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Original Articles

ANTIMICROBIAL ACTIVITY OF TELANG LEAF EXTRACT AGAINST STAPHYLOCOCCUS AUREUS AND CANDIDA ALBICANS

Semi Naim [1], Elly Rustanti [2*], Siti Mudrikatin [3]

[1] Program of Study Midwife Professional, College of Health Sciences Husada Jombang
[2] Program of Study Ners, College of Health Sciences Husada Jombang
[3] Program of Study of Bachelor Degree of Midwifery, College of Health Sciences Husada Jombang

Correspondence:
Elly Rustanti
Program of Study Ners, College of Health Sciences Husada Jombang
e-mail: eilrose1211.er@gmail.com

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ABSTRACT

Background: Infectious diseases that women often experience in obstetric cases are usually problems in the vaginal area, puerperal infections and some cases of infections of the reproductive organs. Efforts to reduce the negative impact of infection can be done by looking for compounds that have antimicrobial activity, one of which is Telang Leaf (Clitoria ternatea). Telang leaves contain flavonoids, flavanols, kaempferol, quercetin and mirisetin. From the results of various studies Telang Leaves have a pharmacological influence as an antimicrobial.
Objectives: The purpose of this study was to determine the activity of telang leaf extract against the growth of Staphylococcus aureus bacteria and Candida albicans fungi based on the diameter of the inhibitory zone.
Design: This research used experimental design.
Methods: The research method used is experimental laboratories. The test was carried out by extracting Telang leaves by the maceration method, then evaporated with a rotary evaporator so that a concentrated extract was obtained. Extracts Made concentrations of 10%, 20%, 30%, 40% and 50%. The antimicrobial activity test of the extract against Staphylococcus aureus bacteria and candida albicans fungus was carried out by disc diffusion method.
Results: The results showed that negative controls did not have an inhibitory zone diameter. The average diameter of the inhibition zone of telang leaf extract in Staphylococcus aureus is the highest with a concentration of 50%, which is 17.8 mm and a positive control of 42.6 mm. while in candida albicans fungus with a concentration of 50% with an inhibitory diameter of 16.5 mm and a positive control of 26.2 mm.
Conclusion: The conclusion is that telang leaves have antimicrobial activity at a concentration of 50% against Staphylococcus aureus and candida albicans. So that, telang leaf extract can be developed as a treatment in infectious diseases in case of obstetrics.

Keywords: Antimicrobials, Telang Leaves, Candida Albicans, Staphylococcus Aureus.

INTRODUCTION

Infectious diseases in Indonesia are the main health problems in developing countries. Where this is the main cause of 50,000 people dying every day worldwide (Kemenkes RI,

2019). Infectious diseases that are often experienced by women in obstetrics are usually problems in the vaginal area or vaginal discharge (fluor albus), puerperal infections and some cases of infections of the reproductive organs. Fluor albus is excessive discharge from the vagina that is not menstrual blood. The causes of vaginal discharge according to WHO (2020) are 25%-50%. candidiasis, 20%-40% bacterial vaginosis and 5%-15% trichomoniasis (Marhaeni, 2016). While puerperal infection is one of the causes of maternal death in Indonesia with an incidence rate of 7.3% worldwide (Kemenkes RI, 2020). Several causes of puerperal infection such as obstetric services, immune system, postpartum care, and genital hygiene (Kate, Chappell, & Shennan, 2016). One of the causes of puerperal infection is Staphylococcus aureus bacteria (Alhuda, 2020). The number of cases of diseases caused by microbes, especially infections in obstetrics, has resulted in a significant increase in the use of antibiotics. The continuous use of antibiotics causes resistance and side effects of therapy. Efforts to reduce the negative impact of the effects of using antibiotics can be done by searching for compounds that have antimicrobial activity, one of which is Telang Leaf (*Clitoria ternatea*).

