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FORMULATION AND ANTIBACTERIAL ACTIVITY TEST OF THE PREPARATION CROWN ETHANOL EXTRACT SHOWER GEL PINEAPPLE (*Apineapple comosus* (L.) Merr) AGAINST BACTERIA *Staphylococcus aureus*

Christica Ilsanna Surbakti[1*], Trinitatis Talunohi[2]

[1,2]Faculty of Pharmacy and Health Sciences, Universitas Sari Mutiara Indonesia
E-mail : Christicailsannas@gmail.com
**corresponding author*

ABSTRACT

Antibacterial bath soap is in great demand by the public. This is because it is believed to cleanse the skin and can also treat or prevent diseases caused by bacteria. One of the natural ingredients that are efficacious as a natural anti-bacterial is pineapple crown. Pineapple crown extract has secondary metabolites namely alkaloids, flavonoids, tannins, saponins and triterpenoids/steroids. The purpose of this study was to determine the formulation of liquid bath soap preparations with the use of pineapple crown ethanol extract (ananas comosus (l.) Merr) as liquid bath soap and to determine the potential of pineapple crown ethanol extract liquid bath soap (ananas comosus (l.) Merr) to have antibacterial properties against staphylococcus aureus bacteria. The type of research carried out is an experimental method. The work procedure consists of sample preparation, sample identification, simplisia making, characteristic examination, phytochemical screening, extract making, making liquid shower soap preparations, evaluating liquid shower soap preparations and antibacterial activity tests against staphylococcus aureus bacteria. Pineapple crown ethanol extract is formulated in a shower soap preparation whose formulation uses concentrations of 3%, 5% and 7%. The results of the characterization of pineapple crown simplisia showed a moisture content of 9.50%, water-soluble juice content of 19.88%, soluble juice content in ethanol 13.30%, total ash content of 6.76%, acid insoluble ash content of 1.19%. The results of phytochemical screening testing show pineapple crown contains alkaloids, flavonoids, tannins, saponins, triterpenoids/steroids.

Keywords: *Shower Soap; Pineapple Crown; Staphylococcus aureus; Antibacterial*

INTRODUCTION

Nowadays, antibacterial bath soap is in great demand by the public. This is because it is believed to cleanse the skin and can also treat or prevent diseases caused by bacteria. One of the natural ingredients that are efficacious as a natural anti-bacterial is pineapple crown (Ginting, 2021). A novel antimicrobial to overcome in increasing resistance, Pineapple crown was reported to have strong antimicrobial ativity and should be taken into consideration as antimicrobial compounds in Ananas Comosus. The active antimicrobial compounds include saponin and bromelain (Ginting, 2017; Nayak, 2022).

Pineapple is a uniqe fruit partly because it has a beautifull crown and consumers around the world regard the crown as an integral part of pineapple fruit. However, farmers in some countries detach the crown at harvest and use it for propagation. It is not clear whetever the detachment of crown affect quality of harvested pineapple. This studi shows that decrowning aggravated internal browning by 55,2 % and reduced SSC/TA ratio by 2.2 following 9-d storage, suggesting that decrowning deteriorated qulity of the flesh and shornened shellift of fruit (Nayak, 2022).

Pineapple is a perennial herb native to the American tropics. It contributes to over 20% of the world production of tropical fruits. Nearly 70% of the pineapple is consumed as fresh fruit in producing

countries. Pineapple is a unique fruit, not only because of its special flavour and attractive pulp color, but also because of its top, or crown. However the beatutiful crown may sometimes be a burden to businessmen, for its big size, normally 20%-80% of that of fruit in volume (Pessoa, 2023).

Among postharvest disorbers of pineapple, internal browning attracts most attention from researches aroun the world, as most pineapple varietitss as susceptible and often causes severe economical losses in producing countries. In some countries like ocet the past decade, farmers have switched other varieties to such qhich are less sensitivie to still make up 90% of pineapple production (Pessoa, 2023).

