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UJI EFEKTIVITAS EKSTRAK ETANOL DAUN KEDONDONG (Spondias dulcis) TERHADAP BAKTERI Staphylococcus aureus

Test Of Effect Kedondong Leaf Ethanol Extract (Spondias Dulcis) On Staphylococcus Aureus Bacteria

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Abstrak

Bakteri penyebab infeksi dan banyak ditemukan di lingkungan kita, salah satunya adalah bakteri Staphylococcus aureus. Beberapa penyakit menular juga disebabkan oleh Staphylococcus aureus, antara lain selulitis, acne (jerawat), dan infeksi Staphylococcal Scalded Skin Syndrome (SSSS). Untuk mengetahui apakah ekstrak etanol daun kedondong (EEDK) memiliki aktivitas antibakteri terhadap bakteri Staphylococcus aureus. Penelitian ini menggunakan metode eksperimen laboratorium dengan beberapa tahapan seperti pengambilan sampel, identifikasi tanaman untuk pembuatan simplisia, skrining fitokimia, pembuatan ekstrak dan pembuatan larutan uji ekstrak daun kedondong dengan variasi konsentrasi 15%, 25%, 35% dan kontrol positif. (Kloramfenikol), kontrol negatif (DMSO), dan uji aktivitas antibakteri menggunakan metode paper disc. Hasil skrining fitokimia simplisia daun kedondong (Spondias dulcis) didapatkan bahwa daun kedondong mengandung metabolit sekunder seperti alkaloid, flavonoid, tanin dan saponin yang berpotensi menghambat pertumbuhan bakteri. % sebesar 9,4 mm, konsentrasi 25% sebesar 13,5 mm dan daya hambat terbesar pada konsentrasi 35% sebesar 19,5 mm. Ekstrak daun kedondong memiliki aktivitas antibakteri terhadap pertumbuhan bakteri Staphylococcus aureus dengan kategori sedang hingga kuat. menghambat aktivitas bakteri Staphylococcus aureus adalah konsentrasi 35%. Berdasarkan uraian di atas diketahui bahwa EED dengan konsentrasi 35% memiliki efek antibakteri yang paling besar dibandingkan dengan konsentrasi 15% dan 25%. dan dapat disimpulkan bahwa semakin tinggi konsentrasi ekstrak yang digunakan maka semakin tinggi pula efek antibakterinya.

Kata kunci: Anti bakteri, Staphylococcus aureus, daun kedondong.

Abstract

Bacteria that cause infection and disease are commonly found in our environment, one of which is Staphylococcus aureus bacteria. Several infectious diseases are also caused by Staphylococcus aureus, including

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cellulitis, acne (acne), and infection with Staphylococcal Scalded Skin Syndrome (SSSS). To determine whether the ethanol extract of kedondong leaves (EEKL) has antibacterial activity against Staphylococcus aureus bacteria. This study used a laboratory experimental method with several stages such as sample collection, identification of plants for making simplicia, phytochemical screening, extract preparation and preparation of kedondong leaf extract test solutions with various concentrations of 15%, 25%, 35% and positive control (Chloramphenicol), negative control (DMSO), and antibacterial activity testing using the paper disc method. The results of phytochemical screening of kedondong leaf simplicia (Spondias dulcis) found that kedondong leaves contain secondary metabolites such as alkaloids, flavonoids, tannins and saponins that have the potential to inhibit bacterial growth. % of 9.4 mm, 25% concentration of 13.5 mm and the greatest inhibition was at a concentration of 35% of 19.5 mm. Kedondong leaf extract has antibacterial activity against the growth of Staphylococcus aureus bacteria, with moderate to strong categories. inhibit the activity of Staphylococcus aureus bacteria is a concentration of 35%. Based on the description above, it was found that the EEKL with a concentration of 35% had the greatest antibacterial effect compared to the concentration of 15% and 25%. and it can be concluded that the higher the concentration of the extract used, the higher the antibacterial effect.

Keywords: Anti-bacterial, Staphylococcus aureus , kedondong leaves.

1. INTRODUCTION

Bacteria that cause infection and disease are commonly found in the environment around us, one of which is the Staphylococcus aureus bacteria, this bacterium can survive in an environment containing high concentrations of salt. Staphylococcus aureus bacteria easily reproduce because they can grow at a maximum temperature of around 300C (Mustika, 2018).

Previous research conducted by Surya Aulia Rahman and Sumijan (2021) entitled an expert system using the case based reasoning method in the accuracy of diseases caused by Staphylococcus aureus bacteria stated that Staphylococcus aureus is the most worrying bacteria in the world of health because it is highly pathogenic and can cause infection. weight in an initially healthy individual. Staphylococcus aureus has cells that are gram positive, spherical in shape (cocci) 0.7 – 0.9 µm in diameter, non-spore forming, non motile, facultative anerobes, in colonies with a distinctive shape like a series of grapes. This bacterial infection in humans has varying degrees of severity, from minor skin infections (furunculosis and inpertigo), urinary tract infections, respiratory tract infections to eye infections.

