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FORMULATION AND ANTIBACTERIAL ACTIVITY TEST OF CHINESE BETEL *(Peperomia pellucida L. Kuntha)* LEAF EXTRACT IN GEL AGAINST *Propionibacterium acnes*

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ABSTRACT

Background: Acne is a disease that often occurs due to bacterial infection *Propionibacterium*Acne. Chinese betel leaf (*Peperomia pellucida L Kunth)* is a type of betel which has various chemical compounds such as alkaloids, flavonoids, sponins, tannins, triterpenoids which are useful for curing acne. MAE*(Microwave Assited Exstraction)* is an extraction process that uses microwave radiation. Wells are a bacterial testing process by placing holes in the media. Method: The design of this research is a laboratory experiment using the MAE method for extraction. Sample of Chinese betel leaf extract*(Peperomia pellucida L Kunth).*Which is included in the gel preparation formulation 3%, 5%, 7% and tested for physical and antibacterial quality using a well test. Results: The final result of the MAE process was a yield of 60.37g from the sample tested, this result was used in the formulation of gel preparations with concentrations of F1 (3%), F2 (5%), F3 (7%). The results of the research on the physical test showed that all tests met the physical test requirements, and the antibacterial test results showed that the inhibition zone was at K+*(kentoconazole)*=28.50 mm, F1=8.43mm, F2=8.96mm, F3=10.37mm. Conclusion: There is an effect by adding a concentration of 96% ethanol extract of Chinese betel leaves*(Peperomia Pellucida L Kunth)*in gel formulations in testing the physical properties of the preparation and antibacterial testing.

Keyword: Peperomia Pellucida L Kunth, *Propionibacterium acnes*

INTRODUCTION

Acne or acne vulgaris is a common inflammation that often occurs on the skin whose appearance is characterized by the presence of blackheads, papules, pustules, nodules (Efendi Z., 2003). The results of research in the Southeast Asia region show that 40-80% of acne problems occur, whereas in Indonesia it was recorded that Indonesian cosmetic dermatology showed that as many as 60% of sufferers in 2006, 80% in 2007 and

90% in 2009 (Sirajudin et al., 2019). The bacteria that often cause acne infections are bacteria*Propionibacterium acnes*. (Marliana & Karim, 2018). This bacterial population can be reduced by administering antibacterial substances (Hafsari et al., 2015). To repair follicles and reduce the population of follicular bacteria, anti-inflammatories can be used (Wolff et al., 2011). One plant that can be used as an alternative treatment for bacterial infections is the Chinese betel plant *(Peperomia pellucida L) (Kunth).* Based on research results (Afifah Rukmini, 2020). Chinese Betel Leaf Extract has been shown to contain flavonoids, saponins, alkaloids, tannins and triterpenoids which can act as antibacterial and anti-inflammatory. . These compounds can be developed into cosmetic preparations, namely gel preparations, because they have good spreading capacity on the skin, do not hinder physiological functions because they do not provide a tight layer on the skin and do not close the pores, provide a cool feeling, are easy to wash off with water, and can be used on parts of the body that have hair, and the release of the drug is good (Sujono, 2017). To determine the inhibitory power of bacterial growth*propionibacterium acnes* in testing the antibacterial activity of Chinese betel extract gel preparations *(Peperomia pellucida L Kunth)* using the MAE extraction method to make a thick 96% ethanol extract of Chinese betel, the solid diffusion method with a well test to see the diameter of the clear zone with the inhibition zone provisions according to (Davis & Stout., 1971) which states that the inhibition zone is divided into 4, namely: <5 (weak), 5-10 (moderate), 10-20 (strong), and > 20 (very strong).

MATERIAL AND METHODS

Tools and materials

The ingredients used are distilled water, bacterial suspension, carbomer, TEA, methyl paraben, propyl paraben, glycerin. Tools include stirring rods, glassware, electric stoves, stamping mortars, analytical scales, watch glasses, porcelain dishes, Petri dishes, L-bars, Erlenmeyer, ovens, autoclaves.

Research procedure

In this process, the first thing to do is make simplicia powder which will be followed by making a thick extract using MAE extraction using 96% ethanol solvent and an evaporator to thicken the extract. Next, make a preparation with a selected formula with components in it, namely Chinese betel extract as the active substance, carbomer as a gelling agent, TEA as an alkalizing agent, methyl paraben and propyl paraben as a preservative, distilled water as a solvent. And the finished preparation is followed by a test of the physical properties of the preparation which includes organoleptic test, pH test, homogeneity test, viscosity test, spreadability test and adhesiveness test. And finally, carry out an anti-bacterial test using the well method, with the propionibacterium acne bacteria test and a positive control using centoconazole.

RESULTS AND DISCUSSION

Preparation of 96% Ethanol Extract of Chinese Betel

600 grams of Chinese betel leaf simplicia powder was weighed, then extracted with 6000 ml of 96% ethanol solvent using the MAE method. The maserate that has been obtained is concentrated using a rotary evaporator until it becomes a thick, dark colored extract.

