Jurnal Jamu Kusuma
Vol. 5, No 1, Juni 2025, pp. 20-27

ISSN : 2798-0332 (print)
ISSN : 2798-558X (online)

PHYSICAL QUALITY TEST AND HEDONIC TEST OF PAPER SOAP PREPARATIONS FROM ETHANOL EXTRACT OF KENIKIR (*Cosmos caudatus* Kunth.) LEAVES WITH VARIATIONS IN GLYCERINE CONCENTRATION

Isna Atifah Rofiatin [1)], Definingsih Yuliastuti [1)*], Pramita Yuli Pratiwi [2)]
[1] Department of Pharmacy, Health Polytechnic of Surakarta, Klaten, Central Java, Indonesia
[2] Department of Indonesia Traditional Herbal, Health Polytechnic of Surakarta, Klaten, Central Java, Indonesia
[*]e-mail: defie.farmasi17@gmail.com

ABSTRACT

Soap is a cosmetic product that can kill bacteria that cause skin infections. Soap preparations can be innovated into paper hand-washing soap that is practical, hygienic, and effective in killing bacteria. A plasticizer, namely glycerin, influences the texture of paper soap. Glycerin in the formulation of paper hand-washing soap can weaken the hardness of the preparation and provide flexibility, resulting in thin soap-like paper. This research aimed to determine the effect of glycerin concentration on the physical and hedonic quality tests of paper hand-washing soap preparations. This research uses an experimental approach with a pre-experimental one-shot case study design. The results of the physical quality test of kenikir leaf ethanol extract paper soap with variations in glycerin concentration in the organoleptic test had a light yellow color, a grape fragrance, a stiff solid shape, elastic, and very elastic and homogeneous. The addition of variations in glycerin concentration affects the results of the physical quality assessment of water content and hedonic tests for texture. However, it does not affect the results of physical quality tests, pH, foam height, and hedonic tests for color and aroma of the preparation.

Keywords : Paper Soap, Ethanol Extract of Kenikir Leaves, Glycerin, Physical Quality Test, Hedonic Test

INTRODUCTION

Ministry of Health of the Republic of Indonesia initiated the Clean and Healthy Living Behavior (PHBS) Program as one of the efforts to improve the health of the community (Sinanto dkk., 2020). There are 10 indicators of PHBS at the household level, one of which is the habit of washing hands with soap and clean water. Soap is a cosmetic product that can emulsify oil and water. Soap preparations must be effective in removing dirt that sticks to the surface of the skin, besides soap can also be used for skin whitening, skin softening, and maintaining skin health (Sapra dkk., 2021). As a result of the times and the need for the importance of washing hands using soap, a paper hand soap preparation was made.

Paper hand washing soap is an innovation from the preparation of liquid hand washing soap applied to thin paper (Water soluble paper) with a thickness of 10-500 µm (Wati dkk., 2020). Plasticizers influence the texture of paper soap. Glycerin is an ingredient that can be added to the paper soap formula to weaken the hardness of the preparation and provide flexibility. This results in a physical soap preparation that is thin like paper (Eryani dkk., 2022). The active ingredients contained in the soap are certainly

antibacterial. Kenikir leaves (*Cosmos caudatus* Kunth.) are natural ingredients that have antibacterial properties (Lutpiatina dkk., 2017).

Research on the manufacture of paper soap preparations with natural ingredients has been widely carried out, but no research has been found on paper soap preparations using ethanol extract from kenikir leaves. Based on this background, the researcher intends to conduct research on the physical quality test and hedonic test of paper soap preparations using ethanol extract of kenikir leaves (*Cosmos caudatus* Kunth.) with various concentrations of glycerin.

METHODS

This research uses experimental research methods. The research design used in this research is pre-experimental with a one shot case study experimental design. The one-shot case study design is used for research on a group of data that is given one treatment in the form of variations in glycerin concentration (1%, 2% and 3%) and one measurement is carried out in the form of a physical quality test.

