation of a Transparent Solid Soap Formulation Containing Red Onion Peel (*Allium cepa* L.) Extract

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Doi: 10.30867/jifs.v5i1.845

ABSTRAK

Indonesia menempati peringkat ke-17 dalam tingkat polusi udara, dengan 91% penduduk tinggal di wilayah yang melebihi batas aman menurut WHO. Polusi udara berdampak buruk bagi kesehatan, termasuk risiko kanker kulit. Kulit bawang merah, limbah sayuran yang sering terabaikan, mengandung flavonoid, saponin, dan tanin yang memiliki sifat antioksidan. Penelitian ini mengeksplorasi potensi ekstrak kulit bawang merah dalam formulasi sabun padat transparan untuk melindungi kulit dari radikal bebas. Metode penelitian meliputi pembuatan sabun dengan konsentrasi ekstrak 4%, 8%, dan 12%, yang kemudian dievaluasi berdasarkan parameter organoleptik, pH, tinggi dan stabilitas busa, serta kekerasan. Hasil penelitian menunjukkan bahwa semua formulasi sabun padat transparan dengan ekstrak kulit bawang merah (4%, 8%, dan 12%) berhasil dibuat dan stabil dalam semua parameter yang diuji. Temuan ini menunjukkan bahwa ekstrak kulit bawang merah dapat dimanfaatkan secara efektif dalam formulasi sabun sebagai antioksidan alami. Sabun padat transparan dengan ekstrak kulit bawang merah berpotensi menjadi produk perawatan kulit yang efektif, melindungi dari radikal bebas sekaligus mendukung kesehatan dan kecantikan kulit.

Kata kunci: ekstrak kulit bawang merah・radikal bebas・sabun transparan・antioksidan

ABSTRACT

Indonesia ranks 17th globally in air pollution levels, with 91% of the population living in areas that exceed WHO safety limits. Air pollution poses various health risks, including skin cancer. Red onion peel, commonly regarded as vegetable waste, contains flavonoids, saponins, and tannins, which possess antioxidant properties. This study investigates the potential of red onion peel extract in soap formulations for skin protection against free radicals. Soaps were formulated with red onion peel extract at concentrations of 4%, 8%, and 12%, and evaluated based on organoleptic characteristics, pH, foam height and stability, and hardness. The results showed that transparent solid soaps containing 4%, 8%, and 12% red onion peel extract were successfully formulated and remained stable across all tested parameters. These findings suggest that red onion peel extract can be effectively incorporated into soap formulations to protect the skin from free radicals. Thus, transparent solid soap containing red onion peel extract represents a promising skincare product, offering antioxidant protection and contributing to skin health and beauty.

Keywords : free radicals・onion skin extract・transparent soap・antioxidant

INTRODUCTION

Indonesia ranks 17th in terms of pollution levels, with 91% of its population living in areas where air pollution exceeds safe limits set by the World Health Organization (WHO). According to the Air Quality Live Index (AQLI), air quality in Indonesia continues to deteriorate, posing severe health risks. Prolonged exposure to air pollution has been linked to various health problems, including respiratory diseases, cardiovascular disorders, and even cancer (Sudaryanto et al., 2020). Among these, skin health is often overlooked despite the significant impact of free radicals generated by pollutants, which contribute to premature aging and skin-related diseases (Isfianti, 2018).

Free radicals are highly reactive molecules that can cause oxidative stress, leading to cell damage. Antioxidants are essential in neutralizing these harmful molecules by donating single electrons or hydrogen atoms, thereby preventing oxidative damage (Rabeta & Nur Faraniza, 2013). Various studies have demonstrated the effectiveness of natural antioxidants in skincare products. For instance, research on the application of plant-based antioxidants such as flavonoids and polyphenols in cosmetic formulations has shown promising results in protecting the skin from environmental damage (Aulyawati et al., 2021). Furthermore, natural sources like turmeric (*Curcuma longa* Linn.), ginger (*Zingiber officinale* Roscoe), and red onion (*Allium cepa* L.) contain potent antioxidant compounds that can mitigate the effects of free radicals (Sari, 2016).