Figure 1. Telang Leaves

Telang leaves contain flavonoids, flavanol glycosides, kaempferol glycosides, quercetin glycosides and myrisetin glycosides (Budiasih, 2017). From the results of various studies, Clitoria ternatea has pharmacological effects as antimicrobial, antiparasitic, anti-inflammatory, anticancer, antioxidant, antidepressant (Purba, 2020). Therefore, it is necessary to further investigate the antimicrobial effectiveness of the extract of telang leaf against Staphylococcus aureus and Candida albicans.

METHODS

Materials

Telang leaves, 96% ethanol, aquades, Streptococcus aureus bacterial culture, candida albicans fungus culture, NA media, SDA, DMSO, amoxilin, Ketoconazole.

Preparation of Sample

Telang leaves are cleaned of dust as well as dirt by washing. After that it is dried in the oven at a temperature of 45 ºC for 72 hours. Next it is mashed with a blender and sifted so that a fine powder is obtained.

Extraction of Telang Leaves

The 500 grams of telang leaf powder soaked in 1 L of ethanol 96% solvent with a solvent

ratio of 1:5 (w/v) was made 5 more soakings in the ratio. Soaking is carried out for 6 days with several stirrings. The resulting extract is vacuum filtered and the filtrate is concentrated with a rotary evaporator vacuum so that a viscous extract is obtained and then tested for antimicrobial activity.

Antimicrobial Activity Test

Antibacterial Test

The 100 µl suspension of Staphylococcus aureus is put into a sterile petri dish, then 10 mL of liquid NA media is inserted, and the media is allowed to solidify. On the NA medium is placed sterile disch paper that has been soaked with concentrated extract of telang leaves with a concentration og 0.1 g/mL (10%) for minutes. Disc paper is laid out on the surface of the subtrate using tweezers and pressed slightly. Then incubated at 37 ºC for 24 hours. The positive control used is amoxicillin 10% and the negative control used is DMSO. After 24 hours, it was observed whether there was a clear zone around the disc paper.

Antifungal Test

The 100 µl Suspension of Candida albicans is put into a sterile petri dish, then 10 mL of liquid SDA media is inserted, and the media is allowed to solidify. On the SDA medium is placed sterile disc paper that has been soaked with concentrated extract of telang leaves with a concentration of 0.1 g/mL (10%) for 30 minutes. Disc paper is laid out on the surface of the substrate using tweezers and pressed slightly. Then incubated at 37 ºC for 24 hours. The positive control used is 10% ketoconazole and the negative control used is DMSO. After 24 hours, it was observed whether there was a clear zone around the disc paper.

RESULTS AND DISCUSSION

In this research which was carried out in accordance with the stages of research is a sample preparation, the process of taking the active compounds of Telang leaves with maceration method, the results of the extract were then tested for antimicrobial activity by looking at its inhibitory zone against S. aureus bacteria and C. albicans fungi. The details of the stages of research that have been carried out are as follows:

Sample preparation

Sample preparation is carried out by sorting Telang leaves, cleaning then dried in an oven with a temperature of 45ºC for 72 hours. Drying With low temperatures it is carried out to avoid chemical changes in the content of active compounds of soursop leaves. Drying in the oven serves to speed up the removal of water and obtain samples with low moisture content, so it is not easily rotten during storage. The dried samples are then ground and sifted with a 90 mesh sieve. The resulting simplician powder can be seen in the following figure:

Figure 2. Dried leaves and telang leaf powder

Grinding and sifting are carried out in order to expand the surface so that the tissue cells containing the compounds to be isolated are easily bound by the solvent and the compounds can dissolve as much as possible in the solvent during the process
maceration extraction.