RESEARCH METHODOLOGY

The ingredients used in this study were pineapple crown extract, ethanol 96%, aquades, olive oil, KOH 30%, Carbofol, SLS, Stearic Acid, BHT, Parfum, Buffer Solution, Phenolphtalein, Chloroform, diluted HCL, HCL 0.1 N, KOH 0.1%, ice water, HCL 2N, Bouchardat Reagent, Mayer Reagent, Dragendroff Reagent, Mg Powder, concentrated HCL, amyl alcohol, Hot water, Iron (III) chloride 1%, and Liberman-Burchard reagent, NA agar medium (Sodium Agar), comparison liquid soap preparation. An extract of pineapple crown from Balai Penelitian Tanaman Rempah dan Obat (Balitro) Plantation was prepared by a maceration method using 96% ethanol as a solvent and was then diluted with distiled water to obtain concentrations of 100%, 50%, 25%, 12,5%, 6,25% and 3,125%. Firstly, the pineapple hump is separated from the flesh. Secondly, it is dried under the sun and then put into a grinder until it becomes powder. Thridly the pineapple crown powder was extracted by maceration using a 96%. Ethanol solution in a ratio of 1:5 for 24 hours. Then the resulting solution is fulltered with a filter paper and then evaporated with a rotary evaporator which aims to obtain a thick extract and free from solvents. Finally this thick extract was diluted with distilled water to obtain concentrations of 100%, 50%, 25%, 12,5% (Jahan, 2022).

Liquid Body Wash Formulation

This liquid soap from pineapple crown extract is made in 4 formulations with different concentrations, namely 0%, 3%, 5%, and 7%. All ingredients are weighed in advance according to the formula made. Olive oil is put as much as 30 mL into a beaker then added with KOH as much as 16 mL little by little while continuing to heat at a temperature of $50^{O\ C}$and stirred using a magnetic stirrer until a soap paste forms. Soap paste is added with 30 mL of aquadest, then put Carbopol that has been developed in hot aquadest, stirred until homogeneous. Then stearate acid is added, stirring until homogeneous. Added SLS and mix until homogeneous. Added BHT, stirred until homogeneous. Added flavorer, stirred until homogeneous. Put pineapple crown extract, stirring until homogeneous. Liquid soap is added with aquadest to a volume of 100 mL. Soap is put in a clean container that has beenprepare (Ginting at al., 2021; Dalimunthe et al., 2024).

Antibacterial Activity Test

Prepared Petri dishes that have been sterilized in the oven. Inserted 0.1 mL of test bacterial suspension in sterile petri dishes. Measured and poured 15 mL of liquid NA at 40^{o}C into a petri dish containing the suspension of test bacteria. Homogenized by shaking on a flat surface to form a figure eight to be evenly spread and allowed to stand until solidified. Inserted sterile paper discs that have been soaked in liquid bath soap samples with pineapple crown extract content that has been determined concentration of 3%, 5%, 7%, blanks and positive control of Dettol soap for 15 minutes. Then plant disc paper of various concentrations and also Dettol soap disc paper as a positive control into a petri dish that has contained bacteria according to marking, then incubated into the incubator at a temperature of ± 35^{o}C for 24 hours. Next, the diameter of the clear zone around the paper disc is measured with a caliper. This test was carried out 3 times (Jawetz et al., 2014; Tambunan et al., 2018).

RESULTS AND DISCUSSION

Table 1. Simplisia Characterization Check

Parameters	Result
Water content	9,50%
Juice content soluble in water	19,88%
Soluble juice content in ethanol	13,30%
Total ash content	6,76%
Ash content is not acid soluble	1,19%

Phytochemical Screening

Phytochemical test results showed that the pineapple crown contains many phytochemical compounds. This compund was extraceted more using water and ethanol 30% as solvent. This phytochemical tes was an initial test to determine the presence of secondary metabolites in the analyzed sample. It can be seen that the secondary metabolites contained in the aqueous and ethanolic eztracts of pineaplle crown were saponin, tannis, flavonoids, triterpenoids, and steroids. The methanole extract contains saponins and alkaloids, the ethyl acetate extract contains alkaloids, while the methylene chloride extracs and hexane extract show negative results in all test (Ginting et al., 2023).