Data analysis in this study is bivariate analysis by providing data on the relationship between two variables. Bivariate analysis is carried out by connecting the independent variable in the form of variations in glycerin concentration with the dependent variable, namely the results of physical and hedonic quality tests of paper soap preparations.

Tools and Materials

The tools used in this research are a grinder (GM-800S1), waterbath (Equitron), pH meter (Hanna Instruments), mesh 80 sieves, porcelain cup, watch glass, stirring rod, beaker (Herma), measuring cup (Herma), 4-arm scale, mortar and stamper, sudip, test tube, glass jar, oven, and stopwatch.

The materials used in this study include 1 g ethanol extract from kenikir leaves, 13 mL virgin coconut oil, 10 mL potassium hydroxide, formula 1, 2 and 3 each 1 mL, 2 mL and 3 mL of glycerin, 1 mL propylene glycol, 1 g sodium lauryl sulfate, 2 mL cocamide-DEA, 10 mL Cocamidopropyl betaine, 2 mL grape fragrance, and ad 100 mL aquadest.

Work Procedures

1. Plant Determination

   Determination of kenikir plants (Cosmos caudatus Kunth.) was carried out at the Functional Implementation Unit of Traditional Health Services, Sardjito General Hospital Tawangmangu, Karanganyar, Central Java. The number of the determination test result letter is TL.02.04/D.XI.6/133.106/2024 with the application number PE/I/2024/119 on January 22, 2024.
2. Preparation of Kenikir Leaf Simplicia

   Wet sorting was carried out on 5000 g of fresh kenikir leaves and then dried indirectly in the sun. Simplicia was then dry sorted, pulverized using a grinder, and sieved using an 80 mesh sieve.
3. Preparation of Ethanol Extract of Kenikir Leaf

   800 g of kenikir leaf simplicia powder was macerated with 70% ethanol as much as 8000 mL for 3 x 24 hours, and stirring was carried out every 8 hours. The dregs are macerated again so that the active substances are perfectly extracted. Filtering is done on the filtrate and concentrated using a waterbath at 50°C until a thick extract is obtained (Lutpiatina dkk., 2017)
4. Preparation of Kenikir Leaf Ethanol Extract Paper Soap

   VCO and KOH were heated to 75°C, glycerin, propylene glycol, SLS, betaine, and aquadest were added. After homogeneous, add cocamide-DEA at 40°C and fragrance. Next, add ethanol extract from kenikir leaves and add distilled water to 100 mL. The

mixture was applied to water-soluble paper and then baked at 50°C for 60 minutes and cut (Adlina dkk., 2023).

5. Physical Quality Test of Kenikir Leaf Ethanol Extract Paper Soap
   a. Organoleptic Test
      The color, shape, and smell of paper soap of ethanol extract of kenikir leaves were observed (Adlina dkk., 2023).
   b. Homogeneity Test
      Paper soap is placed between the two object glasses and observed directly (Priyoherianto dkk., 2023)
   c. pH Test
      pH testing is done with a pH meter. Paper soap is measured in mass of 1 gram, then dissolved in 9 ml of distilled water in a beaker glass. The pH of hand washing soap is in the range of 4-10 (Adlina dkk., 2023).
   d. Foam Height Test
      Paper soap was taken as much as 1 gram and then mixed with distilled water up to 10 ml. The test tube is shaken for 20 seconds, and allowed to stand for 5 minutes after which the foam height is measured. Hand washing soap foam height is in the range of 13-220 mm (Adlina dkk., 2023).
   e. Water Content Test
      Paper soap is weighed as much as 1 gram and then placed on a moisture analyzer cup, set at 105°C (Saraswati & Putra, 2022).
6. Hedonic Test of Kenikir Leaf Ethanol Extract Paper Soap

   Trained panelists in the hedonic test were 20 people who came from DIII Pharmacy Study Program students of the Surakarta Health Ministry Poltekkes level 2. Panelists made observations on the color, smell, and texture of paper soap ethanol extract of kenikir leaves (Ayustaningwarno, 2014)

RESULT AND DISCUSSION

Kenikir leaves (*Cosmos caudatus* Kunth.) in this study were obtained from Karangasri Village, Ngawi District, Ngawi Regency, East Java. Determination aims to avoid errors in the selection of research materials and avoid mixing with other plants (Klau & Hesturini, 2021). The results of the determination of the kenikir plant are included in the Cosmos caudatus Kunth species.

