

NASKAH PUBLIKASI

**FORMULASI DAN EVALUASI SEDIAAN SABUN CAIR DARI KULIT
BUAH NANAS (*Ananas comosus L.Merr*) DAN PROPOLIS LEBAH
KELULUT**

***FORMULATION AND EVALUATION OF LIQUID SOAP FROM
PINEAPPLE (ANANAS COMOSUS L.MERR) PEEL EXTRACT AND
KELULUT BEE PROPOLIS EXTRACT***

Agnes Monica¹, Paula Mariana Kustiawan²



**DISUSUN OLEH :
AGNES MONICA
1911102415075**

**PROGRAM STUDI S1 FARMASI
FAKULTAS FARMASI
UNIVERSITAS MUHAMMADIYAH KALIMANTAN TIMUR
SAMARINDA
2023**

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(*Ananas comosus L.Merr*) dan Propolis Lebah Kelulut**

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Agnes Monica¹, Paula Mariana Kustiawan²



Disusun Oleh :

Agnes Monica

1911102415075

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LEMBAR PERSETUJUAN

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DISUSUN OLEH :

Agnes Monica

1911102415075

**Disetujui untuk diujikan
Pada tanggal, 2 Juli 2023**

Pembimbing



Paula Mariana Kustiawan, M.Sc., Ph.D.

NIDN. 1114038901

Mengetahui,

Koordinator Mata Ajar Skripsi



apt. Rizki Nur Azmi, M.Farm

NIDN. 1102069201

LEMBAR PENGESAHAN

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DISUSUN OLEH :

Agnes Monica

1911102415075

Diseminarkan dan Diujikan

Pada tanggal, 2 Juli 2023

Penguji 1



Chaerul Fadly Mochtar L. M. Biomed.
NIDN.-1115099202

Penguji 2



Paula Mariana Kustiawan, M.Sc., Ph.D.
NIDN. 1114038901

Mengetahui,

Ketua

Program Studi S1 Farmasi



apt. Ika Ayu Mentari, M. Farm.

NIDN. 1121019201

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Research

**Formulation and Evaluation of Liquid Soap from Pineapple
(*Ananas comosus L.Merr*) Peel Extract and Kelulut Bee Propolis
Extract**

Agnes Monica, Paula Mariana Kustiawan*

Faculty of Pharmacy, University Muhammadiyah Kalimantan Timur, Indonesia.

Faculty of Pharmacy,
Departement of S1 Pharmacy,
University Muhammadiyah Kalimantan Timur,
Samarinda, Indonesia.

E-mail address: web@umkt.ac.id

Tel: 0541-748511; Fax: 0541-766832.

ABSTRACT:

Liquid soap made from nature is still rarely found on the market, One natural ingredient that is still little used is pineapple peel and bee propolis both have the same activity, which is antibacterial because it contains flavonoid compounds. This study aims to determine the peel of pineapple (*Ananas comosus L.Merr*) and bee propolis kelulut can be formulated as liquid soap preparations against physical properties tests. This research is experimental where pineapple (*Ananas comosus L. Merr*) peel was obtained using maceration with 96% ethanol followed by vacuum distillation. The active substances are divided into three formulations, namely pineapple peel extract FI 5%, FII 7.5%, FIII 2.5% and kelulut propolis FI 5%, FII 2.5%, FIII 7.5%. The formulation then evaluates storage for 14 days including pH, viscosity, specific gravity, foam height, homogeneity, color and odor, and peel irritation. The yield was 12.19%. pH measurements of formulas I, II, and III obtained stable results, the foam height in formula I ranged from 61-68%, formula II ranged from 66-70%, and formula III ranged from 66-68%, the foam height increased during the storage period. In 14 days storage all three formulas are qualified in terms of specific weight, viscosity, color, odor, homogeneity, and peel irritation. Pineapple (*Ananas comosus L.Merr peel*) and bee propolis can be formulated as qualified and stable liquid soap preparations in 14 days storage and concentration that gets the best results is in Formula 2 because the foam high yield is higher than other formulas, and in viscosity comparison results in Formula 2 get stable results because the decrease in viscosity value is not much different from day to day.

