

Effectiveness of Boiled Water of Breadfruit Leaf (Artocarpus Altilis) on Reducing Cholesterol Levels in The Blood of Mice (Mus Musculus)

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ABSTRACT

Saturated fats (saturated fatty acids) increase the risk of heart disease due to increased levels of cholesterol, triglycerides, low density lipoprotein (LDL) and decreased high density lipoprotein (HDL). In Indonesia, there are a variety of medicinal plants with suboptimal utilization. Among these plants are breadfruit and to date only been used part of the fruit. It turns out that almost all parts of breadfruit plants have benefits, including the leaves. This part contains flavonoids which are proven to be anti-inflammatory, anti-atherosclerosis and antiplatelet. This study aims to determine the effectiveness of decoction of breadfruit leaves (artocarpus altilis) against decreasing cholesterol levels in the blood of mice. This research is an experimental laboratory study with the design of the posttest only control group design involving a sample of 30 mice and taken using the Federer formula. Pig oil is used to make mice become hypercholesterol through induction. Then, the mice were given boiled water with breadfruit leaves with 3 different doses and measured cholesterol levels in their blood. This study shows that breadfruit leaf decoction has the ability to reduce cholesterol levels with the most significant dose of 0.0571 ml ($p = 0.039$)

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INTRODUCTION

According to Basic Health Research people in Indonesia have the behavior of consuming fatty foods, containing cholesterol and fried foods by 40.7% by consuming more than 1 time a day. From several provinces in Java, Central Java has a prevalence of 60.3% in consuming fatty foods, containing cholesterol and fried foods. This data shows that Central Java has the highest prevalence when compared to other provinces in Java, namely Yogyakarta Special Region 50.7%, West Java 50.1%, East Java 49.5%, and Banten 48.8% (Depkes, 2013). Consumption of foods high in fat and cholesterol will increase cholesterol levels in the blood which can ultimately cause hypertension, coronary heart disease, stroke and many more. Related to this, efforts should be made to prevent the occurrence of diseases caused by hypercholesterolemia either with drugs prescribed by doctors or with traditional medicine. In Indonesia, some people still like the use of traditional medicines in their daily lives

because of the ease of obtaining preparations of ingredients, relatively low prices and relatively no side effects.

In an effort to reduce cholesterol, many people use medicinal plants to reduce cholesterol. But of the many medicinal plants, few people know the benefits of breadfruit leaves to reduce cholesterol. One part of the breadfruit plant that is useful is the leaf because it contains saponins, polyphenols, hydroxyic acid, potassium, acetylcolin, tannin, riboflavin, phenol and flavonoids which are proven to be anti-inflammatory, antiaterosclerosis and antiplatelet (Mardiana & Buku, 2012).

Until now, people only use fruit from breadfruit plants and have not utilized other parts of breadfruit plants. However, based on some experience, it turns out that almost all parts of the breadfruit plants have benefits for treating various diseases. One useful part of this plant is the leaf part containing saponins, polyphenols, hydroxyic acid, potassium, acetylcolin, tannin, riboflavin and phenol. The content of other

Effectiveness of Boiled Water of Breadfruit Leaf (*Artocarpus Altilis*) on Reducing Cholesterol Levels in The Blood of Mice (*Mus Musculus*)

compounds present in breadfruit leaves are flavonoids which are proven to be anti-inflammatory, antiatherosclerosis and antiplatelet (Depkes, 2013).

The effectiveness of breadfruit leaves in reducing cholesterol levels is proven in several studies, including research by (Munarsih & Rini, 2019) showed that there were differences in total cholesterol levels before and after administration of breadfruit leaf extract in a group of white rats from 394.5 mg/dl to 195 mg/l. Previous research also showed that breadfruit leaf extract with a dose of 200 mg/kgBB had an effect on blood glucose levels and total cholesterol levels and a dose of 400 mg/kgBB was able to regenerate rat pancreatic tissue (Tandi, Rizky, Mariani, & Alan, 2017).

Related to the above problem, researchers are interested in conducting research on the effectiveness of decoction of breadfruit leaves (*Artocarpus altilis*) in reducing cholesterol levels in the blood of mice.

Methodology

This research is an experimental study with The Post Test Only Control Group Design, in which the researcher intends to investigate the probable cause and effect relationship by giving certain treatment to research subjects (Suharsimi, 2006).

The sample was determined by the Federer formula and a total of 30 samples of mice were used in this study. The criteria for mice used in this study were male, healthy have normal activities, aged between 8-10 weeks and have a body weight of 20-30 mg. To ensure the sameness of the sample, mice were adapted for one week in advance by being put into a special maintenance cage and given the same food and drink during the adaptation period. Mice that have undergone an adaptation period, then induced lard for one week.



Figure 1. Adaptation of Mice

The treatment in each group was carried out as follows: group 1 (the group to find out normal cholesterol levels in mice) were not treated induction of lard but replaced with induction of distilled water, group 2 (control group) received induction of lard and given aquades, group 3 received 0.5 cc of pork fat induction and given breadfruit boiled water at a dose of 0.0571 ml for 14 days, group 4 was induced with 0.5 cc of pork fat and given breadfruit leaf decoction water at a dose of 0.1142 ml for 14 days and group 5 was given 0.55 fat induction cc and given the breadfruit leaf boiled water at a dose of 0.1713 ml for 14 days.