Sieve number affects the particle size of the simplicia powder which in turn will affect the yield of the extract. Higher extract yields are obtained when the size of the simplicia powder is more (Damayanti, 2021). Moisture balance is used to test the drying shrinkage of kenikir leaf simplicia powder. The drying shrinkage of kenikir leaf simplicia powder (*Cosmos caudatus* Kunth.) is 3.40%.

5000 g of fresh kenikir leaves are needed to obtain 816 dry simplicia. Known leaf simplicial powder is then macerated with 70% ethanol because it can extract flavonoid compounds that function as antibacterials. 70% ethanol can attract more polar compounds when compared to 96% ethanol and is able to produce optimal active ingredients and low boiling points. The yield obtained is 32.51% which shows that the extract of kenikir leaves has met the requirements because the calculation of the yield obtained is more than 6.8% (Kemenkes RI, 2017). Water content testing was carried out on a thick extract of kenikir leaves (*Cosmos caudatus* Kunth.) which obtained a result of 17.85%. Based on the Indonesian Herbal Pharmacopoeia edition II, the extract has met the requirements for water content in a thick extract of kenikir leaves, which is less than 18.7%.

The manufacture of paper soap made from ethanol extract of kenikir leaves was carried out by making 3 formulations with different amounts of ingredients that function as

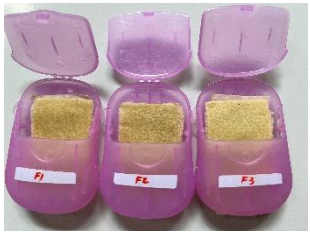
plasticizers in the form of glycerin, namely FI (1%), FII (2%), and FIII (3%). Glycerin can cause a wet feeling, to reduce this effect glycerin is used in low concentrations in paper soap-making (Paramita dkk., 2021).

Table 1. Kenikir Leaf Ethanol Extract Paper Soap Formula

Material	Formula (%)			Material Function
	F1	F2	F3	
Kenikir leaf extract	1	1	1	Antibacterial
VCO	13	13	13	Surfactant
KOH	10	10	10	Saponification agent
Glycerin	1	2	3	Plasticizer
Propilen glikol	1	1	1	Humectant
SLS	1	1	1	Surfactant
Cocamide-DEA	2	2	2	Surfactant
Betaine	10	10	10	Surfactant
Fragrance	2	2	2	Fragrance
Aquadest	ad 100	ad 100	ad 100	Solvent

Description :
F1: Paper soap formula with 1% glycerin concentration
F2: Paper soap formula with 2% glycerin concentration
F3: Paper soap formula with 3% glycerin concentration

Paper soap preparation of ethanol extract of kenikir leaves (*Cosmos caudatus* Kunth.) can be seen in picture 1.



Picture 1. Paper soap preparation of ethanol extract of kenikir leaves (*Cosmos caudatus* Kunth.)

Table 2. Organoleptic Test Results of Paper Soap

Organoleptic Test	Results		
	F1	FII	FIII
Color	Light yellow	Light yellow	Light yellow
Odor	Grape fragrance	Grape fragrance	Grape fragrance
Shape	Solid, slightly stiff	Solid, elastic	Solid, highly elastic

Homogenity tests on the three paper soap formulas of ethanol extract of kenikir leaves (*Cosmos caudatus* Kunth.) can be seen in Table 3 which obtained homogeneous results, this is evidenced by the absence of particles or granules in the preparation (Priyoherianto dkk., 2023) due to the maximum mixing of ingredients (Samsudin dkk., 2022).

