International Journal of Public Health Excellence (IJPHE)
Vol. 4, Issue 2, January-May 2025, pp. 502~505
Journal Homepage: https://ejournal.ipinternasional.com/index.php/ijphe
ISSN: 2809-9826, DOI: 10.55299/ijphe.v4i2.1356

Antihypercholesterolemia Effectiveness Test of Ceremai Leaf Ethanol Extract (Phyllanthus acidus (L.) Skeels) On Male White Rats (Rattus norvegicus)

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Article Info

Article history:

Received April 26, 2025
Revised May 03, 2025
Accepted May 15, 2025

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ABSTRACT

Cholesterol is an increase in blood fat levels that can cause various heart diseases. Ceremai is one of the plants that some Indonesian people use to treat high blood pressure, diabetes mellitus and high cholesterol levels. This study aims to determine the effectiveness of ethanol extract of ceremai leaves in reducing blood cholesterol levels in male white mice with hypercholesterolemia. The inducers given to the test animals were 4 ml of quail egg yolk and propylthiouracil mixed with drinking water ad libitum. This study is an experimental study using 20 mice and divided into 5 groups. Group I (solvent control) CMC 0.5%, group II (comparison), group III, group IV and V (treatment) ethanol extract of ceremai leaves at a dose of 0.15, a dose of 0.3 and 0.6 g / KgBW. The extract was administered orally to the mice, and their cholesterol levels were measured on the 7th and 14th days after treatment. Cholesterol levels of each group were analyzed statistically using the One Way ANOVA method and Duncan's Post-Hoc test using SPSS 24.0. The results of statistical tests on blood cholesterol levels between simvastatin groups, ethanol extract of ceremai leaves showed a significant difference with an α value> 0.05. From the results of the study, it can be concluded that the ethanol extract of ceremai leaves has the activity of reducing blood cholesterol levels in male white rats induced by quail egg yolk and propylthiouracil with an effective EEDC dose of 0.3 g / kgBB.

Keywords: *Cholesterol, Ceremai Leaves, Rats, Quail Egg Yolks, Propylthiouracil*

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1. INTRODUCTION

In Indonesia, an increasingly modern lifestyle encourages people to choose instant ways of doing many things, one of which is choosing food. Consuming fast food which is usually high in fat but low in fiber, has now become a habit that is starting to become a culture in Indonesia. Eating fast food, which is usually found in the form of fried foods, can result in an increase in total cholesterol levels in the blood plasma. This bad habit can cause cardiovascular diseases, such as coronary heart disease. Coronary heart disease is positively correlated with blood cholesterol levels [1],[2],[3]. Cholesterol is currently the only health problem faced by both developed and developing countries. Cholesterol is one of the causes of cardiovascular disease, which is a deadly disease that has become a serious problem in both developed and developing countries. In Indonesia itself, cardiovascular disease is currently the number one killer, along with changes in diet that tend to be high in fat and low in fiber. High cholesterol levels cause plaque formation, starting with the infiltration of fat protein (LDL) into the arterial walls, causing atherosclerosis [4],[5],[6].

Increased cholesterol levels can cause various diseases, such as hypertension, atherosclerosis, and blood vessel blockage. Blockages that occur in the brain can cause strokes and in the heart cause coronary heart disease. One of the modifiable risk factors for (coronary heart disease (CHD)is high blood cholesterol level or dyslipidemia. Two types of cholesterol affect the risk of CHD the most low-density lipoprotein (LDL) and high-density lipoprotein (HDL) [7],[8],[9],[10].

The ceremai plant (Phyllanthus acidus (L.) Skeels) is a traditional plant used as an antihypercholesterolemic drug. Traditional medicine is a material or concoction of materials in the form of plant materials, animal materials, mineral materials, extract preparations, or mixtures of these materials that have been used for generations for treatment, and can be applied according to the norms prevailing in society. As many as 80% of the world's population still depends on traditional medicine for their health, including plant-derived medicines. Since ancient times, plants have not only been used as food, but also for treating diseases and other disorders [11],[12],[13],[14].

A Ceremai tree is a tree with the same name. A Ceremai tree that produces sour fruit, such as starfruit, has various benefits, especially as a medicinal plant (herbal). Ceremai is used by some Indonesian people as a traditional medicine to treat several diseases, such as mouth ulcers, hypercholesterolemia, asthma, lactic acid, and hypertension. The parts of the ceremai plant that are used in traditional medicine vary, from the leaves, fruit, or roots [15],[16],[17],[18]. Previous studies have reported that ceremai leaves contain flavonoids, polyphenols, and saponins, and have shown that ceremai extract is effective in lowering cholesterol levels in mice at doses of 22.5 and 45 mg/KgBB. This study is supported by several subsequent studies that showed that ceremai leaf extract at a dose of 250 mg/KgBB had a hypolipidemic effect on male white mice induced by streptozotocin [19],[20].

Based on the description above, the research is interested in testing the effect of reducing blood cholesterol levels in mice by administering ethanol extracts of ceremai leaves (*Phyllanthus acidus* (L.) Skeels) with the aim of utilizing and developing ethanol extracts of ceremai leaves as an alternative cholesterol medication sourced from natural ingredients.

