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ANTIBACTERIAL EFFECTIVENESS TEST OF KERSEN LEAVES (MUNTINGIA CALABURAL L) ON ESCHERICHIA COLI

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Abstract

The plant known as kersen leaf (Muntingia calabura L) is quite widespread in tropical regions and is frequently used by the local population as a traditional antibacterial because it has a number of pharmacological properties, one of which is the ability to kill Escherichia coli germs. The purpose of this study is to ascertain whether cherry leaf extract (Muntingia calabural L) inhibits Escherichia coli growth and whether cherry leaf extract (Muntingia calabural L) has an antibacterial impact on Escherichia coli. This study tested the ethanol extract of cherry leaves (Muntingia calabural L) against Escherichia coli bacteria using an experimental laboratory method. The collected data were examined using nonparametric statistical analysis known as ANOVA. According to the results of the phytochemical research, Kersen leaves contain tannins and saponins but no flavonoids. Escherichia coli antibacterial studies revealed that kersen leaf extract has a growth-inhibiting impact on these germs. As the concentration of the extract increased, a larger inhibition zone formed. Kersen leaves contain tannins and saponins, and the extract from these leaves can be used to treat bacteria such as Escherichia coli.

Keywords: **Antibacterial, Kersen Leaves, Escherichia Coli.**

INTRODUCTION

A Background

Antibacterials according to the Big Indonesian Dictionary (KBBI) are substances that limit the growth of bacteria, and can even kill bacteria. Based on its toxicity, it can be divided into two antibacterial properties, namely bacteriostatic and bactericidal. Besides that, antibacterials are also found in many plants or plants that we can easily find around us, for example in cherry leaves.(1). Indonesia itself is famous for various sources of raw materials for tropical medicines and various types that can be used to treat various diseases, and Indonesia is also one of the countries that use plants as the largest medicines in the world along with other Asian countries, such as China and India. According to Sastroamidjojo (1997), Indonesia has more than 1,000 types of medicinal plants, one of which is the cherry plant (Muntingia Calabural), which we usually know as cherries.(2).

Kersen leaf (Muntingia Calabura) is a plant that is very easy to find in tropical countries and is also often used as a traditional antibacterial by the community because it has several pharmacological effects, one of which is that it can kill Escherichia coli bacteria and several other types of bacteria. Various studies have also proven that cherry leaves (Muntingia Calabura) contain bioactive compounds such as flavonoids, saponins, and tannins which can damage bacterial structural components such as denaturing or breaking down the state of proteins into primary structures.(3). Escherichia coli bacteria are members of the normal intestinal flora and also belong to the Enterobacteriaceae family with cell sizes 2.0-6.0 um in length and 1.1-1.5 um in diameter. These bacteria have several shapes, such as straight rods, single, pairs or chains. short and belongs to gram-negative bacteria, motile or non-motile, also has aerobic or facultative anaerobic properties.(3)

Escherichia coli bacteria are pathogenic microbes and are also dynamic in that they act as microbes and as living things that want to survive by multiplying in a suitable reservoir and being able to move or spread to new reservoirs. Although Escherichia coli bacteria normally live in the digestive tract, many cases of diarrhea are caused by this bacteria, diarrhea itself is still an endemic

disease in Indonesia with the potential to become an Extraordinary Event (KLB) which is often even accompanied by death.(4))

METHODS

This research is a laboratory experimental type to test the concentration of ethanol extract of cherry leaves (Muntingia calabural L) with varying concentrations of inhibiting the growth of Escherichia coli bacteria in order to determine its antibacterial power. The population used in this study was cherry leaves (Muntingia calabural L) which were found in Gla Meunasah Baro Village, Krung Barona Jaya District, Aceh Besar District. The sample is a small part of the population that is usually used for research. For this study, the samples used were Escherichia coli bacteria and Kersen Leaves (Muntingia calabural L). The study was conducted at the Microbiology Laboratory, Faculty of Medicine, Syiah Kuala University. Observation of antibacterial inhibition zones based on the diameter formed, characterized by the presence of a clear area around the disc paper 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 was measured in the clear area around the disc disc, the clear area was not overgrown with bacteria because the bacteria are sensitive to the antibacterials in the disc disc.

Analysis of the data used to determine the antibacterial activity of the ethanol extract of cherry leaves (Muntingia calabural L) on the growth of Escherichia coli bacteria is using non-parametric statistical Analysis of Varience (ANOVA). the clear area is not overgrown with bacteria because the bacteria are sensitive to the antibacterials present on the disc discs. Analysis of the data used to determine the antibacterial activity of the ethanol extract of cherry leaves (Muntingia calabural L) on the growth of Escherichia coli bacteria is using non-parametric statistical Analysis of Varience (ANOVA). the clear area is not overgrown with bacteria because the bacteria are sensitive to the antibacterials present on the disc discs. Analysis of the data used to determine the antibacterial activity of the ethanol extract of cherry leaves (Muntingia calabural L) on the growth of Escherichia coli bacteria is using non-parametric statistical Analysis of Varience (ANOVA).