Table 3. Paper Soap Homogeneity Test Results

Formula	Replication		
	I	II	III
FI	Homogen	Homogen	Homogen
FII	Homogen	Homogen	Homogen
FIII	Homogen	Homogen	Homogen

The pH test aims to determine whether the pH of paper soap is in a safe range with skin pH. Table 4 shows the results of the pH test of paper soap preparations carried out on the three formulas of FI 8.28 ± 0.012; FII 8.27 ± 0.016; and FIII 8.28 ± 0.016. The pH results show that it meets the requirements because it is included in the pH range of SNI hand-washing soap, which is 4-10 (Badan Standardisasi Nasional, 2017). The pH test results show that the data is normally distributed and homogeneous. One Way Anova statistical analysis obtained a significance value of 0.804 (> 0.05) which means that there is no significant effect of the addition of glycerin concentration on the pH of the preparation. This is because glycerin has a neutral pH value (Widyasanti dkk., 2018).

Table 4. Paper Soap pH Test Results

Formula	Replication			$\bar{x}$±SD	Requirement (SNI)
	I	II	III		
FI	8,26	8,28	8,29	**8,28±0,012[a]**	
FII	8,25	8,29	8,27	**8,27±0,016[a]**	**4-10**
FIII	8,28	8,26	8,30	**8,28±0,016[a]**	

Description :
Superscript (a): The same superscript does not have a significant difference (p > 0,05)

The foam height test aims to see the foam power that can remove impurities from paper soap preparations (Adlina dkk., 2023). Table 5 shows the results of the foam height test after standing for 5 minutes, namely FI 36 ± 0.816; FII 36.33 ± 1.247; and FIII 37.33 ± 1.247. The results of the preparation foam height show that the paper soap of ethanol extract of kenikir leaves (*Cosmos caudatus* Kunth.) has met the requirements because it is included in the range according to SNI, namely 13-220 mm (Fiskia & Mala, 2021). The results of the foam height test showed that the data were normally distributed and homogeneous. One Way Anova statistical analysis obtained a significance value of 0.506 (> 0.05) which means that there is no significant effect with the addition of glycerin concentration on the foam height of the preparation. This is because glycerin generally does not contain surface active ingredients (surfactants) such as polysorbates, so it does not significantly affect foam consistency. However, incomplete shaking in testing foam height can cause low foamability (Afifah dkk., 2021).

Table 5. Paper Soap Foam Height Test Results

Formula	Replication (mm)			$\bar{x}$ (mm) ± SD	Requirement (SNI)
	I	II	III		
FI	35	36	37	**36±0,816[a]**	
FII	36	38	35	**36,33±1,247[a]**	**13-220 mm**
FIII	36	37	39	**37,33±1,247[a]**	

Description :
Superscript (a): The same superscript does not have a significant difference (p > 0,05)

The water content test was conducted to determine the percentage of water content contained in paper soap (Fiskia & Mala, 2021). The water content test was carried out using a moisture analyzer. Table 6 shows the results of the water content test of paper soap preparations, namely FI 7.81 ± 0.150; FII 11.5 ± 0.353; and FIII 13.69 ± 0.197. The water content value of paper soap shows that the preparation has met the SNI requirements of less than 15% (Badan Standardisasi Nasional, 1994). The results of the preparation water content test showed that the data were normally distributed and homogeneous. One Way Anova statistical analysis and continued post hoc test obtained a significance value of 0.000 (<0.05) which means that there is a significant effect on the addition of glycerin concentration on the water content of paper soap preparations of ethanol extract of kenikir leaves (*Cosmos caudatus* Kunth.). The water content of paper soap preparations increases with increasing glycerin concentration (Samsudin dkk., 2022). Glycerin as a plasticizer is

the simplest glyceride compound that binds to hydroxyl groups and has OH groups that are hydrophilic and hygroscopic so that it can bind more water (Arifin dkk., 2021).

