

Effect of Goat Milk Yogurt towards Reducing Uric Acid, Cholesterol, and Blood Glucose Level

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Abstract

This study aimed to determine the effectiveness of goat milk yoghurt against the various levels of uric acid, total cholesterol and blood glucose level in white male rat (*Rattus norvegicus strain Wistar*). It was conducted through true experimental methods with post test Control Group Design, materials research white male mices (*Rattus norvegicus Wistar strain*), aged between 2-3 months as many mices as much as 24 samples. Treatment comprises of four treatments, namely: PA = Placebo/water ad- lib, PS = Yoghurt

Streptococcus thermophilus Stater Goat Milk, Goat Milk Yoghurt PL = Stater Lactobacillus, PC = Stater Goat Milk Yogurt Mix (*Streptococcus* and *Lactobacillus bulgaricus*). The observed variables include the levels of uric acid total cholesterol, and blood glucose of the white male rats (*Rattus novergicus strain Wistar*). Data analysis were used One way ANOVA and LSD test. The results showed that levels of uric acid, total cholesterol and blood glucose level in mice treated with goat milk yogurt were significantly lower compared with mice fed a drinking water/placebo.

Keywords: Goat Milk Yogurt, Uric Acid, Cholesterol, Blood Glucose

INTRODUCTION

Maintaining health becoming an important thing to attained good quality of life(1). There were several ways to maintain our health, not only doing regular physical exercise, but also having balance and nutritious diet. Still, having imbalanced diet and consuming unhealthy food could lead into chronic disease, such as Cardiovascular disease, Diabetic Mellitus, and also hiperurisemia (2) (3).

Nowadays, there were many synthetic drugs offered to treat for those chronic diseases, still it has various side effects that caused disadvantages for the patients (4)(5). The

prescription which includes drugs from the class of fibrate acid (*phenofibrate, bezafibrate, and gemfibrozil*) to treat patients with hiperlipoproteinemia type III and severe hipertriglycerida, having common side effects such as nausea, vomiting and diarrhea (6). Then, drugs from the class of resin (cholestiramin and cholestipol) for treating patients with hipercholesterolemia can create severe bloated, and allergic (7). Moreover, the most feared complications for insulin therapy were suffering from hypoglycemia (8). Therefore, we need such an alternative treatment, especially for the natural product, in which it can minimize the side effects for treating patients with hiperuricemia, hipercholesterolemia, and hiperglycemia. Goat milk yogurt can be seen as an alternative since it has many advantages. It has played a very important role in health and nutrition of young and elderly because it has been known for its beneficial and therapeutic effects on the people who have cow milk allergy (9). Furthermore, It has natural antiseptic compounds that could reduce the proliferation of bacteria, because it contains fluorine (F) which levels reached 10-100 times higher than cow milk so it has higher alkaline, soft protein, and light laxative effect thus it does not cause diarrhea (10). Moreover, when the yogurt has been processed, it contains whey that has high sodium (Na) so it could prevent from joint stiffness (11). Goat milk yogurt also has vitamin B1 that have similar chemical structure with allopurinol (12). Allopurinol is chemical compound used to treat patient with hiperuricemia because it can stop the xanthine oxidase (13). Also, goat milk yogurt containing the live active probiotics

Lactobacillus acidophilus La5 and *Bifidobacterium lactis* Bb12, and consuming each day was beneficial in lowering both total cholesterol and low-density lipoprotein compared to eating yogurt without these probiotics (14) (15).

Thus, in this study it will explore further about the effectivity of goat milk yogurt for minimizing uric acid level, total cholesterol level, and blood glucose level for animal testing on white male rats (*Rattus norvegicus strain wistar*).

METHODS AND MATERIALS

1. Methodology. This research conducted based on true experimental study design with Post test control group design. It aimed to identify the correlation between two research objects (intervention and control group) in which both of the groups were measured the post test (16).

2. Treatments. This study was managed with The Randomized complete block design (RCB) using four treatments and six replications, namely:

PA= placebo/mineral water as ad-lib

PS=goat milk yogurt with stater *Streptococcus*, dosage 10ml/day/mice

PL=goat milk yogurt with stater *Lactobacillus*, dosage 10ml/day/mice PC=goat milk yogurt stater mixture (*Streptococcus & Lactobacillus*), dosage 10 ml/day/mice

3. Samples. This is an animal experimentation study because samples used were white male mice (*Rattus Norvegicus Strain Wistar*), aged 2-3 months-old, with an

average weight at about 2,799gram \pm coefficient of variation 9,46% on a healthy condition, and having clear eye. There were six replications given in this research, in which in each replication there were 24 mice and 2 reserves.