RESULTS AND DISCUSSION

The results of identification of cherry leaves (Muntingia calabural L) conducted at the Biochemistry Laboratory of the Faculty of Medicine, University of Syiah Kuala confirmed that the samples of cherry leaves (Muntingia calabural L) were obtained from Gla Meunasah Baro Village, Krung Barona Jaya District, Aceh Besar District.

Figure 1. (a) Samples of dried cherry leaves (b) Samples of cherry leaves after maceration

Results of Extraction of Cherry Leaves (Muntingia calabural L)

The maceration method is used to extract. 500 grams of cherry leaf powder (Muntingia calabural L) was put into a vessel and 96% ethanol was added as a solvent. The vessel was closed, and the cherry leaves (Muntingia calabural L) were soaked for three days with occasional stirring. After three days, the soak was filtered to produce a liquid extract. This extract is then concentrated

with a vacuum rotary evaporator to become thick. Then the extract was divided into three parts: 250 µl extract, 500 µl extract, 750 µl extract.

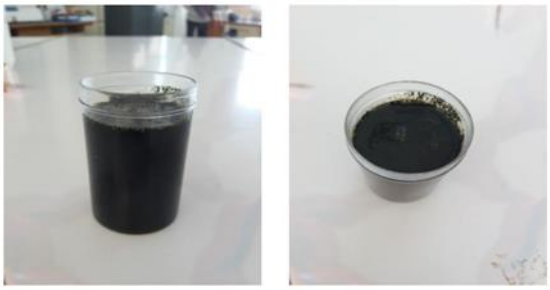

Figure 2. Extract after splitting.

Phytochemical Results on Cherry Leaves (Muntingia carabural L)

In this study, the active compound tests were carried out, namely the flavoid test, saponin test and tannin test. The flavonoid test is an analytical method used to identify and measure the amount of flavonoids found in a sample. Flavonoids are a group of polyphenols that are often found in plants and have various biological functions that they perform. (5) The results of the flavoid test were (-) indicating that cherry leaves (Muntingia carabural L) did not contain flavoid compounds. An analytical method known as the saponin test is used to identify and evaluate the presence of saponins in a sample. Saponins are glycoside compounds that are found naturally in plants and have many properties, such as foam activity and the ability to form emulsions. The test results for saponins are (+) which indicates that cherry leaves (Muntingia carabural L) contain saponin compounds.

An analytical method known as the tannin test is used to find and evaluate the level of tannins in a sample. Tannins are a group of polyphenols that exist in plants naturally. They have various properties based on their chemical structure, such as antioxidant activity, astringents, and the way they interact with proteins. (6) The test results from the tannin test are (+) indicating that cherry leaves (Muntingia carabural L) contain tannin compounds.

Bacterial Test Results on Cherry Leaves (Muntingia carabural L)

The inhibition results of the cherry leaf extract (Muntingia carabural L) used were able to inhibit the growth of Escherichia coli bacteria, the higher the concentration the greater the inhibition power.

Table 1. Handcream test results for Staphylococcus aureus and Escherichia coli

Test	Positive Control	Negative Control	Sample Concentration		
			25%	50%	75%
1	20,3	0	14.65	17.55	15.65
2	22,2	0	13,9	13.05	15.5
3	21	0	12.05	12.55	15,25
Average	21.16	0	13.68	14.38	15,46

Table 1 above shows that at repetitions 1, 2 and 3, a 25% concentration obtained an average inhibition zone of 13.68 mm, a 50% concentration obtained an average inhibition zone of 14.38 mm and a 75% concentration obtained an average inhibition zone 15.46mm.

Table 2. Results of Non-Parametric Statistics Analysis of Variance (ANOVA).

Source of Diversity	Fcount	Ftable
Test	2.873329	6.944272
Concentration	1.458088	6.944272

In table 2, the value of Fcount (2.873328541) <Ftable (6.94427191) is obtained, so accept the null hypothesis (H0) and reject the alternative hypothesis (H1). In this context, the conclusion that can be drawn is that there is not sufficient evidence to state the antibacterial activity of cherry

leaf extract against Escherichia coli bacteria. Furthermore, if the value of Fcount (1.458087707) > Ftable (6.94427191), then accept the alternative hypothesis (H1) and reject the null hypothesis (H0). In this context, the conclusion that can be drawn is that there is an effect of the concentration of cherry leaf extract which can inhibit Escherichia coli bacteria.

Discussion

Phytochemical Test

500 grams of cherry leaf powder (Muntingia calabural L) added with 96% ethanol solvent which is then soaked for 3 days (3 x 24 hours). The soak was filtered to obtain a liquid extract and concentrated using a vacuum rotary evaporator which made the extract viscous.

