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Antibactery test of dragon scale leaves (*Drymoglossum piloselloides*) patientaries on the hamble zone of *Propionibacterium acnes*

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ABSTRACT

Research on the benefits of the starch essence of dragon scale leaves (*Drymoglossum piloselloides*) against anti-bacterial *P.acnes* has not yet been conducted. The use of dragon's scales as an anti-bacterial on acne is intended to develop a new type of anti-bacterial that has minimal side effects against *Propionibacterium acnes* bacteria and to overcome resistance problems arising from the use of antibiotic drugs. This research uses laboratory experimental method with quantitative research type and the design used in the research is Post Test Only Control Group Design. The parameters measured were the antibacterial power of *Drymoglossum piloselloides* leaf starch juice against *Propionibacterium acnes* microbiologically by using the disc paper method, then the inhibition zone was measured using a caliper with an accuracy of 0.01 mm. The results of measuring the diameter of the inhibition zone of dragon scale leaf starch juice (*Drymoglossum piloselloides*) against *Propionibacterium acne*s inhibition zone, obtained the average diameter of the inhibition zone at a concentration of 40% of 1.26 mm with a weak category, at a concentration of 50% of 1.94 mm with a weak category, at a concentration of 60% of 2.8 mm with a weak category, at a concentration of 70% of 3.36 mm with a weak category, at a concentration of 80% of 3.94 mm with a weak category and in the positive control using Chloramphenicol get an average inhibition zone diameter of 8.36 mm with a moderate category.

Introduction

Acne is one of the problems that exist on the skin, especially on facial skin and is most commonly found and affects almost everyone. Acne is an inflammatory disorder that occurs in the pilosebaceous unit, caused by increased sebum secretion, *follicular hyperkeratinization*, *Propionibacterium acnes* in follicles and inflammatory response[1].

One of the causes of acne is due to the activity of *Propionibacterium acnes* (*P. acnes*) colonization. Currently, people are more concerned with physical appearance so that acne treatment continues to be developed, one of which is with antibiotics. Antibiotics that are often used for acne are bacteriostatic (inhibit bacterial growth) rather than bactericidal (kill bacteria), exposure to bacteriostastics can encourage antibiotic-resistant *Propionibacterium acnes* and these drugs can cause skin irritation or sensitivity reactions on the skin of certain people[2].

The side effects caused by synthetic anti-acne preparations are allergic reactions caused by antibiotics that involve the body's immune system into the host and hypersensitivity reactions[3]. New antibacterial compounds that have not experienced resistance are one of the alternative solutions to overcome this problem, these compounds can be found in plants, because plants have a variety of compounds that have potential as antibacterials with new mechanisms of action that have antibacterial activity[4].

One solution that can be done to minimize the use of chemical antibiotics to treat diseases caused by *P.acnes* is with plants that have the potential as anti-acne preparations, namely dragon scale spikes (*Drymoglossum piloselloides*). Based on research that has been done on dragon's scale spikes (*Drymoglossum piloselloides*) which have been extracted with water and ethanol, dragon's scale spikes (*Drymoglossum piloselloides*) contain secondary metabolites in the form of flavonoids, steroids, triterpenoids, polyphenols, saponins and tannins. Phytochemical tests show that the active antibacterial isolate in dragon's scale spikes is the flavonoid compound contained therein[5].

Research on the benefits of dragon scale leaf starch (*Drymoglossum piloselloides*) against *P.acnes* anti-bacteria has not yet been conducted. The use of dragon's scales spikes (*Drymoglossum piloselloides*) as an anti-bacterial on acne is intended to develop new types of anti-bacteria that have minimal side effects against *P.acnes* bacteria and to overcome resistance problems arising from the use of antibiotic drugs, and starch juice was chosen because ordinary people are more familiar with starch juice than extracts, managing starch juice is simpler and does not require complicated equipment and materials such as extracts.

Based on some of these problems, the researcher wants to conduct research on dragon's scales (*Drymoglossum piloselloides*) against P.acnes bacteria with the research title "Antibacterial test of dragon's scales leaf starch juice (*Drymoglossum piloselloides*) against *Propionibacterium acnes* inhibition zone".

