OPTIMIZATION OF SUCROSE CONCENTRATION ON TRANSPARENCY AND PHYSICAL PROPERTIES OF TRANSPARENT SOLID SOAP 96% ETHANOL EXTRACT OF PANDAN WANGI LEAVES (PANDANUS AMARYLLIFOLIUS ROXB)

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Abstract
Nowadays, many people are negligent in maintaining skin cleanliness, even though cleanliness or skin care is important. One way to keep your skin clean is to bathe regularly using soap. Transparent soap is the latest innovation to attract public interest in using soap. The ingredient that can affect the transparency of soap is sucrose, sucrose can emulsify the oil used so that it affects the free fatty acids contained in transparent solid soap so that sucrose in soap making functions as a transparent agent. The ability of soap as a cleaner is not enough to make it attractive if it does not have more specific benefits, therefore we need ingredients that can provide dual benefits apart from being a cleaner and also being an antibacterial. One ingredient that has antibacterial properties is fragrant pandan leaf extract which is obtained from the fragrant pandan plant. This research was carried out with the aim of determining the optimization of sucrose concentration and the effect of variations in the addition of sucroseon the quality of the physical properties of transparent solid soap with 96% ethanol extract of fragrant pandan leaves(Pandanus amaryllifolius Roxb). The method used is experimental research.The results of the research show that in organoleptic tests increasing the concentration of sucrose can affect the color. The more sucrose, the more transparent the soap produced. Ph measurements using universal pH resulted in a stable pH at pH 10. The surfactant content in the high foam test was able to remove foam well. The conclusion is that variations in sucrose concentration in making transparent solid soap from 96% ethanol extract of fragrant pandan leaves (Pandanus amaryllifolius Roxb) affect the physical properties of soap because the more sucrose, the more transparent the soap produced.

Key words: Fragrant pandan leaf extract, transparent solid soap, physical properties, Ph test, foam height test.

INTRODUCTION

Nowadays, many people are negligent in maintaining skin cleanliness, even though cleanliness or skin care is important. One way to keep your skin clean is to bathe regularly using soap(Wakhidah, 2012). Soap is a class of skin care cosmetics which is included in the category of cosmetics for skin cleansers or cleansers (Tranggono and Latifah, 2007). Soap is the sodium and potassium salt of fatty acids derived from vegetable oils or animal fats. There are 2 types of soap, namely liquid soap and solid soap, solid soap is divided into opaque, translucent and transparent soap.(Wylęgała, 2010).

Transparent soap is the latest innovation to attract public interest in using soap. The level of transparency of this solid soap is higher so that particles and objects outside the soap can be seen clearly.(Novitasari, 2016). The ingredient that can affect soap transparency is sucrose(Anjani et al., 2014). Sucrose is a nonionic compound in free form and has excellent emulsifying, foaming, detergent and dissolving properties. Sucrose can emulsify the oil used thereby affecting the free fatty acids contained in transparent solid soap so that sucrose in soap making functions as a transparent agent.(Hardian et al., 2014).

Using a transparent agent with a good composition and type will produce a clear solution because sucrose will make the soap solidify and crystallize so that the resulting soap can have strong transparency.(Gunawan, 2014). Apart from being a transparent agent, sucrose also functions as a humectant in making solid soap because of its properties which can maintain skin moisture(Zulbayu et al., 2020). However, the use of sucrose should not exceed 20% because it will produce soap that is very hard and produces little foam(Hardian et al., 2014).

The ability of soap as a cleaner is not enough to make it attractive if it does not have more specific benefits, therefore we need ingredients that can provide dual benefits apart from being a cleaner and also being an antibacterial. One ingredient that has antibacterial properties is fragrant pandan leaf extract

which is obtained from the fragrant pandan plant (Widyasanti et al., 2016). The fragrant pandan plant, which has the Latin name Pandanus amaryllifolius, is a type of monocotyledonous plant from the Pandanaceae family that has distinctive fragrant leaves. Fragrant pandan plants also have antibacterial activity(Suwandi and Sugito, 2017). The chemical compounds contained in fragrant pandan leaves include essential oils, saponins, flavonoids and tannins, the contents that can inhibit the growth of microorganisms are flavonoid compounds.(Sheila, 2011).

