

PHYSICAL AND ACTIVITY ACTIVITY TONER OF ESSENTIAL OIL OF BAY LEAF (SYZYGium POLYANTHUM) AGAINST PROPIONIBACTERIUM ACNE

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ABSTRACT

Indonesian people have been using natural ingredients for generations as traditional medicines to treat various diseases or as a preventative measure. One of the plants often used is bay leaf (*Syzygium polyanthum*). Bay leaves (*Syzygium polyanthum*) contain 0.2% essential oil, with methyl chavicol, eugenol, and citral as the main compounds. The purpose of this study was to determine the physical properties of essential oil toner preparations from bay leaf plants (*Syzygium polyanthum*) and to understand the activity of the essential oil toner preparation from bay leaf plants (*Syzygium polyanthum*) against *Propionibacterium acnes* as an acne treatment. The physical test results produced the following data: organoleptic test, thin liquid form, distinctive bay leaf smell, clear slightly cloudy color, homogeneity test all preparations were homogeneous, pH test for average F0 5.75 ± 0.5016 , F1 5.62 ± 0.1039 , F2 5.70 ± 0.08083 and F3 5.64 ± 0.05508 all met the requirements in the pH range of 4.5-6.5. Viscosity test average F0 2.48 ± 0.01155 mPas, F1 3.23 ± 0.01155 mPas, F2 3.18 ± 0.05774 mPas and F3 3.58 ± 0.02887 mPas have met the good viscosity standard of ≤ 5 mPas. Displaceable volume test average F0 $99.67 \pm 0.5774\%$, F1 $99.33 \pm 1.155\%$, F2 $99.67 \pm 0.5774\%$ and F3 $99.25 \pm 0.8660\%$ have met the standard of not less than 95% volume. Antibacterial activity tests were conducted using the agar diffusion disc method. The test results showed that the anti-acne activity of bay leaf essential oil face toner (*Syzygium polyanthum*) can inhibit the growth of *Propionibacterium acnes*. The average inhibition is negative control 0.00 ± 0.00 mm, F1 7.333 ± 1.155 mm, F2 7.667 ± 0.5774 mm and F3 9.667 ± 0.5774 mm all included in the moderate inhibition category. Based on the results of the data analysis, the result is 0.000, which means that there is a significant difference in the inhibition test of each formulation, and the best is F3, which has a concentration of 2%.

Keywords: *Toner, Bay Leaf, Toner Formulation, Physical Test, Anti Bacterial Test*

INTRODUCTION

The use of traditional plants in medicine is growing, as they have been proven to have many health benefits. With rising prices of medicines, public interest in the use of traditional plants is increasing. Traditional plants have a lower risk of side effects and are more economical. In addition, traditional plants are easy to find and are available because they grow in the environment. Therefore, the use of traditional plants as an alternative medicine has become the main choice for most Indonesians, especially because plant-derived medicines are more affordable, easier to obtain, and have a relatively negligible risk of side effects (Shofwan, 2018).

According to a study conducted by Kun Harismah and Chusniatun (2017) bay leaves (*Syzygium polyanthum*) contain 0.2% essential oil. The results of extraction with 70% ethanol from bay leaves (*Syzygium polyanthum*) showed activity against *Candida albicans*.

In Indonesia, the tradition of using natural ingredients in hereditary medicine has long been recognized in an effort to overcome various diseases (Kun & Chusniatun, 2017). One plant that is often used is the bay leaf (*Syzygium polyanthum*). Previous research has shown that bay leaves (*Syzygium polyanthum*) contain 0.2% essential oil, with major compounds such as methyl khavicol, eugenol, and citral (Elfahmi et al., 2014).

