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FORMULATION AND EVALUATION OF ALOE VERA GEL LIQUID SOAP PREPARATION (*Aloe vera* L.) WITH VARIOUS VEGETABLE OILS

FORMULASI DAN EVALUASI SEDIAAN SABUN CAIR GEL LIDAH BUAYA (*Aloe vera* L.) DENGAN VARIASI MINYAK NABATI

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Abstract

Aloe vera is one of the plants that is very easy to find in Indonesia. This plant is rich in saponins, lignin, vitamins, and enzymes. Liquid soap is made through a saponification reaction of oil reacted with KOH. This study aims to make a liquid soap formulation from *Aloe vera* gel with three oil variations: sesame, corn, and soybean oil, and their evaluation test. *Aloe vera* gel is obtained by peeling the skin of *Aloe vera* leaves and then taking the gel. Furthermore, the aloe vera gel obtained is made in the form of a liquid soap preparation by hot means where the oil is directly reacted with an alkaline solution at a temperature of 50ºC until it gets a soap base. The evaluation of liquid soap includes an organoleptic test, pH, foam height and stability, and viscosity carried out for 28 days of storage time. The results showed that liquid soap preparations made from cream-colored aloe vera gel, in the form of a thick liquid and a distinctive smell from oil, had a pH of 9.4 – 9.7, and the height and stability of the foam at t0 minutes between 30 mm – 93 mm and t5 minutes between 25 mm – 500 mm, viscosity 1133.0 cP – 1133.7 cP. Based on the results of the evaluation test, it can be concluded that liquid soap preparations from *Aloe vera* gel with three oil variations can produce good liquid soap because it has met the requirements of the organoleptic test, pH, viscosity, and foam height and stability.

***Keywords*:** *Aloe vera Gel, Liquid Soap, Oil Variations*

Abstrak

Lidah buaya merupakan salah satu tanaman yang sangat mudah ditemukan di Indonesia. Tanaman ini kaya akan kandungan saponin, lignin, vitamin, dan enzim. Sabun mandi cair dibuat melalui reaksi saponifikasi dari minyak yang direaksikan dengan KOH. Penelitian ini bertujuan untuk membuat formulasi sabun mandi cair dari gel lidah buaya dengan tiga variasi minyak yaitu minyak wijen, minyak jagung dan minyak kedelai serta evaluasinya. Gel lidah buaya diperoleh dengan cara mengupas bagian kulit daun lidah buaya, lalu diambil gelnya. Selanjutnya gel lidah buaya yang diperoleh dibuat dalam bentuk sediaan sabun mandi cair dengan cara panas dimana minyak langsung direaksikan dengan larutan basa pada suhu 50ºC hingga mendapat basis sabun. Evaluasi sabun mandi cair meliputi uji organoleptis, uji pH, uji tinggi dan kestabilan busa, serta uji viskositas yang dilakukan 28 hari waktu penyimpanan. Hasil penelitian menunjukkan bahwa sediaan sabun mandi cair yang dibuat dari dari gel lidah buaya berwarna cream, berbentuk cairan kental dan berbau khas dari minyak, memiliki pH 9,4 – 9,7 serta tinggi dan kestabilan busa pada menit t0 antara 30 mm – 93 mm dan pada menit t5 antara 25 mm - 500 mm, viskositas 1133,0 cP – 1133,7 cP. Berdasarkan hasil uji evaluasi maka dapat disimpulkan bahwa sediaan sabun mandi cair

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dari gel lidah buaya dengan tiga variasi minyak dapat menghasilkan sabun cair yang baik karena telah memenuhi pensyaratan uji organoleptis, uji pH, uji viskositas, serta uji tinggi dan kestabilan busa.

Kata Kunci : Gel Lidah Buaya, Sabun Cair, Variasi Minyak

INTRODUCTION

Aloe vera (*Aloe vera* L.) is one of the plants that is very easy to find in Indonesia, both in the home environment and in the outside environment. *Aloe vera* plants have several properties, including anti-inflammatory, anti-allergic, astringent, antioxidant, and many other properties such as rejuvenating the skin, maintaining skin health, making the skin not dry, and softening the skin (Ningsih, 2021). *Aloe vera* will be effective for skin health when used at a concentration of 6-15%. This is because aloe vera contains, among others, lignin, saponins, amino acids, chrysophane acid, vitamins, enzymes, minerals, aloectin B, aloe-emoedin and hydrazone. This richness of content can be used as a cosmetic and medicinal ingredient. Several ways can be done to use aloe vera for skin health, one of which is by adding aloe vera gel (Sinaga *et al*., 2023).