Table 6. Paper Soap Moisture Content Test Results

Formula	Replication (%)			$\bar{x}$ (%) ± SD	Requirement (SNI)
	I	II	III		
FI	7,97	7,61	7,85	**7,81±0,150[a]**	
FII	11,97	11,41	11,12	**11,5±0,353[b]**	**≤ 15%**
FIII	13,63	13,96	13,49	**13,69±0,197[c]**	

Description :
Superscript (a,b,c): Different superscript indicates there is a significant difference ($p < 0,05$)

The hedonic test aims to determine the panelists' liking for the color, smell, and texture of the preparation which was carried out on 20 trained panelists (Ayustaningwarno, 2014). The results of the hedonic test of the texture of the preparation have significant differences. The formula I have a significant difference with formulas II and III, while formulas II and III have no significant difference. Formula I has a stiffer and drier texture because it uses the lowest concentration of glycerin. Glycerin functions as a plasticizer to weaken the stiffness of paper soap preparations and make the preparation more flexible (Wati dkk., 2020). The odor and color hedonic test results showed no significant differences. Table 7 shows that the results of the hedonic texture test of formula I were preferred by respondents because they had the highest test value compared to formulas II and III. This is also because the texture of the soap tends to be stiff and not soft. Formula III was preferred by respondents because it had the highest hedonic test value in terms of color and aroma, although variations in glycerin concentration did not affect the color and aroma of the preparation.

Table 7. Hedonic Test Results of Paper Soap

Formula	Replication (%)		
	I	II	III
Color	76[a]	78[a]	82[a]
Odor	77[a]	72[a]	80[a]
Texture	86[a]	66[b]	61[b]

Description :
Superscript (a) : The same superscript does not have a significant difference ($p > 0,05$)
Superscript (a,b) : Different superscript indicates there is a significant difference ($p < 0,05$)

CONCLUSION

Based on the research that has been done, it can be concluded that the results of the FI organoleptic test have a solid, slightly stiff shape, while FII is solid, elastic and FIII is solid, very elastic. The three formulas have grape fragrance and light yellow color. The three preparation formulas showed homogeneous results. Variations in glycerin concentration in paper soap formulas have a significant effect on the results of the water content test and do not have a significant effect on pH and foam height. The most preferred preparation in the hedonic test is Formula III because it has the highest hedonic test value from the aspects of color and aroma.

REFERENCES

Adlina, S., Roesman Bachtiar, K., & Nurhasanah, B. (2023). Formulasi Dan Uji Aktivitas Sediaan Sabun Kertas Ekstrak Etanol Daun Pandan (Pandanus amaryllifolius) Sebagai Antibakteri. Jurnal Pharmacoscript, 6(1), 22–30.

Afifah, S., Apriana, R., Widianto, A., & Tri Wahyuni, W. (2021). Pemanfaatan Virgin Coconut Oil Sebagai Foaming Agent Pada Beton Ringan. Analit:Analytical and

Environmental Chemistry, 6(02), 156–167.

Arifin, M., Handayani, C. B., & Afriyanti, A. (2021). Pengaruh Penambahan Gliserol Terhadap Sifat Fisik Dan Kimia Edible Film Dari Selulosa Batang Jagung. Journal of Food and Agricultural Product, 1(1), 7.

Ayustaningwarno, F. (2014). Teknologi Pangan Teori Praktis dan Aplikasi (pp. 1–8). Graha Ilmu.

Badan Standardisasi Nasional. (1994). Sabun Mandi. In SNI 06-3532-1994 (pp. 1–8).

Badan Standardisasi Nasional. (2017). Sabun Cair Pembersih Tangan. In SNI 2588:2017 (pp. 1–8).

Damayanti, M. V. (2021). Uji Aktivitas Antibakteri Ekstrak Daun Kenikir (Cosmos caudatus Kunth.) Secara Difusi Terhadap Bakteri Bacillus Cereus. Skripsi. STIKES Karya Putra Bangsa, 5-8..

