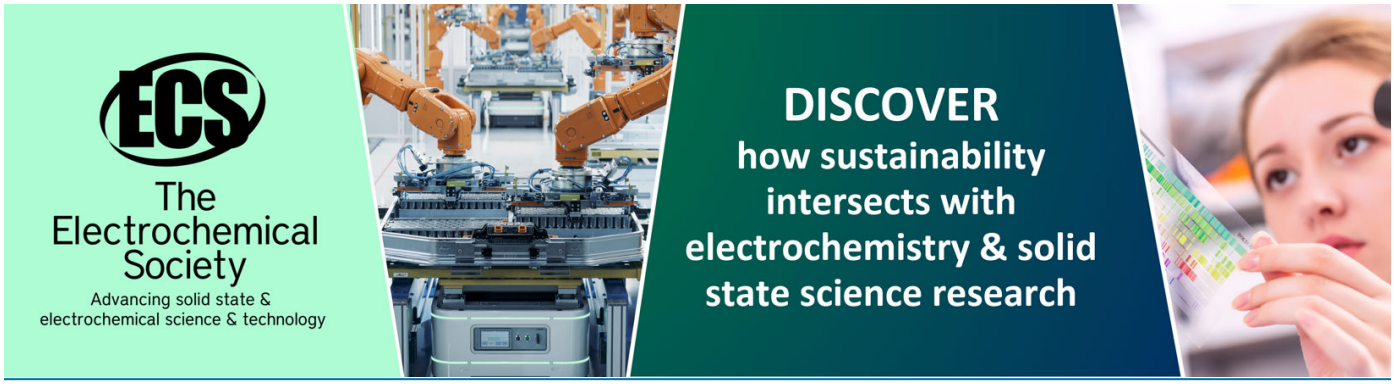
# Effect of Powder Leaf Breadfruit Disposals (*Arthocarpus Altilis*) in Oil Mandar District and Polman Against Cholesterol and Glucose Mice (*Mus Musculus*)





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# Effect of Powder Leaf Breadfruit Disposals (*Arthocarpus Altilis*) in Oil Mandar District and Polman Against Cholesterol and Glucose Mice ( *Mus Musculus* )

**A. Mu'nisa*, A. Asmawati , Farida A., Fressy FA., and Erni**

Department of Biology, Faculty of Mathematics and Natural Sciences, Jl. Daeng Tata Raya Kampus Parangtambung, Universitas Negeri Makassar, Indonesia

*andi.munisa@unm.ac.id

**Abstract**. The purpose of this study was to determine the effect of powdered leaves of breadfruit (*Arthocarpus altilis*) on oil is mandated origin of the Polman glucose and cholesterol levels in mice (*Mus musculus*). This study comprised 4 treatments and each treatment consisted of 5 replicates, ie groups of mice were fed a standard (negative control); 2 groups: group of mice fed with standard and cholesterol feed (positive control); Group 3 that mice fed with standard and Selayar oil; and group 4: group of mice fed with standard and Mandar oil that has been given powdered leaves of breadfruit. Measurement of glucose and blood cholesterol levels in mice done 3 times ie 2 weeks after the adaptation period (phase 1), 2 weeks after administration of the oil (phase 2) and 2 weeks after feeding cholesterol (stage 3). Based on the analysis of data both cholesterol and glucose levels showed that in a group of 4 decreased glucose and cholesterol levels in stage 2 but at stage 3 an increase in the group of mice given only the oil while in the group of mice given the oil and powdered leaves of breadfruit indicate glucose levels and normal cholesterol. The conclusion of this study show that the addition of powdered leaves of breadfruit into cooking oil Mandar influential in glucose levels and normalize blood cholesterol levels in mice.

## 1. Introduction

Utilization of existing plants in the areas we need to be cultivated. Plants that live around us has many benefits. These plants need to be cultivated one plant that is very useful is the breadfruit plants (Arthocarpus altilis). Breadfruit leaves (Arthocarpus altilis) can be used for the treatment of various diseases, such as liver disease, hepatitis, enlarged spleen, heart, kidney, high blood pressure and diabetes, using breadfruit leaves are rich in compounds of flavonoids to prevent the increase in blood cholesterol levels , It also will help the community in the field of economic empowerment in particular.

Plant in Indonesia received by the public is the breadfruit plants (Arthocarpus altilis). Arthtocarpus altiltis can be utilized for human life. Breadfruit can also be used on the leaves for treatment of disease. Previous research has conducted research on the leaves of breadfruit and discovered that the leaves of breadfruit effective for treating diseases such as liver, hepatitis, enlarged spleen, heart, kidney, high blood pressure and diabetes, because it contains flavonoids [1].