According to research by Dasopang and Simutuah(2016)which has been carried out in the activity test of 96% ethanol thick extract of pandan wangi leaves using a concentration of 5%, resulting in an inhibitory power against staphylococcus aureus bacteria of 8.06 mm at an inhibitory zone diameter of 5-10 mm, including a moderate growth inhibition response.

In this research, transparent solid soap was added with 96% ethanol extract of fragrant pandan leaves at a concentration of 5%. Based on the description above, this research was conducted to determine the process of making transparent solid soap from 96% ethanol extract of fragrant pandan leaves (Pandanus amaryllifolius Roxb) with varying concentrations of added sucrose on the test parameters for the physical properties of transparent solid soap.

METHODS

This research was carried out at the ITEKES Scholar Utama Kudus Technology Laboratory. The research method used is experimental. Materials usedin the formulation of transparent solid soap preparations, namely fragrant pandan leaf extract, olive oil, glycerin, stearic acid, Nacl, NaOH, 96% ethanol, sucrose, coco-DEA, aquadets and pandan oil as fragrance. The tools used are a blender, measuring cup, analytical scale, stirring rod, water bath, 1000ml glass beaker, thermocouple, silicon mold, universal pH, 40 mesh sieve, aluminum foil, drying cabinet.

The treatment in this research was varying the sucrose in a transparent solid soap formula. Sucrose, which functions to make soap transparent, is varied into 4 formulas, namely F0 (11%), F1 (11%), F2 (13) and F4 (15). After that, physical properties were tested and the results of the sucrose concentration were best used in optimizing the transparent solid soap base formula. In optimizing the base, 3 formulas were also made and then the physical characteristics of the soap were evaluated. The solid soap formula is as follows:

Table 1 Formulation of Transparent Solid Soap from Pandan Wangi Leaf Extract

No	Material	Treatment				Function
		F1	F2	F3	F4	
1.	Fragrant pandan leaf extract	0	5	5	5	Active substance
2.	Olive oil	20	20	20	20	Fatty acid
3.	NaOH	20	20	20	20	Base
4.	Stearic acid	6.5	6.5	6.5	6.5	Hardener
5.	Glycerin	13	13	13	13	Humectant
6.	Ethanol	16	16	16	16	Transparent shaper
7.	Sucrose	11	11	13	15	Transparent shaper
8.	Coco-DEA	3	3	3	3	Emulsifier
9.	NaCL	0.2	0.2	0.2	0.2	Base
10.	*Fragrance oil*	qs	qs	qs	qs	Fragrance
11.	Aquadest	There's 100 ml	There's 100 ml	There's 100 ml	There's 100 ml	Solvent

Fragrant pandan leaf extract was made using the maceration method using 96% ethanol solvent. The glass container is closed tightly and then covered with aluminum foil. Stirring is done 1-2 times a day for 24 hours. After that, filter it using flannel cloth. Evaporate the filtration results using a water bath at a temperature of 40º C for 3-4 hours and at the end of the process a thick extract is obtained.

Making transparent solid soap using a hot process. All ingredients used are weighed first. Heated the stearic acid at 60º C for 15 minutes. Add olive oil then stir until homogeneous. The temperature was measured until it reached 70º C - 80º C after which NaOH was added. Stirring is done for about 3-5 minutes until soap forms. Add glycerin, ethanol, sucrose, coco-DEA, NaCl, fragrance oil and distilled

water to form basic soap. Fragrance oil uses pandan oil so that the soap emits a pandan aroma. Add fragrant pandan leaf extract then stir until completely homogeneous, around 7-10 minutes. Pour the mixture into a silicone mold and let it sit for 24 hours until the soap hardens.

