Formulation and Test of Antibacterial Activity of Antiacne Patch Preparations of Centella Asiatica Leaf Ethanol Extract Against the Growth of Propionibacterium Acnes

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Abstract. Gotu Kola (Centella Asiatica) is a wild plant that has excellent potential to be used as a medicinal plant because it has antimicrobial activity. The patch is a local preparation that can provide a good therapeutic effect on the skin, and this preparation is an innovation in the drug delivery system. This study aims to know that the ethanol extract of Gotu kola leaves (Centella Asiatica) can be formulated into patch preparations and has the potential to inhibit the growth of Propionibacterium acnes. In this study, Gotu kola extract was formulated in the form of patch dosage with a concentration of 5%, 7%, and 9%. This research design is an experimental type. The method used in testing antibacterial activity is the agar diffusion method and for statistical data analysis using the One-Way ANOVA test method. The results showed that the patch preparation of Gotu kola leaf extract (Centella Asiatica) was physically and chemically stable and the concentration of 9% had the greatest potential in inhibiting the growth of Propionibacterium acnes. It is necessary to do further research on the patch of Gotu kola leaf extract (Centella Asiatica) against other types of bacteria.

Keywords: Gotu Kola leaves, Patch, Propionibacterium acnes

1 Introduction

At this time skin health is important for everyone, one of the skin health problems that can interfere with appearance is acne. Acne is a chronic inflammation of the sebaceous glands due to an increase in sebum production, keratinization, inflammation, and bacterial infection of Propionibacterium acnes in hair follicles (Aulia, 2015). Acne can affect psychologically and leave temporary reddish spots and cause scars on the skin, so medical acne management such as topical therapy and systemic treatment and non-medical therapy such as lifestyle must be done in a balanced manner to reduce and avoid the severity of acne (Afriyanti, 2015).

Propionibacterium acnes is a normal bacterial flora that is on the skin, this bacterium is found in the sabasea gland, it is also found in human tissues, such as the lungs and prostate tissue. However, the main habitat of Propionibacterium acnes is the skin (Wahyuddin et al, 2019). The concentration of Propionibacterium acnes in adolescents with acne was higher when

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compared to adolescents who did not have acne, but there was no correlation between the amount of Propionibacterium acnes and the severity of acne (Ramdani, 2015).

Gotu kola (Centella Asiatica) is a plant that is easy to grow and can adapt, can grow well in slightly damp soil exposed to sunlight which is often found in open and humid places such as tagalan, rice fields, even the edge of a wall or fence. The bioactive components of Gotu kola that have antibacterial properties are flavonoids, tannins, and saponins (Agfadila, 2017). Transdermal patches are a form of drug dosage form for local therapy that can deliver drugs to the site of action. This delivery system is a development in the drug delivery system. Prajapati et al (2011) said that the drug delivery system through the skin tended to increase both for local therapeutic effects on sore skin and systemic drug delivery (Ermawati, 2019).

Based on previous research by Jantarat et al (2018) that Gotu kola leaf extract (Centella Asiatica) has antimicrobial activity and is made in gel dosage form, and research by Hidayat et al (2018) that in Gotu kola (Centella Asiatica) there are compounds that have a zone of inhibition. the large Propionibacterium acnes. Therefore, this research will develop a formulation of Gotu kola (Centella Asiatica) in the form of a patch dosage as antiacne with a concentration of 5%, 7%, and 9%.

2 Research Methods

Tools

The tools used in this research are: Scissors, jar, cloth filter, bunsen, tripod, tweezers, horn spoon, parchment paper, blender, mortar, stamper, dropper pipette, scale pipette, stirring rod, watch glass, aluminum foil (Klin Pak®), test tube (Iwaki Pyrex®), measuring cup (Iwaki Pyrex®), beaker glass (Iwaki Pyrex®), Erlenmeyer (Iwaki Pyrex®), petri dish, incubator (B-ONE®), round loop, ose straight, wooden flap, tube rack, autoclave (GEA®), pH-meter (RoHS® PH-009 (I) A), analytical balance (Camry®), refrigerator, calipers, oven (B-ONE®).