Table 2. Results of phytochemical screening

Secondary Metabolites	Reagent	Result
Alkaloids	Dragendorf	+
	Bourchardat	+
	Mayer	+
Flavonoids	Concentrated Mg + Hcl Powder + Amyl Alcohol	+
Saponins	Hot water shaken	+
Tannins	$FeCl_3$	+
Triterpenoids/Steroids	Lieberman-Bourchat	+

Data Analysis

All quantitative data to determine the formulation of pineapple crown ethanol extract (*ananas comosus* (L). Merr) conducted statistical data analysis using the One-Way ANOVA method at a confidence level of 95%. Statistical analysis was performed using the IBM SPSS Statistical version application program.

Evaluation of Shower Gel Preparations

a. Organoleptis Test

Table 3. Results of Organoleptis Test

Dosage	Examination		
	Texture	Color	Smell
F0	Thick	Milky White	Characteristic smell
F1	Thick	Light Green	Characteristic smell of pineapple crown
F2	Thick	Deep Green	Characteristic smell of pineapple crown
F3	Thick	Deep Green	Characteristic smell of pineapple crown

Based on research conducted from organoleptis tests, it is known that each formula with a concentration of 0%, 3%, 5%, 7% is liquid. The resulting soap scent smells of soap perfume and the resulting color at F0 with a concentration of 0% in White, in F1 with a concentration of 3% in light green, in F2 with a concentration of 5% in solid green, in F3 with a concentration of 7% in more concentrated green.

b. pH Test

Table 4. Results of pH test

Dosage	pH Inspection			Average	pH Requirements for SNI Liquid Soap in 1996
	Week I	Week II	Week III		
F0	8,84	8,81	8,29	8,64	8-11
F1	9,28	8,73	8,56	8,85	
F2	9,19	8,68	8,63	8,83	
F3	10,19	9,74	9,23	9,72	

The results of the soap pH measurement made ranged from 8.29 – 10.19 which showed that the pH of liquid bath soap in this study met standards that have an alkaline pH, this is because the basic ingredients of the liquid soap produced are KOH which is a strong base (Widyasanti, 2017; Ginting et al., 2022). KOH is used to produce saponification reactions with fats or oils, or synthetic detergents that have a pH value above neutral pH (Irmayanti et al., 2014).

c. Foam Height Test

Table 5. Results of Foam height test

Dosage	Foam Stability Check(mm)			SNI Foam Height Requirements
	Week I	Week II	Week III	
F0	54	59	65	13-220
F1	52	58	63	
F2	47	51	55	
F3	50	53	59	

The test results of foam height in all liquid soap formulations are at a value of 47-65 mm which means that liquid soap meets the standards set by the Indonesian National Standard (SNI). The foam function in soap prevents redeposition, meaning that dirt particles that have been dissolved in water by soap do not fall or settle again so that dirt can be removed with the previous water (Legi, 2021).

d. Specific Weight Test

Table 6. Specific gravity test results

Dosage	Specific Gravity Check (g/mL)			SNI Specific Weight Requirements
	Week I	Week II	Week III	
F0	1,08	1,1	1,09	1,01-1,1
F1	1,09	1,07	1,05	
F2	1,04	1,1	1,06	
F3	1,09	1,1	1,02	

Specific gravity testing using a pycnometer, from the observations obtained specific weights ranging from 1.02-1.1. The specific weight of each concentration has a clear difference, all concentrations from weeks I to III have a specific weight of liquid soap in accordance with the standards set by SNI. The specific gravity value is influenced by a material its composition and physical properties (Hutauruk et al., 2020).