Phytochemical Screening Test includes flavonoid test, tannin test, saponin test and essential oil test. The flavonoid test is carried out by making an extract by dissolving 0.5 grams of thick extract in 10 ml of 70% ethanol, here are several flavonoid tests as follows:

a. Wilstatter test

A total of 1 ml of the extract solution was put into a test tube then added with 0.1 gram of Magnesium and 2-4 drops of concentrated HCl. The formation of an orange color indicates the presence of flavonoids from the flavonol and flavonone groups.

b. Bate-Smith Test

A total of 1 ml of the extract solution was put into a test tube, a few drops of concentrated HCL were added and heated over a Bunsen for 15 minutes. If it is red, it indicates the presence of anthocyanidin group flavonoids.

c. Test with 1-% NaOH

A total of 1 ml of extract was put into a test tube, added with a few drops of 10% NaOH solution. The occurrence of an orange color change indicates the presence of flavonoids because they are classified as phenolic compounds.

Tannin test of thick extract was 0.5 grams of thick extract dissolved in 10 ml of distilled water, filtered and the filtrate was dropped with 3 drops of 1% FeCl3 reagent. If a greenish brown or blackish blue color occurs, it indicates positive.

Saponin test: 0.5 grams of thick extract was dissolved in 10 ml of hot distilled water and added with 3 drops of HCl then shaken. If stable foam forms, it indicates that it contains saponin.

Essential Oil Test: 0.5 gram of thick extract was diluted with 10 ml of 96% ethanol solvent then 3 drops of Sudan III were added. Positive results for essential oils are indicated by the appearance of color.

Testing the quality of transparent solid soap using organoleptic tests, pH tests and foam height tests.

Analysis of the data from the foam power test research was tested using the SPSS (Statistical Product and Service Solution) program version 26. The first step was to analyze the data using the Shapiro Wilk method to determine homogeneity and normality. If the data is normal and homogeneous, continue with analysis using the One Way Anova method to determine the average difference between groups. If there are differences, continue with the Post Hoc Tukey test to see the real differences between treatments. If there is normal data but not homogeneous then use the One Way Anova test then continue with the Post Hock Games Howell test.

RESULTS AND DISCUSSION

The formulation of transparent solid soap with 96% ethanol extract of fragrant pandan leaves is an experimental research carried out at the ITEKes Pakar Utama Kudus pharmaceutical technology laboratory. This research carried out 3 tests including organoleptic tests, pH tests and foam height tests. In this research, 4 transparent solid soap formulas were formulated with different variations of sucrose. In F1 it is the base, in F2 the variation in sucrose is 11%, in F3 the variation in sucrose is 13% and in F4 the variation in sucrose is 15%. The choice of varying concentrations was based on research by Zulbayu et al., (2020) because in this research variations in sucrose produced soap preparations that met good physical characteristics.

Table 2 Results of Making Simplicia Powder from Pandan Wangi Leaves

Fresh Leaf Weight	Dry Weight	Drying Shrinkage	Simplicia Powder Weight	Color
2000 g	250g	87.5%	230g	Pale green

Source: Processed primary data (2022)

Based on the research results in table 2, make fragrant pandan leaf simplicia powder by taking fragrant pandan leaves that are still fresh, green, have no holes and are not diseased. The leaves are then washed under running water, separated from any dirt attached, then cut into small pieces to speed up the drying process and weighed to get the wet weight. The weighed leaves are then arranged on a baking

sheet and then placed in a drying cupboard at a temperature of 50ºC for ±3 days after the leaves are dry, then ground using a simple blender and then sifted using a 40 mesh sieve. The aim of using a 40 mesh sieve is to obtain simplicia powder of a uniform size with a moderate degree of fineness to make it easier to withdraw compounds during the extraction process.(Permadi et al., 2015). 200 grams of fresh fragrant pandan leaves, green in color, after drying, weighed 250 grams, experienced a drying loss of 15%, the weight of simplicia powder obtained was 230 grams. The drying process causes the color change from fragrant pandan leaves from fresh green to pale green. This color change occurs due to a non-enzymatic reaction in the evaporation of water content in a plant so that the color fades (Prasetyo and Inoriah, 2013).