Bay leaves contain various compounds such as steroids, phenolics, saponins, flavonoids, and alkaloids (Kassim & Karim, 2011). Nowadays, the state of the facial skin has become so significant that it has become an integral part of the lifestyle, not only for women but also for men. Everyone pays close attention to their facial skin and seeks solutions to skin problems that may arise, such as acne. When acne appears, it can disrupt the appearance of the facial skin, so they immediately look for ways to get rid of the acne. Acne, also known as acne vulgaris, is one of the most common skin problems, especially among teenagers, as it can interfere with self-confidence. This skin condition is caused by chronic inflammation of pilosebaceous follicles (Eka et al., 2019). Other factors that can trigger acne include genetic predisposition, hormonal fluctuations during the menstrual cycle, stress levels, excessive sebaceous gland activity, hygiene, diet, and cosmetic product use (Dewi & Neti, 2013).

Research on the relationship between the use of facial cosmetics and the incidence of acne (acne vulgaris) showed that as many as 59.1% of respondents experienced acne with an age range of respondents–16-20 years, and as many as 84.8% of respondents used cosmetics. The incidence of acne was higher among respondents who used cosmetics (Risa et al., 2014). It is known that about 80% of teenagers have experienced acne problems, which are characterized by the appearance of blackheads, papules, pustules, nodules, scars, and other symptoms that can interfere with appearance. The disease can be affected by various factors, including changes in skin keratinization patterns, increased sebum production, free fatty acid formation, increased bacterial growth, changes in androgen hormones, and psychological factors. In addition, factors such as age, race, diet, and weather conditions can trigger acne (Eka et al., 2019).

RESEARCH METHOD

Tools and Materials

The tools used were a viscometer, pH meter, incubator, and autoclave, whereas the materials used were bay leaves, distilled water, clindamycin, Na₂SO₄, nutrient agar, and *Propionibacterium acnes*.

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1. Bay Leaves Distillation

Fresh bay leaves (5 kg) were placed in a distillation flask, 5 liters of water was added, and the distillation process occurs for 8-10 hours. The resulting distillate is added anhydrous Na₂SO₄ to separate water and oil. Place in a dark-colored bottle.

2. Toner Formulations

Tabel 1. Formulasi Toner

No	Bahan	Toner Formulations			
		F 1	F 2	F 3	F0 (Negatif Control)
1	Bay Leaf essensial oil	1,5%	1,75%	2%	-
2	Glycerine	2%	2%	2%	2%
3	Allantoin	1%	1%	1%	1%
4	Potassium Sorbate	0,1%	0,1%	0,1%	0,1%
5	Triethanolamin	up skin pH	up skin pH	up skin pH	up Skin pH
6	Tween 80	0,5%	0,5%	0,5%	0,5%
7	Water up	100 ml	100 ml	100 ml	100 ml

3. Toner Making

Calibrate a 100 ml bottle, put allantoin and potassium sorbate into a 100 ml beaker glass, and add enough distilled water to stir until dissolution and homogeneity. Glycerin was added to the mixture and stirred until homogeneous, and Tween 80 was added to the beaker and stirred until homogeneous. Add bay leaf essential oil to the mixture stirred until homogeneous. Add Triethanolamine to the solution drop by drop until the pH of the skin is reached. Stir until homogeneous, filter, and then put the filtered preparation into a bottle.

4. Toner Physical Test

a. Organoleptic Test

Organoleptic testing of face toner preparations is performed by visually observing the shape, smell, and color of the toner.

b. Homogeneity

Homogeneity tests on face toner preparations were carried out to determine whether particles were mixed or not in face toner preparations. Homogeneity testing was performed by taking 10 ml of the preparation and placing it in a beaker glass and then visually looking at it.

c. pH Test

A pH test was carried out to determine the acidity or basicity of the preparation. The pH test of the preparation was performed using a pH meter.

d. Viscosity Test

A viscosity test was conducted to determine the viscosity of the preparation. Viscosity tests were performed using a Brookfield viscometer.

e. Transferred Volume Test

The movable volume test was carried out by taking 10 ml of the preparation into a beaker glass, allowing it to stand for 30 minutes and then transferring it to a measuring cup.