Materials

The materials used in this study were: The materials used in this study were: Gotu Kola (Centella Asiatica), Aquadest, Hydroxypropyl Methylcellulose (HPMC), 96% Ethanol, 70% Ethanol, Aquadest, Propylene glycol, Tween 80, Nutrient Agar (NA), 0.9% Sodium Chloride (NaCl).

Making Gotu kola leaf extract

500 g of pegagan leaf Simplicia, macerated with 96% ethanol for 3x24 hours then filtered and obtained a liquid extract. The liquid extract is then evaporated so that a thick extract is obtained and the percent rendamen is calculated.

Preparation of patch preparations

To find out the ingredients in making the patch preparations can be seen in the table below.

Table 1. Design of Gotu kola leaf patch formulation

Materials	Functions	F(0)	F1	F2	F3
Gotu kola Extract	Active substance	-	5%	7%	9%
HPMC	Polymer	1 g	1 g	1 g	1 g
Glycerol	Humectant	0,5 g	0,5 g	0,5 g	0,5 g

Tween 80	Humectant	0,12 g	0,12 g	0,12 g	0,12 g
Propylene Glycol	Plasticizer	0,5 g	0,5 g	0,5 g	0,5 g
Ethanol 70%	Solvent	10 mL	10 mL	10 mL	10 mL

Note: F(0) = Formula without extract; F(1) = Formula with 5% extract; F(2) = Formula with 7% extract; F(3) = Formula with 9% extract.

Hydroxypropyl methylcellulose (HPMC) and glycerol were mixed in the mortar until homogeneous, then Gotu kola leaf extract (Centella Asiatica) was added which was previously dissolved with 70% ethanol to taste. After that, the Propylene glycol and Tween 80 were added. The mixture was stirred until it was homogeneous and then added the remaining ethanol gradually until it was homogeneous. Put in a petri dish, evaporate for 3 hours at room temperature, and in the oven for 5 hours at 50˚C.

Preparedness Evaluation

a. Organoleptic Observations
   Done by observing the changes that occur in the preparation which includes the shape, color, and smell of the preparation for 24 hours.
b. pH test
   The pH test is done by measuring the pH of the unprinted patch preparations. The desired pH value is in a pH range that does not irritate the skin, which is 5–7.
c. Uniformity of weight
   The weight of the patch is weighed using an analytical balance, where for every 3 patches, the average weight and standard deviation are determined.
d. Folding resistance
   The folding resistance test is performed with the patch repeatedly folded in the same position until the patch is torn. Then the number of folds is considered as the value of the resistance to the folding of a patch.
e. Test the thickness of the patch
   The patch thickness tester in each formula is to measure the thickness one by one on 4 patch formulations. Measurements were made at 3 different points.
f. Moisture absorption (moisture uptake)
   The patch was weighed and then stored at room temperature for 24 hours. After that, it was stored at 40˚C for 24 hours and weighed again. The percentage of moisture absorption is calculated using the formula:

$$\%\ \textbf{Humidity} = \frac{\textbf{Initial Weight} - \textbf{Final Weight}}{\textbf{Initial Weight}}\ \textbf{x 100}\%$$

g. Cycling Test
   A cycling test is an accelerated test, which aims to determine the stability of the test preparation. In the cycling test base preparations for Control (+), Control (-), Formulation I, Formula II, and Formula III preparations. The preparation was stored at 50C for 12 hours, after which it was transferred to a high temperature of 350C (1 cycle). The cycle in this test will be carried out in 6 cycles. If the results of the cycling test are observed organoleptically,

it shows that there is no physical change in the preparation, then this indicates stability (Mardikasari, Andi, Wa, & Endeng, 2017).