Based on the research results above, it can be seen that cherry leaves (Muntingia calabural L) contain active compounds, including saponins and tannins. This is supported by Desiyana et al. (2021) who stated that the results of the phytochemical test of the water extract of the plant contained secondary metabolites of the saponin group. (7) The existence of tannin content in cherry leaves is supported by research by Vonna et al. (2021) which stated that there is a tannin content in cherry leaves (Muntingia carabural L).(8)

Based on the results of the study, it stated that there was no flavonoid content, this was not in line with the research conducted by Vonna et al. (2021) who stated that there was a flavonoid content in the content of cherry leaves (Muntingia carabural L). (8) In a study conducted by Anita Dwi Puspita and Lean Syam Prayogo also stated that there was a flanovoid content in cherry leaves (Muntingia carabural L). 9)

Antibacterial Test

Based on the results of Table 1 in repetition 1 with a positive control of 20.3 at a concentration of 25%, it was found that the inhibition zone was 14.65 mm, the inhibition zone was 17.55 mm at 50% concentration and the 75% concentration was 15.65 mm. In repetition 2 with a positive control of 22.2, a concentration of 25% obtained a 13.9% inhibition zone, a 50% concentration of a 13.05% inhibition zone and a 75% concentration of a 15.5% inhibition zone. In repetition 3 with positive control 21 concentration of 25%, it was found that the inhibition zone was 12.05 mm, the concentration of 50% inhibition zone was 12.55 mm and the concentration of 75% inhibition zone was 15.25 mm. Kersen leaf extract used is able to inhibit the growth of Escherichia coli bacteria, the higher the concentration of food the inhibition zone will be greater.

In repetitions 1, 2 and 3, 25% concentration obtained an average inhibition zone of 13.68 mm, 50% concentration obtained an average inhibition zone of 14.38 mm and 75% concentration obtained an average inhibition zone of 15.46 mm. The inhibitory power of cherry leaf extract (Muntingia carabural L) is categorized as moderate.(10)

Table 3. Categorization Based on the diameter of the inhibition zone formed (Morales et al., 2003)

Inhibition Zone Diameter(mm)	Inhibitory Strength
>21-30	Strong
11-20	Currently
6-10	Weak
<6	No activity

In table 2, the value of Fcount (2.873328541) <Ftable (6.94427191) is obtained, so accept the null hypothesis (H0) and reject the alternative hypothesis (H1). The results of statistical analysis using the ANOVA test showed that, statistically, there was no antibacterial activity in cherry leaves (Muntingia carabural L) against Escherichia coli bacteria. Thus, based on the data used in this analysis, cherry leaf extract does not have a significant antibacterial effect against Escherichia coli bacteria.

Furthermore, if the value of Fcount (1.458087707) > Ftable (6.94427191), then accept the alternative hypothesis (H1) and reject the null hypothesis (H0). The results of statistical analysis using the ANOVA test showed that variations in the concentration of cherry leaf extract had a

significant impact on the ability to stop the growth of Escherichia coli bacteria. This shows that higher concentrations of cherry leaf extract (Muntingia carabural L) show the ability to stop the growth of Escherichia coli bacteria. This is supported by research conducted by Arum and Suparmin which stated that at a concentration of 75% cherry leaf extract (Muntingia carabural L) was able to inhibit bacteria, the higher the concentration of cherry leaf extract (Muntingia carabural L), the higher the inhibition of bacteria. (11).

Conclusions and recommendations

Based on the discussion above it can be concluded that:

1. There is not enough evidence to state that there is antibacterial activity of cherry leaf extract (Muntingia carabural L) against Escherichia coli bacteria. This is supported by the results of statistical analysis using the ANOVA test which showed that there was no significant antibacterial activity in cherry leaves against Escherichia coli bacteria.
2. There is an effect of the concentration of cherry leaf extract on the ability to inhibit the growth of Escherichia coli bacteria. The results of statistical analysis using the ANOVA test showed that variations in the concentration of cherry leaf extract had a significant impact on the ability to stop the growth of Escherichia coli bacteria. The higher the concentration of the extract, the greater the ability to inhibit the growth of these bacteria.
3. Cherry leaves (Muntingia carabural L) contain active compounds such as saponins and tannins. Phytochemical tests showed the presence of saponins and tannins in the cherry leaves. This is in line with previous studies which also stated the presence of saponins and tannins in cherry leaves. However, no flavonoid compounds were found in cherry leaves, which is not in line with several previous studies which found flavonoid content in cherry leaves.
4. The suggestion is that it is necessary to carry out further research with a more comprehensive method to obtain more accurate conclusions regarding the antibacterial activity of cherry leaf extract against Escherichia coli. Next, identify the active compounds contained in cherry leaves to understand their potential antibacterial activity. Antibacterial activity test against other bacteria also needs to be done. If there is significant antibacterial activity, purification of the extract can be carried out to increase its effectiveness. Furthermore, more in-depth research regarding the mechanism of action of cherry leaf extract against Escherichia coli needs to be carried out. Lastly, exploration of the potential utilization of cherry leaf extract in other fields such as pharmaceuticals and food can be carried out.

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