The ability of breadfruit leaves in treating some chronic diseases is because the compounds contained therein. Breadfruit leaves contain several compounds that are beneficial for the body such as polyphenols, hidrosionat acid, tannin, quercetin and artoindosionin. Ortoindonesionin compounds and

quercetin is a group of flavonoids derived compounds that function as antioxidants and are widely used as an active component in medicines.

Breadfruit leaves are solid green used in this study because the leaves are dark green more compounds possessed compared with light green leaves. Flavonoids are one of secondary metabolites, the possibility of its existence in the leaves is affected by the process of photosynthesis so that not too many young leaves contain flavonoids. Flavonoids are phenolic compounds contained in plant pigment, red, yellow, blue and purple.

Breadfruit leaves effectively treat diseases such as liver, hepatitis, enlarged spleen, heart, kidney, high blood pressure, diabetes and also to cure skin swelling or itching. Substances contained in its leaves could also able to overcome the inflammation in the liver, spleen enlargement, coroner of the heart, inflammation of the kidneys, high blood pressure, and diabetes [2][3][4].

Oils are triglycerides composed of fatty acids are liquid at room temperature (25oC) and mengadung more unsaturated fatty acids so susceptible to oxidation. Oil in the solid form can be called fat [5][6].

Mandar excellence origin used cooking oil because it has a distinctive aroma, is still the traditional way of making which is still maintained today, but it is also used as a cooking oil because of its non-polar solvents, as well as materials used for massage. Cooking oil is an ester that is easily oxidized resulting in the formation of free fatty acids. Damage to the quality of cooking oil can also be affected by improper storage and packaging that is not good. When oil kept too long in place where the temperature above room temperature, the oil will be susceptible to oxidation, because any increase in temperature of 15oC rate of oxidation is doubled.

Mandar origin manufacture cooking oil is treated with a technique that is still very simple, so that the level of damage during storage becomes very high. Extent of the damage can be in the form of discoloration and rancid when stored over 30 days. Damage to the oil can trigger the formation of free radicals that can cause degenerative diseases one of which is hypercholesterolemia. Treatment can be given is the addition of natural antioxidants that can prevent the oxidation of the oil.

Some research indicates that, the process of cooking oil rancidity can be inhibited by administration of antioxidants, and antioxidants both synthetic and natural antioxidants. Synthetic antioxidants are often used to prevent rancidity of oil is butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA), but the use of excess will cause poisoning. Natural Antioxidants are chemical compounds derived from plants. This substance is able to significantly slow down or inhibit the oxidation of a substance that is easily oxidized even in low concentrations. This natural antioxidant has many double bonds are easily oxidized so it will protect fats from oxidation [7]. This study will use breadfruit leaf powder is added to the oil traditionally processed, then tested on animals who have hypercholesterolemia.

## 2. Method

### *2.1. Equipment and Materials Research*

The tools used are glass tools in the form of beaker size of 250 mL and 1000 mL Erlenmeyer flasks, beakers, stir bar, basin, rang wire, eating and drinking equipment, scissors, oven, and gauges glucose and cholesterol in the form of NESCO multi check.

The main material used in this study was 70 mL Mandar oil made from coconut hybrid types, 0.9 grams of breadfruit leaves, filter paper, feed cholesterol egg yolk powder form as much as 210 grams which had been in the oven, aluminum foil, and a syringe, feed AD 1 standard form which can be from the traditional markets.

### *2.2. Breadfruit Leaf Powder Process*

Breadfruit leaves used are old leaves that are in the growth phase stagnam. Breadfruit leaves are washed thoroughly with water and dried with aerated at room temperature 27 ° C - 28 ° C for 48

hours. Once dried breadfruit leaf, then 400 rpm in a blender until smooth and sieved using a sieve size of 60 mess. Breadfruit leaf powder put into a transparent plastic packaging to avoid contaminants and stored in a sealed container.

*2.3. Breadfruit Leaf Powder Addition process into oil Mandar*

A total of 70 mL Mandar oil heated in water bath at a temperature of 50 ° C - 65 ° C for ± 30 minutes. Breadfruit leaf powder as much as 0.9 grams mixed into the oil Mandar. Cooking oil as suspense for eugenol and phenol compounds contained in the powder leaves of breadfruit. Mandar oil in the filter to separate the pulp powder breadfruit leaves.

*2.4. Provision of Treatment*

Test animals used were mice (Mus musculus) Sprague Dawley sex male, healthy, and normal activities are kept in the Green House Biological Science UNM. Mice were 2 months old as much as 20 fish with a weight of 25 ± 5 grams. Mice were divided into 4 groups and each treatment group consisted of 5 mice in one cage.

