



## Antibacterial Activity Of *Musa Paradisiaca* Var. *Sapientum* Peel Extract Cream And Ointments Dosage Form On *Staphylococcus Aureus*

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### ABSTRACT

The aim of the present study was to determine the difference of antibacterial effectivity between ointment and cream *Musa paradisiaca* var. *Sapientum* (MPvS) peel extract against bacteria *Staphylococcus aureus*. Objective: To prove the antibacterial effect of banana peel extract with 5%,10%,15% concentration cream and ointments on *Staphylococcus aureus*. Methods: This study was applying the true experimental design with analyzed statistically with the ANOVA test and continued with the Duncan test to determine the level of treatment that provided the difference and the T-test to determine the most effective differences between groups. The results of the antibacterial activity of cream with a concentration of 10% with an inhibition zone diameter of 12.80 mm and Ointment at a concentration of 15% with an inhibition zone value of 11.07 mm were able to inhibit antibacterial activity. Conclusion, banana peel MPvS extract Cream Formula is the most effective in inhibiting the growth of *Staphylococcus aureus* bacteria.

**KEYWORDS:** extract banana peel, cream, ointment, *Staphylococcus aureus*

### INTRODUCTION

The skin is one part of the body that is susceptible to infection by microbial *Staphylococcus aureus*, *Pseudomonas aeruginosa* and pathogenic microbes that infect other skin ((Inge et al., 2008). One use of these herbal ingredients is as a treatment, especially for the treatment of skin diseases, namely in the form of cream preparations. Skin cream is one form of semi-solid dosage with a composition of more than one material which is dispersed into a suitable base material and has a small moisture content of less than 60% (Syamsuni, 2012).

Banana is a tropical plant with the estimated world's total production of 102 million tonnes in 2012, of which 57 million tonnes was produced in Asia (FAO 2013). Therefore, the uses of banana peels would be beneficial both in reducing the amount and adding the value of industrial waste (Padam et al. 2014). Banana peels contain tannins. Tannins in general are part of polyphenol compounds which have a long chain molecular weight of more than 1000 and can form complexes protein. Based on its structure, tannins are divided into two namely hydrolysable tannins (hydrolysable tannins), and hydrolyzed tannins (condensed tannins). Tannins are used for the treatment of burns by prescribing protein and because of the presence of anti-bacteria (Nurmay. S et al., 2016). Before any form of use, the fruits of the banana trees, in general, are peeled and the peelings can be discarded, given to cattle or cooked, or eventually composted

(Bakry et al., 1997). Nowadays, there is little mention of their use in the literature. Potential application of these peels depends on their chemical composition. The attention of researchers is focused on the pulp (Bello-Perez, Pano de leon, Agama-Acevo, & Paredes-Lopez, 1998; Kayisu & Hood, 1981; Lii, Chang, & Young, 1982; Zhang et al., 2005) and peels.

On research, Okaru (2012) the release of topical dosage drugs in the formulation of metronidazole through the Cellulose Membrane, proving the difference in the process of drug release in semisolid preparations. Creams and ointments are topical dosage forms used in the manufacture of drugs. Based on the background above, The purpose of this study was to determine the difference of antibacterial effectivity between ointment and cream *Musa paradisiaca* var. Sapientum (MPvS) peel extract against bacteria *Staphylococcus aureus*

## **MATERIALS AND METHODS**

### **Materials**

The materials used in this study were extracts of banana peels. Concentration of banana peel extract was made with various concentrations of 5%, 10% and 15%. The purpose of this study was to determine the difference of antibacterial effectivity between ointment and cream *Musa paradisiaca* var. Sapientum (MPvS) peel extract against bacteria *Staphylococcus aureus*

### **Cream Formulation**

The cream begins with separating the ingredients into two parts: the components that phase the oil and the elements that phase the water. Ingredients include oil phase, stearic acid, adept lanae, paraffin liquidum, and propyl parabens. Meanwhile, materials that phase water, among others, triethanolamine, methyl parabens, and aquades. First, the preparation of oil phases (stearate acid, adeps lanae, propyl parabens, and paraffin liquidum) is put in beaker glass then melted over the stirrer 70<sup>0</sup>C. Second, the preparation of water phases (triethanolamine, methyl parabens, and aquades) is inserted into beaker glass then melted on stirrer stirred until homogeneous, temperature maintained 70<sup>0</sup>C. The oil phase has dissolved, poured into beaker glass, stirrer until homogeneous over the magnetic stirrer. The water phase is added little by little into the oil phase while stirring using a magnet stirrer with periodic stirring speed from 1800 to 3000 Rpm until a mass of cream is formed. When the cream's temperature has reached  $\pm 45^{\circ}\text{C}$ , then the thick extract of banana skin MPvS is put in the cream group little by little and stirred until homogeneous (Duha et al., 2016).