Method

This research uses laboratory experimental method with quantitative research type and the design used in the research is Post Test Only Control Group Design. The parameters measured were the antibacterial power of *Drymoglossum piloselloides* leaf starch juice against *Propionibacterium acnes* microbiologically using the disc paper method, then the inhibition zone was measured using a caliper with an accuracy of 0.01 mm.

Place of Research

The research was conducted at the Biology Laboratory of PGRI Silampari University in November 2022.

Tools and materials

The tools used in this study consisted of: ose wire, petri dish, bunsen, three legs, mortal, pestle, hot plate, measuring cup, dropper pipette, beaker, erlenmeyer, magnetic stirrer, spatula, stirring rod, analytical balance, spray bottle, aluminum bucket, fire starter, oven, vernier, perforator and tray. The materials used in this study consisted of: dragon scale leaves (*Drymoglossum piloselloide*), *Propionibacterium acnes* bacteria, chloraphenixol, distilled

water, alcohol, tissue, NA (nutrient agar), 70% alcohol, spritus, aluminum foil, gauze, cotton bud, mask, label paper and gloves.

Research Work Procedure

1. Sterilization of tools and materials

   In this study, the first thing to do is to sterilize all the tools that will be used to minimize unwanted microbial contamination. The sterilization process uses 2 methods, namely the first method by boiling on a hot plate and the second method by using an oven and bunsen[6].

2. Preparation of Nutrient Agar (NA)

   The making of NA in this study modifies the making of NA weighing as much as 2 g of NA media using sterile aluminum foil, then boiling 100 mL of distilled water, after boiling put NA into distilled water and then stirring with a magnetic stirrer until it is completely dissolved (suspended), cool for a while, then put it in a Petri dish with a volume of 20 mL and put it in the oven at 500C for 7 minutes, cool the media until it solidifies.

3. Preparation of dragon scale leaf starch juice

   The making of dragon scale starch juice was carried out by modifying Widya's research namely: prepare dragon scale leaves that are still fresh and not contaminated by pests, dragon scale leaves must be washed to remove dirt attached to the leaves, the leaves are dried by aerating, after drying, pulverize the dragon scale leaves with a mortar and pestle until the dragon scale leaf starch juice comes out, make starch juice with each concentration of 40, 50, 60, 70, 80 gr and each concentration is added with 10 mL of distilled water while homogenized, the homogeneous results are filtered with a filter to get the starch juice of dragon scale leaves, for positive control using chloramphenicol which is added with 10 mL of distilled water[7].

4. Antibacterial activity testing

   Testing the antibacterial activity of dragon scale leaf starch juice using the agar diffusion method with paper disc technique (Cup Plate Technique). The antibacterial activity test was carried out by making disc paper on nutrient agar (NA) media with a disc paper diameter of ± 5.5 mm using a perforator, Na then applied or implanted Propionibacterium acnes bacteria. Each Petri dish was inserted with 6 paper discs, then each paper disc was treated with different treatments according to the predetermined concentration. The media whose disc paper has been dripped with the starch essence of the dragon's scales plant is then incubated at 370C for 2x 24 hours in the oven, after incubation, observations are made by measuring the inhibition zone formed with a caliper.

Data Collection Technique

The data collection technique in this study uses how to measure the inhibition zone formed with a push term and by observation. The inhibition zone formed around the disc paper is an indication of the sensitivity of bacteria to the test material, namely dragon scale leaves.

Results and Discussion

The variable observed in this study was the inhibition of *Propionibacterium acnes* on nutrient agar given the concentration of dragon scale leaves (*Drymoglossum piloselloides*) using a positive control in the form of chloramphenicol antibiotics. From the research that has been done, it can be seen that the higher the concentration of dragon scale starch juice used, the greater the inhibition zone formed and can also be seen from the average diameter of the inhibition zone formed. This statement is the same as research conducted by Febriani, et al., in which used dragon scale leaf extract while in this study using dragon scale leaf starch juice[8].

Table 1. Antibacterial test results of dragon scale leaf starch juice (Drymoglossum piloselloides) against Propionibacterium acnes inhibition zone.