Antibacterial test

a. Making Bacterial Suspensions
   Propionibacterium acnes bacteria colonies were taken with sterile ose, then implanted on slanted NA media using scratches. Furthermore, it was incubated at 37oC for 24 hours. The inoculated bacteria were taken with a sterile loop wire and then suspended into a tube containing 2 ml of 0.9% NaCl solution.
b. Antibacterial Activity Test
   15 mL of NA medium was poured into a petri dish and then 500 µL of the Propionibacterium acnes suspension was added. The patch was placed on NA media which had been added with Propionibacterium acnes bacteria then incubated for 24 hours at 37oC. Antibacterial activity is known from the diameter of the inhibition. The value of the diameter of the inhibition is obtained by measuring the clear zone around the patch on the media that has been overgrown with bacteria using a caliper.

Data analysis

The physical and chemical stability testing of antiacne patch preparations including pH testing, weight uniformity, crease-resistance, and antibacterial testing were statistically tested using the one-way ANOVA method

3 Research Findings

1. Evaluation of Gotu Kola Leaf Extract Patch Preparation (Centella Asiatica)

To determine whether the patch preparations meet the predetermined patch quality standards, an evaluation of the patch preparations consists of the organoleptic test, pH test, thickness test, weight uniformity test, absorption test, and folding resistance test.

Table 2. Evaluation of Gotu kola leaf extract patch preparations (Centella Asiatica)

Evaluation	Group	Replication			Average
		1	2	3	
Organoleptic					
Shape	I	-	-	-	-
	II	L	L	L	-
	III	L	L	L	-
	IV	L	L	L	-
	V	L	L	L	-
Smell	I	-		-	-
	II	TB	TB	TB	-
	III	BK	BK	BK	-
	IV	BK	BK	BK	-
	V	BK	BK	BK	-
Color	I	-	-	-	-
	II	TW	TW	TW	-
	III	HM	HM	HM	-
	IV	HM	HM	HM	-

	V	HT	HT	HT	-
	I	-	-	-	-
	II	7.50	7.20	7.40	7.37
pH	III	5.30	5.00	5.10	5.13
	IV	5.40	5.30	5.40	5.37
	V	5.50	5.40	5.60	5.50
	I	-	-	-	-
	II	0.30	0.30	0.30	0.30
Thickness (mm)	III	0.30	0.30	0.32	0.31
	IV	0.35	0.36	0.35	0.35
	V	0.40	0.38	0.39	0.40
	I	-	-	-	-
Weight	II	1.10	1.10	1.10	1.10
Uniformity	III	1.00	1.10	1.10	1.07
(gr)	IV	1.00	1.20	1.20	1.13
	V	1.10	1.30	1.30	1.23
	I	-	-	-	-
	II	18.00	9.00	9.00	12.00
Absorption	III	10.00	9.00	9.00	9.33
	IV	10.00	8.00	8.00	8.67
	V	9.00	8.00	8.00	8.33
	I	-	-	-	-
Crease	II	240	246	241	242.33
Resistance (x	III	226	230	227	227.67
folds)	IV	214	221	218	217.67
	V	203	205	202	203.33

Note: Group I = Positive Control (Oxy® Antibacterial Acne Patch); Group II = Negative Control (Formula Without Extract); Group III = 5% Gotu Kola Leaf Extract (Centella Asiatica); Group IV = 7% Gotu Kola Leaf Extract (Centella Asiatica); Group V = 9% gotu kola leaf extract (Centella Asiatica); L = Circle; TB = Odorless; BK = Typical Smell; TW = Colorless; HM = Light Green; HT = Dark Green.

From the results of the evaluation of the preparations above, it can be concluded that the patch preparations for groups II, III, IV, and V meet the predetermined patch quality standards.

2. Cycling test

To find out whether the patch preparations can be physically and chemically stable, the stability test of the preparation is carried out in the form of a cycling test which is carried out for 6 cycles.