5. Anti Bacterial Activity Test

Inhibition Testing

Testing the antibacterial activity of bay leaf essential oil in toner preparations as an anti-acne agent against the growth of *Propionibacterium acne* bacteria was carried out by the agar diffusion method using disc paper. In the preparation of toners F1, F2, F3, Negative Control and Positive Control (anti-acne toner brand X), the disc paper was dipped, allowed to stand for about 3 minutes, then removed and allowed to dry for less than 3 minutes, and then placed aseptically on the surface of the solidified test medium. (Gerard J et al., 2010). Next, the antibacterial activity was made after a 24-hour and 48-hour incubation period. The diameter of inhibition was measured using KHM (9).

Data Analysis

Data analysis was performed using the Minitab 19 program with one-way ANOVA.

RESULT AND DISCUSSION

1. Preparation of Essential Oil of Bay Leaf

The materials used in this study were bay leaves (*Syzygium polyanthum*) weighing 15 kg obtained from Purwahrja District, Banjar City. The plants studied were identified at the Biology Laboratory of Galuh University Ciamis and declared as a species of *Syzygium polyanthum* L. For the manufacture of essential oil from bay leaves (*Syzygium polyanthum*) originating from Purwahrja District, Banjar City. The process of making essential oil was carried out using the wet steam distillation method in the environmental laboratory of Manoko Plantation, Bandung. A total of 15 kg of bay leaves were washed thoroughly and then placed into the distillator. The separation

process lasted for 3 h and produced 15 ml of bay leaf essential oil (*Syzygium polyanthum*). A yield of 100% was obtained in this study.

2. Toner Physical Test

Tabel II. Toner Phycal Test

Test Name	F0 (control)	F1	F2	F3
Shape	Fluids	Fluids	Fluids	Fluids
Smell	Characteristic odor of glycerin	Characteristic bay leaf odor	Characteristic bay leaf odor	Characteristic bay leaf odor
Color	Clear	Milky white clear	Milky white clear	Milky white clear
Homogeneity	Homogeneous	Homogeneous	Homogeneous	Homogeneous
pH	5,75 ± 0,5016	5,62±0,1039	5,70±0,08083	5,64±0,05508
Viscosity	2,48 ± 0,01155	3,23 ± 0,01155	3,18 ± 0,05774	3,58 ± 0,02887
Transferred	99,67 ± 0,5774	99,33 ± 1,155	99,67 ± 0,5774	99,25 ± 0,8660
Volume Test				

Description :

F 0 = Toner formula without essential oils

F 1 = Bay leaf essential oil toner formula concentration 1,5%

F 2 = Bay leaf essential oil toner formula concentration 1,75%

F 3 = Bay leaf essential oil toner formula concentration 2 %

Based on the above table, it can be seen from the control formulations, F1, F2, and F3 that there are differences in color and odor because there are differences in the concentration of essential oils used. In the toner form, there is no difference between F0, F1, F2, and F3, all of which are the same, namely, dilute.

The results of the homogeneity test on the preparation of bay leaf essential oil toner (*Syzygium polyanthum*) showed that there were no particles that were not evenly mixed, and there were no small bubbles in the toner preparation. It can be concluded that all toner preparations met the homogeneous requirements. Homogeneous preparations can produce good quality preparations because all ingredients in the formulation are evenly dispersed. The results of the pH testing of the face toner formulation of bay leaf essential oil (*Syzygium polyanthum*) show that it meets the requirements of the pH test standard, which is in the range of values 4.5-6.5. This is in line with the Indonesian Pharmacopeia edition IV regarding the pH test, namely, the pH standard value for the skin is 4.5-6.5.

The results of the pH value analyzed using one-way ANOVA showed a significant value ≥ 0.05 , which is 0.057, indicating that there was no significant change from each formulation. The viscosity value obtained is in the range of 2.47-3.60 mPas, which means that the viscosity test results are in accordance with good viscosity standards according to the Indonesian National Standard (SNI) which is ≤ 5 mPas.