**Table 1. creamformulation**

Materials	Formulation					Functions
	C-	C1	C2	C3	C4	
Ethanol Extract Banana Peels	0	0,75 g	1,5 g	0	0,75 g	Main rawmaterials
Stearic Acid	2,2 g	2,2 g	2,2 g	2,2 g	2,2 g	Emulsifier
Adeps lanae	0,45 g	0,45 g	0,45 g	0,45 g	0,45 g	Emulsifier
Triethanolamina	0,2 ml	0,2 ml	0,2 ml	0,2 ml	0,2 ml	pH Regulator
Paraffin liquidum	0,75 ml	0,75 ml	0,75 ml	0,75 ml	0,75 ml	Emollientsand Stabilizers
Nipasol (Propil Paraben )	0,0075 g	0,0075g	0,0075 g	0,0075 g	0,0075 g	Preservatives
Nipagin (Metil Paraben )	0,015 g	0,015 g	0,015 g	0,015 g	0,015 g	Preservatives
Aquades	Ad 15 ml	Ad 15 ml	Ad 15 ml	Ad 15 ml	Ad 15 ml	Solvent

C-: Cream base (negative control)C<sub>1</sub>: formulation Cream extract banana MPvS peel 5% concentration C<sub>2</sub>: formulation Cream extract banana MPvS peel 10% concentrationC<sub>3</sub>: formulation Cream extract banana MPvS peel 15% concentration.

### Ointment Formulation

The ointment consists of three formulas with different concentrations of banana *MPvS* peel extract. The goal is to vary the extract *MPvS* banana peel peel concentration to get the appropriate antibacterial cream formula. In the formulation of cream banana *MPvS* peel is carried out a variety of procedures with various concentrations of active substances (ethanol extract banana *MPvS* peel

**Table 2. Ointment Formulation**

Materials	Formula				Functions
	O-	O1	O2	O3	
Bananapeel extract	0	0,75 g	1,5 g	2,25 g	Main rawmaterials basic ingredients
Cera alba	2 g	2 g	2 g	2 g	Preservatives
Propil paraben	0,01g	0,01g	0,01g	0,01g	basic ingredients
White vaseline	Ad 15 g	Ad 15 g	Ad 15 g	Ad 15 g	Main rawmaterials

O-: Base ointment (negative control), O1: Base ointment Ointment banana *MPvS* peel extract 5% concentration, O2: Ointment banana *MPvS* peel extract 10% concentration , O3: Ointment banana *MPvS* peel extract 15% concentration

### Antibacterial activity Test

The preparations of ointments and creams from *MPvS* banana peel extract tested antibacterial activity against *Staphylococcus aureus* bacteria using the diffusion method. The diffusion method used is by preparation well that are 4 mm in diameter and 4 mm deep using sterile borer on MSA media that has been grown *Staphylococcus aureus* bacteria. Each well is inserted 4 µL various concentrations of extract preparations, positive and negative control. Petri dish used as a treatment is labeled according to their attention. Positive control in the form of ointments and bacitracin. In contrast, the negative control used base ointment and cream. Furthermore, the media is wrapped in HVS paper and incubated in an incubator at a

temperature of 37°C for 24 hours. After that, observation and measurement of the bland zone are a clear area around the well. Furthermore, by using the trundle term, the spot is measured in diameter (Ariani et al., 2017).

### Data Analysis

The results of this study will be analyzed descriptively and statistically. Descriptive analysis was used on organoleptic. Data were analysed using a computer statistics program. One-way analysis of variance (ANOVA) followed by Duncan's multiple range test was used to assess the mean difference among treatments. All statistical analyses were determined at 5% level of probability ( $p \leq 0.05$ ). Only significantly different results are discussed in the text. Data are presented as the mean and standard deviation. T-test used to determine the most effective differences between groups

## RESULTS AND DISCUSSION

**Table3.OrganolepticTestof CreamPreparation**

Formula	Form	Color	Smell
Base	Half solid	Yellowish white	Typical cream odor
C1	Half solid	Blackish green	The characteristic odor of the extract
C2	Half solid	Blackish green	The characteristic odor of the extract
C3	Half solid	Blackish green	The characteristic odor of the extract

C1: Cream of banana peel extract concentration of 5%, C2: Cream of banana peel extract concentration of 10%, C3: Cream of banana peel extract concentration of 15%

**Table4.OrganolepticTestof OintmentPreparation**

Formula	Form	Color	Smell
Base	Half solid	White	Typical ointment odor
O1	Half solid	Blackish green	The characteristic odor of the extract
O2	Half solid	Blackish green	The characteristic odor of the extract
O3	Half solid	Blackish green	The characteristic odor of the extract

O1: Cream of banana peel extract concentration of 5%, O2: Cream of banana peel extract concentration of 10%, O3: Cream of banana peel extract concentration of 15%

**Table5.Z oneInhibition(mm)Creamofbananapeel extractwithDuncanTest Results**

Formula	Zone Inhibition (mm)
C1	12,73 ± 2,06 <sup>a</sup>
C2	12,75 ± 0,78 <sup>a</sup>
C3	10,63 ± 0,66 <sup>a</sup>
P (Bacitrasin)	37,62 ± 1,92 <sup>b</sup>

