In Vitro Studies: Potensial Use of Dyospiros kaky, Avium grafeolens, Guazuma ulmifolia, Hibiscus sabdariffa as an Agent of Anti-cholesterol

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Abstract: God has made man and has prepared everything for human life. This universe was created for humans to be healthy. The lifestyle of humans in the millenial era has made circulatory disorders in the form of hypercholesterolemia. This study aims to determine the efficacy of herbal plants to reduce blood cholesterol levels. The method used is the in vitro method. Herbal plant used in this experiment Dyospiros kaky 50%, Avium grafeolens 20%, Guazuma ulmifolia 20%, Hibiscus sabdariffa 10%. This study showed that cholesterol level decreased from 200 mg/dL to 102 mg/100 g at dose 20 mg/dL, 64.5 mg/100 g, at dose 40 mg/dL, and 94.2 mg/100 g, at dose 60 mg/dL. The best dose to decrease blood cholesterol was 40 mg/dL. This study indicated that Dyospiros kaki is an agent of anti-cholesterol.

Key words: In Vitro Study, Dyospiros kaky, Avium grafeolens, Guazuma ulmifolia, Hibiscus sabdariffa, Agent of Anti-cholesterol.

1. Introduction

Indonesia is an extraordinarily, wealthy country of natural materials. Natural materials have excellent prospects in the field of health and beauty. The use of chemicals in the field of health and beauty has negatively impacted negative effect. Natural materials that can be used include fruit, leaves, tubers, wood, fish, and animals. These natural ingredients are also called herbs. Fruit that has excellent potential for health is Persimmon fruit (Dyospiros kaki).

Lifestyle changes in the global era, bringing in the type of disease. Fast food such as burger, fried chicken, beefsteak, and soft drinks can potentially make disease because of high cholesterol, lipid, and sugar-blood cholesterol 70% from liver synthesis, and 30% from nutrition. If cholesterol intake from fast food and changes lifestyle is very high, this will cause atherosclerosis, consequently hypertension and blockage of blood vessels of the brain, heart, and feet occurs. The blockage of blood vessels of the brain causes stroke, blockage of blood vessels of the heart, cardiovascular disease, and blockage of feet, causing pain, crams, numb, and gangrene [1]. Cholesterol above 240 mg/dL may cause atherosclerosis and a healthy cholesterol level is 200 mg/dL [2].

Chicken meat is cheap food. The industry of broiler chick increases from year to year because chicken meat is very liked by the community. Chicken livestock innovation has undergone development such as probiotic chick, and the organic chick is better at nutritive value than conventional broiler chick with hormone injection or antibiotic. In the future, a cholesterol-free chick will be an innovation. That needs a few steps to realize chicken low cholesterol.

In vitro studies are the first step. This research designs an innovative natural source to decrease cholesterol in the serum blood. Antioxidant and polyphenol in Persimmon fruit are able to lower blood lipids, and fiber helps regulate blood pressure. Hypothesis in this research was Persimmon fruit combined with other herbal has an excellent potency to decrease cholesterol in the blood. The purpose of this study is to determine the effect of formulation stroke care.
2. Materials and Methods

Composition of formulation: Dyospiros kaki 50%, Apium grafeolens 20%, Guazuma ulmifolia 20%, Hibiscus sabdariffa 10%.

*In vitro* studies used the composition of cholesterol blood liquid 200 mg/dL: isotonic liquid 100 mL and yellow egg 5 g.

Methods to the proximate analysis were: water SNI 01-2891-1992, 5.1; ash SNI 01-2891-1992, 6.1; protein SNI 01-2891-1992, 7.1; fat SNI 01-2891-1992, 8.2 and carbohydrate IK 5.4.5. Method for measuring cholesterol was MU/INS/4 (GC). The analysis was done at Analytical and Calibration Laboratories, Center for Agro-based industry, Bogor, Indonesia

3. Results and Discussion

Nutritional values of Persimmon are: water 92.93%, vitamin C 11.85 mg/100 g, tannin 881.2 mg/L, vitamin B1: 4864.23 mg/kg, vitamin B2: 85.87 mg/kg, carbohydrate 5.73%, protein 9.24%, fat 0.85%, alcohol 0%, mineral 0.48% (e.g. Al 0 mg/L, Cu 0.48 mg/L, Ca 154.25 mg/L, Fe 3.18 mg/L, Mg 149.87 mg/L, Zn 1.75 mg/L, Ni 0.24 mg/L, Cd 0 mg/L, Pb 1.37 mg/L, Cr 0.25 mg/L). Persimmon fruit contained astir oil, tannins, amylin, fructose, flavonoid, vitamin C, Fe, Cu and Phosphor [3].

Dyospira kaki fermentation was rich in Bacillus sp. as much as $1.05 \times 10^3$ CFU/mL, which is useful as an antibiotic and organic antifungal. The content of pathogenic bacteria *E. coli* and Staph aureus was negative [4].

The result showed that formulation contains nutrients in Table 1.

This formula contain Carbohydrates 74.7%. This formula from the plant are rich in C (Carbon). Dyospiros kaki is the fruit, Apium grafeolens is the leaf, Guazuma ulmifolia is wood, and Hibiscus sabdarifa is the flower. Dyospiros kaki contains *probiotic Bacillus sp.* [4, 5]. Phytochemical analysis of Apium grafeolens contain carbohydrate, flavonoid, alkaloid, steroid, and glycoside, also phenols dan furocoumarins [6]. Guazuma ulmifolia contains alkaloid dan flavonoid, also tannin [7]. The other research indicated that Hibiscus sabdariffa L.) contains an antioxidant [8].

Results showed the cholesterol levels in *in vitro* studies in Table 2.

Cholesterol control 200 mg/100 g used this study and formula composition can decrease cholesterol level to 102 mg/100 g at dose 20 mg/dL (49%), 64.5 mg/100 g; at dose 40 mg/dL (67%) and 94.2 mg/100 g; at dose 60 mg/dL (53%).

The result other study showed that Apium grafeolens could reduce fatty acid in rat hepar on an effective dose of 0.72 mL/200 g Body Weight [9]. This indicated that Apium grafeolens could reduce cholesterol content at hyper cholesterol conditions. Apium grafeolens contains phytosterol, the main component in phytochemistry used to reduce cholesterol. Fitosterol has a function to prevent heart disease as well as atherosclerosis.

Flavonoid can erode cholesterol deposits on coronary vein walls that have calcification [10], can reduce triglyceride by inhibiting enzyme 3 hydroxyl 3-Methil glut aril coenzyme A reductase (HMG Co-A reductase) [11]. Tannin can reduce the accumulation of cholesterol in the blood by accelerating the discharge of cholesterol through the fesses [12]. Saponin lowers cholesterol levels by binding to cholesterol [13].

| Table 1  | Formulation Analysis. |
|----------|------------------------|
| