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PHYTOCHEMICAL SCREENING OF PAPAYA LEAF EXTRACT LAMPOH KEUDEE AREA AND ITS EFFECT ON STAPHYLOCOCCUS AUREUS BACTERIA

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Abstract

Background: The plant known as papaya leaf (Carica papaya L) is a plant that commonly grows in tropical areas and is often used by local residents as an alternative treatment method to prevent bacterial growth because papaya leaves (Carica papaya L) have a number of pharmacological properties , one of which is the ability to kill Staphylococcus aureus bacteria. The aim of this research was to find out whether papaya leaf extract (Carica papaya L) could inhibit the growth of Staphylococcus aureus bacteria and whether papaya leaf extract (Carica papaya L) had antibacterial activity on Staphylococcus aureus bacteria. Method: This study tested the ethanol extract of papaya leaves (Carica papaya L) against Staphhylococcus aureus bacteria using experimental laboratory methods. The collected data was analyzed using nonparametric statistical analysis known as ANOVA. Results: According to the results of phytochemical research, papaya leaves (Carica papaya L) contain alkaloids, flavonoids, saponins, steroids and tannins. In papaya leaf extract which was tested against Staphylococcus aureus bacteria, there was an effective inhibitory power of papaya leaf ethanol extract with concentrations of 25%, 50% and 75%, with a concentration of 25% obtained an average inhibition zone of 6.2 mm, a concentration of 50% obtained an inhibition zone. an average of 6.7 mm and a concentration of 75% obtained an average inhibition zone of 7.8 mm. Conclusion: Antibacterial studies of Staphylococcus aureus reveal that papaya leaf extract has a growth inhibitory effect on this bacteria. As the leaf extract concentration increases, a larger zone of inhibition is formed.

Keywords*: Antibacterial; papaya leaf; Staphylococcus aureus.*

INTRODUCTION

Staphylococcus aureus bacteria are round-shaped gram-positive bacteria or cocci with an arrangement resembling grapes.Saureus is often found on the surface of the skin. If the skin layer experiences scratches or friction, bacteria can enter the wound and blood vessels and can cause bacteremia. Indonesian people have long used plants as medicines because it is believed that plants have fewer side effects than chemical drugs. 3 Papaya leaves are often used as traditional medicine to cure various diseases. Papaya leaves are often prepared by boiling from fresh plant material. The disadvantage of using fresh plants is that they rot quickly if not used immediately. The use of traditional plants is still often used by people who live far from urban areas, so that people use plants that have the same properties to treat diseases.

The papaya plant is a type of tropical plant that grows widely in Indonesia. Papaya is one of the herbal plants with a different shape than other herbal plants. As a herbal plant, papaya has various health benefits such as anti-inflammatory, antioxidant, antifungal and antibacterial. According to research by Candra et al. 2024 Papaya has bioactive compounds that are useful as anti-inflammatory, antiseptic and antibacterial. Compounds contained in papaya leaf extract include alkaloids, tannins, flavonoids, terpenoids and saponins which are antibacterial. The levels of bioactive compounds will be directly proportional to the potential inhibitory power of these compounds on bacterial growth. The papaya leaf extraction process can be carried out by maceration using 96% ethanol solvent. Ethanol is a solvent that can filter most of the secondary metabolites in papaya leaf simplicia. Ethanol has the molecular formula C2H5OH. C2H5 is non-polar, while OH is polar, so ethanol can attract bioactive compounds in papaya leaves.

METHOD

The research method carried out was an experimental laboratory type to test the concentration of papaya leaf ethanol extract with varying concentrations to inhibit the growth of Staphylococcus aureus bacteria in order to determine the antibacterial inhibitory power. The population used in this research was papaya leaves (Carica papaya L.) obtained in Lampoh Keudee village, Kuta Baro subdistrict, Aceh Besar district. The sample is a small portion of the population that is usually used for research. For this research, the samples used were Staphylococcus aureus bacteria and papaya leaves (Carica papaya L). This research was carried out from December 2023 to February 2024. Sample collection was carried out in Lampoh Keude Village, Kuta Baro District, Aceh Besar Regency. Determination tests, phytochemical tests and bacterial isolation were carried out at the Microbiology Laboratory, Biology Department, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Banda Aceh City.

A kg sample of papaya (Carica papaya L) leaves was selected by wet sorting and dry sorting, then dried by air drying. After drying the papaya leaves, immediately powder them with a simplicia blender and then sift them with mesh no. 20/40 to obtain papaya leaf powder with a homogeneous degree of fineness. Pollination is carried out to obtain particles that have a small surface area so that the extraction solvent can contact and filter the compounds contained. Extraction is carried out using the maceration method. Put 500 grams of papaya leaf powder into a jar, then add 96% ethanol as a solvent. Next, the vessel is closed, the papaya leaves are soaked for 3 days and stirred occasionally. After 3 days, the marinade obtained was filtered and a liquid extract was obtained, and concentrated using a vacuum rotary evaporator so that the extract became thick. Then the extract is divided into 3 concentrations, namely 25%, 50% and 75%.

Identification of active compounds was carried out by phytochemical tests, phytochemical tests for the content of active compounds qualitatively by testing reagents from the ethanol extract of papaya leaves dissolved in a small amount of solvent, then carrying out flavonoid tests, saponin tests, terpenoid tests and tannin tests. Testing was carried out at the Microbiology Laboratory, Biology Department, FMIPA, Syiah Kuala University. The antibacterial activity test was carried out using the diffusion method, namely by using a disc. Antibacterial substances are saturated into paper discs planted in solid agar seeding media that have been mixed with the bacteria being tested, then incubated at 37°C for 18-24 hours. Next, observe the presence of a clear area (zone) around the paper disc which indicates the presence or absence of bacterial growth.