Table 3. Evaluation of the cycling test

Evaluation	**Group**	Treatment					
		Before			**After**		
		1	**2**	**3**	**1**	**2**	**3**
Organoleptic							
	I	-	-	-	-	-	-
	II	L	L	L	L	L	L
Shape	III	L	L	L	L	L	L
	IV	L	L	L	L	L	L
	V	L	L	L	L	L	L
	I	-		-	-	-	-
Smell	II	TB	TB	TB	TB	TB	TB
	III	BK	BK	BK	BK	BK	BK

	IV	BK	BK	BK	BK	BK	BK
	V	BK	BK	BK	BK	BK	BK
	I	-	-	-	-	-	-
	II	TW	TW	TW	TW	TW	TW
Color	III	HM	HM	HM	HM	HM	HM
	IV	HM	HM	HM	HM	HM	HM
	V	HT	HT	HT	HT	HT	HT
	I	-	-	-	-	-	-
Thickness (mm)	II	0.30	0.30	0.30	0.30	0.30	0.30
	III	0.30	0.30	0.32	0.30	0.30	0.32
	IV	0.35	0.36	0.35	0.35	0.36	0.35
	V	0.40	0.38	0.39	0.40	0.38	0.39
	I	-	-	-	-	-	-
Weight Uniformity (gr)	II	1.1	1.1	1.1	1.1	1.1	1.1
	III	1.0	1.1	1.1	1.0	1.1	1.1
	IV	1.0	1.2	1.2	1.0	1.2	1.2
	V	1.1	1.3	1.3	1.1	1.3	1.3
	I	-	-	-	-	-	-
Crease Resistance (x folds)	II	240	246	241	240	246	241
	III	226	230	227	226	230	227
	IV	214	221	218	214	221	218
	V	203	205	202	203	205	202

Note: Group I = Positive Control (Oxy® Antibacterial Acne Patch); Group II = Negative Control (Formula Without Extract); Group III = 5% Gotu Kola Leaf Extract (Centella Asiatica); Group IV = 7% Gotu Kola Leaf Extract (Centella Asiatica); Group V = 9% gotu kola leaf extract (Centella Asiatica); L = Circle; TB = Odorless; BK = Typical Smell; TW = Colorless; HM = Light Green; HT = Dark Green.

From the results of the cycling test above, it can be concluded that group II, III, IV, and V patch preparations can be physically and chemically stable following the predetermined patch quality standards.

3. Results of the inhibition test

To determine whether the patch preparation has the effect of inhibiting the growth of Propionibacterium acnes, the inhibition power test was carried out for each group of preparation. From the results of the inhibition test (Table 4), it can be concluded that the patch preparations for groups I, III, IV, and V can inhibit the growth of Propionibacterium acnes. Acne is a chronic inflammatory disease in the polysebaceous unit, with a usually polymorphic clinical picture consisting of various skin disorders that must be treated (Ramdani, 2015).

In this study, the formulation of patch preparations from the ethanol extract of Gotu kola leaves (Centella Asiatica) and antibacterial activity test using Propionibacterium acnes test bacteria. The patch dosage formulations were made in three variants of extract concentrations, namely 5%, 7%, and 9%, for negative control the patch was formulated without the addition of extract, while for positive control, the formulation on the market, namely Oxy® Antibacterial Acne Patch with the active substance Chlorhexidine with three repetitions was then grouped, group 1 for control (+), group II for control (-), group 3 extract 5%, group 4 extract 7%, and group 5 extract 9%.

Table 4. Results of the inhibition test

Group	Replication of Resistance Test (mm)			Average
	1	2	3	
I	8	8	8	8
II	-	-	-	-
III	8	7	9	8
IV	13	12	14	12
V	14	13	15	14

Note: Group I = Positive Control (Oxy® Antibacterial Acne Patch); Group II = Negative Control (Formula Without Extract); Group III = 5% Gotu Kola Leaf Extract (Centella Asiatica); Group IV = 7% Gotu Kola Leaf Extract (Centella Asiatica); Group V = 9% gotu kola leaf extract (Centella Asiatica); L = Circle; TB = Odorless; BK = Typical Smell; TW = Colorless; HM = Light Green; HT = Dark Green.