Concentration	Inhibition zone diameter (mm)					$\bar{x}$ ± SD	Inhibition Zone Response
	P1	P2	P3	P4	P5		
K+ (Kloramfenikol)	8.4	5.6	6.1	6.3	15.4	8.36 ± 4.65	Medium
K1(40 gr)	1.1	0.7	2.2	0.4	1.9	1.26 ± 0.69	Weak
K2 (50 gr)	1.8	1.7	2.1	1.5	2.6	1.94 ± 0.62	Weak
K3 (60 gr)	2.6	2.3	2.5	3.2	3.4	2.8 ± 0.61	Weak
K4 (70 gr)	3.3	2.8	2.7	3.8	4.2	3.36 ± 0.70	Weak
K5 (80 gr)	3.6	3.7	3.1	4.6	4.7	3.94 ±0.69	Weak

(Source: Modified from Handayani and Natasia[9])

To see the level of comparison of the antibacterial activity of dragon scale leaf starch (*Drymoglossum piloselloides*) against *Propionibacterium acnes*, the following bar chart presents the comparison data of the average diameter of the inhibition zone formed (Figure 1).

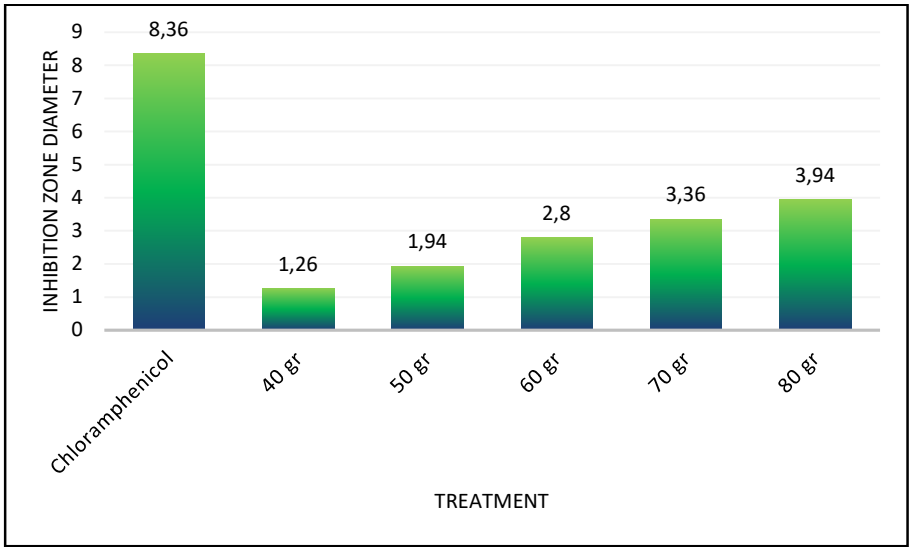

Fig 1. The average diameter of the inhibition zone formed.

Based on Figure 1 shows that each concentration of dragon scale leaves has a different average diameter of the inhibition zone, so it can be explained that H1 is accepted because each treatment has a different average. The results of this study state that dragon scale leaves are able to inhibit the growth of *P.acnes* because they contain several active compounds. The results of phytochemical tests of dragon scale leaves show that the content of secondary metabolic substances contained in dragon scales is a group of saponins, triterpenoids, flavonoids, essential oils, tannins and polyphenols[10], according to research dragon scale leaves positively contain flavonoid and tannin compounds[11]. The content of flavonoids and tannins in dragon scale leaves has the potential to have pharmacological effects on human health. And in the research of Nurainun, et al. the results of the phytochemical test of dragon scale leaves contain flavonoids, saponins, polyphenols, tannins and steroids. Water is used because it functions as a solvent.

The inhibition of bacterial colony growth can be caused by damage to the structural components of the cell membrane in bacteria. Damage to the bacterial cell membrane can disrupt the process of nutrient transport, so that cells will experience a lack of nutrients needed in the process of bacterial growth[12]. Bacterial growth can be different because each bacterium has a different ability to multiply even in 1 colony depending on the growth medium and

nutrients available. Bacterial growth factors also depend on pH and temperature. The optimum temperature for bacterial growth is 37^0C. In addition, the ability to adapt to the environment and the ability to divide and survive also affects the growth of bacteria[13].

The following figure shows the performance mechanism of several secondary metabolite substances contained in dragon scale leaves (Figure 2).