Table 3 Results Results of Water Content of Simplicia Wangi Pandan Leaf Powder

Mean ± Std. Deviation	Condition	Information
7.06 ± 0.27	≤10%	Fulfil

Source: Processed primary data (2022)

Based on the research results in table 3, water content was measured by taking samples from the top for replication 1, taking samples from the middle for replication 2 and taking samples from the bottom for replication 3. The water content should not be excessive, namely ≤10%. According to research by Anggraini and Kusuma (2020), if a material has a water content of more than 10%, it can affect the quality of the material, accelerate the growth of mold and hydrolysis of the chemical content can occur.

Table 4 Results of Extraction of Wangi Pandan Leaves

Simple powder	Solvent	Condensed Extract	Color
200 grams	Ethanol 96% 2000 ml	50 grams	Blackish dark green

Source: Processed primary data (2022)

Based on the research results in table 4, the extraction method used was maceration with 96% ethanol solvent. 100 grams of simplicia powder was used using a solvent ratio of 1:10 by placing the powder in a glass container lined with aluminum foil, lined with aluminum foil so that it is not exposed to sunlight. Solvent replacement was carried out every 24 hours three times.

The first day, 400 ml of simplicia powder was added with solvent, left for 24 hours, stirring occasionally, then filtered, then on the second day the solvent was replaced with 300 ml, left for 24 hours, stirring occasionally, then filtered, after that the solvent was replaced again with 300 ml, left for 24 hours. stir occasionally.

The aim of remaceration is to obtain a clear filtrate. According to research by Ulfah (2020), a clear filtrate indicates that the secondary metabolite compounds contained in the plant can be extracted optimally. The filtrate obtained was then thickened using a water bath because the retory evaporator had problems so it was replaced by using a water bath and occasionally measuring the temperature using the thermometer used was 45ºC. According to research by Aziz et al., (2014), temperatures that are too high will result in the compounds contained being damaged. After use, the thick extract turned out to be not enough, so we made another 100 gram extract with a ratio of 1:10 using the same method, putting 100 gram powder into a glass container lined with aluminum foil.

Solvent replacement was carried out every 24 hours three times. The first day, 400 ml of simplicia powder was added with solvent, left for 24 hours, stirred occasionally, then filtered, then on the second day the solvent was replaced with 300 ml, left for 24 hours, stirred occasionally, then filtered, after that the solvent was replaced again with 300 ml, left for 24 hours. stir occasionally. So the total of all thick extracts obtained from both maceration processes is 50 grams.

Table 5 Yield Results of Pandan Wangi Leaf Extract

Extract Yield	Information
25%	Fulfil

Source: Processed primary data (2022)

Based on the research results in table 5, the results of the maceration that were carried out obtained a thick, blackish green, sticky and distinctive odor extract of 50 grams resulting in a yield of 25%.

According to research by Kartikasari et al., (2014), high yield results indicate that the chemical compounds that can be absorbed in the extract are quite large.