Staphylococcus aureus is the cause of various types of infections and syndromes in humans, especially skin and soft tissue infections, Staphylococcus aureus infection is characterized by tissue damage and followed by a purulent abscess. Several infectious diseases that are also caused by Staphylococcus aureus include: Cellulitis, acne, and Staphylococcal

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Scalded Skin Syndrome (SSSS) infection (Nurfitri Arfani, 2021).

The prevalence of acne varies from country to country. Acne often occurs at the age of puberty. Around 35 – 100% of teenagers are estimated to have experienced acne. The incidence of SSSS (Staphylococcal Scalded Skin Syndrome) in the general population ranges from 0.09 - 0.56 cases per 1 million population. There were no sex differences in the incidence of SSSS (Meshram et al, 2018).

Based on research conducted by Anggriani Fusfita et al, (2021) the Kedondong plant is used as a traditional medicine for the treatment of diarrhea, dysentery, mouth and throat infections. The kedondong plant contains flavonoids, saponins and tannins which are active compounds a

Saponins work as antimicrobials by interfering with the stability of the bacterial cell membrane, causing cell bacteriosis. Flavonoids have an antimicrobial effect through their ability to form complexes with extracellular proteins which are soluble proteins and with bacterial cell walls (Kusumawati et al, 2017).

Tannins are secondary metabolites which are classified as condensed phenolic compounds and are widely found in Angiosperm plants. Tannins at low concentrations can inhibit the growth of germs and at high concentrations can kill bacteria. Phenolic compounds work as antimicrobials by coagulating or agglomerating the germ protoplasm so that stable bonds are formed with germ proteins and in the digestive tract, tannins are known to be able to eliminate toxins (Kusumawati et al, 2017).

2. METHOD

This study used a laboratory experimental method with several stages, namely sample collection, identification, manufacture of simplicia, examination of simplicia characteristics, phytochemical screening, preparation of extracts and preparation of test solutions for kedondong leaf extract with various concentrations and testing of antibacterial activity of ethanol extract of kedondong leaves against Staphylococcus aureus.

Material And Tools

Kedondong leaves from Kab. Deli Serdang, DMSO, 96% ethanol, aquadest, Staphylococcus aureus, and acetic acid while the tools such as laboratory glasses, scales, blender, evaporating dish, petri dish, cotton, disc paper, tweezers, autoclave, aluminum foil, beaker glass, oven, caliper, osce needle, NA (Merck), chloramphenicol.

Making Extract

Samples in the form of kedondong leaves were collected and then cleaned of the remaining dirt, then washed with running water until clean. After cleaning from dirt, the kedondong leaves are drained, then dried in the wind. After that, the dried samples were chopped into small pieces and then dried in a drying cabinet with a temperature of + 40^0C. Samples that have dried are usually determined by their friable texture. Then grind it with a blender until it becomes powder. The resulting powder is then sifted with a sieve, until a fine and homogeneous powder is obtained. The result is stored in a tightly closed container (Retnaningsih, 2019).

The ethanol extract of kedondong leaf powder was prepared by maceration by weighing 500 grams (0.5kg) of kedondong leaf simplicia powder. Then, the sample was put into a glass jar, 96% ethanol was added, then stirred for the first 6 hours, then allowed to stand for

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24 hours. then filtered the extract obtained using filter paper. The dregs were macerated again with 96% ethanol then stirred for the first 6 hours then allowed to stand again for 24 hours, then evaporated using a rotary evaporator to obtain kedondong leaf extract. The resulting thick extract is put into a water bath and evaporated until all the ethanol solvent has evaporated. The extract was weighed and stored in a closed glass container before being used by the tester (Rosmania, 2020).

Antibacterial Activity Test

A sterilized petri dish was prepared, after which 20 ml Na media was poured into the cup and allowed to stand until it solidified, then Staphylococcus aureus suspension was inoculated using a sterile cotton swab onto the surface of the media until evenly distributed. Then take paper discs with a diameter of 6 mm using sterile tweezers, put them into EEDK concentrations of 15%, 25%, 35% which have previously been dissolved with extract, and positive controls using cholamphenicol solution and negative controls using 1% DMSO after that incubation at 37ºC for 24 hours, observed using a caliper and measuring the inhibition zone formed (Binugraheni, 2020). Inhibitory zone activity is grouped into 4 categories: weak activity 10-20 mm, very strong > 20-30 mm.