2. METHOD

The study was conducted using a laboratory experimental method, with a research design in the form of Duncan's Post Hoc Test. The total number of samples used in the study was 1 sample; randomly grouped into five groups, each consisting of four rats and given oral treatment. Identification Results: The samples tested in this study were ceremai leaves (*Phyllanthus acidus* (L.) Skeels) found in Punge Ujong, Banda Aceh. Fresh materials were collected, washed thoroughly under running water, drained, and weighed (5,000 g). Ceremai leaves simplicia (*Phyllanthus acidus* (L.) Skeels) was made with 5 kg of fresh ceremei leaves, cleaned from dirt (wet sorting), washed with running water until clean, drained, and then cut into small pieces, weighed, and dried in a drying cabinet at a temperature of around 600C until dry; that is, when squeezed, it feels brittle and crushed. After drying, the ceremei leaves were dried, ground using a blender, sieved, and stored in a dry glass container protected from light. Macroscopic and, microscopic testing, and determination of water content were carried out on ceremei leaf samples. Treatment of test animals: Each group was administered oral treatment for 14 days. Blood cholesterol levels wew measured on days 7th and 14th days after the induction period.

The treatment procedure on experimental animals began by inducing all mice for 7 days using 4 ml of quail egg yolk per day, propylthiouracil was given together with drinking water ad libitum, and blood cholesterol levels were measured again after induction. Twenty white mice used were 20 and divided into five groups consisting of four mice per group. Before treatment, all mice were acclimated for 7 days, and the initial blood cholesterol levels of each group were measured. Then each group was given treatment orally as consisting of the solvent control group, comparison group, EEDC group 0.15 g / kgBB, EEDC group 0.3 g / kgBB, EEDC group 0.6 g / kgBB. Each group received oral treatment for 14 days. Blood cholesterol levels were measured on days 7th and 14th days after the induction period.

3. RESULTS AND DISCUSSION

Data from fresh ceremei leaves, ceremei simplicia powder, and percolation of ceremei leaves with water content were used to Determine the water content of the ceremai leave simplicia using Thermogravimetric Analysis. The water content of ceremai leaf simplicia was determined to be 8.5%. The percentage requirement for the water content was <10%. The water content was determined to provide the maximum limit or range of water content. A high water content in a material can encourage enzymes to carry out their activities to change the chemical content of the material into other products that may no longer have pharmacological effects similar to the original compound. Mice were designated as hypercholesterolemic when cholesterol levels were >150 mg/ml (Paget, 2001). The induced mice were then given cholesterol-lowering treatment for 14 days afterwards with the treatment groups, namely the hypercholesterolemic mice group with the solvent control group (CMC), the hypercholesterolemic mice group with the comparison group (simvastatin) and ethanol extract of ceremai leaves with a dose of 0.15 mg/kgBW, ethanol extract of ceremai leaves with a dose of 0.3 mg/kgBB and ethanol extract of ceremai leaves with a dose of 0.6 mg/kgBB. Blood cholesterol levels were measured on days 7th and 14th days during the treatment period.

Normal human cholesterol levels when fasting are <200 mg/dL, and the ideal condition is 200-239 mg/dL. Normal cholesterol levels in mice are 10-54 mg/dL and hypercholesterol levels are >150 mg/dL (Paget, 2001). The results of measuring the cholesterol levels in the test animals are shown in Table 1.

Table 1 Results of Cholesterol Level Measurements in Test Animals

Test Group	Cholesterol Level (mg/dL)		
	Induction(7 hari)	Day 7 of treatment (day 14)	Day 14 of treatment (day 21)
CMC	180,1	168,9	153
Simvastatin	180,1	122,7	106,1
EEDC 0,15 g/kgBB	180,1	111,6	99,3
EEDC 0,3 g/kgBB	177,6	88,4	86,0
EEDC 0,6 g/kgBB	183,1	100,5	93,0

Based on Table 1, it is known that when blood cholesterol levels were induced by quail egg yolk and propylthiouracil for 7 days, the cholesterol levels of the test animals increased. After a 14-day healing period for the test animals, cholesterol levels decreased on the 21st day (14th day of healing), followed by a decrease on the 14th day (7th day of healing). The best decrease was obtained by administering EEDC 0.3 g/kgBB because it had the most results in reducing cholesterol levels than the others.

Table 2 Results of Duncan's post-hoc mean difference test for rat cholesterol
Rat hypercholesterol tolerance test

Hypercholesterolemia		
Duncan[a]		
Treatment	N	Subset for alpha = 0.05
		1
EEDC 0,3g/kgBB	4	177.650
EEDC 0,15g/kgBB	4	180.125
CMC	4	180.175
Simvastatin	4	180.575
EEDC 0,6g/kgBB	4	182.950
Sig.		.075

In Table 2, Duncan's Post-Hoc mean difference test when the mice were hypercholesterolemic showed no significant difference in blood cholesterol levels between the EEDC 0.3 g/KgBB, EEDC 0.15 g/KgBB, CMC, simvastatin groups, and EEDC 0.6 g/KgBB groups.

4. CONCLUSION

Based on the results, it can be concluded that the ethanol extract of ceremai leaves (*Phyllanthus acidus* (L.) Skeels) is effective in lowering blood cholesterol levels in male white rats (*Rattus norvegicus*) induced by quail egg yolk and propylthiouracil. The most effective ethanol extract of ceremai leaves (Phyllanthus acidus (L.) Skeels) in reducing cholesterol levels is the ethanol extract of ceremai leaves (*Phyllanthus acidus* (L.) Skeels) 0.3 g/kgBW. The effect of lowering blood cholesterol levels in rats given ethanol extract of ceremai leaves (*Phyllanthus acidus* (L.) Skeels) 0.3 g/kgBB is better in lowering cholesterol levels compared to simvastatin.

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