KEYWORDS: Liquid soap, Pineapple peel, Propolis bee kelulut, Physical properties test.

INTRODUCTION:

Indonesia is a country with a tropical climate. Climate impacts many of them have problems with dry peel. Dry peel can reduce the body's defenses, the way to overcome dry peel problems is to use soap¹. One of the most popular types of soap today is liquid soap considering its more practical use and more attractive form. In the market, natural liquid soap is still rarely found, one of the natural ingredients that is still underused is pineapple peel². Pineapple peel waste is often found in the market but rarely used it ends up in the trash, even though pineapple peel has very useful activities, one of which is antibacterial³. Another potential natural ingredient is bee propolis because it has the same activity, which is antibacterial⁴, both potential natural ingredients can be further developed into liquid soap preparations. The purpose of this study was to determine the peel of pineapple (*Ananas comosus L.Merr*) and bee propolis can be formulated as liquid soap preparations, to know the physical stability of liquid soap, and to find out which liquid soap formulation has the best stability.

The purpose of extracting natural materials is to leave the chemical components contained in these natural materials⁵. Maceration is an extraction technique using a stationary solvent, stirred several times at room temperature⁶. Bees do not produce much honey and are more difficult to extract, but can produce more propolis than other types of bees⁷. In the manufacture of liquid soap, fatty acids (oils, fats, or esters) and bases such as sodium hydroxide (NaOH) and potassium hydroxide (KOH) are used as soap bases⁸. To make soap smell good, you can use fragrance. To give it an attractive color, dye chemicals are used⁹. The purpose of the softener is to soften the peel. If the coating process is not perfect, a neutralizer is used to neutralize the soap base¹⁰. Antioxidants serve to prevent rancid odors. Preservatives protect the water phase against microbial contamination¹¹. Soap filled with thickening agent and filler¹².

MATERIALS AND METHODS:

Materials

The tools used are rotary evaporators, glass objects, microscopes, pycnometers, rulers, blenders, Brookfield viscometer, pH meters, analytical scales, cake mixers, measuring cups, beakers, horn spoons, petri dishes, and stirring rods. The ingredients are bee kelulut propolis, pineapple peel extract, 96% ethanol, aquadest, HPMC, citric acid, texapon, KOH, glycerin, and cocomide DEA.

Methods

Research Sample

The samples of this study were pineapple peel extract obtained from the Samarinda opposite inpress market, and kelulut bee propolis obtained from the red soil area of Samarinda. The number of samples used in this study is divided into 3 formulations with different concentrations of 5: 5, 7.5: 2.5, and 2.5: 7.5.

Extract Creation

Pineapple peels are washed using running water, sorted, chopped, weighed, and dried. Then the pineapple peel in the blender becomes a coarse powder. The pineapple peel is macerated with 96% ethanol until the solvent is clear while stirring and stored in a place that is not exposed to sunlight. The resulting fiber is filtered using filter paper, then vacuum distilled using a rotary evaporator to obtain a viscous extract⁴.

Making Liquid Soap Preparations

Pineapple peel extract and bee propolis are formulated into liquid soap using various concentrations of pineapple peel extract and propolis respectively, namely 5% : 5% (FI), 7.5% : 2.5% (FII), and 2.5% : 7.5% (FIII). The formula can be seen in Table 1. Aquadest is heated to dissolve HPMC and Texapone then stirred homogeneously, add cocomide DEA and glycerin, add citric acid, then add pineapple peel extract and bee propolis diluted with 96% ethanol, add KOH, finally add fragrance and stir until homogeneous.

Tests on Pineapple Peel Liquid Soap Preparations and Bee Propolis

All formulations are evaluated first for 14 days before being tested for irritation in humans, including organoleptis tests (odor and color) observing stability for 14 days of storage, pH tests with conditions 8-11, viscosity tests with conditions 400-4000cP, foam height tests with conditions 60-70%, specific gravity tests with conditions 1.01-1.10, homogeneity tests with the condition that there are no particles¹³. If the entire test is successful, it will proceed with human irritation testing.

