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ANTIHYPERURICEMIC EFFECT OF CLOVE LEAF (*Syzygium aromaticum L.)* ON DECREASING URIC ACID LEVELS IN BLOOD RAT (*Rattus norvegicus)*

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ABSTRACT

This research is laboratory experimental in nature and was analyzed using Analysis of Variance and continued with Duncan's test, with 95% confidence (α=0.05) using SAS software. The results showed that giving clove leaf steeping could reduce uric acid levels in the blood of Rattus norvegicus rats. Clove leaf infusion *(Syzygium aromaticum L.)* contains flavonoids which have xanthine oxidase inhibitory activity, including luteolin, apigenin, kaemferol, and quercetin. In addition, Vitamin C can reduce oxidative stress and inflammation which affect the decrease in uric acid synthesis. Other compounds, namely tannins, alkaloids, and saponins have the same role as flavonoids, namely reducing the activity of the enzyme xanthine oxidase in serum and increasing the concentration of uric acid in the urine, as well as binding free radicals during the conversion of purines into uric acid. Infusion of clove leaves doses of 0.09g, 0.18g and 0.36g can reduce uric acid levels in the blood of rats (*Rattus norvegicus*) with an effective dose of 0.36g.

Keywords: *antihyperuricemic, blood, flavonoid, clove.*

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INTRODUCTION

Cases of uric acid in Indonesia are increasing due to diet, genetic factors and age factors. Foods that can trigger gout are meat and excess alcohol. These foods contain very high levels of purines that can trigger gout. Uric acid is the result of purine metabolism in the body that flows with the blood circulation. Derived from the breakdown of nucleic acids, both endogenous and exogenous. If blood uric acid levels are more than 7.0 mg/dl (hyperuricemia), the excess uric acid will accumulate in the tissues and joints which we call gout or gout (Nadesul, 2009). Increased levels of uric acid in the blood will cause deposition in the joints and form small crystals (hard deposits), causing intense pain. Incorrect or careless eating patterns, especially consuming too many foods that contain high purines, is one of the causes of a person suffering from gout pain as a manifestation of hyperuricemia, namely increased levels of uric acid in the blood (Sudewo, 2004). This is in line with the research of Brunner and Suddarth (2002), which stated that increased uric acid (gout) is an etherogenous condition associated with genetic effects on purine metabolism or hyperuricemia (Brunner, 2002). This disease is a metabolic disorder because uric acid accumulates in body tissues

(Wijayakusuma, 2006). According to Kertia (2009), uric acid is an acid that is formed as a result of purine metabolism originating from foods that contain protein in the body and if it is in a chronic condition it can cause complications to the kidneys, heart, infections and others which can cause death (Kertia, 2009).

Traditional medicine is now seen as a companion to modern medicine. Even though the use of these traditional medicines is not very popular among the general public, the habit of drinking jamu or traditional medicinal ingredients is still seen among Indonesian people. One of the plants that is thought to be efficacious in overcoming rheumatic gout by reducing uric acid levels in the blood is cloves. Clove *(Syzygium aromaticum L.)* is included in the myrtaceae tribe, this plant is a plant that belongs to the spice category and its use can also be used as a medicinal ingredient. Cloves can overcome uric acid is cloves. Cloves have been used since before the 20th century in England. Cloves are also used as a mixture of traditional medicinal herbs. Cloves have properties in treating various diseases, for example, they can be used to treat rheumatic diseases, coughs, colds, stomach disorders, chest and stomach pain, and toothache, and high uric acid. Clove leaves are thought to be able to reduce uric acid levels in the blood because they contain essential oil compounds, eugenol, flavonoids, tannins, saponins and thymine, so it is necessary to have laboratory tests on giving clove leaf steeping *(Syzygium aromaticum L.)* to decrease uric acid in rats (Wijayakusuma, 2006).

METHOD

The type of research conducted was laboratory experimental using animal models. The research was carried out in the zoology laboratory of the Faculty of Mathematics and Natural Sciences, Pattimura University, Ambon. This study used a completely randomized design, in which 15 rats weighing ± 200g were divided into 5 treatment groups and 3 replications. The treatment group was: the negative control group (K-), the positive control group (K+), which was given potassium bromate 29g/100ml for 14 days, without infusion of clove leaves, the rat group was given potassium bromate 29gr/100ml then gived clove leaf infusion 0.09 g/head/day (K1), the rat group was given 29g/100ml potassium bromate and given clove leaf infusion 0.18g/head/day (K2), and the rat group was given 29g/100ml potassium bromate and then given a dose of 0.36g clove leaf infusion /head/day (K3).