The results of the data analyzed using the Minitab 19 One Way ANOVA program show results that are worth 0.000, which means there are significant differences for each formulation. Based on the results of the above data, the face toner of bay leaf essential oil (*Syzygium polianthum*) does not experience shrinkage above the standard, where the standard for the displaced volume test is a volume of less than 95%, but not less than 90%.

The results of data analysis using one-way ANOVA show that the face toner of bay leaf essential oil (*Syzygium polianthum*) obtained a result ≥ 0.05 , which is 0.057, which means that there is no significant difference from each formulation.

3. Anti Bacterial Activity Test

The antibacterial activity test aimed to determine the ability of the bay leaf essential oil toner (*Syzygium polianthum*) to inhibit *Propionibacterium acnes*.

Tabel III. Inhibition Diameter

Treatment	Mean \pm SD	Category
Control +	28,33 \pm 2,887	Very Strong
Control -	0,00 \pm 0,00	Weal
F I	7,333 \pm 1,155	Medium
F II	7,667 \pm 0,5774	Medium
F III	9.667 \pm 0,5774	Medium

Description :

F 0 = Toner formula without essential oils

F 1 = Bay leaf essential oil toner formula concentration 1,5%

F 2 = Bay leaf essential oil toner formula concentration 1,75%

F 3 = Bay leaf essential oil toner formula concentration 2 %

The results of the anti-acne inhibition activity test of Face toner essential oil of bay leaves (*Syzygium polyanthum*) showed that it can inhibit the growth of *Propionibacterium acnes*. The results in Table 3 show that the face toner formula of bay leaf essential oil (*Syzygium polyanthum*) and the positive control in the form of 1% clindamycin have bacterial activity with evidence of a clear zone around the wells. A clear zone indicates that the test sample contains substances that can inhibit or kill bacteria. For the positive control, clindamycin 1% was categorized as very strong with a magnitude of inhibition of 28.33 ± 2.887 mm. The negative control, toner without bay leaf atisri oil content, was categorized as weak with no inhibition of 0.00 ± 0.00 mm. The results for F1, namely toner with 1.5% bay leaf atisri oil content, were categorized as moderate, with an inhibition of 7.333 ± 1.155 mm. The results for F2, namely toner with a bay leaf atisri oil content of 1.75%, were categorized as moderate, with an inhibition of 7.667 ± 0.5774 mm. The results for F3, namely toner with 2% bay leaf atisri oil content, were categorized as moderate, with an inhibition of 9.667 ± 0.5774 mm.

Based on the results of the anti-acne test comparison, the inhibition power of F1, F2, and F3 was categorized as moderate activity because the diameter of the inhibition zone was in the range of 5-10 mm (10).

Based on the results of data analysis F1, F2, and F3 using the Minitab 19 One Way ANOVA program, the result was 0.000, which means that there was a significant difference in the inhibition test of each Face toner formulation of bay leaf essential oil (*Syzygium polyanthum*). Although it has the same inhibition zone category, which is moderate, different concentrations of bay leaf essential oil have different strengths in each formulation. This is due to variations in the concentration of essential oil, which is the cause of different inhibitory diameter activities.

CONCLUSIONS

The face-toner preparation formulation of bay leaf essential oil meets the physical test requirements, namely organoleptic test, homogeneity test, pH test, viscosity test, and volume movement test. The activity of the face toner preparation of bay leaf essential oil (*Syzygium polianthum*) on *Propionibacterium acnes* bacteria at different concentrations, namely F1, F2, and F3, was moderate. Based on the inhibition of the preparation of the test bacteria, the best inhibition concentration was face toner of bay leaf essential oil (*Syzygium polianthum*), namely F3, with a concentration of 2%, with an inhibition of 9.667 ± 0.5774 mm.

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