Soap is one of the most commonly used skincare products. Transparent solid soap, in particular, is known for its appealing aesthetic properties and mild cleansing effects (Dyartanti, 2014). The incorporation of natural antioxidants in soap formulations has gained interest due to their potential benefits in enhancing skin protection against pollutants. Previous studies have explored the inclusion of plant extracts in soap formulations, such as basil leaf extract (*Ocimum sanctum*) and moringa leaf extract (*Moringa oleifera*), which exhibit strong antioxidant activity and contribute to skin health (Riskianto et al., 2021).

Red onion peel (*Allium cepa* L.) is often discarded as agricultural waste despite being a rich source of flavonoids, saponins, and tannins—compounds known for their antioxidant, anti-inflammatory, and antimicrobial properties. Studies have indicated that flavonoids from onion peel possess strong radical-scavenging activity, making them suitable for skincare applications (Tomi and Indawati, 2020). Additionally, the presence of saponins in onion peel contributes to foam stability, which is crucial for soap formulations (Nurrosyidah et al., 2019).

Given these findings, this study, conducted at the University of Muhammadiyah Kuningan, aims to develop and evaluate a transparent solid soap containing red onion peel extract as a natural antioxidant. The research focuses on assessing the stability of the soap in terms of organoleptic properties, pH, foam height and stability, and hardness. By exploring the potential of red onion peel extract in cosmetic formulations, this study seeks to provide an innovative and sustainable approach to skincare, utilizing natural ingredients to combat the adverse effects of air pollution on skin health.

METHODS

Materials and Tools

The equipment used in this study includes an analytical balance (Henherr BL-H2), blender (Miyako), macerator, glassware (Pyrex), mortar and pestle, micropipette, oven (Hemmert), vacuum rotary evaporator (IKA Model RV 10 B), thermometer, pH indicator (Unesco), and soap mold.

The materials used in this research include red onion peels (*Allium cepa* L.) collected locally from Kuningan District; 96% ethanol (DPH, Brataco); distilled water (Ikapharmindo); magnesium powder (Merck); hydrochloric acid/HCl (Merck); 10% and 1% ferric chloride solution (Sigma-Aldrich); Dragendorff's reagent (Sigma-Aldrich); Virgin Coconut Oil/VCO (Tropicana Slim); citric acid (Merck); stearic acid (Brataco); glycerin (Brataco); propylene glycol (Dow Chemical); sucrose (Puspa Agro or Merck); sodium lauryl sulfate/SLS (Brataco); fragrance (Essential Oils Indonesia, Rose variant); 30% NaOH solution (Merck); distilled water (Ikapharmindo); and castor oil/Oleum Ricini (Kimia Farma).

Sample Collection and Plant Identification

The sample used in this study was red onion skin collected from the Kuningan District, Kuningan City, West Java. The red onion skin was identified to confirm its identity as the skin of the red onion plant. This determination process was conducted at the Biology and Pharmacy Laboratory of

University of Muhammadiyah Kuningan under No. 107/KET/Lab.BF/V/2024 from February to April 2024.

Preparation of Red Onion Peel Simplisia

The red onion peels that were obtained were wet sorted to remove any dirt or foreign materials. Next, the onion peels were dried by air circulation without direct sunlight exposure. The dried material was then further dried in an oven at a temperature of 30-60°C to obtain high-quality dried material (simplisia) with a moisture content of less than 10%. Finally, the onion peels were ground using a blender.

Microscopic Observation

Microscopic observations were conducted using a microscope. Thin slices of fresh red onion peels were observed on a glass slide under magnifications of 100× and 400×.