e. Viscosity Test

Table 7. Results of viscosity test

Dosage	Viscosity Inspection (cP)			SNI General Viscosity Standard
	Week I	Week II	Week III	
F0	670	550	480	400-4000
F1	750	640	600	
F2	930	900	820	
F3	1200	1140	1000	

From the results above, it is known that the viscosity of liquid soap preparations from day to day has decreased which may be caused by the evaporation of several constituent components of liquid soap. The influence of storage can also cause viscosity to decrease (Laksana et al., 2017).

f. Antibacterial Activity Test Results

Table 8. Results of antibacterial activity test

Sample	Concentration	Inhibitory Zone Diameter (mm)			Average Inhibition Zone (mm)
		P1	P2	P3	
Pineapple Crown Extract Shower Soap	3%	7,4	7,6	7,8	7,6
	5%	8,3	8,5	8,9	8,5
	7%	10,3	10,8	11,2	10,7
Blank (-)	0%	0	0	0	0
Dettol Soap (+)	-	14,5	14,7	15,3	14,8

In table 4.10 it can be seen that there is antibacterial activity from the liquid bath soap formulation of pineapple crown ethanol extract against *Staphylococcus aureus bacteria.* The content of secondary metabolites of alkaloids, flavonoids, saponins, tannins and steroids / triterpenoids found in pineapple crown extract can inhibit the growth of *Staphylococcus aureus bacteria.* Antibacterial testing was carried out from a minimum concentration of 3%, 5%, , 7% and a positive control of Dettol soap.

Based on the results of the study, it can be concluded that pineapple crown ethanol extract (*Ananas comosus* (L.) Merr.) has inhibition with different categories, where concentrations of 3% (7.6 mm) belong to the medium category, 5% (8.5 mm) belong to the medium category, 7% (10.7 mm) belong to the strong category and for positive control Dettol soap (14.8 mm) is included in the strong category. This proves that the formulation of pineapple crown ethanol extract liquid shower soap with this concentration shows activity against *staphylococcus aureus bacteria.* In this study, the percentage of inhibition zones from pineapple crown ethanol extract liquid shower soap preparations was also obtained with a comparison (Dettol) of around 75% at a concentration of 7%.

Results of Data Analysis Using SPSS

a. Data Normality Test

Based on the results of the normality test, namely Kolmogorov Smirnov and Shapiro Wilk, an antibacterial activity test of ethanol extract against *Staphylococcus aureus* bacteria was obtained with a significant value of p >0.05, so that the data used were normally distributed. The condition that must be met when conducting a data normality test is that if there is a significant value of p>0.05, then Ho is accepted and the data used in the study has a normal distribution. But, on the contrary, the significant value of p<0.05, then Ho is rejected and has no normal distribution.

b. One Way Anova Test Results

The function of the one way ANOVA test is to distinguish the average between groups from an experiment that has a sample of more than 2 groups. Based on the tests conducted, antibacterial activity tests of pineapple crown ethanol extract against Staphylococcus aureus were obtained each treatment equally had a sig value of p < 0.05 which is sig = 0.000, then Ho was accepted. So it can be concluded that there are significant differences (effectiveness) in each treatment group, and to find out these differences, further Post Hoc tests are carried out.

c. LSD Test

The post LSD test is a follow-up test used to determine whether one group has significant differences from other groups marked by the presence of an asterisk in the mean defference * group.

CONCLUSION

Pineapple crown ethanol extract (*Ananas comosus* (L.) Merr.) can be made in the form of liquid shower soap preparations and the results of quality testing of pineapple crown ethanol extract liquid soap (*Ananas comosus* (L.) Merr.) that meet the requirements of good shower gel in accordance with the standards set SNI06-4085-1996, namely organoleptis test, pH test, foam height test, specific gravity test, and viscosity test. Pineapple crown ethanol extract shower gel (*Ananas comosus* (L.) Merr.) can inhibit the growth of *Staphylococcus aureus* bacteria with a concentration of 3% 3.6 mm included in the weak category, 5% 5.3 mm included in the medium category, and 7% 6.6 mm included in the strong category.

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