

## Potential Therapeutic Effects of Tali Bamboo Leaf Tea (*Gigantochloa apus*) on Lipid Profile of Rats With Metabolic Syndrome

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### ABSTRACT

This study aimed to determine the potential of Tali bamboo leaf tea (*Gigantochloa apus*) on the lipid profile of metabolic syndrome rats. This study is a laboratory-based experimental study using 30 male Wistar rats with metabolic syndrome aged 8 weeks and weighed 150–250 g, that were divided into 5 groups namely negative control (K-), positive control (K+), and three intervention groups with intervention doses of bamboo leaf tea at 300, 600, and 900 mg/200 g BW for 28 days. The results showed that there were significant differences ( $p < 0.05$ ) in High-Density Lipoprotein Cholesterol (HDL-C) and Low-Density Lipoprotein Cholesterol (LDL-C) levels before and after intervention. Tali bamboo leaf tea has the potential to improve the lipid profile of rats with metabolic syndrome ( $p < 0.001$ ).

**Keywords:** bamboo leaf tea, dyslipidemia, HDL cholesterol, LDL cholesterol, metabolic syndrome

### INTRODUCTION

Metabolic syndrome is defined as having at least three out of five health problem conditions: obesity, high blood pressure, high blood triglycerides, low levels of High-Density Lipoprotein (HDL), cholesterol, and insulin resistance. The prevalence of metabolic syndrome has increased significantly around the world, including in Indonesia with a prevalence of 23.3% of the total population (Gartika *et al.* 2023). Metabolic syndrome increases the risk of cardiovascular disease, Diabetes Melitus Type 2 (DMT2), and stroke. One of the treatments for metabolic syndrome is to control the lipid profile. Tali bamboo leaf tea is a herbal beverage that is a source of antioxidants that can improve lipid profile. The antioxidants present in the leaves of the bamboo include flavonoids, tannins, saponins, phenols, and alkaloids (Ambarwati *et al.* 2020). This study aimed to determine the potential of tali bamboo leaf tea on lipid profiles in rats with metabolic syndrome.

### METHODS

This study is an experimental study with a pre-test-post-test control group design and was conducted from January to March 2023 at the

Laboratory of the Center for Food and Nutrition Studies, Gadjah Mada University. This study was approved by the Ethics Committee Sebelas Maret University with the reference number 20/UN27.06.11/KEP/EC/2023. The subjects were 30 male Wistar rats, 8 weeks old with 150 to 250 g BW, acclimatized for 7 days and randomized into 5 groups, namely negative control (K-) (distilled water), positive control (K+) (9 mg metformin per 200 g BW), and bamboo leaf tea at different doses (300, 600, and 900 mg per 200 g BW). Rats with metabolic syndrome were made by HFHF<sub>r</sub> for 14 days, then induced by nicotinamide, 110 mg/kg BW and streptozotocin, 45 mg/kg BW. Rats received intervention for 28 days. Blood was collected from rats to check High-Density Lipoprotein Cholesterol (HDL-C) and Low-Density Lipoprotein Cholesterol (LDL-C) levels before and after intervention. Data were analyzed by one-way ANOVA and paired t-test.

### RESULTS AND DISCUSSION

Administration of bamboo leaf tea at doses of 300, 600, and 900 mg per 200 g BW for 28 days has the potential to improve lipid profiles in rats with metabolic syndrome ( $p < 0.05$ ). This study is consistent with previous research

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showing that administration of bamboo leaf tea at doses of 360, 720, and 1,440 mg per kg BW can reduce LDL-C (Figure 1) and HDL-C (Figure 2) in obese rats for 35 days (Ambarwati *et al.* 2020). Tali bamboo leaf tea contains natural sources of antioxidants such as flavonoids, tannins, phenols, saponins, and alkaloids that are useful in improving lipid profiles. Antioxidants increase HDL-C levels by increasing hepatic apolipoprotein A mRNA, which plays a role in initiating apo (A) synthesis. Apolipoprotein A is the major component of HDL-C and functions to suppress LDL-C proliferation so that LDL-C oxidation does not occur. Flavonoids may improve the lipid profile by increasing the activity of the enzyme lipoprotein lipase, which converts Very Low Density Lipoprotein (VLDL) to intermediate density lipoprotein, thereby reducing VLDL accumulation in the liver. The high activity of the lipoprotein lipase enzyme may help to reduce LDL-C levels and increase

HDL-C levels (Octavia *et al.* 2017). Saponins can reduce the gastrointestinal lipase enzyme, thereby preventing the absorption of fat in the intestine. Unabsorbed fat is excreted in the feces. The lipase enzyme functions to hydrolyze fat into monoglycerides, which are absorbed and stored as fat reserves in adipose tissue which causes obesity. Tannins may suppress LDL-C by increasing LDL receptor activity (Rizki *et al.* 2015). Administration of metformin also has the potential to improve lipid profiles by inhibiting triglyceride and cholesterol synthesis (Dinanti 2022).

### CONCLUSION

Tali bamboo leaf tea at doses of 300, 600, and 900 mg per 200 g BW for 28 days has the potential to improve lipid profiles in rats with metabolic syndrome. Future research is expected to test the nutritional content of bamboo leaf

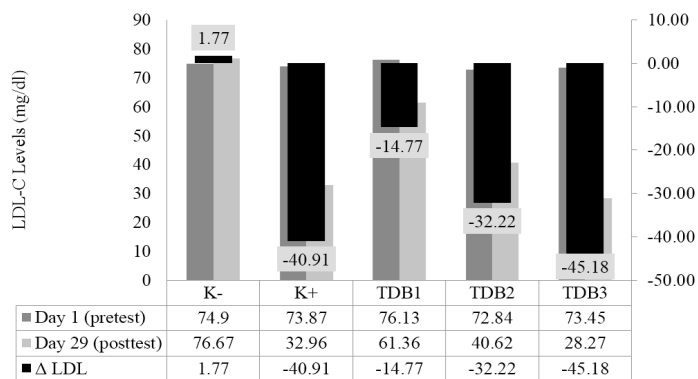


Figure 1. Mean LDL-C levels in rats with metabolic syndrome

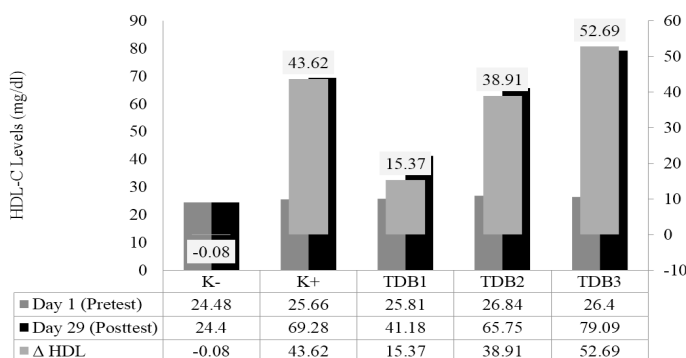


Figure 2. Mean HDL-C levels in rats with metabolic syndrome

tea and conduct organoleptic tests to determine acceptability

#### ACKNOWLEDGEMENT

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#### DECLARATION OF CONFLICT OF INTERESTS

The authors have no conflicts of interest to declare.

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