

An Analysis of Uric Acid Level Difference before and After Chayote Biscuit Treatment (Sechium Module) on Rats (*Rattus Norvegicus*)

Rahcmida^{1(*)}, Abd. Hakim Leanggeng², Moh. Ansar³

^{1,2,3}Division of Nutrition, Faculty of Public Health, Muhammadiyah University of Palu, Indonesia

*Corresponding Author, Email: rachmida026@gmail.com

ABSTRACT

Chayote (*Sechium edule*) is a type of vegetable that can be used for various types of food. It is not native to Indonesia but comes from Thailand. It has a fairly complete nutritional content and is also low in purine content. Besides it can be processed as a vegetable, it can also be processed as biscuits. The results of the laboratory test analysis of the content: uric acid level on rats average before intervention (3.84 mg/dL), and mean uric acid level in the day the 8 of intervention (3.26 mg / dL). Differences in treatment levels: before and after the 8th day (p -value = 0.110). This research was conducted at the Laboratory of the Faculty of Mathematics and Natural Sciences, University of Tadulako. This type of research is a laboratory experimental research using paired t-test statistical tests based on the analysis of uric acid levels in rats (*Rattus norvegicus*) in 2 interventions (treatments). It is expected that the public will make more use of the chayote (*Sechium edule*) because there are many nutritional contents in chayote which are very beneficial for the health of the body, especially for gout sufferers.

Keywords – Chayote (*Sechium edule*), Biscuit, Uric Acid of Rats (*Rattus norvegicus*)

INTRODUCTION

According to data from the World Health Organization (WHO), patients with joint disorders in Indonesia reach 81% of the population, only 24% go to the doctor, while only 71% of those directly consume over-the-counter pain relievers (1). This figure places Indonesia as the highest country suffering from joint disorders when compared to other countries. For international scale 2, based on a survey by the World Health Organization WHO, Indonesia is the largest country in the world whose population suffers from gout.

High uric acid levels in the body can be caused by excessive consumption of foods containing purines (2). The body provides 85% of purine compounds every day, this means that the purine requirement from food is only about 15%. Because every normal metabolism will produce uric acid, while the trigger is food factors and other compounds that contain lots of purines. Purines are found in all protein-containing foods such as meat, meat, crab, shellfish, legumes, and cheese.

Chayote (*Sechium edule*) is a natural resource that has high nutritional value. Chayote (*Sechium edule*) contains minerals, a little sugar, and water (3). Also, chayote contains antioxidants such as flavonoids and vitamin C which are good for warding off free radicals. Chayote also contains several components that can be used as medicine, including saponins, vitamin A, thiamin, protein, and many more. Although the content and benefits of chayote are very much, Indonesian people are less interested in consuming or processing it. Therefore, it is necessary to innovate chayote products to increase the selling price and is favored by the Indonesian people, one of which is processed into chayote biscuits (4).

Chayote (*Sechium edule*) can also cure several diseases so that it can be called a medicinal plant. Chayote is good for use by gout sufferers, the benefits of chayote for gout sufferers come from the content of vitamins and minerals (5). Also, chayote contains low purines (elements that can increase uric acid levels in the blood), so it is good for consumption by gout sufferers.

Based on the results of previous research on the content and benefits of chayote, the researchers will conduct an anti-gout test using chayote-based biscuits against uric acid levels in mice. It is hoped that the results of this study can be scientific evidence that chayote has the property of lowering uric acid.

METHODOLOGY

This research uses experimental research with laboratory analysis (6). This research was conducted at the research laboratory of the Faculty of Mathematics and Natural Sciences, Tadulako University. This research will be conducted from June to July 2020. The population in this study is white rats (*Rattus norvegicus*). The sample in this study was 5 white rats (*Rattus norvegicus*), taking into account the inclusion and exclusion criteria.

RESULTS

Based on the results of the analysis of uric acid levels in rats (*Rattus norvegicus*) before and after giving chayote (*Sechium edule*) biscuits, the following data were obtained:

Table 1. Distribution of Average and Standard Deviation of Rat Uric Acid (*Rattus norvegicus*) Before and after Giving Chayote Biscuits (*Sechium edule*)

No	Treatment	Uric Acid Levels (mg/dL) ($\bar{x} \pm SD$)	Minimum	Maximum
1	Before	3,84 ± 0,58mg/dL	3,40	4,80
2	After 7 days	3,26 ± 0,08mg/dL	3,20	3,40

Source: Primary Data, 2020

Based on table 1, the paired t-test calculation shows that the average uric acid level before being treated is 3.84 mg / dL, while the uric acid level after being treated is 3.26 mg / dL, this indicates a decrease in uric acid levels in rats).

Table 2. Differences in UraT Levels in Rats (*Rattus norvegicus*) based on the duration of the intervention

No	Intervention Time Difference	<i>p-value</i>
1	Before and after the 7th day	0,110 ^(TS)

Note: The sign (ts) indicates that there is no significant difference between groups based on the paired t-test. Based on table 5.3, shows that the p-value before and after the 8th day is 0.110.