Telang Leaf Extraction

At this stage, the extraction of telang leaves (*Clitoria ternatea* L.) is carried out with the aim of obtaining extracts from telang leaves. Extraction methods used in this study is maceration extraction. Maceration is an extraction process simplicial uses a solvent with several stirrings at room temperature. In this study, the solvent used in the maceration process was 96% ethanol. Ethanol is used as a solvent because it is polar, universal and easy to obtain. In addition, ethanol is also a solvent for organic and inorganic substances (Niranjan, Vaishnav, Mankar, 2020). The purity of the lowest ethanol solvent that can dissolve a secondary metabolite compound is 66%, so 96% ethanol is expected to be able to extract

The purity of the lowest ethanol solvent that can dissolve a secondary metabolite compound is 66%, so 96% ethanol is expected to be able to extract more secondary metabolite compounds. Because the higher the ethanol concentration, the easier it will be in the process of separating secondary metabolite compounds from the sample (Budiasih, 2017). The 96% ethanol is also able to inline the compounds needed to test the activity of telang leaves, namely phenolics, flavanoids, alkaloids, terpenoids, and steroids. The maceration process is carried out for 5 days and the extract obtained is then separated with the solvent using a vacuum rotary evaporator and obtained a thick extract of ethanol in a deep green color.

Antimicrobial Activity Test

This study was conducted to test the antimicrobial activity of telang leaf extract against the bacterium Streptococcus aureus and the fungus Candida albicans in vitro. When the test culture is given a certain substance that is antimicrobial, its growth will be inhibited. The inhibitory zone is a clear zone located around the disc paper on a medium that has been inoculated by bacteria or a zone where there is no growth of streptococcus aureus and the fungus Candida albicans. In this study, microbes will be inhibited by telang leaf extract with several concentrations of 10%, 20%, 30%, 40%, 50% using disc paper.

In the inhibitory power test, concentration variations were made, the purpose was to find the concentration of extracts that are effective in inhibiting the growth of Streptococcus aureus bacteria, The higher the concentration of the extract the higher the inhibitory power. The diameter of the inhibitory zone can be seen in table 1.

The following are the results of the inhibitory zone of telang leaf extract against S. aureus bacteria:

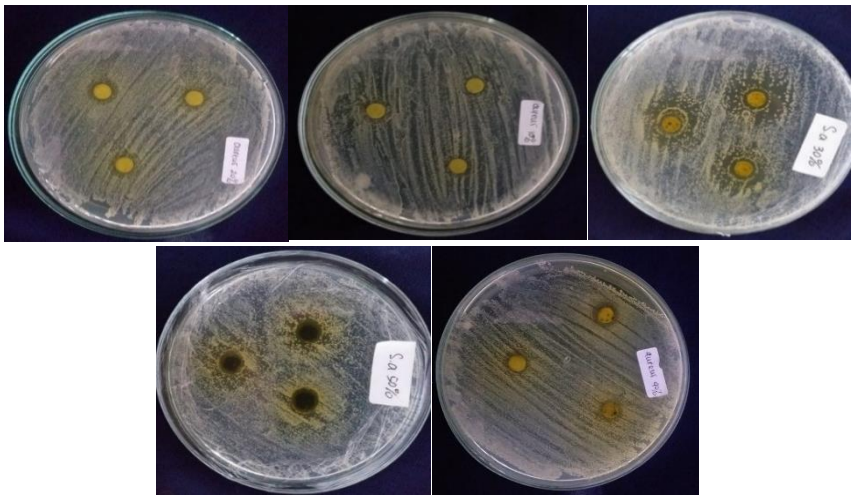

Figure 3. Extract Inhibition Zone against S. Aureus.

Table 1. Results of the inhibitory power test of Telang leaf extract against Streptococcus Aureus.

Sample Extract telang leaf	*Diameter of the Inhibitory Zone (mm)*		
	U1	*U2*	*U3*
10%	*10.0*	*10.4*	*11.4*
20%	*12.2*	*11.2*	*12.2*
30%	*11.8*	*11.9*	*12.9*
40%	*10.0*	*10.5*	*8.7*
50%	*17.8*	*10.4*	*10.3*
K-	*0*	*0*	*0*
K+	*42.6*	*43.0*	*43.7*

Based on Figure 3. and Table 1., The extract that gives the highest inhibitory Zone is Telang leaf extract which is effective in inhibiting the growth of Streptococcus aureus bacteria with an inhibitory diameter of 17.8 mm in the medium category. The result was smaller compared to the positive control of pure amoxicillin with an inhibitory zone of 42.6 mm.