So far, *Aloe vera* gel has been widely used by humans to beautify themselves. However, the cosmetic industry has utilized aloe vera as a herbal raw material, which aims to have preparations that have little side effects (Solihati & Bela, 2022). Cosmetic products that are already common in the market include bath soap preparations. Bath soap is divided into two types, namely solid and liquid. The advantages of liquid bath soap compared to solid bath soap are the relatively easy manufacturing process, relatively cheap production costs, ease of carrying and storing, not easily damaged and dirty, protection from germs, easier and more efficient to use, and exclusive packaging. In terms of health, solid soap can be a medium for disease transmission, so it is not recommended to be used together, while the use of liquid soap is easier and more economical and not easily damaged or dirty (Barel *et al.*, 2014).

Liquid soap with the addition of aloe vera gel is a safe cosmetic because it uses natural ingredients that come from nature. In addition, based on research conducted by Dewi & Erda (2019), *Aloe vera* gel has antibacterial activity against *Staphylococcus aureus* bacteria that cause skin infections, so it is very good when applied to soap preparations. In addition to aloe vera gel, other natural ingredients that have properties for skin health are also added, namely oils that have lipid compounds and structures in the form of esters of glycerol, including sesame oil, corn oil (maydis oil) and soybean oil. The oil used as a soap base, with the addition of KOH as an alkaline solution in the manufacture of liquid soap, serves to form soap due to the saponification reaction while also adding other additives such as thickeners, neutralizers, and preservatives.

Based on the description mentioned above, the researchers wanted to formulate *Aloe vera* gel (*Aloe vera* L.) into liquid soap preparations. To determine the stability of liquid soap preparations made, an evaluation of the physical quality of liquid soap is carried out, which includes organoleptic tests, pH, foam height and stability, and viscosity.

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(a) (b)

Figure 1. (a) *Aloe vera* Stem ; (b) *Aloe vera* Gel
Source: Personal Documents (2023)

RESEARCH METHODS

Plant Determination

Determination of aloe vera leaves was carried out in the Botany Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Syiah Kuala, Banda Aceh. The purpose of the determination is to ensure that the identity of the plant used is a species of *Aloe vera* L.

Aloe Vera Gel Extraction

Aloe vera leaves are taken, cleaned first, washed with water, and dried. Furthermore, the aloe vera skin is slashed, and the gel is taken (Andiva *et al.*, 2023).

Development of Na CMC

Weighed Na CMC as much as 0.5 g, then sprinkled over 10 mL of hot water in a mortar and allowed to expand, then crushed until homogeneous (Setiana *et al.*, 2020).

Preparation of Alkali Solution

KOH 40% solution was made by weighing 40 g of KOH, put into a measuring flask, and then adding 100 mL of distilled water.

Liquid Soap Formulation

In this study, three liquid soap formulations were made with a variety of oils.

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Table 1. Aloe Vera Gel Liquid Soap Formula

Material	Formulation		
	F1	F2	F3
Aloe vera gel	6 g	6 g	6 g
Sesame oil	30 mL	-	-
Corn oil	-	30 mL	-
Soybean oil	-	-	30 mL
KOH	16 mL	16 mL	16 mL
Na CMC	0,5 g	0,5 g	0,5 g
Stearic acid	0,5 g	0,5 g	0,5 g
Sodium benzoate	0,5 g	0,5 g	0,5 g
Aquadest	Ad 150 mL	Ad 150 mL	Ad 150 mL

Preparation of Aloe Vera Gel Liquid Soap

All ingredients were weighed. Put 30 mL of vegetable oil (sesame, corn, soybean) into a glass beaker, then add 16 mL of KOH little by little while stirring and heat at 50ºC to get a soap base. The soap base was then added 25 mL of distilled water and stirred homogeneously, and Na CMC, which had been developed, was stirred until homogeneous. Then, add stearic acid stirred until homogeneous. Then sodium benzoate is added and stirred until homogeneous. Next, aloe vera gel was added and stirred until homogeneous. Then, add aquadest until the volume is 150 mL and put into a clean container that has been prepared (Soebagio *et al.*, 2022).