a. Inclusion Criteria, were:

1. Aged between 2-3 months-old
2. Mice weight is measured using coefficient of variation with results not more than 10%
3. White male mices, with strain Wistar class
4. Mice on healthy condition indicated by having active mobility and clear eyes.

b. Exclusion criteria, namely:

1. Mice were dead during treatments
2. Mice were too aggressive to endanger other mices

4. Variables

a. Independent variable: the independent variable used in this study were award's goat milk yoghurt using stater *Lactobacillus*, *Streptococcus*, and mixture (*Lactobacillus* & *Streptococcus*) 10ml/day/mice

b. Dependent variable: the dependent variables in this resarch were uric acid levels, total cholesterol level, and blood glucose level of white male rats (*Rattus Novergicus Strain Wistar*).

5. Instruments

a. Maintenance tool for mice: rat cage, cage's cover which made from woven wire, bottles for drink

b. Surgical tools: surgical scissors, pinset, bottles for accomodating blood, gloves, needles, surgical board,

c. Others: syringe 3ml and 1 ml, weight scales, spectrofotometer 546nm, pipette, micropipette, hand schoen, microhematocrite, sentrifuge, reaction bottle, vaccutainer, sonde, cotton

6. Intervention Procedure

Goat milk yoghurt were given 10ml/day/mice in which it divided into three times a day within a month. It given through sonde made from syringe 3ml modified with rubber pipette (diametre 4 mm dan 7cm length).

7. Anesthesia Procedure

During anesthesia process, each mice were given chloroform for 5 ml. It given through dyed cotton with chloroform in a chamber for 5 minutes, then mice were also dipped in those chamber for 25-30 minutes, until they were dying.

8. Surgical Method

Mice were operated by unfurled their body in a surgical board, then on their feet were given needles in order to they cannot move their leg during operation process. The operation went on dissect their body vertically, from bottom to the neck. Especially for the neck section, there were different method on dissect the mice, since it went horizontally. After that, we need to take their blood using syringe 3 ml. While, the blood volume need to be taken 1-2 ml. The blood taken then were stored in a vaccutainer.

9. Data Analysis

One way Anova test were used to analyze the difference between those four groups on reducing uric acid level, total cholesterol level, and blood glucose level of the white male rats.

RESULT AND DISCUSSION

1. Uric Acid Levels

The observation result after 30 days treatments of the four groups based on average decreasing of uric acid level has been shown on the table. 1.

Table 1: The Average Decreasing of Uric Acid Level among White Male Rats (*Rattus norvegicus strain wistar*)

Treatments	Average Decreasing of Uric Acid Levels (mg/dl)
Placebo/mineral water	2,25
Group of goat milk yoghurt starter <i>Lactobacillus bulgaricus</i>	2,50
Group of goat milk yoghurt starter <i>Streptococcus thermophilus</i>	2,40
Group of goat milk yogurt starter mix <i>Lactobacillus bulgaricus</i> and <i>Streptococcus thermophilus</i>	2,65

From table 1, the highest decreasing of uric acid level among white male rats happened on the fourth group which given goat milk yoghurt starter mix *Lactobacillus bulgaricus* and *Streptococcus thermophilus* for 2,65mg/dl. The second group, which given goat milk yoghurt starter *Lactobacillus bulgaricus*, indicates that the decreasing level of uric acid were 2,50 ml/dl. Then, in the third group, given goat milk yoghurt starter *Streptococcus thermophilus*, points out that it can reducing uric acid level into 2,40 mg/dl. However, the least decreasing were shown on the first group, in which given only placebo, with 2, 25 mg/dl of uric acid levels.

Those results explained that goat milk yoghurt has been significantly reduce the uric acid level, as goat milk yoghurt contain vitamin B1 that having similar chemical

compound with allopurinol in which it can inhibit the forming of xantin oxidase because it will compete with xantin and hipoxantin, therefore it will minimize producing of uric acid as the outcome of xanti process (12), (13) (14). Moreover, the benefits of goat milk yogurt as treatment of gout has been medically examined, since it contains high Natrium (Na) and Chloride (Cl) (17). Those chemical elements help the kidneys in balancing the body fluid and electrolyte. With the goat milk yogurt and acid-base balance of the body can be maintained properly so that the chemical composition of the blood is mainated and it controls the uric acid levels.

2. Total Cholesterol Levels

The average levels of total cholesterol among four groups intervention has shown on the table 2 and figure 1.