Irritation testing on human skin

Applying soap to the inner arm, leaving it on for about 30 minutes, and observing changes that occur in the form of redness, itching, heat, and dryness for three consecutive days allows skin irritation testing to evaluate the presence or absence of side effects¹⁴. The test was conducted with 12 panelists for 3 consecutive days with ethical clearance number DP.04.03/7.1/07812/2023.

Table 1. Pineapple Peel Liquid Soap Preparation Formulation and Bee Propolis

No.	Materials	Concentration (%)		
		FI	FII	FIII
1.	Pineapple peel extract	5	7,5	2,5
2.	Kelulut bee propolis	5	2,5	7,5
3.	Aquadest	40	40	40
4.	Ethanol 96%	13,8	13,8	13,8
5.	HPMC	4	4	4
6.	Sitrat acid	0,4	0,4	0,4
7.	KOH	0,8	0,8	0,8
8.	Texapon	10	10	10
9.	Gliserin	7	7	7
10.	Cocomide DEA	13	13	13
11.	Fragrance	1	1	1
	Total	100	100	100

RESULT:

Results of Making Extracts

From the initial weight of 4000 grams, after drying obtained as much as 450 grams. Simplisia is then ground with a blender to make a coarse powder. Then, a thick extract weighing 490.19 grams was obtained which had been vacuum distilled using a rotary evaporator and produced a yield of 12.19% after maceration using 96% ethanol to ethanol which was used to soak clear colored simplisia.

Stability Test Results of Liquid Soap Preparations

Physical stability tests are carried out on soap every week for 14 days of storage, including organoleptic tests (color and odor), homogeneity tests, pH tests, foam height tests, specific gravity tests, viscosity tests, and human peel irritation tests. The stability test results of liquid soap preparations from pineapple peel extract (*Ananas comosus L.Merr*) and Kelulut Bee Propolis can be seen in Table 2.

Table 2. Liquid Soap Stability Test Results

No.	Parameter	Provision	Days- 1			Days- 7			Days- 14		
			FI	FII	FIII	FI	FII	FIII	FI	FII	FIII
	Organoleptic										
1.	Odor	Stabile	+	+	+	+	+	+	+	+	+
	Color	Stabile	+	+	+	+	+	+	+	+	+
2.	Homogeneity	Homogen	+	+	+	+	+	+	+	+	+
3.	pH	8-11	11	11	11	11	11	11	11	11	11
4.	Foam Height (%)	60-70	61,53	66,66	66,66	65,71	67,14	67,18	68,25	70	68,65
5.	Specific Weight (g/ml)	1,01-1,10	1,10	1,10	1,09	1,10	1,09	1,09	1,09	1,09	1,09
6.	Viscosity (cPs)	400-4000	2720	2826	2580	2200	2786	2573	1913	2746	2533
7.	Peel Irritation	No Irritation Occurs	0	0	0	0	0	0	0	0	0

+ : Eligible
- : Not eligible



Figure 1. Organoleptic Test

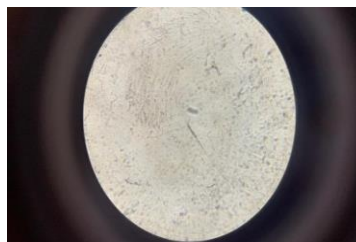


Figure 2. Homogeneity Test



Figure 3. pH Test

DISCUSSION:

In this study, we observed the formulation of liquid soap with various concentrations of pineapple peel extract and kelulut bee propolis as active substances. Considering that these two ingredients contain flavonoid compounds which are effective as antibacterials, the combination of these two ingredients aims to see whether the resulting activity will be higher besides increasing the beneficial value of a product because bee propolis is still underutilized, especially in liquid soap preparations.

Organoleptic tests were carried out to visually determine the color and odor of liquid soap formulations extract from pineapple peel (*Ananas comosus L. Merr*) and kelulut bee propolis. In the observations that have been made, brown color is obtained in Formula I, black in Formula II, and brown in Formula III show in (Figure 1). The resulting color intensity increases with the amount of pineapple peel extract used. Even though each formula produces a different color, after 14 days of storage the resulting color remains stable and does not change⁵. In previous studies using pineapple peel extract said that the higher the concentration of pineapple peel extract, the darker the resulting color¹⁵. The formula has a perfume scent that does not contain alcohol, the selection of perfume aims to ensure that there is no unpleasant odor from a mixture of pineapple peel and kelulut bee propolis in the preparation which will make the user uncomfortable when using it¹⁶.