Evaluation of Liquid Soap Preparation

Observation of liquid soap was carried out for one month, namely days 1, 7, 14, 21, and 28, while the viscosity test was carried out only on days 1 and 28. Evaluation of liquid soap preparations refers to the research of Mahayuni *et al.* (2023), which includes:

1. Organoleptic test
   This is performed by looking at the shape, color, and smell of liquid soap preparations. The quality parameters of good liquid soap are liquid dosage form, uniform color, and no rancid smell.
2. pH test
   A total of 1 g of liquid soap was diluted with 10 mL of distilled water. Then, the pH of the preparation using a calibrated pH meter.
3. Foam height and stability test
   A total of 2 mL of liquid soap was put into a test tube and added 10 mL of hot water. Then, the tube is shaken for 20 seconds, and the height of the foam formed. Foam height and stability were observed at the time after shaking (t0) and after 5 minutes of shaking (t5).
4. Viscosity test
   Performed using a Brookfield viscometer.

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Data Analysis

Observation data obtained from the evaluation of liquid soap preparations were analyzed descriptively.

RESULTS AND DISCUSSION

RESULTS

Evaluation of Aloe Vera Gel Liquid Soap Preparation

Liquid soap stability testing is done by evaluating the soap preparation made. The evaluation was carried out on liquid soap from aloe vera gel with three types of oil variations (sesame oil, corn oil, and soybean oil), which included organoleptic tests, pH value tests, foam stability tests, and viscosity tests. The evaluation of liquid soap was carried out for one month on days 1, 7, 14, 21, and 28, while the viscosity test was carried out on days 1 and 28.

Figure 2. *Aloe Vera* Gel Liquid Soap Preparation with Various Oils Namely: Sesame Oil, Corn Oil, And Soybean Oil.
Source: Personal Documents (2023)

Organoleptic Testing

The results of organoleptic testing, which includes shape, color, and odor conducted for one month, can be seen in Table 2.

Table 2. Organoleptic Observation Results

Oil Variations	Physical Properties	Organoleptic Observation Day-				
		1	7	14	21	28
Sesame oil	Shape	thick liquid				
	Color	cream				
	aroma	typical sesame oil				
Corn oil	Shape	thick liquid				
	Color	cream				
	aroma	typical of corn oil				
Soybean oil	Shape	thick liquid				
	Color	cream				
	aroma	typical of soybean oil				

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pH testing

The pH value was determined using a pH meter. From the experiments conducted, the following results were obtained:

Table 3. Results of pH Test

Oil Variations	Observation of pH Day-				
	1	7	14	21	28
Sesame oil	9,7	9,7	9,5	9,4	9,4
Corn oil	9,5	9,5	9,5	9,4	9,4
Soybean oil	9,9	9,7	9,7	9,7	9,6

Foam Height and Stability Testing

Observation of the height and stability of liquid soap foam is determined by observing the foam height after shaking. From the experiments conducted, the following results were obtained:

Table 4. Observation Results of Foam Height and Stability

Oil Variations	time	Observation of Foam Height and Stability Day- (mm)				
		1	7	14	21	28
Sesame oil	t0	80	85	88	90	93
	t5	40	44	45	48	50
Minyak jagung	t0	45	48	53	57	62
Corn oil	t5	25	30	34	37	40
Minyak kedelai	t0	70	55	60	63	68
	t5	30	32	35	38	43

Viscosity Testing

Viscosity observations were made using a Brookfield viscometer. From the experiments conducted, the following results were obtained:

Table 5. Viscosity Observation Results

Oil Variations	Viscosity Observations Day-	
	1	28
Sesame oil	3514,4 cP	3703,7 cP
Corn oil	1133,0 cP	1140,6 cP
Soybean oil	2518,6 cP	2525,7 cP

DISCUSSION

The manufacture of liquid bath soap from *Aloe vera* gel (*Aloe vera* L.) using oil variations was carried out with several stages of research, starting from plant determination, sampling, collection of aloe vera gel using the slicing method, and evaluation of liquid bath soap preparations from the resulting aloe vera gel. Evaluation of soap preparation includes an organoleptic test, pH test, foam height and stability test, and viscosity test.