Table 2:. The Average of Total Cholesterol Level among Four Gropus of White Male Rats (*Rattus norvergicus Strain wistar*)

Treatments	Average of Total Cholesterol Levels (mg/dl)
Placebo/mineral water	62,83 ^a
Group of goat milk yoghurt starter <i>Lactobacillus bulgaricus</i>	52,17 ^b
Group of goat milk yoghurt starter <i>Streptococcus thermophilus</i>	51,00 ^{bc}
Group of goat milk yogurt starter mix <i>Lactobacillus bulgaricus</i> and <i>Streptococcus thermophilus</i>	54,16 ^b

Notes: Different notation indicates significant differences

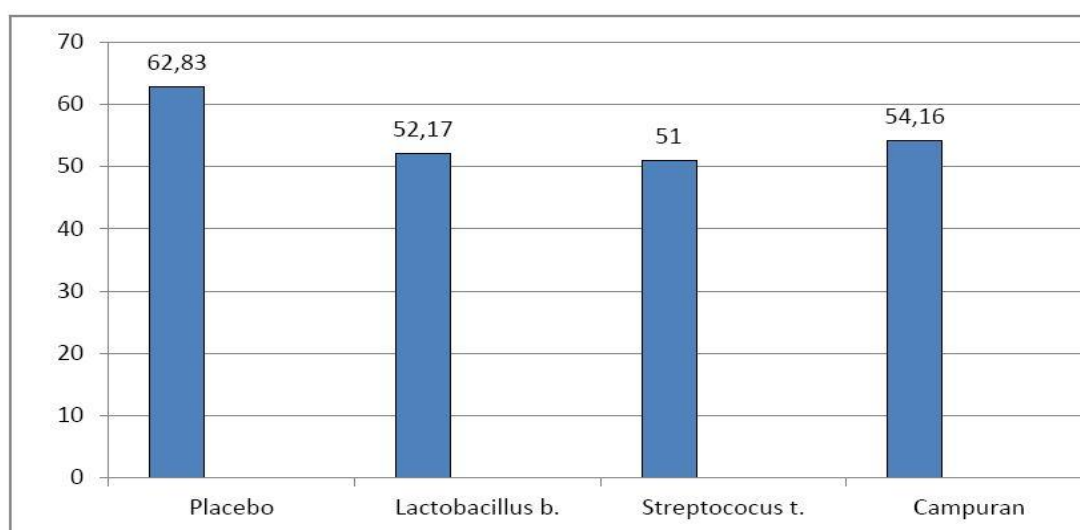


Figure 1. Graphic of Average on Total Cholesterol Level Among Four Groups of White Male Rat (*Rattus norvergicus Strain wistar*)

Based on LSD test results (Table 2 and Figure 1), it revealed that the first group, which, given only a placebo, have significant differences compared with other treatments. However, between groups were given goat milk yogurt with starter *Lactobacillus*, starter *Streptococcus*, and mix of starter *Lactobacillus* - *Streptococcus* has demonstrated no significant differences between those groups. In other words, it concluded that goat milk yogurt (with various kinds of starter) on white male rats, could reduce the total cholesterol level.

The total cholesterol level in the first group, which, given only a placebo, remains high compared with other groups. It caused by *Lactic Acid Bacteria* in the groups given goat milk yogurt having ability to survive in the intestine and helps during fermentation process and *bile salts deconjugation* process. Those processes aimed at controlling the plasma cholesterol level through cutting the conjugation process during *Bile Salt Deconjugation* mechanism (3). Moreover, the body cell of the Lactic Acid bacteria having ability on binding the cholesterol in the digestive system, thus cholesterol could not absorb by intestinal lumen and its outs along with feces (18) . Goat milk yogurt also having vitamin E, as an antioxidant, in which effective to control total cholesterol in blood system(17).

3. Blood Glucose Level

Based on the treatments given, on Table 3 and Figure 2 has revealed the average of blood glucose level on the white male rat (*Rattus Norvegicus strain wistar*).

Table 3. The average of Blood Gluco Level among white male rat (*Rattus Norvegicus strain wistar*).