In the inhibitory power test, concentration variations were made, the purpose was to find the concentration of the extract that is effective in inhibiting the growth of the fungus Candida albicans, The higher the concentration of the extract the higher the inhibitory power. The diameter of the inhibitory zone can be seen in table 2.

Meanwhile, the results of the inhibitory zone of Telang leaf extract against C. Albicans fungi are as follows:

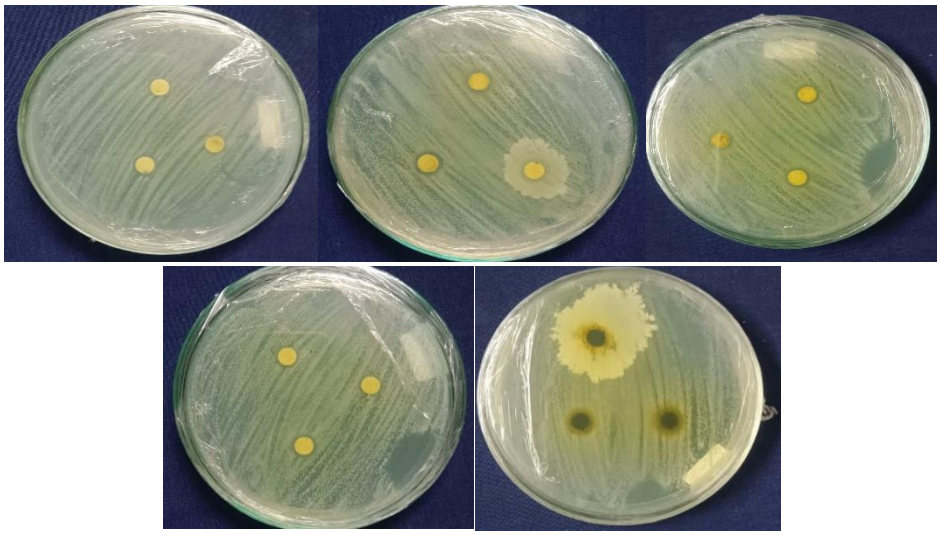

Figure 4. Extract Inhibition Zone against C. Albicans.

Table 2. Results of the inhibition test of Telang leaf extract against Candida Albicans.

Sample	*Diameter of the Inhibitory Zone (mm)*		
Extract Telang Leaf	*U1*	*U2*	*U3*
10%	8,6	8,8	6,6
20%	8,5	9,9	8,6
30%	11,0	9,6	9,4
40%	9,5	9,9	9,5
50%	*16,5*	*15,0*	*12,3*
K-	0	*0*	*0*
K+	*26.2*	*24.6*	*25,8*

Based on Figure 4. and Table 2., The extracts that provide the highest inhibitory zone are the extracts that are effective in inhibiting the growth of candida albicans with an inhibitory diameter of 16.5 mm in the moderate category. The result was smaller compared to the positive control of ketoconazole with an inhibitory zone of 26.2 mm.

This is possible because the test extract used contains active compounds that act as antibacterial, so they are able to inhibit the growth of bacteria and test fungi. Based on research by Niranjan, Vaishnav, Mankar (2020) showed that the antimicrobial activity of Telang flower methanol extract showed inhibition of *E. Coli* 12 mm, Pseudomonas aeruginosa 11 mm, Bacillus subtilis 11.5 mm, and staphylococcus aureus 10 mm. The inhibitor zone the large may be due to the high active substances present in the extract. The non-formation of inhibitory zones at certain concentrations is due to the small concentration of active substances so that it has not been able to inhibit microbes. The formation of an inhibitory zone around the disc paper indicates that inside the extracts from plants contain compounds that are antimicrobial.

CONCLUSION

Telang leaf extract has antimicrobial activity at a concentration of 50% against Staphylococcus aureus and candida albicans. This is because the test extract used contains active compounds that act as antimicrobials, so that they can inhibit the growth of bacteria and fungi. Based on the results of these studies, the extract of the leaves of Telang can be developed as a treatment in infectious diseases in obstetrics.

LIMITATION

There are no limitations in carrying out this research.

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