All formulations were characterized by the absence of particles which were not spread evenly during 14 days of storage so that it can be said that the liquid soap preparations were distributed fairly well show in (Figure 2). In research, liquid soap preparations using binahong leaf extract obtained homogeneity results were even in all parts, all formulas had no coarse particles in the preparations¹⁷.

The result of measuring the pH of the liquid soap formula shows a pH of 11 show in (Figure 3), which indicates that the liquid soap is alkaline. KOH affects the PH of liquid soap preparations because it is a strong base and causes the preparation to become alkaline⁷. Even though it has a tendency to be alkaline, the liquid soap formula still meets the pH standard, namely 8-11 for soap formulations, so it can be considered relatively stable. In another study using avocado leaf ethanol extract got a pH value of 10.2-10.90¹⁸.

Dissolved molecules such as surfactants change the surface tension of the liquid, which causes the foam height to increase, there are repulsive forces that make the foam stable and last longer. Formation of foam is caused by changes in osmotic voltage in the liquid¹⁹. The data generated in Formula 2 obtained higher results compared to other formulas so that it can be said that changes in the concentration of pineapple peel extract affect the foam height of liquid soap⁸. In another study, liquid soap using aloe vera extract produced a high value of foam, which is 61%-70%²⁰. The specific gravity requirements are 1.01-1.10 g/ml from the observations in Table 2. All liquid soap formulas meet the requirements and there is no difference between each concentration. In other studies using aloe vera extract obtained a specific weight between 1.067-1.082²⁰. Specific gravity decreases from day to day because viscosity decreases, because viscosity and specific gravity are directly related, greater specific gravity will result in higher viscosity, and vice versa²¹.

The results of the viscosity test decreased after 14 days of storage, but still met the criteria of 400-4000 cPs²². Storage temperature, a number of liquid from the preparation evaporates and causes the viscosity of the preparation to decrease. The longer the storage time, the longer the preparation will be affected by the environment, such as air. The results obtained by the most stable viscosity test were in Formula 2 because seen from the comparison between days it was not much significant. In another study patchouli leaf oil liquid soap gets a viscosity value of 2616-4188 cPs²³.

In a study of liquid soap preparations using purslane herbal extract, an irritation test was carried out with 12 panelists getting non-irritating results²⁴. This is comparable to Table 2 which shows that none of the 12 panelists participating in the skin irritation test showed signs of skin irritation after smearing with liquid soap, such as redness, itching, heat, or dryness. This is due to the non-irritating ingredients of the formula, the liquid soap preparation of pineapple peel, the liquid soap preparation and propolis of the kelulut bee remains in good condition for 14 days after storage, and the pH of the liquid soap preparation that meets the pH requirements of 8-11 for liquid soap¹³. Thus, liquid soap preparations of pineapple peel extract (*Ananas comosus L.Merr*) and bee propolis are safe if used as liquid soap on human skin, The advantage of this study compared to previous studies using the same extract, namely pineapple peel and using Citrus oleum fragrance while in this study used perfume so that the results obtained left a durable smell on the hands and tended to be more fragrant and not greasy²⁵.

CONCLUSION:

Pineapple (*Ananas comosus L. Merr*) peel and kelulut bee propolis can be formulated into liquid soap preparations. During 14 days of storage, pineapple (*Ananas comosus L. Merr*) peel liquid soap and kelulut bee propolis met the requirements and were physically stable. The concentration that gets the best results is in Formula 2 because the foam height results are higher than the other formulas, and in the day to day comparison viscosity results in Formula 2 get stable results not decreasing very significantly.

CONFLICT OF INTEREST:

No have conflict of interest.

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LAMPIRAN

NP 1 : Formulation and Evaluation of Liquid Soap from Pineapple (*Ananas comosus* L.Merr) Peel Extract and Kelulut Bee Propolis Extract

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