Moisture Content Test

The moisture content of the dried material (simplisia) was tested using the gravimetric (drying) method. This process began by weighing 1 gram of red onion peels simplisia, followed by drying it in an oven at 80°C for 10 minutes. After drying, the simplisia was placed in a desiccator for about 15 minutes before being weighed again. This process was repeated until the weight of the red onion peel simplisia remained constant. The moisture content can be calculated using the following formula:

$$Moisture\ content(\%) = \frac{wet\ weight\ (g) - weight\ after\ drying\ (g)}{wet\ weight\ (g)} x\ 100\%$$

Sample Extraction

A total of 250 grams of dried red onion peel simplisia was macerated with 6 liters of 96% ethanol. The maceration process took place over 3 days by soaking the simplisia powder. After soaking, the maceration results were filtered using filter paper. The obtained filtrate was then concentrated using a rotary evaporator at a temperature of 50°C. The resulting thick extract was further evaporated using a water bath at 50°C. Once the thick extract was obtained, the yield could be calculated.

$$\%\ Yield\ = \frac{Weight\ of\ extract\ (g)}{Weight\ of\ dried\ sample\ (g)} x\ 100\%$$

Secondary Metabolite Testing

According to Aulyawati et al. (2021), the phytochemical screening procedure conducted is as follows:

a. Alkaloids

Ten drops of the extract are mixed with 5 ml of 2N hydrochloric acid and shaken until two layers form. The acidic layer (top) is then pipetted and divided into four parts in test tubes. The first test tube is used as a blank. To the second test tube, 1-2 drops of Mayer's reagent are added, which will indicate the presence of alkaloids by forming a white or yellow precipitate. To the third test tube, 1-2 drops of Bouchardat's reagent are added and observed for a brown or black precipitate. To the fourth test tube, 1-2 drops of Dragendorff's reagent are added and observed for an orange precipitate.

b. Flavonoids

Ten drops of the extract are added to a test tube, followed by the addition of 2 mL of distilled water. Then, 0.2 grams of zinc powder and 1 mL of 2N hydrochloric acid are added. The mixture is heated in a water bath and then filtered. The resulting filtrate is mixed with 1 mL of amyl alcohol and shaken vigorously. If flavonoids are present, the filtrate will change color to red, yellow, or orange, which can be absorbed by the amyl alcohol.

c. Saponins

An aliquot of ten drops of the extract is introduced into a test tube, followed by the addition of 10 mL of distilled water. The mixture is then subjected to heating. Upon cooling, the contents of the test tube are vigorously agitated for several minutes. The presence of saponins is confirmed by the formation of a stable foam with a height of approximately ±1 cm, which persists for several minutes and remains unchanged upon the addition of 1–2 drops of 2N hydrochloric acid.

d. Tanins

One to two drops of 1% ferric chloride reagent were added to the extract containing approximately one spatula of the sample. The presence of tannins was indicated by the development of a green, blue, or black coloration.

e. Triterpenoids and Steroids

Ten drops of acetic anhydride and one drop of concentrated sulfuric acid (Liebermann-Burchard reagent) were added to the extract containing approximately one spatula of the sample. The presence of steroids or triterpenoids was indicated by the formation of a purple or red coloration that subsequently changes to blue-green.

Formulation and Production of Transparent Solid Soap

Three concentration formulations were prepared with a basis soap ratio that does not contain red onion peel extract (*Allium cepa* L.).

Table 1. Formulation of Transparent Solid Soap with Red Onion Peel Extract (*Allium cepa* L.)