Mice were adapted for 2 weeks with fed commercial feed in the form of standard flour secar AD1 and drinking water ad libitum fed before treatment (feed cholesterol egg yolk powder form) so that the way of life and food becomes uniform. In the third week, mice were grouped according to their group. Groups of mice were determined based on body weight were divided into 4 groups. The treatments as follows: a) Group I (negative control) is a group of male mice hanyadiberi standard feed with a dose of 1.4 grams / head / day during the trial period, b) Group II (positive control) is a group of male mice fed a standard doses 1.4 gram / head / day plus egg yolk powder as much as 1 gram / head / day, c) group III, the group of male mice fed a standard of 1.4 grams / day / head and oiled without powder and Mandar Mandar during 2 weeks at a dose of 1 ml / head / day. After 2 weeks, the mice were fed cholesterol at a dose of 1 gram / head / day for 2 weeks, and d) Group IV, which is a group of male mice fed with a standard dose of 1.4 grams / head / day and oiled Mandar plus powdered leaves of breadfruit 0.3% at a dose of 1 ml / head / day for 2 weeks. After 2 weeks fed cholesterol at a dose of 1 gram / head / day.

*2.5. Period Measurement of Blood Glucose and Cholesterol*

Each 14-day measurement of glucose levels. Measurement of glucose and cholesterol is carried out after a period of adaptation as glucose and cholesterol levels early and giving treatment period (after mice were given oil) and after being given a feed of cholesterol in the form of feed cholesterol.

## 3. Result and Discussion

*3.1. Blood Glucose*

The average glucose level of male mice (*Mus musculus*) after checking glucose levels stage I or prior to treatment (after a period of adaptation) and phase II (after the cooking oil) and phase III (after feeding in the form of feed cholesterol) can be seen in table 4.1 as follows:

**Table 1.** Average glucose levels of male mice (*Mus musculus*) before and after treatment

| Treatment | The average glucose level of male mice (*Mus musculus*) mg/dL | | |
|---|---|---|---|
| | **Stage I** | **Stage II** | **Stage III** |
| Negative control | 74.20[a] | 81.40[a] | 97,20[a] |
| Hypercholesterolemia control | 99.20[a] | 97.00[a] | 104,00[ab] |
| Mandar oil | 90.60[a] | 119.00[b] | 123,80[b] |

| Treatment | The average glucose level of male mice (*Mus musculus*) mg/dL | | |
|---|---|---|---|
| | **Stage I** | **Stage II** | **Stage III** |
| Mandar oil+ breadfruit leaf powder | 97.20[a] | 95.00[a] | 108,20[ab] |

*Description: The letters in the same column indicates "not significant". Different letters in one column shows "Significantly different".*

In Table 1, the results of the analysis of the average glucose levels (mg / dL) male mice (*Mus musculus*) shows the average glucose levels are still normal. Gukosa levels normal limit of 50 mg / dL - 135 mg / dL. On average glucose levels between Phase I, Phase II, and Phase III, did not rise drastically despite using cooking oil Mandar origin.

*3.2. Cholesterol*

Data from measurements of cholesterol levels in mice (*Mus musculus*) starting from measurement before treatment (initial cholesterol levels in mice) (phase I), after administration of the oil (phase II), until after feeding cholesterol (phase III). Average cholesterol levels can be seen in Table 2.

**Table 2**. Average Value Cholesterol (mg / dL) of mice (*Mus musculus*) before and after treatment

| Treatment | The average cholesterol level of male mice (*Mus musculus*) mg/dL | | |
|---|---|---|---|
| | **Stage I** | **Stage II** | **Stage III** |
| Negative control | 163,20[a] | 139,40[a] | 161,00[ab] |
| Hypercholesterolemia control | 142,40[a] | 121,80[a] | 194,50[b] |
| Mandar oil | 133,60[a] | 146,25[a] | 157,25[ab] |
| Mandar oil+ breadfruit leaf powder | 132,60[a] | 119,80[a] | 150,00[a] |

*Description: The letters in the same column indicates "not significant". Different letters in one column shows "Significantly different".*

Effect of Oil origin Mandar added powdered leaves of breadfruit (Arthocarpus altilis) to glucose and cholesterol levels in mice (Mus musculus) consists of 4 groups and each treatment group consisted of 5 replicates. Group I (negative control), the male mice (Mus musculus) were given only standard feed. Group II (positive control), the male mice (Mus musculus) were fed a standard feed supplemented with cholesterol. Group III, the male mice (Mus musculus) were given a standard feed and cooking oil given origin Mandar (1 ml / day) orally without being given powdered leaves of breadfruit (Arthocarpus altilis) for 2 weeks. Group IV, male mice (Mus musculus) are given oil mandated that has been added powdered leaves of breadfruit (Arthocarpus altilis), after 2 weeks later the male mice (Mus musculus) given the standard feed + feeding cholesterol (90 grams of feed standard and 10 grams of feed cholesterol) for 2 weeks followed by glucose and cholesterol.