4 Discussion

This study used a sample of Gotu kola leaves (Centella Asiatica) which is made in a patch form for healing acne. Gotu kola leaves are used because this plant is often found in open and humid places with a widespread area (Agfadila, 2017) and in research by Hidayat et al (2018) besides that it also has a large zone of inhibition against Propionibacterium acnes. Four compounds act as antibacterial agents in the leaves of Gotu Kola (Centella Asiatica), namely flavonoids, tannins, triterpenoids, and saponins. Flavonoids from complexes with bacterial cell proteins through hydrogen bonds so that the bacterial cell proteins lose their biological activity. Tannins work by shrinking bacterial cell walls so that they can cause the bacterial cells to be unable to carry out life activities so that their growth is inhibited.

Triterpenoids involve damage to the membrane. Triterpenoids can react with porin (transmembrane protein) on the outer membrane of the bacterial cell wall, form strong polymer bonds and damage porin, and reduce the permeability of the bacterial cell wall so that the bacteria lack nutrients, as a result, the growth of these bacteria becomes inhibited or dies. Saponins form complex compounds with cell membranes through hydrogen bonds so that they can destroy the permeability of bacterial cell walls (Sutardi, 2016).

The preparation used in this study is a patch, according to Ermawati (2019) patch is a local preparation that can provide a good therapeutic effect on the skin, and this preparation is an innovation in the drug delivery system. This preparation has several advantages over other preparations namely that it can be done alone, the drug passes through the intact skin for a controlled period to achieve its effect, protects the skin from inflammation such as friction effects, protects injured skin from sun UV rays thereby reduces the risk of hyperpigmentation, contains hydrocolloids can absorb pus in acne, and protect the wound from bacterial contamination during the healing process.

According to Hanbali (2019) said that in making a patch preparation it has forming substances or additives that support the formation of a good patch preparation, including HPMC as a polymer to control the rate of drug delivery and also as a pressure-sensitive adhesive, HPMC is a water-soluble polymer that is swollen by water absorption and exhibits rapid drug release. The combination of glycerin and tween 80 as a humectant because has to produce a flexible patch so it is easy to use, and the combination of the two ingredients is not irritating because it is chemically stable, humectant is a hygroscopic substance that is used to maintain moisture.

The plasticizer in this patch formulation uses propylene glycol, the plasticizer is to form elastic preparations, increase skin permeability, and form a strong matrix. Mufrod (2016) states

that the plasticizer most often used in transdermal preparations is propylene glycol, besides that propylene glycol is not irritating because it can be chemically stable when mixed with ethanol, tween 80, and glycerin, a combination of the composition of glycerin, propylene glycol, and tween 80 can also produce patches with good flexibility.

In this study, the first thing to do was extract a sample of Gotu kola leaves (Centella Asiatica), the sample was taken in the Pallangga area, Gowa Regency, 3 kg of old leaves were taken, picked one by one manually, this process was carried out at the time of photosynthesis, namely 10:00 - 12: 00, after that it is cleaned off the remaining dirt with running water then aerated to dry then powdered by blending, the resulting powder with a weight of 2 kg is dissolved using 96% 2-liter ethanol in a tightly closed jar, left for 3x24 hours, 96% ethanol It is used in extraction because Ariafianti (2015) says that 96% ethanol is an ideal solvent that is often used for soft plant parts such as leaves, alcohol or a mixture of it with water which is an extraction solvent that has the best extractive power for almost all compounds that have molecular weight low alcohol, saponins, and flavonoids.

After maceration it is then filtered using a cloth filter so that the liquid extract is obtained, the liquid extract is evaporated until a thick extract is obtained. In the formulation stage of 1 gram of HPMC polymer and 0.5 gram of glycerol are mixed, the thick extract is dissolved with a little 70% ethanol then mixed with other ingredients, then added 0.5 gram of propylene glycol plasticizer and 0.12 gram of tween and all the mixture of ingredients is dissolved with the remaining 70% ethanol after that put into a mold using a petri dish then evaporated at room temperature and oven for 5 hours at a temperature of 500C and a patch with a hard consistency is obtained so that it breaks easily when folded, so it is necessary to increase the concentration of humectants and plasticizers because Mufrod (2016) states that glycerin and propylene glycol is an ingredient or component commonly used as a plasticizer and humectant so that the addition of the patch formula makes the mass of the patch more elastic. Therefore, the concentration in the humectant formula design of 0.5-gram glycerin is added to 1 gram, and 0.5 gram of propylene glycol plasticizer becomes 1 gram during formulation so that a patch preparation with relatively good physical and chemical stability is obtained.

