Antibacterial Activity Of Daemonorops Draco (Willd) Blume Fruit Ethanol Extract Against Some Bacterial Pathogens

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Abstract
Daemonorops draco (Willd.) Blume fruit has been used as a traditional medicine which is well-known as an antiseptic, stimulates blood circulation, anti-microbial, anti-viral, anti-tumor, wound medicine, diarrhea, fractures, gonorrhea, minor burns and others. Daemonorops draco (Willd.) Blume belonging to the Arecaceae tribe contains a class of chemical compounds such as alkaloids, flavonoids, tannins, saponins, steroids/triterpenoids, and glycosides. Flavonoid compounds, saponins and tannins are chemical compounds that have potential as antibacterial and antiviral. This study aims to determine the characteristics of simplicia, phytochemical screening, antibacterial activity test of the ethanol extract of Daemonorops draco (Willd.) Blume fruit.Simplicia characterization includes organoleptic, macroscopic, microscopic examination, determination of water content. Extraction was carried out by maceration using ethanol as a solvent. Phytochemical screening was carried out on simplicia powder, fruit ethanol extract Daemonorops draco (Willd.) Blume, assay of antibacterial activity of extract using diffusion methodagar by observing the zone of inhibition against several test bacteria: Staphylococcus aureus, Escherichia coli, Salmonella thypi. The results of simplicia characterization obtained water content of 4.65%. The results of the phytochemical screening test of simplicia and ethanolic extracts contained groups of alkaloids, flavonoids, glycosides, saponins, tannins, steroids/triterpenoids. Having the highest antibacterial activity was ethanol extract from Gram positive Staphylococcus aureus bacteria followed by Gram negative bacteria Escherichia coli and Salmonella thypi at a concentration of 500 mg/ml with an effective inhibitory diameter of 15.5 mm, Escherichia coli at 14.3 mm, Salmonella typhi at 14, 8 mm.

Keywords: *Daemonorops draco(Willd.) Blume, Maceration, Antibacterial, Staphylococcus aureus, Escherichia coli, Salmonella typhi.*

I. INTRODUCTION

Microorganisms are one of the causes of various diseases. This can be seen from its ability to infect humans, animals and plants, causing various diseases from mild infections to death. several pathogenic bacteria that can cause infection such as Staphylococcus aureus, Escherichia coli and Salmonella typhi [1].Infectious diseases are still a serious problem in Indonesia, coupled with the increasing prevalence of microbial resistance to available antibiotic drugs.The World Health Organization has warned of growing antimicrobial resistance during a pandemic. One source of new antibiotics is medicinal plants derived from nature. The active components in medicinal plants have antimicrobial effects that are different from existing antibiotics. This shows the potential of medicinal plants in overcoming the problem of antibiotic[2]. Antibacterial is a substance or compound that has the ability to inhibit or kill the growth of harmful microorganisms. Most of the antibacterial compounds come from synthetic chemicals or from natural ingredients [3].

One of the medicinal plants originating from nature that has the potential for antibacterial effects is *Daemonorops draco* (Willd.) Blume fruit. Plants contain a red resin. The ripe fruit of *Daemonorops draco* (Willd.) Blume is reddish {Citation}. Producing a lot of resin is fruit that is old but not too ripe. When the fruit picked is ripe, the resin contained in the fruit of Daemonorops draco (Willd.) Blume has been reduced [5].Some research Antibacterial activity has previously been carried out against Daemonorops draco (Wild.) Blume species using commercially available resins, but the antibacterial activity test using ethanol extract extracted using the fruit of Daemonorops draco (Wild.) Blume in its intact form is very little reported. Based on the above background, researchers are interested in characterizing simplicia, screening for phytochemical simplicia and extracts, then conducting tests antibacterial activity of the ethanolic extract of Daemonorops draco (Willd.) Blume fruit which was prepared by maceration using ethanol solvent, then the antibacterial

activity was tested against the test bacteria Escherichia coli, Salmonella thypi, Staphylococcus aureus by the agar diffusion method in vitro.