C1: Cream of banana peel extract concentration of 5%, C2: Cream of banana peel extract concentration of 10%, C3: Cream of banana peel extract concentration of 15%, different subscript show an effect on the analysis with Duncan test ( $\alpha=95\%$ )

**Table 6. Zone Inhibition (mm) Ointment of banana peel extract with Duncan Test Results**

Formula	Zone Inhibition (mm)
Base	09,96 ± 1,97 <sup>a</sup>
O1	10,74 ± 0,35 <sup>a</sup>
O2	10,54 ± 1,92 <sup>a</sup>
O3	11,07 ± 0,67 <sup>a</sup>
P (Bacitrasin)	35,62 ± 1,92 <sup>b</sup>

O1: Cream of banana peel extract concentration of 5%, O2: Cream of banana peel extract concentration of 10%, O3: Cream of banana peel extract concentration of 15%, different subscripts show an effect on the analysis with Duncan test ( $\alpha=95\%$ ).

**Table 7. Inhibition Zona T test**

Sample	Cream Inhibition Zona (mm)	Ointment Inhibition Zona (mm)	Significant
A	12,75 ± 0,78	10,74 ± 0,35	0,015
B	12,80 ± 2,12	10,54 ± 1,92	0,34
C	10,63 ± 0,66	11,07 ± 0,67	0,47

A: preparation with 5% *MPvS* banana peel extract, B: preparations with 10% *MPvS* banana peel extract, C: preparations with 15% *MPvS* banana peel extract

Based on the data showed in table 3 dan table 4, Organoleptic examination of creams including the observation of form, smell and color. The results of this study show that organoleptic test for the ointment showed that the base was yellowish white while in formulasi O1, O2 and O3 were blackish green, the greenish-black color was due to the addition of banana peel extract in formulas O1, O2 and O3.

Based on the data showed in table 5, we can see that creams banana peel extract shows an inhibitory activity against *Staphylococcus aureus* bacteria. As seen in table 5, the extract 10% concentration, the bigger the inhibition zone formed. extract at 15% concentration indicated lower inhibition zone. Based on the data showed in table 5, we can see that the inhibition zone diameter difference between these concentrations were statistically insignificant. The results showed that banana peel cream extract ability inhibitory on the growth of *Staphylococcus aureus*. Banana peels extracts have an antibacterial effect on *Staphylococcus aureus* because they contain tannins. Tannins in general are part of polyphenol compounds which have a long chain molecular weight of more than 1000 and can form complexes protein. Based on its structure, tannins are divided into two namely hydrolysable tannins (hydrolysable tannins), and hydrolyzed tannins (condensed tannins). Tannins are used for the treatment of burns by prescribing protein and because of the presence of anti-bacteria (Nurmay. S et al., 2016). This research was in line with Chabuck, et al. (2013), states that banana peel extract can inhibit the growth of pathogenic microbes such as *Staphylococcus aureus*, this is due to the fact that banana peels contain glycosides, saponins, tannins, flavonoids. Saponin as an antibacterial and

antifungal is to reduce surface tension resulting in increased permeability or cell leakage and resulting intracellular compounds will come out (Roysidah et al. 2012). Cream making uses preservatives (nipagin and nipasol), works by eliminating membrane permeability so that the contents of the cytoplasm come out and inhibit the electrolyte transport system in bacteria. The addition of preservatives to the cream base is needed to protect the preparation from contamination of microorganisms and maintain the activity of the active ingredients (Mandasari et al., 2016).

Based on the data showed in table 6, we can see that statistical calculations show the banana peel extract ointment has antibacterial power against the *Staphylococcus aureus* test bacteria. The negative control showed an inhibition zone which was not statistically different from the banana peel extract ointment 5, 10 and 15% and showed different results, the positive control in the statistical test was in a different subscript column with other treatments. This shows that positive control provides a significant difference with negative control and ointment with various extract concentrations. Ointment with a concentration of 5, 10 and 15% did not show a significant difference in the diameter of the inhibition zone, so it could be said that the dispersion power did not have a significant effect on the release of the active cream.

Based on the data showed in table 7, significant or there is a difference from each Based on the data above, it can be said that there is a difference in treatment A but there is no difference in treatment B and C. So it can be said that only treatment A has a difference between cream and ointment preparations with a concentration of 5%, treatment B and C there was no difference between cream and ointment with a concentration of 10% and 15% in inhibition *Staphylococcus aureus* bacteria. The results of statistical analysis showed that the cream base showed greater antibacterial power than ointment bases. Both topical dosage bases They have similarities, namely both the ointment base and the cream base used are hydrocarbon base group.

## CONCLUSION

The results show that, antibacterial activity of the cream formulation of MPvS banana peel extract, the optimal formulation was obtained at the formula level with a concentration of 10% (C2) with an inhibition zone of 12.80 mm. Antibacterial activity of banana peel extract ointment preparations obtained the optimal formulation at the formula level with a concentration of 15% (O3) with an inhibition zone of 11.07 mm.

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