At the stage of the evaluation of the preparation, seven types of testing were carried out with three replications on the patch preparations of groups II, III, IV, and V which consisted of organoleptic observations including shape, color, and odor, pH testing of preparations, weight uniformity, crease-resistance, patch thickness test, moisture absorption, and cycling test. Organoleptic observations were carried out by observing changes including shape, color, and odor on the preparation for 24 hours, as long as these observations did not change in all preparations, both changes in shape, color, and odor (Nurahmanto et al, 2017), and the results were obtained. in all groups with a circle shape, the average odor for Group II did not have a distinctive odor with a clear white or colorless color, while Groups III IV and V had an extract odor, Groups III and IV had an average light green color, while groups V is dark green, this is influenced by the higher the concentration of the extract, the odor, and color of the resulting patch will be more concentrated.

The pH test was carried out using a pH meter and obtained an average pH of Group II 7.37, Group III 5.13, Group IV 5.37, and Group V 5.50, so it can be concluded that the higher the extract concentration, the lower the acidity level of preparation, this is influenced by because Putri (2013) states that the ethanol extract of Gotu kola herb tends to be acidic with the resulting pH value still in the range of skin pH, namely 4.0-6.0. The pH value desired for patch preparations is in the pH range that does not irritate the skin, namely 4.5 - 7.0 (Hermanto, 2019). In analyzing the pH data, the Kruskal-Wallis nonparametric statistical test was used because the

data were not normally distributed, and it was concluded that there was a significant difference in pH in each preparation group.

The uniformity of patch weight according to Hermanto (2019) can be seen from the average patch weight. The average weight of Group II is 1.10 grams, Group III is 1.07 grams, Group IV is 1.13 grams and Group V is 1.23 grams, so it can be concluded that the higher the extract concentration, the weight of the patch will increase, this is influenced by the weight of the extract that is weighed for each. -Each group III, IV, and V increased, namely 0.5-gram, 0.7 gram, and 0.9 gram respectively, which certainly affected the weight of the patch preparation. In the analysis of the weight uniformity data using the Kruskal-Wallis nonparametric statistical test, because the data were not normally distributed, and the data variants were not homogeneous, it was concluded that there was a significant difference in the weights for each preparation group.

Folding resistance is carried out aimed at determining the fold resistance of a patch, which indicates that the patch has a good film consistency so that it is not easily torn during use and storage, the results of the average folding resistance in each patch group are 242.33 folds for Group II, Group III 227.67 folds, Group IV with 217.67 folds, and Group V 203.33 folds, so it can be concluded that the higher the concentration of the extract, the folding resistance of the patches will decrease, this is because if the extract concentration increases it will cause a decrease in concentration. in other additives such as humectants and plasticizers that play a role in increasing flexibility and elasticity as stated by Mufrod (2016) that the flexibility of a patch is influenced by the RES levels (glycerin, propyleneglycol, and tween), the higher the RES level, the more flexible.

As for the number of fold resistance that meets the standard if the folding resistance is more than 200 times the fold so that all groups of patch preparations can be said to meet good patch characteristics. In the analysis of the fold resistance data using the One-Way ANOVA parametric statistical test with a sig value <0.05, it was concluded that the average number of fold resistance for the five groups of patch preparations was significantly different.