Table 6 Results of Fitkomia Screening for Pandan Wangi Leaf Extract

Phytochemical Screening	Color	Results
Flavonoid test		
a. Wilstater test	Orange	**(+)**
b. Bate Smith Test	Red	**(+)**
c. 10% NaOH Test	Orange	**(+)**
Tannin test	Greenish brown	**(+)**
Saponin test	Produces foam	**(+)**
Test essential oils	Deep green	**(+)**

Source: Processed primary data(2022)

Information:

(+) = Positive for containing the compound

Based on the research results in table 6, phytochemical screening aims to identify the content of secondary metabolite compounds contained in the extract (Shaikh and Patil, 2020). The results of the phytochemical screening of fragrant pandan leaf extract were positive for containing flavonoids, tannins, saponins and essential oils in line with research by Sheila (2011) that fragrant pandan leaves contain flavonoid compounds, tannins, saponins and essential oils. The function of flavonoid compounds is as an antioxidant which is used to protect the skin, the function of tannin compounds is as an antioxidant, the function of saponin compounds is as a cleanser, antiseptic and produces foam, the function of essential oil compounds is to provide a distinctive odor (Sari et al., 2021). The compounds that play a role in soap are flavonoids and saponins.

In the flavonoid test, 3 tests are used, namely the Wilstater test which functions to reduce the benzopyrone core in the flavonoid structure, the Smith bate test which is H2SO4 which is then heated. H2SO4 is an acid catalyst which causes an electrophilic substitution reaction which is characterized by a change in color to red, and the 10% NaOH test. is a base catalyst that causes the decomposition of flavonoid compounds into acetophenone molecules (Harborne, 1987).

Table 7 Organoleptic test results for transparent solid soap preparations from 96% ethanol extract of fragrant pandan leaves

Formulas	Observation		
	Color	**Smell**	**Form**
F1	White	Pandan aroma	Transparent solid
F2	Deep green	Pandan aroma	Transparent solid
F3	Clear green	Pandan aroma	Transparent solid
F4	Clear green	Pandan aroma	Congested

Source: Processed primary data(2022)

Information:

F1 = Transparent solid soap base with 11% sucrose concentration
F2 = Transparent solid soap contains varying concentrations of 11% sucrose
F3 = Transparent solid soap contains varying concentrations of 13% sucrose
F4 = Transparent solid soap contains varying concentrations of 15% sucrose

Based on the research results in table 7, organoleptic tests were carried out to visually determine the results of transparent solid soap preparations in the form of color, smell and shape. Based on the data table of organoleptic test results, the transparent solid soap preparations produced by all formulas (F1, F2, F3 and F4) have a white color in F1 and a deep green color in F2, F3 is a clear light green color. and F4 is light green and increasingly clear. The color differences in each formula are influenced by variations in the concentration of sucrose which are different in each formula. The higher the concentration of sucrose, the color of the soap preparation will fade or become clearer. In line with research by Zulbayu et al., (2020)

Using variations in sucrose concentration to obtain transparent soap preparations with a good level of transparency. The addition of sucrose concentration makes it more transparent because sucrose itself has a role in helping the development of crystals in soap because sucrose plays a role in forming crystals so that the soap looks clear and transparent (Novianti et al., 2021).

Table 8 pH test results for transparent solid soap preparations from 96% ethanol extract of fragrant pandan leaves

Formulas	Condition	Average	Information
F1	9-11	10	Fulfil
F2	9-11	10	Fulfil
F3	9-11	10	Fulfil
F4	9-11	10	Fulfil

Source: Processed primary data(2022)

Information:
F1 = Transparent solid soap base with 11% sucrose concentration
F2 = Transparent solid soap contains varying concentrations of 11% sucrose
F3 = Transparent solid soap contains varying concentrations of 13% sucrose
F4 = Transparent solid soap contains varying concentrations of 15% sucrose

Based on the research results in table 8, a pH test was carried out to determine the pH of the soap preparation. The pH must be acceptable to the skin because it is related to the safety of the preparation when used. pH measurement uses universal pH, the pH of solid soap according to SNI 3532-2016 used on the skin ranges from 9-11

The results obtained for F1, F2, F3 and F4 were 10, 10, 10, 10 respectively, where all concentrations met the requirements for a transparent solid soap preparation. The pH test results for transparent solid soap preparations are in the range 9-11. According to research by Hardian et al., (2014) the pH value is a very important characteristic in determining the quality of soap because a pH value that is too high ≥11 can cause skin irritation and dehydration. Meanwhile, a pH that is too low ≤9 according to research by Ainiyah and Riniutami (2020) will cause an increase in the absorption power of soap on the skin, thereby also causing skin irritation.