Eryani, M. C., Nurmalasari, D. R., & Fadilah, S. R. (2022). Pengaruh Variasi Konsentrasi Gliserin Terhadap Sifat Fisik Paper Soap Ekstrak Daun Nangka (Artocarpus heterophyllus Lam.). Journal of Islamic Pharmacy, 7(2), 74–78.

Fiskia, E., & Mala, C. D. F. U. (2021). Formulasi Dan Evaluasi Sediaan Sabun Kertas Ekstrak Etanol Fuli Buah Pala (Myritica fragrans Houtt). Jurnal Kieraha Medical, 3(2), 121–127.

Kemenkes RI. (2017). Farmakope Herbal Indonesia Edisi II (II). Kementerian Kesehatan RI, Direktorat Jenderal Kefarmasian dan Alat Kesehatan.

Klau, M. H. C., & Hesturini, R. J. (2021). Pengaruh Pemberian Ekstrak Etanol Daun Dandang Gendis (*Clinacanthus nutans* (Burm F) Lindau) Terhadap Daya Analgetik Dan Gambaran Makroskopis Lambung Mencit. Jurnal Farmasi & Sains Indonesia, 4(1), 6–12.

Lutpiatina, L., Rizqi Amaliah, N., & Dewi Dwiyanti, R. (2017). Daya Hambat Ekstrak Daun Kenikir (*Cosmos caudatus* Kunth.) Terhadap *Staphylococcus aureus*. Jurnal Meditory, 5(2), 83–91.

Paramita, H. E., Ambari, Y., & Ningsih, A. W. (2021). Formulasi Dan Uji Stabilitas Sediaan Gel Hand Sanitizer Ekstrak Etanol Buah Mentimun (*Cucumis Sativus* L.). Journal of Pharmaceutical Care Anwar Medika, 3(2), 110–125.

Priyoherianto, A., Purwati, E., Fitriany, E., Budi, D. L., & Laila, diah R. (2023). Uji Mutu Fisik Sediaan Sabun Padat Ekstrak Daun Tin. Jurnal Sains Dan Teknologi, 6(3), 365–372.

Samsudin, D., Nopiyanti, V., & Nilawati, A. (2022). Formulasi Dan Uji Aktivitas Antibakteri Staphylococcus aureus Paper Soap Ekstrak Daun Sirsak (*Annona muricata* L.) Dengan Variasi Gliserin Sebagai Plasticizer. Journal of Pharmacy, 11(2), 1–12.

Sapra, A., Khairi, N., Nur Aisyah, A., Indrisari, M., Jumaetri, F., & Fauziah, N. (2021). Formulasi Sediaan Sabun Cuci Tangan Ekstrak Daun Kelor (*Moringa oleifera* L.) dan Efektivitasnya Sebagai Antiseptik. Journal of Pharmaceutical and Medicinal Sciences, 6(2), 44–49.

Saraswati, L. A. P., & Putra, I. G. N. A. D. (2022). Pengaruh Variasi Waktu Pengeringan Oven Terhadap Karakteristik Fisik Amilum Talas Kimpul (*Xanthosoma sagittifolium*). Journal Transformation of Mandalika., 3(4), 39–43.

Sinanto, R. A., Nur, S., & Djannah, S. N. (2020). Efektivitas Cuci Tangan Menggunakan Sabun Sebagai Upaya Pencegahan Infeksi : Tinjauan Literatur. Jurnal Kesehatan Karya Husada, 8(2), 96–111.

Wati, F., Ega Priani, S., & Cahya Eka Darma, G. (2020). Kajian Formulasi dan Aplikasi Sediaan Paper Soap. 6(2), 456–470.

Widyasanti, A., Miracle, A., Ginting, L., & Asyifani, E. (2018). Produksi Sabun Kertas Dari Minyak Kelapa Dan Virgin Coconut Oil (VCO) Dengan Penambahan Gliserin Sebagai Plasticizer. Konferensi IOP. Seri : Ilmu Bumi dan Lingkungan, 141.