

In Vitro Phytochemical And Antibacterial Activity Test On Temu Putih Extract (Curcuma Zedoaria) Against Aeromonas Hydrophila

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Abstract: Aeromonas hydrophila bacterium is one of the bacteria which frequently attack fresh water aquaculture and cause the farmer experience terrible loss. In order to cope with the diseases caused by A. hydrophila bacteria, the usage of natural antibacteria was more recommended as it does not give negative effects to the environment. One natural antibacteria which can be used against A. hydrophila is from the white turmeric extract (Curcuma zedoaria). The aim of this study is to know the active compound content in white turmeric (Curcuma zedoaria), to determine the most effective solvent and the effective maceration duration to extract Curcuma zedoaria as antibacteria against Aeromonas hydrophila using disc diffusion method. The study used descriptive and experimental method with treatments to 3 different solvents (ethanol, ethyl acetate and chloroform) and 3 repetitions. The data acquired from the results of the study were then analyzed descriptively. Results showed that Curcuma zedoaria extract from the phytochemical test contained saponins, alkaloid and flavonoid. The best solvent was ethyl acetate with maceration for 2x24 hours and inhibition area width 11.34 mm.

Keywords: antibacterial, Aeromonas hydrophila, Curcuma zedoaria, phytochemical, solvent, maceration duration

Introduction

Indonesian population is growing exponentially year after year. This exponential growth of population means a great demand of principle commodity as food and in particular the source of protein as fish (1). Fresh water aquaculture system which is in its intensification phase is not without biological risk, such as the emergence of various diseases (2). Diseases are caused by the water condition which is not appropriate for cultivation. One of the diseases which often attacks goldfish cultivation is caused by Aeromonas hydrophila bacteria. These bacteria causes diseases and fails the fresh water cultivation. It can cause an epidemic with high mortality rate (80-100%) in only 1-2 week period (3). To overcome this problem, not only we need to improve the environment condition but it is also recommended to use antibiotics to cure bacterial infection. Despite the effective usage of chemical substance to prevent or cure the diseases, the usage also causes some negative effects (4). The antibiotic residuals pollute the environment and they can be found in the fish so it is not safe for human consumption. Antibiotics given to fish, through soaking or injection, accumulate the residuals. To cope with this problem, tests on natural resources which possess antibacterial trait are needed and one of the natural antibacterial sources is Curcuma zedoaria.

2. Materials and Method

The study was done from October to December 2014 in Paracyte and Fish Disease Laboratory, Fish Reproduction Laboratory and for extraction process was done in Fish Product Engineering Laboratory of Fishery and Marine Science Faculty and Organic Chemical Laboratory of Mathematics and Science Faculty in University of Brawijaya. The bacteria used in the study were acquired from Quarantine Center in Perak, Surabaya. White turmeric (Curcuma zedoaria) extraction was done using maceration method with different duration (1x24, 2x24 and 3x24) and 3 kinds of solvents (ethanol, ethyl acetate and chloroform) with 3 repetitions, ampicilin antibiotic was also used as positive control comparison. Parameter observed in the study was inhibition area (mm). Data acquired from the results was analyzed descriptively.

3. Results

Inhibition area Curcuma zedoaria

Antibacterial activity test using disc diffusion method by observing inhibition area width of the extract against the bacteria. The inhibition width of each extract can be seen in **Table 1**.

No	The extract with each solvent	Inhibition width		
		1 x 24 hour	2 x 24 hour	3 x 24 hour
1	Ethanol	7.61 ± 0.14	10.14 ± 0.21	9.31 ± 0.24
2	Ehyl Acetate	7.23 ± 0.28	11.34 ± 0.18	9.02 ± 0.11
3	Chloroform	1.14 ± 0.13	1.43 ± 0.22	2.20 ± 0.30

Table 1. Test Results on Inhibition Area of White Turmeric Curcuma zedoaria against Aeromonas hydrophila

The table shows average inhibition area from white turmeric (Curcuma zedoaria) extract with different solvent. The

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extract with ethyl acetate solvent for 2x24 hour duration of maceration showed greater inhibition width compared to the extract with other solvent and different maceration duration. It was possible because ethyl acetate solvent with 2x24 hour maceration were the most effective parameter to draw the active compound contained in white turmeric (*Curcuma zedoaria*). From the results of maceration, duration of extraction, the type of solvent and the extract's dosage affect the inhibition width results as the bigger the dosage the bigger inhibition width acquired.

Phytochemical *Curcuma zedoaria*

Phytochemical test was conducted to the best extract of *Curcuma zedoaria* with ethyl acetate as solvent using compounds namely saponin, alkaloid, triterpenoid and flavonoid. The results of the analysis on white turmeric extract with ethyl acetate can be seen in **Table 2**.

Compound used	Result (+/-)
Saponin	+
Alkaloid	+
Triterpenoid	-
Flavonoid	+

Table 2. *Phytochemical Test Results on White Turmeric (Curcuma zedoaria) with Ethyl Acetate*

The table shows positive results which means *Curcuma zedoaria* extract possesses saponin, alkaloid and flavonoid compounds. The result of this phytochemical test on the extract with ethyl acetate was slightly different from the previous test (5), where the analysis from *Curcuma zedoaria* extract had contained triterpenoid compound, but this time it showed negative result of triterpenoid. This could be caused by different soil texture of the plant, rainfall intensity from plantation to the harvest time of white turmeric. The content of white turmeric extract such as saponin, alkaloid, and flavonoid are quite possible used as antibacterial compound because flavonoid compound has an ability to destroy permeability trait of bacteria's cell membrane (6). Flavonoid compound is also able to form complex extracellular and protein compound so that it can lyse bacteria's cell membrane (7). Alkaloid compound also has the ability as antibacterial because this compound can disrupt peptidoglycan composing components so the cell membrane formation would not be perfect as there is no peptidoglycan content in the cell membrane (8). Saponin compound has the ability to bond with bacteria's cell membrane composition namely lipopolysaccharide, so it disrupts the cell wall's permeability (9).

CONCLUSION

White turmeric (*Curcuma zedoaria*) extract macerated with ethyl acetate solvent for 2x24 hours resulted the best antibacterial extract against *Aeromonas hydrophila*. It was based on the results of inhibition width test. Based on phytochemical test, macerated white turmeric extract with ethyl acetate contained compounds namely saponin, alkaloid and flavonoid which are able to disrupt the bacteria's growth.

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