No.	Materials	Concentration (w/v)				Function
		F1	F2	F3	F4	
1.	Red Onion Peel Extract	-	4	8	12	Active ingredient
2.	NaOH 30%	13	13	13	13	Saponification
3.	VCO	10	10	10	10	Saponification
4.	Ethanol 96%	18	18	18	18	Solvent
5.	Glycerin	7	7	7	7	Humectant
6.	Sucrose	15	15	15	15	Crystallization
7.	Stearic acid	7	7	7	7	Crystallization
8.	Propylene Glycol	7	7	7	7	Humectant
9.	Citric acid	0,25	0,25	0,25	0,25	pH Stabilizer
10.	*Oleum ricini*	2	2	2	2	Moisturizer
11.	Fragrance	qs	qs	qs	qs	Fragrance

12.	Sodium Lauryl Sulfate	2	2	2	2	Foaming agent
13.	Aquadest	Ad 100	Ad 100	Ad 100	Ad 100	Solvent

F1 : Soap base formula without red onion peel extract

F2 : Soap formula with a 4% concentration of red onion peel extract

F3 : Soap formula with an 8% concentration of red onion peel extract

F4 : Soap formula with a 12% concentration of red onion peel extract

A 30% sodium hydroxide (NaOH) solution was prepared by dissolving 30 grams of NaOH in 100 mL of distilled water using a volumetric flask. Stearic acid, virgin coconut oil (VCO), and castor oil were melted in a beaker with the aid of a magnetic stirrer until complete liquefaction was achieved. The 30% NaOH solution was subsequently added to the melted mixture and stirred until a homogeneous phase was obtained. Citric acid was then introduced and mixed until uniformly distributed. Following this, a sucrose solution (prepared in distilled water), along with glycerin and propylene glycol, was added and stirred thoroughly. Ethanol 96% was added at a constant temperature and stirred until the mixture became transparent and homogeneous. Sodium lauryl sulfate was then incorporated and stirred until the entire mass attained a transparent consistency. Finally, red onion peel extract (*Allium cepa* L.) was added at 40°C and stirred until complete homogeneity was achieved. The resulting mixture was poured into molds while still hot, allowed to solidify at room temperature, and subsequently removed from the molds (Tomi and Indawati, 2020).

Evaluation of the Characteristics of Transparent Soap with Ethanol Extract of Red Onions

1. Organoleptic Testing

This test was conducted for the visual physical observation of the transparent solid soap, including its color, odor, and consistency, after being stored for 2 weeks (Tomi and Indawati, 2020).

2. pH testing

The pH of the transparent solid soap preparation was tested. One gram of the thin soap sample was weighed, then 10 mL of distilled water was added, and the mixture was shaken until dissolved. Next, the pH was measured using a pH indicator. Observations were made over for 2 weeks to determine the soap's pH value (Tomi and Indawati, 2020).

3. Foam height and stability testing

Testing was conducted to measure the foam height and stability of the produced soap. One gram of soap was weighed, then finely cut and placed into a graduated cylinder with the addition of 10 mL of distilled water. The graduated cylinder was then shaken back and forth for 1 minute. Observations were made over 2 weeks to determine the pH of the soap.

4. Hardness test

This test was conducted to evaluate the hardness of the formulated soap. The hardness was determined using a hardness tester. A soap specimen measuring 1 × 1 cm was positioned vertically on the device. The tester was operated until penetration into the soap occurred, after which the value indicated on the scale was recorded.

RESULT AND DISCUSSION

Plant Identification

The results of the determination conducted at the Universitas Muhammadiyah Kuningan laboratory, documented in certificate number 107/KET/Lab.BF/V/2024, can be seen in Table 2.

Table 2. Plant Identification Results

Plant Taxonomy	
Common Name	Red Onion
Kingdom	Plantae
Division	Tracheophyta
Subdivision	Spermatophytina
Class	Liliopsida
Order	Asparagales
Family	Amaryllidaceae
Genus	*Allium*
Species	*Allium cepa* L.

The plant identification results verified that the sample used in this study is correctly identified as red onion peel extract (*Allium cepa* L.). This identification aims to ensure the accurate identification of the plant, thereby preventing errors in the selection of research materials. The results of the organoleptic test in Table I show stable outcomes, with one formula exhibiting instability in terms of physical form, color, and odor after 14 days of storage at room temperature (20-25°C).