DISCUSSION

The results showed that the average uric acid level of rats (*Rattus norvegicus*) before giving chayote (*echium module*) biscuits were 3.84 mg / dL, while the mean blood uric acid levels after 7 days of giving chayote (*Sechium edule*) biscuits decreased to 3.26 mg / dL with p-value or a decrease that occurs at 0.58%. These results indicate a difference in uric acid levels of rats before and after giving chayote (*Sechium edule*) biscuits.

The decrease in uric acid levels in rats (*Rattus norvegicus*) occurs because chayote has high levels of fiber which is good for the body and has low levels of purines so it is good for consumption by gout sufferers (7). Apart from being high in fiber and low in purine content, chayote also contains various minerals that the body needs, such as calcium, iron, magnesium, phosphorus, potassium, and zinc, as well as low-calorie consumption that is safe for gout sufferers (8).

The flavonoids contained in chayote (*Sechium edule*) have a xanthine oxidase inhibitor effect or an inhibitory effect of the xanthine enzyme to become uric acid and can also inhibit purine metabolism so that it can reduce excess uric acid production by more than 50%. This plant works in a diuretic, namely to help remove the excess uric acid in the blood (9).

In addition to the flavonoid content that can reduce uric acid levels, vitamin C can also reduce uric acid levels (10). Vitamin C contained in chayote is 7.7 mg and this vitamin can act as an antioxidant that can prevent damage to body cells while preventing exposure to free radicals that can trigger various diseases. If we consume only 100 grams of chayote, then we already get 13 percent of the daily requirement of vitamin C. Giving vitamin C increases kidney plasma and glomerular filtration rate and weakens the increase in arteries thereby reducing oxidative stress and inflammation, therefore vitamin C reduces uric acid synthesis.

Based on the research of Marlinca Agung R (2015), chayote can reduce uric acid levels in male white rats (*Rattus norvegicus*) because potassium, water content, and saponins

inhibit uric acid formation. These compounds can increase urine volume which prevents the buildup of uric acid. Too much uric acid production or disposal through the kidneys causes too little uric acid in the blood to increase so it is highly recommended for gout sufferers to consume chayote (*Sechium edule*) (11).

Chayote (*Sechium edule*) can reduce uric acid levels in the body (3). This health benefit comes from the high fiber content in chayote, which can accelerate the body's metabolic processes and can help the process of breaking down uric acid in the body more optimally.

CONCLUSIONS

This study concluded that there was no difference in uric acid levels in rats (*Rattus norvegicus*) before and after giving chayote (*Sechium edule*) biscuits on day 8, with p-value = 0.116 ($p > 0.05$).

SUGGESTION

Recommendations are expected for the public to make more use of chayote (*Sechium edule*) because there are many nutritional contents in chayote which are very beneficial for the health of the body, especially for gout sufferers.

REFERENCE

1. Burton J, Organization WH. WHO Healthy workplace framework and model: Background and supporting literature and practices. World Health Organization; 2010.
2. Choi HK, Atkinson K, Karlson EW, Willett W, Curhan G. Purine-rich foods, dairy and protein intake, and the risk of gout in men. *N Engl J Med*. 2004;350(11):1093–103.
3. Vieira EF, Pinho O, Ferreira IM, Delerue-Matos C. Chayote (*Sechium edule*): A review of nutritional composition, bioactivities and potential applications. *Food Chem*. 2019;275:557–68.
4. Marie-Vivien D, Chabrol D. Geographical Indications (GIs), biodiversity and poor communities: The opportunity of GIs to provide protection of traditional indigenous biodiversity products and benefits to poor agricultural communities. A Desk Study on six target countries: Cambodia, Laos, Indonesia, Vietnam, Ethiopia, Mauritania. 2014;
5. Wright CI, Van-Buren L, Kroner CI, Koning MMG. Herbal medicines as diuretics: a review of the scientific evidence. *J Ethnopharmacol*. 2007;114(1):1–31.
6. Berinsky AJ, Huber GA, Lenz GS. Evaluating online labor markets for experimental research: Amazon.com's Mechanical Turk. *Polit Anal*. 2012;20(3):351–68.
7. Sun SZ, Flickinger BD, Williamson-Hughes PS, Empie MW. Lack of association between dietary fructose and hyperuricemia risk in adults. *Nutr Metab (Lond)*. 2010;7(1):1–12.
8. Savage M. The Green Aisle's Healthy Smoothies & Slushies: More Than Seventy-Five

- Healthy Recipes to Help You Lose Weight and Get Fit. Simon and Schuster; 2016.
9. Ghelani H, Chapala M, Jadav P. Diuretic and antiurolithiatic activities of an ethanolic extract of *Acorus calamus* L. rhizome in experimental animal models. *J Tradit Complement Med.* 2016;6(4):431-6.
 10. Bove M, Cicero AFG, Veronesi M, Borghi C. An evidence-based review on urate-lowering treatments: implications for optimal treatment of chronic hyperuricemia. *Vasc Health Risk Manag.* 2017;13:23.
 11. Speer F. Food allergy. Elsevier; 2013.