Procedures

a) Making clove leaf infusion. Clove leaves were taken from the village of Taniwel, West Seram district, Maluku. Clove leaves are air dried at room temperature. After the leaves are dry, they are blended into a powder, then weighed according to the dosage and brewed with boiling water. After that it is filtered and the dregs are removed.

b) Preparation of experimental animals. Experimental animals consisted of 15 rats weighing ± 200g, divided into 5 treatment groups and 3 replications. The treatment groups were: the negative control group (K-), the positive control group (K+), which was given potassium bromate 29g/100ml for 14 days, without infusion of clove leaves, the group of rats were given potassium bromate 29gr/100ml then force-fed with infusion of clove leaves 0.09g/kg BW (K1), the rat group was given 29g/100ml potassium bromate and fed clove leaves 0.18g/kg BW (K2), and the rat group was given 29g/100ml potassium bromate and then given a dose of 0.36g clove leaf steeping / kg BW (K3).

Data analysis

The results of changes in uric acid levels in the blood obtained were analyzed by Analysis of Variance (ANOVA) and continued with Duncan's test with a 95% confidence interval ($\alpha = 0.05$) using SAS.

DISCUSSION RESULT

The results showed that the average change in uric acid levels in the rats' blood after being given clove leaf infusion (Table 1), indicated that there was a decrease in uric acid levels in the rat's blood in the first week, between all treatments given clove leaf infusion compared to the negative control (K-) and positive control (K+) ($P<0.05$). While between treatments giving clove leaf steeping was not significantly different ($P> 0.05$).

Table 1. The average change in uric acid levels in the rats' blood after being given clove leaf infusion.

Uric Acid (mg/dl)	Treatment				
	(K-)	(K+)	K1	K2	K3
The first week	3.0 ±0.01^{c}	10.7±0.01^{a}	9.0±0.01^{b}	8.3±0.01^{b}	7.7 ±0.01^{b}
Second week	2.0 ±0.01^{c}	11.0 ±0.03^{a}	8.3 ±0.02^{b}	7.0 ±0.02^{b}	4.0 ±0.01^{c}

The second week showed a significant change, namely the clove leaf steeping treatment of 0.09g/kg BW (K2) and 0.18g/kg BW (K3) was significantly different from the negative control and positive control ($P<0.05$), while the clove leaf steeping treatment was 0.36g /kg BW was significantly different with the clove leaf steeping treatment of 0.09g/kgBW and 0.18g/kgBW, and the positive control ($P<0.05$), but not significantly different from the negative control ($P>0.05$). This shows that the decrease in uric acid levels in the blood of rats is close to negative control, which means that giving steep clove leaves regularly can reduce uric acid levels. This is presumably because the content of flavonoid compounds in clove leaves is able to inhibit the xanthine oxidase enzyme. Some research results explain that flavonoids can function to reduce uric acid levels through inhibition of the xanthine oxidase enzyme (Sunarni, 2007). According to Sarawek (2007) stated that several flavonoid compounds that have xanthine oxidase inhibitory activity include luteolin, apigenin, kaemferol, and quercetin (Sarawek, 2007).According to Lakhanpal and Rai (2007), quercetin plays a natural role in inhibiting xanthine oxidase and preventing uric acid production thereby alleviating the symptoms of gout. lower serum uric acid levels, because the double bonds and hydroxyl groups have antioxidant action by counteracting the effects of free radicals or superoxide reactions. In addition, the content of antioxidant compounds such as flavonoids, vitamin C and vitamin E is also known to reduce uric acid levels in the blood by acting as antioxidants, namely free radical scavengers. Adequate vitamin C intake is thought to prevent hyperuricemia and its further development such as gout and hyperuricemia nephropathy (Lakhanpal, 2007).

The relationship between vitamin C and uric acid is that both will experience reabsorption in the proximal tubule. Vitamin C can reduce oxidative and inflammatory stress which affects the decrease in uric acid synthesis. Apart from vitamin C, tannins, alkaloids, and saponins have almost the same role as flavonoids. Its role is to reduce uric acid levels by reducing xanthine oxidase enzyme activity in serum and increasing uric acid concentrations in urine, as well as binding free radicals during the conversion of purines to uric acid (Lakhanpal, 2007).

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