Data Analysis

The data that has been obtained is then analyzed using the One Way Anova Test (one-way analysis of variance) to determine the difference between each concentration of EEDK which inhibits the growth of Staphylococcus aureus bacteria.

3. RESULTS AND DISCUSSION

The results of the phytochemical screening of kedondong leaf simplicia (Spondias dulcis) found that kedondong leaves contain secondary metabolites such as alkaloids, flavonoids, tannins and saponins which can be seen in Table 1.

Table 1. Results of the Phytochemical Screening of Kedondong Leaf Extract

Compound Class	Results
Alkaloids	+
Flavonoids	+
Tannins	+
Saponins	+

Secondary metabolite compounds from alkaloids work by interfering with the constituent components of peptigglycan in bacterial cells, so that the cell wall layer is not formed completely and causes cell death (Rosmania, 2020).

Flavonoids work as antibacterials by forming complexes with extracellular proteins that can dissolve with bacterial cell walls (Kusumawati et al, 2017).

Tannins work as an antibacterial by coagulating or agglomerating the germ protoplasm so that a stable bond is formed with the germ protein in the digestive system (Kusumawati et al, 2017).

Antibacterial effectiveness test in this study used the paper disc diffusion method and used Staphylococcus aureus bacteria. The inhibition zone (clear) formed from the test results was measured using a manual caliper with millimeter (mm) accuracy. The results of measuring the antibacterial activity test of the ethanol extract of kedondong leaves can be seen in Table 2 and figure 1 and 2.

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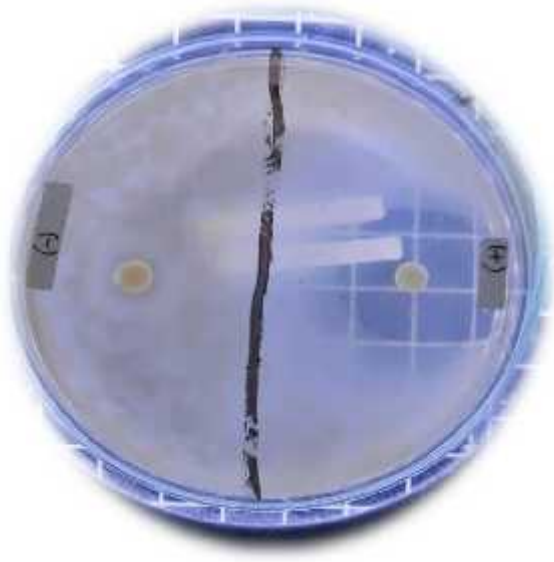
Table 2. Results of the Antibacterial Activity Test of Kedondong Leaf Extract.



SAMPLE	Repeat Diameter of Bacterial Inhibition Zone			Average Inhibition Zone (mm)
	1	2	3	
A	9,1	9,4	9,7	9,4
B	13,2	13,6	13,9	13,5
C	19,2	19,9	19,6	19,5
D	22,1	22,5	22,6	22,4
E	0	0	0	0

Note: A EEDK dose of 15%, B EEDK dose of 25%, C EEDK 35% dose, D positive control (chloramfenicol) and E negative control (DMSO)

In table 2 it can be seen that the inhibition zones resulting from several concentrations of kedondong leaf extract, namely 15%, 25% and 35% on the growth of Staphylococcus aureus bacteria have different diameter values and have different criteria for antibacterial strength. Some are of moderate to strong strength, because the range of inhibition zones formed is 9.4–19.5mm.

Figure 1. EEDK Concentration 15%, 25% and 35%

Figure 2. Positive control (chloramphenicol) negative control (DMSO)

The presence of secondary metabolites such as alkaloids, flavonoids, saponins and tannins in EEDK can inhibit the growth of Staphylococcus aureus bacteria with a variety of different mechanisms, alkaloids work by interfering with the peptidoglycan component in bacterial cells so that the cell wall layer is not formed intact and causes cell death. Flavonoids have an antimicrobial effect through their ability to form complexes with extracellular proteins and soluble proteins as well as with bacterial cell walls, saponins work as antimicrobials by disrupting the stability of the bacterial cell membrane, causing cell bacteriosis, and tannins work by coagulating and agglomerating the germ protoplasm so that bonds are formed. which is stable with germ protein in the digestive system (Kusumawati et al, 2017)

4. CONCLUSION

EEDK has antibacterial activity against the growth of Staphylococcus aureus bacteria, with a concentration of 15%, 25%, 35% of each of these concentrations having moderate to strong bacterial inhibition. The concentration that was most effective in inhibiting the activity of Staphylococcus aureus bacteria was a concentration of 35%, where the inhibition zone formed was 19.5mm, and it can be concluded that the higher the concentration of the extract used, the more the antibacterial effect will increase.

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