Microscopic Observation

The microscopic examination of red onion peel was conducted to observe the cellular structures and components present in the tissue. This analysis provides a detailed view of the microscopic features, offering insights into the cellular arrangement and the presence of specific structures such as parenchyma cells, sclerenchyma cells, and calcium oxalate crystals. The results of the microscopic examination of red onion peel can be seen in Figure 1.

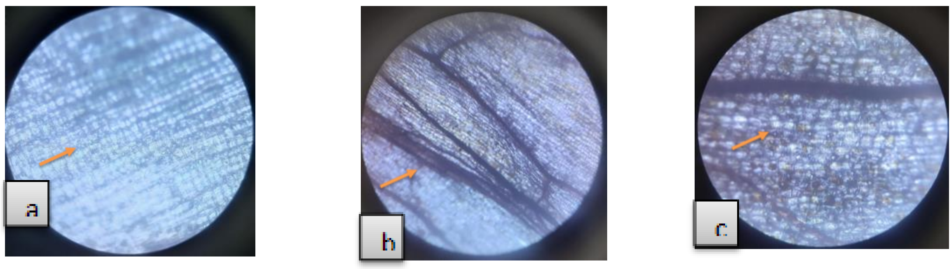

Figure 1. Results of the microscopic test on red onion peel: (a) parenchyma cells, (b) sclerenchyma cells, and (c) calcium oxalate crystals.

Parenchyma cells, visible in Fig.1a, are the fundamental tissue cells responsible for various functions, including storage and photosynthesis. They are typically large, with thin cell walls and abundant cytoplasm, indicating their role in metabolic activities. Fig 1b displays sclerenchyma cells, which are characterized by their thick, lignified walls, contributing to the structural support of the plant. These cells are crucial in providing rigidity and strength to the tissue, making them essential for the plant's mechanical support. Finally, Fig.1c reveals calcium oxalate crystals, which are often found in the vacuoles of plant cells. These crystals serve several functions, including deterring herbivory and regulating calcium levels within the plant. Their presence in red onion peel underscores the tissue's protective mechanisms and its role in the plant's overall defense strategy. Overall, the microscopic examination confirms the complex cellular structure of red onion peel, highlighting its multifaceted role in the plant's physiology.

Moisture Content of Dried Red Onion Peel

The moisture content test of the simplicia was conducted to determine the amount of water present in the dried red onion peel. This test is essential for ensuring the quality and stability of the simplicia, as excessive moisture can lead to the degradation of active compounds and affect the overall effectiveness of the final product. Results of the moisture content test of red onion peel extract simplicia can be shown in Table 3.

Table 3. Results of the moisture content test of red onion peel extract simplicia

No.	Moisture content (%)	Indonesian Herbal Pharmacopoeia standard (%)	Description
1	4		MS
2	6	≤ 10	MS
3	7		MS

MS = meet the standard

The moisture content test indicates that the moisture level in the simplicia meets general requirements, not exceeding 10%. This test aims to determine the maximum allowable water content in red onion peel simplicia. This is crucial for maintaining the quality of the simplicia and ensuring its long-term storage. High moisture content, exceeding 10%, can lead to mold growth on the simplicia, potentially damaging and affecting its quality.

Extraction of Red Onion Peel

The maceration method utilizes ethanol as a polar solvent, which can dissolve secondary metabolites that generally also have polar properties. The advantage of using maceration lies in the principle of "like dissolves like," where ethanol facilitates the release of desired active compounds or secondary metabolites from plant cell walls. Additionally, the presence of hydroxyl (OH) groups in ethanol allows it to bond with hydrogen (-H) groups in phenolic compounds, thereby increasing their solubility in ethanol (Aulyawati et al., 2021). The weight of the extract obtained from 250 grams of simplicia is 33.95 grams, resulting in a yield of 13.58%.