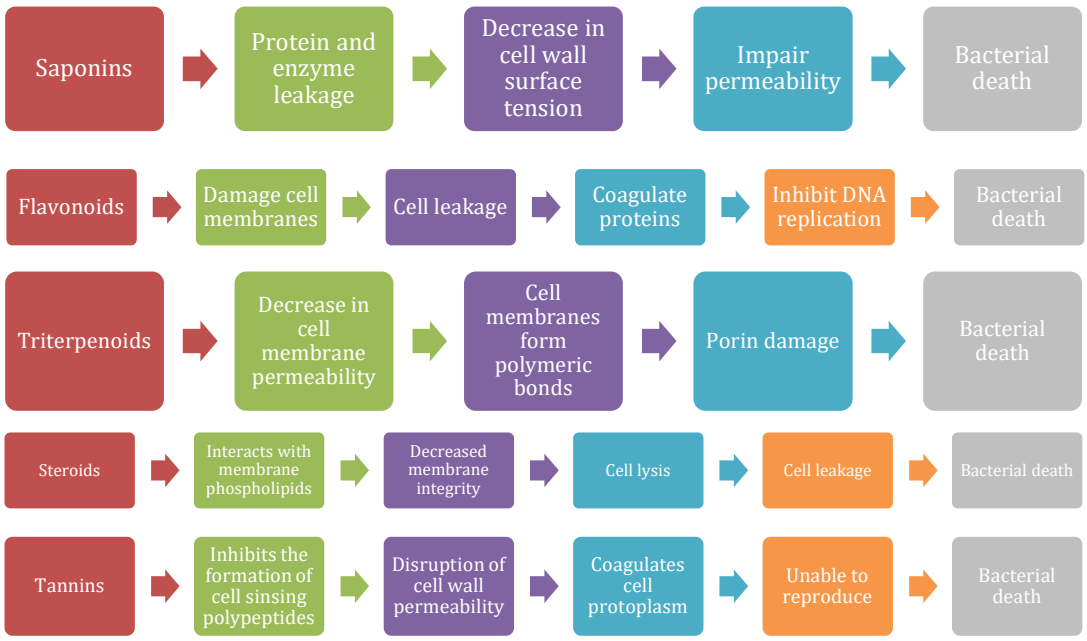

Fig 2. Mechanism of cell damage by secondary metabolite compounds
(Source: Adaptation from Yurika, 2019: 59-60)

Based on the results of measuring the diameter of the inhibition zone of dragon scale leaf starch juice (*Drymoglossum piloselloides*) against the *Propionibacterium acnes* inhibition zone, the average diameter of the inhibition zone at a concentration of 40% was 1.26 mm with a weak category, at a concentration of 50% was 1.94 mm with a weak category, at a concentration of 60% by 2.8 mm with a weak category, at a concentration of 70% by 3.36 mm with a weak category, at a concentration of 80% by 3.94 mm with a weak category and in the positive control using Chloramphenicol getting an average inhibition zone diameter of 8.36 mm with a moderate category.

In this study, the best concentration was at a concentration of 80% dragon scale leaves. The concentration used is a factor that also affects the size of the inhibition zone formed around the treatment given starch juice, the wider the diameter of the inhibition zone, proving the stronger the bioactive compounds contained in the starch juice to inhibit bacterial growth[14]. This also proves that the higher the concentration given, the greater the inhibition zone formed.

Conclusion

Based on the results of the research that has been done, the conclusions of this study are:

1. The results of measuring the diameter of the inhibition zone of dragon scale leaf starch juice (*Drymoglossum piloselloides*) against the *Propionibacterium acnes* inhibition zone, obtained an average diameter of the inhibition zone at a concentration of 40% of 1.26 mm with a weak category, at a concentration of 50% of 1.94 mm with a weak category, at a concentration of 60% of 2.8 mm with a weak category, at a concentration of 70% of 3.36

mm with a weak category, at a concentration of 80% of 3.94 mm with a weak category and in the positive control using Chloramphenicol getting an average inhibition zone diameter of 8.36 mm with a moderate category. 2.

2. The higher the concentration of starch juice of dragon scale leaves (*Drymoglossum piloselloides*) used, the greater the inhibition zone that will be formed.

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