The average glucose levels in tahap1, phase II and phase III, the provision of cooking oil Mandar mice to give effect to an increase in blood glucose levels. In phase I indicates the average glucose level of 90.60 mg / dL, the second phase increased to 199.00 mg / dL, and the third phase, the average glucose levels increased by 123.80 mg / dL.

Average cholesterol levels were obtained after checking cholesterol levels showed that the cooking oil origin Mandar to test animals male mice (Mus musculus) does not raise blood cholesterol levels in test animals male mice (Mus musculus) because the data obtained is still within the normal range of 40 -130 mg / dL. Likewise with the addition of powdered leaves of breadfruit (Arthocarpus altilis) into the origin Mandar cooking oil to neutralize the increase koletsrol levels in male mice (Mus musculus). Test results average cholesterol levels of male mice (Mus musculus) for 48 days with 3 times the inspection period. The average value obtained cholesterol levels showed a decrease, the use of

powdered leaves of breadfruit (Arthocarpus altilis) can prevent the increase in cholesterol levels in male mice (Mus musculus).

Ketaren (1986), states that the oil is a triglyceride composed of three units of fatty acids, are liquid at room temperature (25 ° C) and contain more unsaturated fatty acids so susceptible to oxidation.

Breadfruit plants (Arthocarpus altilis) is one of the plants that can be used as a traditional medicine because it has antioxidants that are beneficial to health. The leaves of breadfruit plants are very effective for treating diseases such as inflammation of the liver (hepatitis), spleen enlargement, coronary heart disease, inflammation of the kidneys, high blood pressure, and diabetes, because it contains flavonoids [3].

The use of cooking oil as a solvent Mandar origin flavonoid compound in powdered leaves of breadfruit because it is non-polar. By using breadfruit leaves are rich in flavonoids compounds that can prevent the increase in blood glucose and cholesterol levels.

Mechanism of action of flavonoids as natural antioxidants in the hamper and slow down the oxidation process that causes the formation of free radicals is to supplement a shortage of electron free radicals that can cause oxidative stress. Flavonoid compounds work effectively because it can neutralize the fatty acid radicals and oxygen radicals. Flavonoids inhibit the formation of reactive metabolites that can bind to macromolecules network so as to prevent tissue damage. When flavonoids react with free radicals, flavonoids donate a proton and become radicals. But unpaired electrons generated didelokaslisasi by resonance, it makes radical flavonoid compounds have very low energy to be reactive radicals [8].

One source of the increased levels of cholesterol in the blood is the consumption of foods containing cholesterol and saturated fat. Sources of cholesterol comes from animal products, such as meat, spleen, brain, kidney, egg yolk and shrimp. Egg yolks contain 220-250 mg of cholesterol so that the feed containing 2.02 grams of egg yolk as already can raise cholesterol levels [9].

Excess cholesterol is a dreaded disease, which interferes with heart health. Actually, we only need a small amount of cholesterol is to create and maintain nerve cells and to synthesize the hormones in the body. If the excessive blood cholesterol levels, so most of the cholesterol it will settle. This allows for the classification or calcification, causing an increased risk of blood pressure. This situation is harmful especially when it comes to cause rupture of blood vessels. If the vessels are ruptured blood vessel in the brain that can lead to paralysis. If calcification occurs in the blood vessels going to the heart of this vital organ blood supply, so that its strength is reduced, if the flow of blood until a hiccup, cardiac infarction will occur which create irregular heartbeat or not at all strong [9].

The process of fat metabolism in the body begins with ingestion of food ingredient components in the intestine by the enzyme. Fatty acids are fused back with glycerol to form fat which is then transported by the lymph vessels. Furthermore, fat is stored in adipose (fat tissue), if needed fat to be transported to the liver in the form of lecithin is hydrolyzed by lipase into fatty acids and glycerol, glycerol is activated by ATP to glycerol phosphate and eventually undergoes oxidation. The carbon chains of fatty acids within mitochondria treated so produced acetyl coenzyme which can then be entered into the Krebs cycle. The increase in free fatty acids also increase the distribution of fatty acids in the liver. It can improve the process of gluconeogenesis, inhibits the uptake and use of glucose in the muscles. The accumulation of triglycerides in the liver and in the muscles will lead to insulin resistance. Besides the fat tissue it produces several cytokines and hormones that inhibit the action of insulin. Hormone Insulin is an important regulator in the metabolism of carbohydrates, lipids, and proteins, then any distraction in insulin action will cause degenerative diseases, including diabetes mellitus.

## 4. Conclusion

The conclusion of this study show that the addition of powdered leaves of breadfruit into cooking oil Mandar influential in gluokosa levels and normalize blood cholesterol levels in mice.

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