Secondary Metabolite Testing

Secondary metabolite testing was conducted on the red onion peel extract to identify the presence of various bioactive compounds. These metabolites, which include alkaloids, flavonoids, saponins, tannins, and steroids/triterpenoids, are known for their potential therapeutic properties. The detection of these compounds is crucial for understanding the extract's pharmacological potential and its effectiveness in various applications. Based on the conducted tests, the results of the secondary metabolite testing are presented in Table 4.

Table 4. Results of secondary metabolite test of red onion peel ethanol extract

Compounds	Reagent	Result
Alkaloid	Mayer	-
	Dragendroff	+
	Bouchardat	+
Flavanoid	Mg powder, concentrated HCl	+
Tanin	$FeCl_3$ 1%	+
Saponin	Warm Aquadest and HCl	+
Steroid	CH_3COOH and H_2SO_4	-
Triterpenoid	CH_3COOH and H_2SO_4	-

(+): Detected to contain secondary metabolites

(-): Not detected to contain secondary metabolites

The phytochemical screening of red onion peel extract (*Allium cepa* L.) was performed qualitatively to identify the presence of various secondary metabolites. The results indicate the presence of alkaloids, flavonoids, tannins, and saponins in the extract, which suggests that red onion peel contains bioactive compounds with potential therapeutic benefits. Specifically, alkaloids were detected using Dragendorff and Bouchardat reagents, while flavonoids were also confirmed in the extract. However, the absence of alkaloids when tested with Mayer's reagent, and the non-detection of steroids and triterpenoids, highlights the specificity of the phytochemical methods and the potential variation in the presence or detectability of these compounds depending on the reagents used. This outcome underscores the complex chemical profile of red onion peel, which may be influenced by the method of detection and the sensitivity of different tests.

Evaluation of the Characteristics of Transparent Soap

1. Organoleptic Testing

The organoleptic testing was conducted to evaluate the physical characteristics of the extract, including its appearance, color, odor, and texture. This assessment provides an initial understanding of the extract's sensory properties, which are essential for determining its suitability for various applications. The results of the organoleptic test for the transparent solid soap with red onion peel extract can be seen in Table 5. The appearance of the soap can be seen in Fig. 2.

Table 5. The results of the organoleptic test for the transparent solid soap with red onion skin extract

Day	Formulation	Appearance	Odor	Color
D+1	F1	Solid	Slightly rose-scented	Clear white
	F2	Solid	Slightly rose-scented	Clear red
	F3	Solid	Slightly rose-scented	Slightly dark red
	F4	Solid	Slightly rose-scented	Deep red
D+7	F1	Solid	Slightly rose-scented	Clear white
	F2	Solid	Slightly rose-scented	Clear red
	F3	Solid	Slightly rose-scented	Slightly dark red
	F4	Solid	Slightly rose-scented	Deep red
D+14	F1	Solid	Slightly rose-scented	Clear white
	F2	Solid	Slightly rose-scented	Clear red
	F3	Solid	Slightly rose-scented	Slightly dark red
	F4	Solid	Slightly rose-scented	Deep red

F1 F2 F3 F4

Figure 2. The appearance of the transparent solid soap with red onion skin extract based on its formulation

The results of the organoleptic testing on F1, F2, F3, and F4 show stable consistency from the first day through the seventh day, and even up to the fourteenth day. The results indicate that all samples have a solid form and a rose scent, which is attributed to the use of oleum rosae as a fragrance to mask the original odor of the red onion peel extract. Additionally, there is a color variation: F1 is transparent white, while F2, F3, and F4 range from clear to deep red. This color variation is likely due to differences in the amount of extract added.

2. pH testing

The pH testing was conducted to assess the acidity or alkalinity of the soap, which is crucial for determining its suitability for use and its potential effects on the skin. This evaluation helps ensure that the soap maintains a balanced pH level, which is essential for both its stability and its compatibility with the skin. The pH test results for the transparent solid soap with red onion peel extract can be seen in Table 6.