Figure 2. Induction of Lard

After the administration of lard, all the rats were taken blood to check their cholesterol levels

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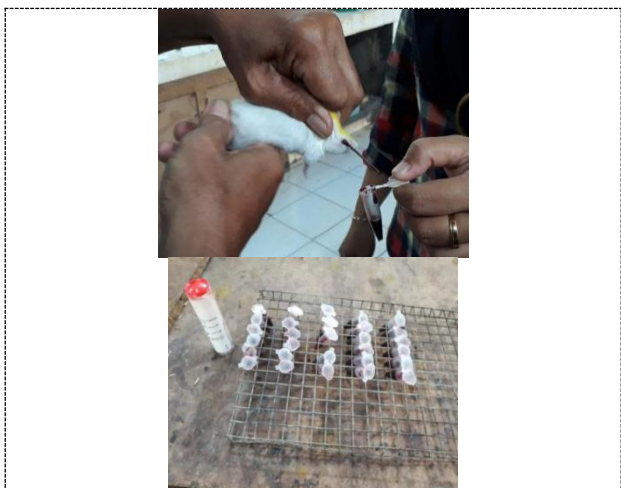


Figure 3. Blood collection of rats to check their cholesterol levels

Result

In the homogeneity test, the Levene Statistics number is 1.381 with a probability of 0.277, so it can be said that the variants of the five groups are homogeneous. From seeing the results of the analysis above, it can be concluded that the ANOVA test can be performed on all research samples. Furthermore, the ANOVA test results obtained with an F value of 4.083 and a significance of 0.021 (less than 0.05) which means that there are differences in the average cholesterol in all groups of mice used in the study.

Tukey HSD test results showed that in all groups, only cholesterol levels in group 2 (without induction of lard fat and not given breadfruit boiled water) and group 3 (induction of 0.5 cc lard and given breadfruit boiled water dose of 0.0571 ml) had differences average with a significance level of 0.039. Tukey HSD analysis results also showed that the administration of breadfruit leaf extract to reduce cholesterol only significantly affected the dose of 0.0571 ml.

Discussion

This study shows that a significant decrease in cholesterol levels was found in mice given a dose of 0.0571 ml breadfruit leaf decoction. This decrease is very possible due to the presence of flavonoid compounds and tannins in the leaves

of Breadfruit (Kurnia, Afifah, Mustofa, & Firdausy, 2010; Syah et al., 2009). This decrease in cholesterol occurs due to the existing lipoprotein lipase enzyme. In the body will be increased by Flavonoids that are taken by mice and will further increase the hydrolysis of triglycerides into fatty acids and glycerol to be released into blood vessels. Furthermore, fatty acids and glycerol will be burned into energy, carbon dioxide (CO₂) and water (H₂O) (Botham & Mayes, 2009; Sudheesh, Presannakumar, Vijayakumar, & Vijayalakshmi, 1997). In addition, because breadfruit leaves can also inhibit the accumulation of fat in the aortic wall of rats eating breadfruit leaves can prevent coronary heart disease.

The intestine will also be protected from unsaturated fatty acids by tannins contained in breadfruit leaves by binding to body proteins and lining the intestinal wall so that the mucous layer is more dense and ultimately inhibits fat absorption (Kurnia et al., 2010). With the inhibition of fat absorption, the number of triglycerides circulating in the blood will also be reduced.

The findings in this study are supported by a previous study conducted by Sulistyarningsih (Sulistyarningsih, 2003) which concluded that there was a significant difference ($p < 0.05$) in total cholesterol and blood serum triglyceride levels of white rats that received breadfruit infusion. A similar study that strengthened the results of this study was conducted by Pramono, Kesuma, Tazkiana, and Yunita (Pramono, Kesuma, Tazkiana, & Yunita, 2016) who found that there were significant differences in cholesterol levels with significance values ($p < 0.001$).

Although breadfruit leaves have been shown to have lower blood cholesterol properties, side effects have not been identified in this study. For this reason, research needs to be done on the effects of breadfruit leaf decoction, especially if consumption is done in the long run

Effectiveness of Boiled Water of Breadfruit Leaf (*Artocarpus Altilis*) on Reducing Cholesterol Levels in The Blood of Mice (*Mus Musculus*)

Discussion

Decoction of breadfruit leaves (*Artocarpus altilis*) can reduce cholesterol levels in the blood of mice given pork oil for 14 days. The amount of breadfruit boiled water the most effective way to reduce cholesterol levels in the blood of mice is at a dose of 0.0571 ml ($p = 0.039$). The need for breadfruit leaf extraction techniques with better techniques so that the maximum content is obtained. Research also needs to be done to find out the percentage of each compound content in breadfruit leaves. So that side effects can be known if consuming breadfruit boiled water in a long period of time.

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