Treatments	The average of blood glucose level (mg/dl)
Placebo/mineral water	148,66 ^a
Group of goat milk yoghurt starter <i>Lactobacillus bulgaricus</i>	134,50 ^{bc}
Group of goat milk yoghurt starter <i>Streptococcus thermophilus</i>	135,33 ^c
Group of goat milk yogurt starter mix <i>Lactobacillus bulgaricus</i> and <i>Streptococcus thermophilus</i>	130,16 ^b

Notes: Different notation indicates significant differences

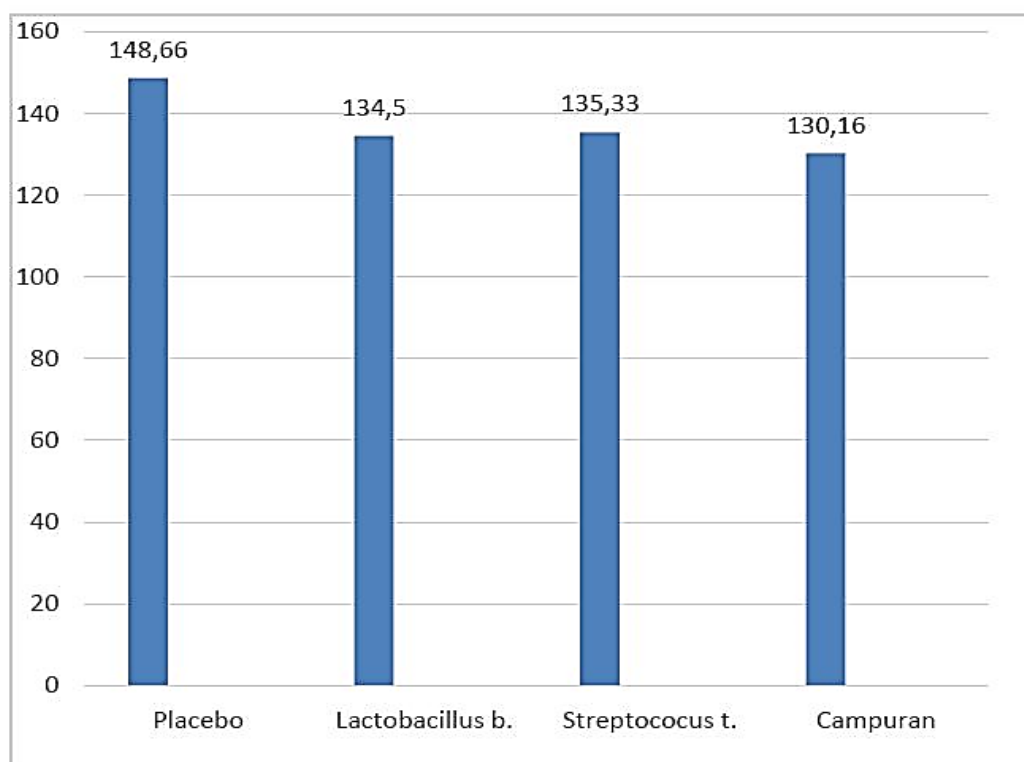


Figure 2. Graphic of Average on Blood Glucose Level among Four Groups of White Male Rat (*Rattus norvegicus Strain wistar*)

Based on the LSD test result (Table 3 and Figure 2), it demonstrates that the fourth group, which given goat milk yogurt with starter mix *Lactobacillus bulgaricus* and *streptococcus thermophilus*, is the most effective at controlling blood glucose level compared with other groups, since it could control the blood glucose to the lowest level. Those mixtures of the probiotics have arranged symbiosis mutualism due to *streptococcus thermophilus* produces formic acid, which stimulates the growth of *Lactobacillus bulgaricus*. Then, *Lactobacillus bulgaricus* will produce amino acid glycine and histidine needed to stimulate growth of *streptococcus thermophilus* (19). Also, it informed that lactic acid bacteria in the goat milk yogurt, able to increase the insulin sensitivity, especially in the IRS (*InsulineReceptor Substrate*) through decreasing the fat process in mice, so its effect on increasing the effectiveness of insulin secretion and glucose transfer to cell become more optimal. So, goat milk yogurt also can serve as an anti-diabetic and anti-oxidant (20), (6), (21). It also stated that goat milk yogurt consumption lowers risk for insulin resistance, metabolic syndrome, or diabetes because it contains fatty acid, called trans-palmitoleic acid as the protective compound. Higher levels of trans-palmitoleic acid were associated with numerous desirable outcomes: lower body-mass index, smaller waist circumference, lower triglyceride levels, lower levels of C-reactive protein (a marker of inflammation), lower fasting insulin levels, and less insulin resistance (22).

CONCLUSION

Goat milk, yogurt effective in reducing uric acid level, total cholesterol level, and blood glucose level in white male rats (*Rattus norvegicus strain Wistar*). Then, goat milk yogurt with starter mix *Lactobacillus bulgaricus* and *streptococcus thermophilus* has the most effective method of controlling degenerative disorder comparing with single starter.

ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to Director General of Higher Education Ministry of Research, Technology, and Higher Education of The Republic Indonesia and University of Muhammadiyah Malang for research grant and facilities during this study.

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