Table 6. pH test results for the transparent solid soap with red onion skin extract

Formulation	pH
F1	10
F2	10
F3	10
F4	10

Acidity level, or pH, indicates the potential for irritation in soap. Typically, the pH of solid soap ranges from 9 to 11. If the pH is too high, it can increase absorption into the skin, leading to irritation and dryness. The pH testing of formulas F1, F2, F3, and F4 shows that all four formulas meet the skin pH standards.

3. Foam height and stability testing

Foam height and stability testing were conducted to evaluate the effectiveness of the soap in producing and maintaining foam. This testing is essential for assessing the quality and performance of the soap, as stable and ample foam is a key indicator of its cleaning efficiency and user satisfaction. By analyzing both the height and longevity of the foam, we can determine how well the soap performs in practical use and how its formulation affects foam production. Results of foam stability and foam height testing for transparent solid soap with red onion peel extract can be seen in Table 7.

Table 7. Results of foam stability and foam height testing for transparent solid soap with red onion skin extract

Formulation	Foam Height (cm)		Foam Stability (%)
	Initial Foam Height	Final Foam Height	
F1	5,5	3,6	65,5
F2	7	4,5	64,3
F3	5,5	3,6	65,5
F4	6	4	66,67

According to Nurrosyidah et al. (2019), the criterion for stable foam is approximately 60-70%. The stability of the foam is influenced by the addition of Sodium Lauryl Sulfate (SLS), which acts as a foaming agent. The addition of extracts can also impact foam stability, potentially due to the presence of saponins in the extracts, which produce foam when they react with water. Results indicate that all soap formulations produced high foam levels. The high foam stability observed in these formulations suggests that the combination of SLS and saponin-rich extracts effectively contributes to the production of stable and abundant foam, thereby improving the soap's performance and user experience.

4. Hardness testing for the transparent solid soap

The hardness testing was conducted to evaluate the consistency and durability of the soap produced. This test is critical for determining the soap's performance, usability, and overall quality. During the testing period of 14 days, measurements were taken on days 0, 7, and 14 to assess any changes in the soap's hardness over time. The results of the hardness testing for the transparent solid soap with red onion peel extract can be seen in Table 8.

Table 8. Results of the hardness testing for the transparent solid soap with red onion skin extract

Day	Soap Hardness (kgf)			
	F1	F2	F3	F4
0	5	4	5	4
7	6	4	5	4
14	6	4	5	4

*kgf = kilogram-force

The results indicate that the soap maintained its hardness throughout the testing period, meeting the established standards. This suggests that the formulation used effectively contributes to the soap's structural integrity and durability. Consistent hardness is essential for ensuring that the soap performs well under typical usage conditions, does not disintegrate quickly, and provides a satisfactory user experience.

Furthermore, stable hardness throughout the testing period implies that the soap formulation is robust and that the ingredients used, including the extract and other components, do not adversely affect the soap's physical properties. The ability to maintain hardness over time also suggests good processing and curing conditions, which are crucial for producing high-quality soap. Overall, these findings demonstrate that the soap formulations are well-crafted and capable of sustaining their physical characteristics, contributing to their effectiveness and longevity.

CONCLUSIONS

Based on the observations and discussions outlined, it can be concluded that ethanol extract of red onion peel (*Allium cepa* L.) at concentrations of 4%, 8%, and 12% can be formulated into transparent solid soap. The transparent solid soaps containing ethanol extract of red onion peel in F1, F2, F3 and F4 demonstrate stability across various tested parameters, including organoleptic aspects, pH, foam height and stability, as well as hardness.

ACKNOWLEDGEMENT

The highest gratitude is dedicated to the research funding from the Higher Education, Research, and Development Council (Diktilitbang) of the Central Executive Board of Muhammadiyah through the "RisetMu" grant, based on decree number 0258.239/I.3/D/2024. We would also like to express our gratitude to Universitas Muhammadiyah Kuningan for their invaluable support and the use of their laboratory facilities.

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