Observation of the antibacterial inhibition zone is based on the diameter formed, marked by the presence of a clear area around the paper disc placed on the incubating bacteria. Measurement of the diameter of the inhibition zone using a caliper on bacteria that have been incubated for 1x24 hours. The inhibition zone is measured in the clear area around the disc. This clear area does not grow bacteria because bacteria are sensitive to the antibacterials on the disc. The inhibition zone categories in this study are as follows: ≤ 5 mm is the weak category, the 6-10 mm inhibition zone is the medium category, the 11-20 mm inhibition zone is the strong category, and the inhibition zone ≥ 20-30 mm is the very strong category. Analysis of the data used to determine the antibacterial activity of papaya leaf ethanol extract on the growth of S.aureus bacteria used the Shapiro-Wilk normality test, then a homogeneity test was carried out using the Lavene test, then the data was analyzed using the non-parametric statistical Analysis of Varience (ANOVA) test, and to To determine the effectiveness of the broadest antibacterial inhibitory power, Duncan's poshoc test will be carried out.

RESULTS AND DISCUSSION

Contents Results and Discussion

The papaya leaves (Carica Papaya L) used were determined in the Laboratory of the Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Biology Study Program. Based on the results of the determination that has been carried out, it can be confirmed that the plant used in this research is the correct species (Carica papaya L). The simplicia that has been

made is extracted using 96% ethanol solvent. The extraction method uses the maceration method, namely extraction without heating which aims to not damage the secondary metabolic compounds contained in papaya leaves. Ethanol solvent was chosen because it can attract both polar and non-polar compounds found in papaya leaves. The presence of a hydroxyl group in the ethanol compound means it can attract all polar compounds and the presence of a methyl group means that ethanol can attract all non-polar compounds in papaya leaves. The dissolution method using the maceration method was used to extract, 500g of papaya leaf powder was put into a jar and 750mL of 96% ethanol was added as a solvent. Papaya leaves were soaked in 96% ethanol solution for three days, consistently stirring once every day for 10 minutes. After three days, the soak is filtered using filter paper to get a liquid extract which will then be evaporated using a vacuum rotary evaporator to get the extrak thick.

PHYTOCHEMICAL TEST RESULTS OF PAPAYA LEAVES

Table 1. Phytochemical Test Results of Papaya Leaves (Carica papaya L)

No.	Test Type	Reactor	Information	Results
1.	Alkaloids	Dragendrof	Orange/Red brown	(+)
2.	Flavonoids	Concentrated HCl+Mg powder	Brownish yellow	(+)
3.	Saponin	HCl 2N	Forms stable foam	(+)
4.	Steroids	Acetic acid+H2SO4 reagent	Color changes to green	(+)
5.	Tannin	FeCl3	Blackish Green	(+)

Note: The results of the phytochemical test on papaya leaf extract are positive for containing alkaloids, flavonoids, saponins, steroids and tannins.

BACTERIA TEST RESULTS ON PAPAYA LEAVES

Table 2. Test results for the antibacterial activity of papaya leaf extract against staphylococcus aureus bacteria

Test	Positive Control	Negative Control	Sample concentration		
	Ciprofloxacin	*Sterile Aquadest*	25%	50%	75%
1	25.3	0	6.3	6.6	7.9
2	24.6	0	6.1	6,7	8.1
3	24.2	0	6.2	6,8	7.5
Average	24.7	0	6.2	6,7	7.8

The table above shows that repetitions 1, 2, and 3 with a concentration of 25% obtained an average inhibition zone of 6.2 mm, a concentration of 50% obtained an average inhibition zone of 6.2 mm, a concentration of 50% obtained an average inhibition zone of 6. .7 mm and a concentration of 75% obtained an average inhibition zone of 7.8 mm.

RESULTS OF ANALYSIS OF VARIANCE (ANOVA) NON PARAMETRIC STATISTICS

Table 2. Test results for the antibacterial activity of papaya leaf extract against staphylococcus aureus bacteria

Diversity Source	Fcount	Ftable
Concentration	3029.028	3.478049691

In the table above, the value Fcount (3029.028) > Ftable (3.478049691) is obtained, so we accept the alternative hypothesis (H1) and reject the null hypothesis (H0). In this context, the conclusion that can be drawn is that there is sufficient evidence to state the antibacterial activity of papaya leaf extract against Staphylococcus aureus bacteria.

CLOSING

Conclusion

Based on the discussion above, it can be concluded that there is an influence of the concentration of papaya leaf extract on the ability to inhibit the growth of Staphylococcus aureus bacteria. The results of statistical analysis using the ANOVA test showed that variations in the concentration of papaya leaf extract had a significant impact on the ability to stop the growth of Staphylococcus aureus bacteria. The higher the concentration of the extract, the greater the ability of the extract to inhibit the growth of Staphylococcus aureus bacteria, this is in line with research conducted by Wulandari et al who tested papaya leaf extract in 100% and 200% extract concentrations against S. aureus bacteria and produced inhibitory power. strong at 21 mm for a concentration of 100% and 27 mm for a concentration of 200%. Papaya leaves (Carica papaya L) contain active compounds including alkaloids, flavonoids, saponins, steroids and tannins. Phytochemical tests show the presence of secondary metabolic compounds in papaya leaves. This is in line with research conducted by Candra et al and Santi et al which also stated the presence of these compounds in papaya leaves.

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