The first test carried out was an organoleptic test on liquid soap from *Aloe vera* gel with oil variations, which included the shape, smell, and color of the preparation. In the preparation of

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liquid bath soap, the desired liquid is homogeneous, not cloudy and precipitated, has a distinctive color and smell, has a fairly good viscosity, and has a lot of foam. Liquid soap derived from sesame oil base, corn oil, and soybean oil reacted with KOH has a cream color due to the absence of the addition of dyes, but the resulting color is from the reaction between the base and KOH. The smell of liquid soap is typical of each oil used, liquid soap from a variety of oils has a homogeneous liquid form. The results of testing liquid soap from aloe vera gel using a variety of oils show that the organoleptic test meets the requirements according to SNI 1996, namely, liquid soap preparations have a homogeneous liquid form, a distinctive dosage color, and a distinctive odor.

Testing the pH value is one of the quality requirements of liquid soap. This is because liquid soap will be in direct contact with the skin and can cause irritation if it does not match the pH of the skin. In general, liquid soap has a pH that tends to be alkaline due to the constituent ingredients of liquid soap, namely KOH, which is used to produce saponification reactions with fats and oils or synthetic detergents that have a pH value above normal pH (Sufi *et al*., 2023). The pH measurement in this study was carried out at different times, namely on days 1, 7, 14, 21, and 28. From the results of the pH test carried out, it can be seen that aloe vera gel liquid soap with oil variations has a pH between 9.4-9.7. According to Wijana *et al.* (2009), the pH value of soap solution depends on the type of fat, soap made with vegetable fat has a pH between 9-10. Based on SNI (1996), the pH of liquid soap is between 8-11, so all liquid soap formulas in this study are by the requirements.

Foam height and stability tests were conducted to observe the foam height produced by liquid soap from aloe vera gel using various oils. Foam is one of the important parameters in determining the quality of bath soap. In its use, foam plays a role in the cleaning process and bestows the fragrance of soap on the skin (Nurrosyidah *et al.,* 2019). The liquid bath soap produced by shaking for 20 seconds observed at time t0 of the three oil variations had an average foam height between 30 mm - 93 mm and at minute t5 between 25 mm-50 mm. The decrease in foam height from t0 to t5 minutes is due to the absence of the addition of foaming agents in the liquid soap preparation, and foam is produced only from the saponin content contained in aloe vera, while these compounds, when reacted with water and shaken, the foam will not last long. In addition, the decrease in foam height which greatly decreases is also influenced by the free fatty acid content contained in the soap so that it can inhibit the clean power, which is characterized by the lack of foam produced (Zuhra *et al.,* 2023). The requirements for liquid bath soap preparations have a foam height of 13 mm-220 mm (Moningka *et al.,* 2020). This shows that the test for foam height and stability has met the parameters of the foam height requirements.

Viscosity testing to see the viscosity of liquid soap preparations from *Aloe vera* gel with oil variations. According to Regina *et al.* (2018), the higher the viscosity of a material, the more stable the material will be because particle movement tends to be difficult with the thicker a material is, and the ability to spread on the skin surface will decrease while the ability to adhere to the skin will increase, and vice versa. The results of viscosity testing using a Brookfield viscometer obtained results for liquid soap using variations of sesame oil 3514.4 cP-3703.7 cP, for corn oil 1133.0 cP-1140.6 cP and the resulting viscosity of soybean oil 2518.6 cP-2525.7 cP.

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This shows that the viscosity testing of liquid soap from *Aloe vera* gel with oil variations meets the viscosity parameters for liquid soap. This is possible due to the addition of Na CMC as a thickener that is not too much, and the water content is too high. According to Rosmainar (2021), for liquid bath soap, viscosity requirements are between 400 cP and 4000 cP.

CONCLUSION

Based on the results of the research that has been done show that the preparation of liquid bath soap from *Aloe vera* gel (*Aloe vera* L.) with three variations of vegetable oils, namely sesame, corn, and soybean oil, can produce good liquid soap and meet the quality requirements of liquid soap preparations and is physically stable during four weeks of storage.

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