Table 9 Results of foam height test for transparent solid soap preparations from 96% ethanol extract of fragrant pandan leaves

Formulas	Mean ± Std. Deviation (cm)
F1	7.533 ± 0.1528
F2	7.333 ± 0.1528
F3	7.533 ± 0.1528
F4	7.633 ± 0.3055

Source: Processed primary data(2022)

Information:
F1 = Transparent solid soap base with 11% sucrose concentration
F2 = Transparent solid soap contains varying concentrations of 11% sucrose
F3 = Transparent solid soap contains varying concentrations of 13% sucrose
F4 = Transparent solid soap contains varying concentrations of 15% sucrose

Based on the research results in table 9, the foam height test was carried out to determine its ability to clean and emit a soapy fragrance on the skin (Hambali et al., 2012). Measuring foam height is one way to control the quality of soap products so that the preparation has the appropriate ability to produce foam (Rahayu, 2015).

The results obtained for the foam height test at F1, F2, F3 and F4 were 7.7 cm respectively; 7.5cm; 7.7cm; 7.9 cm where all concentrations produce good foam height. According to research by Rahayu (2015), there is no minimum or maximum foam height requirement for a soap preparation because foam height does not indicate cleaning ability, this is more related to the aesthetics preferred by consumers.

Table 10 Data Normality Test from Foam Height Test

Formulas	Shapiro-Wilk (sig.)	Description P value
F1	0.637	Normal data
F2	0.637	Normal data
F3	0.637	Normal data
F4	0.637	Normal data

Source: Processed primary data(2022)

Information:
1. P value <0.05 = data is not normal
2. P value >0.05 = normal data
3. F1=Transparent solid soap base with 11% sucrose concentration
4. F2 = Transparent solid soap variation of 11% sucrose
5. F3 = Transparent solid soap variation of 13% sucrose
6. F4 = Transparent solid soap variation of 15% sucrose

The data normality test in this study was normally distributed because a significant value of >0.05 was obtained.

Table 11 Data Homogeneity Test from Foam Height Test

Levene Statistics	Sig.	Description P value
1,099	0.404	Homogeneous data

Source: Processed primary data(2022)

Information:
1. P value <0.05 = data is not homogeneous
2. P value >0.05 = homogeneous data

The homogeneity test of the data in this study was homogeneously distributed because a significant value of >0.05 was obtained.

Table 12 One Way Anova Data Test from Foam Height Test

Asymp. Sig.	Description P value
0.382	There is no significant difference

Source: Processed primary data(2022)

Information:
1. P value <0.05 = there is a difference between F1, F2, F3, and F4
2. P value >0.05 = no difference between F1, F2, F3, and F4

The statistical test results showed that the transparent solid soap preparations in F1, F2, F3 and F4 in the normality test and homogeneity test showed normal and homogeneous data, then continued with the one way anova parametric test showing P value >0.05, namely 0.382, which means no there is a significant difference between the foam height at F1, F2, F3 and F4. This shows that the addition of sucrose with different concentrations does not affect the foam height in transparent solid soap preparations.

CONCLUSION

Based on the research results, it can be concluded that the 96% ethanol extract of fragrant pandan leaves (Pandanus amaryllifolius Roxb) can be formulated into a transparent solid soap and the addition of sucrose can affect the quality of the physical properties of 96% ethanol extract of fragrant pandan leaves (Pandanus amaryllifolius Roxb) soap, especially the color change.

It is necessary to conduct research on reducing the number of bacteria (ALT) after using transparent solid soap with 96% ethanol extract and before using transparent solid soap with 96% ethanol extract.

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