The patch thickness test obtained an average thickness in each group of patch preparations, namely, Group II 0.30 mm, Group III 0.31 mm, Group IV 0.35 mm, and Group V 0.40 mm, so it can be concluded that the higher the extract concentration, the patches formed will be getting thicker. Based on the theory put forward by Hermanto (2019), the thickness of the patch affects the process of absorption of active substances into the skin, the thinner the patch is formed, the absorption of active substances into the skin will be faster because the media for moving active substances to the therapy location becomes smaller. The thickness data analysis used the Kruskal-Wallis nonparametric statistical test because the data were not normally distributed, and the data variance was not homogeneous, with the Asymp value. > 0.05 so it can be concluded that there is no significant difference in thickness in each preparation group.

The moisture absorption test was carried out by storing the patch at room temperature for 24 hours, after which it was transferred at 400C for 24 hours and weighed again, for the percent average absorption capacity of the formula group obtained, namely Group II 12.0%, Group III 9.3%, Group IV 8.6%, and Group V 7.6%. Hermanto (2019) said that moisture absorption is one of the parameters in determining the ability of a patch to absorb moisture, the smaller the moisture absorption value, the resulting patch will be relatively stable and protected from microbial contamination. In the data analysis, the absorption capacity used the nonparametric Kruskal-Wallis statistical test because the data were not normally distributed, and the data variants were not homogeneous, with the Asymp value < 0.05 so it can be concluded that there is a significant difference in absorption in each preparation group.

For the cycling test, it was carried out to determine the stability of the test preparation by storing the preparation at 50C for 12 hours, after which it was transferred to a high temperature of 350C for 12 hours (1 cycle) which was carried out in 6 cycles, Mardikasari, et al. (2017) stated that the results of the cycling test are good if organoleptically there is no physical change in the preparation, it can be said that the preparation is stable. The results obtained after the cycling test were that there were no changes either physically or chemically to the patch preparation, so it could meet the criteria for a stable patch.

Inhibition testing of patch preparations used three variants of the concentration of Gotu kola leaf extract (Centella Asiatica) for Group III, namely 5%, Group IV 7%, and Group V 9%, for negative control patch formulated without extract was used as Group II, while positive control was used. Category I used patent preparations for Oxy Antibacterial Patch Acne with the active substance Chlorhexidine, chlorhexidine is a broad-spectrum antimicrobial for gram-positive and gram-negative bacteria which works by reacting with the surface of microbial cells to destroy the cell membrane.

Negative control and positive control are used as a comparison to the tested patch preparations, this test is carried out by the diffusion method so that with three replications, the first thing is done is the inoculation of bacteria to facilitate its handling to condition the environment for microbial growth, inoculation is done using pure colony Propionibacterium acnes was implanted on oblique media using scratches and then incubated for 24 hours at 37oC. After the inoculation process was continued to test the inhibitory power using the inoculum suspended with 0.9% NaCl then poured on the surface of the media in a petri dish, the patch was placed on the surface of the media that had been spread with bacterial suspension then incubated for 24 hours

The results of the average inhibition test for each group, namely, for Group I with a diameter of 8.0 mm, Group II did not form a clear zone around the patch, Group III 8.0 mm, Group IV 12.0 mm, and Group V 14.0 mm, so it can be concluded that the higher The concentration of the extract, the greater the inhibition power, the patch with a concentration of 9% Gotu kola extract (Centella Asiatica) showed the highest antibacterial potential. Septyarin (2017) said that to determine the effect of the antimicrobial activity of a preparation, a statistical test was carried out in concluding.

In the data analysis, the antibacterial activity test used the One-Way ANOVA analysis method using SPSS software 20 degrees of 95% confidence to find out significant differences between groups of preparations. And based on the One-Way ANOVA data analysis that has been done with the Sig. <0.05 so it can be concluded that the mean inhibition of the five groups of patch preparations was significantly different.

5 Conclusion

Based on the results of the research that has been conducted and obtained by researchers, it is concluded that: first, the ethanol extract of Gotu kola leaves (Centella Asiatica) can be formulated into patch preparations. Second, the patch preparation from the ethanol extract of Gotu kola leaves (Centella Asiatica) can be physically and chemically stable. Third, the 9% concentration of patch preparations from the ethanol extract of Gotu kola leaves (Centella Asiatica) had the greatest potential in inhibiting the growth of Propionibacterium acnes.

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