II. METHOD

This research was conducted using the experimental method, by looking at the effect of the independent variable on the dependent variable. The sample used was Daemonorops draco (Willd.) Blume fruit obtained from the Aceh Jaya Regency area, the test bacteria: *Staphylococcus aureus, Escherichia coli, Salmonella typhi*.

a. Preparation *Daemonorops draco* (Willd.) Blume Fruit Dried Powder

Daemonorops draco (Willd.) Blume fruit is cleaned of dirt by washing it thoroughly with running water and draining it. The wet weight of the *Daemonorops draco* (Willd.) Blume fruit was then weighed, then dried in a drying cabinet at a temperature of 40-50^{o}C, the fruit was considered dry when it was brittle, then the dry weight was weighed. Furthermore, the sample was powdered using a blender, then stored in a plastic container in a place protected from sunlight before use and labeled.

b. Ethanol Extract Preparation of *Daemonorops draco* (Willd.) Blume. Fruit

Extracts were made by maceration method. One part of Daemonorops draco (Willd.) Blume dry simplicia powder was put into a maceration vessel, then 10 parts of 96% ethanol solvent were added. Soaked for the first 6 hours while stirring occasionally, then allowed to stand for 18 hours. The macerate is separated by filtration. The filtration process is repeated at least once with the same type and amount of solvent and the total volume of solvent is half the volume of the solvent in the first extraction. All the maserate was collected and the solvent was evaporated using a rotary evaporator at a temperature of 40oC, then dried using an oven at ±40oC to obtain a thick extract [6].

2.3 Antibacterial Activity Testing

Antibacterial activity testing of ethanol extract was carried out by agar diffusion method using paper backing, using *Staphylococcus aureus, Escherichia coli*, *Salmonella typhi bacteria* [7].

2.4 Data analysis

Data are presented as mean values with standard deviation values. Data analyzed with SPSS v.22 software

III. RESULT and DISCUSSION

3.1 Dried Powder of *Daemonorops draco* (Willd.) Blume. Fruit Macroscopic and Microscopic Examination

The results of macroscopic examination of the fruit of Daemonorops draco (Willd.) Blume are brownish red in color, hard and scaly texture, about 2 cm long, 3 cm wide, the tip of the skin is tapered and tastes bitter. The results of microscopic examination of the simplicia powder of Daemonorops draco (Willd.) Blume fruit showed sclerenchyma, flower base epidermis, loose pollen, unicellular hairs, transport bundles containing stone cells, essential oils.

3.2 Examination of the characteristics of Simplicia Powder Fruit Daemonorops draco (Willd.) Blume

The characteristics of the simplicia powder of jernang rattan fruit are not listed in the Materia Medika Indonesia book. The simplicia characterization examination is carried out to provide a purpose so that it is expected to meet the requirements as a raw material.

Table 1. Examination of the characteristics of simplicia powder and fruit ethanol extract of *Daemonorops draco* (Willd.) Blume

No	Characterization	Yield (%) Simplicity
1	Water content	4.65%
2	Water soluble juice content	9.62%
3	The content of the juice is soluble in ethanol	26.96 %
4	Total ash content	5.73%
5	Ash content is not soluble in acid	0.65%

Description: (-) = no treatment

Determination of the water content was carried out to determine the water content in simplicia, the simplicia powder of *Daemonorops draco* (Willd.) Blume fruit showed results that were smaller than 10%, namely 4.65%, meaning that simplicia standardization met the requirements of the Indonesian Ministry of Health (2011). Determination of the water soluble extract content to determine the levels of polar chemical compounds contained in the simplicia fruit *Daemonorops draco* (Willd.) Blume the result was 9.62%. Determination of ethanol soluble extract content to determine the concentration of soluble extract in ethanol solvent, both polar and non-polar compounds, the result was 26.96%. Determination of the total ash content was carried out to determine the levels of inorganic substances contained in simplicia of 5.73%, while the determination of the acid insoluble ash content was 0.65% to determine the levels of inorganic substances that were insoluble in acid [8].