Preparation of 96% Ethanol Extract Gel Preparation of Chinese Betel

Table 1. Gel Preparation Formula

Material Name	Concentration (%)			
	F0	F1	F2	F3
Ethanol Extract 96% Chinese Betel	0%	3%	5%	7%
Carbomer	1%	1%	1%	1%
TEA	0,3%	0,3%	0,3%	0,3%
Methyl Paraben	0.2%	0.2%	0.2%	0.2%
Paraben profile	0.2%	0.2%	0.2%	0.2%
Glycerin	5%	5%	5%	5%
Aquadest	Ad 100	Ad 100	Ad 100	Ad 100

Making this gel preparation is done by weighing all the ingredients. First, develop the carbomer with hot water in a stirring mortar until it forms a gel base. Then add TEA, then add methyl paraben and propyl paraben, stir until homogeneous, then add glycerin, stir until homogeneous, finally add the extract which is the active ingredient in the preparation, namely Chinese betel*(Peperomia pellucida L Kunth)*Stir until homogeneous and store the preparation in a container and label it.

Physical Test Evaluation

a. Organoleptic Test

The gel preparations that have been made are tested by visually observing them in terms of texture, color and smell. And from the test results it was found that the higher the concentration of the extract, the lower the viscosity texture and the color and smell increased.

Table 2. Organoleptic Tests

Formula	Organoleptic Test Results		
	Texture	Color	Smell
F0	Gel pad	Clear	No scent
F1	Gel pad	Deep Green	Special smell
F2	Gel pad	Deep Green	Special smell
F3	Gel pad	Deep Green	Special smell

b. Test the Degree of Acidity (pH)

Take a small amount of each formula and dissolve it in 20 ml of distilled water. Then check the pH using a pH meter, and a good pH measurement for the skin is in the range from 4.5-6.5 (Rahmatullah S et al., 2020).

Table 3. pH test

Formula	pH Test Results
F0	5,88
F1	5,27
F2	5,45
F3	5,87

c. Homogenity Test

Homogenity testing is carried out by smearing the preparation on a glass slide and placing it on another slide and then observing. And it was found that all preparations were homogeneous because no preparations were found to have different granules or Chinese betel extract granules.

Table 4. Homogeneity Test

Formula	Homogeneity Test Results
F0	Homogeneous
F1	Homogeneous
F2	Homogeneous
F3	Homogeneous

d. Viscosity Test

The visco test uses a viscometer using a spindle that matches the texture of the preparation. A good viscous value is in the range of 2,000-50,000 cPs (SNI, 1996).

Table 5. Viscosity Test

Formula	Viscosity Test Results
F0	10000 cps
F1	24900 cps
F2	13700 cps
F3	7000 cps

f. Spreadability Test

A total of 1 gram of the gel preparation is placed on top of the body butter and a flat glass is placed on top which is weighted for 1 second. Observe the difference in size before loading and after loading. The good range of the spreadability test is 5-7 cm.

Table 6. Spreadability Test

Formula	Spreadability Test Results
F0	6 cm
F1	5,7 cm
F2	5,9 cm
F3	6,1 cm

g. Adhesion Test

A total of 1 gram of the gel preparation is placed on a glass base, then covered with another glass and given a weight. Observe the holding time using a stopwatch.

Table 7. Adhesion Test

Formula	Adhesion Test Results
F0	01.00 sec
F1	02.19 seconds
F2	01.58 seconds
F3	01.07 seconds

Evaluation of Anti-Bacterial Tests Against Propionibacterium acne Bacteria

The antibacterial test in this study used a well diffusion method with one layer of media using Na Agar. In this process, the tools and materials are first sterilized, then continued to make a bacterial suspension. Making agar media is done by inserting 5 holes along with spreading the bacterial suspension which has been compared first using MC Farland solution above, and the holes are filled with K+, K-, F1, F2, F3 and incubated for 24 hours to see the inhibition zone. to determine the inhibitory power of the preparation on the test bacteria. According to Davis & Stout., 1971, the inhibition zone is divided into 4, namely: <5 (weak), 5-10 (medium), 10-20 (strong), and > 20 (very strong).

Table 8. Antibacterial Test

Formula	Antibacterial Test Results
K+	28,50 mm
F0/ K-	0 mm
F1	8,43 mm
F2	8,96 mm
F3	10,37 mm

CONCLUSION

From the data obtained, a good formula was obtained, namely carbomer 1%, TEA 0.3%, methyl paraben and propyl paraben 0.2%, glycerin 5%. And in the physical quality test, it was found that all dosage concentrations met the physical quality standards for gel preparations. Furthermore, for antibacterial, at f1 3% you get an inhibition zone of -/+8.43mm, at f2 5% you get an inhibition zone of -/+8.96mm, f3 7% you get an inhibition zone of -/+10.37mm.

From the results of the antibacterial test, it was found that the most effective preparation was F3 with a zone of -/+ 10.37mm, which is a strong category. which according to (David&Shout., 1971). This means that more bacteria die at this concentration, because the more extract there is, the more active substances are included in the gel preparation.

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