3.3 Phytochemical Screening Result

The results of the phytochemical screening examination of the ethanol extract of the *Daemonorops draco* (Willd.) Blume fruit showed different results, which can be seen in Table 2 below.

Table 2. Phytochemical screening results of *Daemonorops draco* (Willd.) Blume. fruit

No	Compound	Simplicia powder	Ethanol Extract
1	Alkaloids	+	+
2	Flavonoids	+	+
3	Glycoside	+	+
4	Saponins	+	+
5	Tannins	+	+
6	Steroids/Triterpenoids	+	+

Description: (+) = contains a group of compounds,
(-) = does not contain a group of compounds.

Based on the results of the phytochemical screening examination of simplicia powder and ethanol extract of *Daemonorops draco* (Willd.) Blume fruit, there were chemical compounds of alkaloids, flavonoids, glycosides, saponins and tannins. These compounds are thought to provide antibacterial activity.There were chemical components belonging to the alkaloids, flavonoids, glycosides, saponins, and tannin groups found in the phytochemical screening investigation of simplicia powder, ethanol extract, and the fruit fraction of *Daemonorops draco* (Willd.) Blume. The phytochemical screening results of the n-hexane fraction, ethylacetate fraction, and residual fraction of *Daemonorops draco* (Willd.) Blume fruit were all distinct. Steroids are found in the n-hexane fraction; alkaloids, flavonoids, glycosides, saponins, and tannins are found in the ethylacetate fraction; and no chemical substances are found in the remaining fraction. Antibacterial action is thought to be provided by these chemicals.

3.4 Fruit Ethanol Extract Antibacterial Activity Test Results *Daemonorops draco* (Willd.) Blume.

The results of the antibacterial activity test of *Daemonorops draco* (Willd.) Blume fruit extract against *Staphylococcus aureus, Escherichia coli* and *Salmonella typhi* at concentrations of 500 mg/mL, 400 mg/mL, 300 mg/mL, 200 mg/mL, 100 mg/mL, 50 mg/mL, 25 mg/mL, and 12.5 mg/mL all provide inhibitory power. The results of the ethanol extract activity test can be seen in Table 3.The test results of the ethanol extract of *Daemonorops draco* (Willd.) Blume fruit can provide the ability to inhibit the growth of bacteria effectively. The diameter of the effective inhibition zone of the ethanolic extract on *Staphylococcus aureus* bacteria is 300 mg/ml with an inhibitory diameter of 14.0 mm, and on *Escherichia coli* bacteria is 500 mg/ml with a diameter of 14.3 mm, and *Salmonella typhi* bacteria is 500 mg/ml. ml with a diameter of 14.8 mm. According to the Ministry of Health of the Republic of Indonesia (1995) [9]., the diameter of the most effective antibacterial inhibition area for antibacterial testing is 14 to 16 mm. The results of the measurement of the diameter of the inhibition zone can be seen in the graphic image of the antibacterial activity test results of the ethanol extract of *Daemonorops draco* (Willd.) Blume fruit below [10].

Table 3. The results of the antibacterial activity of the ethanol extract of the jernang rattan fruit extract

No	Ethanol Extract Concentration mg/ml	Bacterial Growth Inhibitory Area Diameter (mm)*		
		Staphylococcus aureus	*Escherichia coli*	*Salmonella typhi*
1	500	15.5	14.3	14.8
2	400	14.8	13.4	13.7
3	300	14.0	11.2	13.2
4	200	13.6	10.4	11.7
5	100	12.8	9.0	9.8
6	50	11.7	8.1	9.3
7	25	11.0	7.3	8.5
8	12.5	9.6	6.8	7.6

Information:
* = Average measurement 3x

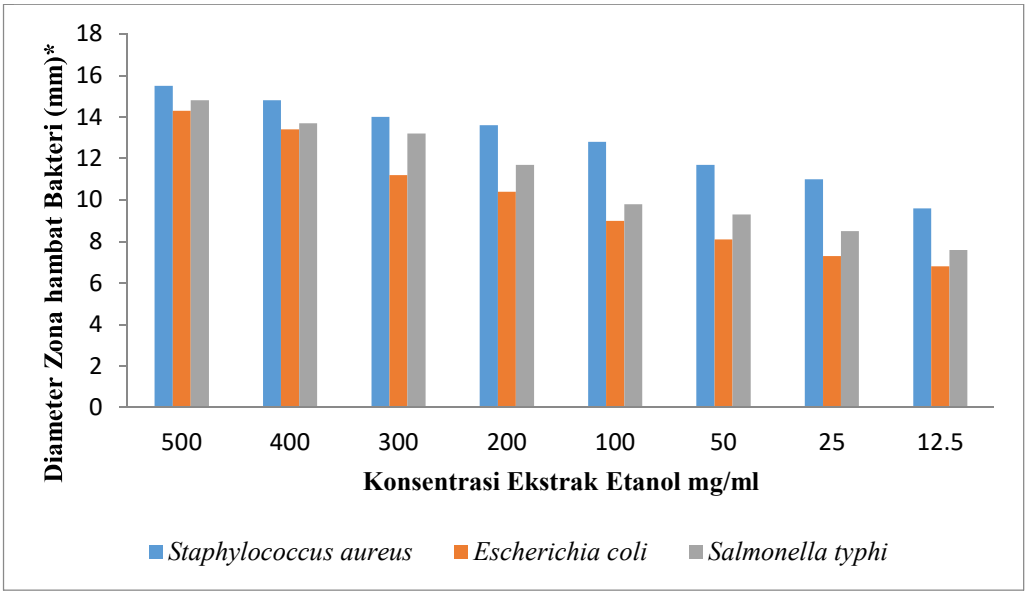

Fig 1. Graph of antibacterial activity test results of *Daemonorops draco* (Willd.) Blume fruit ethanol extract

In the figure, it can be seen that the greater the test concentration, the greater the diameter of the inhibition zone. This is due to the difference in the number of secondary metabolites contained at each concentration. The smaller the concentration, the less secondary metabolite content will be at that concentration because it is more dilute [11]. Previously, phytochemical screening had been carried out on simplicia and ethanol extract of *Daemonorops draco* (Willd.) Blume fruit, where the results obtained contained classes of chemical compounds suspected of having antibacterial properties such as alkaloids, flavonoids, glycosides, saponins, tannins, and steroids/triterpenoids. The antibacterial activity of the ethanolic extract of *Daemonorops draco* (Willd.) Blume fruit against these bacteria can be caused by its chemical content, namely alkaloid compounds, flavonoids, glycosides, saponins, tannins and steroids/triterpenoids. The SPSS test was carried out to see the difference in each treatment carried out, the value of the antibacterial activity index of the three test bacteria did not have similarities and had a very significant difference, namely ≥ 0.05.Gram positive *Staphylococcus aureus* gave a stronger inhibitory diameter than Gram negative bacteria *Escherichia coli* and *Salmonelle typhi*. This is because the ability of a compound to kill bacteria is also influenced by the type of bacteria, both Gram-negative and Gram-positive bacteria, because both have differences in their cell walls. Gram-negative bacteria are more difficult to inhibit because they have a more complex cell wall [12].

IV. CONCLUSION

Phytochemical screening results from *Daemonorops draco* (Willd.) Blume fruitcontains alkoloida, flavonoids, saponins, glycosides, tannins and steroids/triterpenoids. Antibacterial activity of ethanol extract *Daemonorops draco* (Willd.) Blume. Fruithas greater antibacterial activity in Gram-positive bacteria *Staphylococcus aureus*when compared to Gram negative bacteria *Escherichia coli* and *Salmonelle typhi.* The value of the antibacterial activity index of the three test bacteria did not have similarities and had a very significant difference, namely ≥ 0.05.

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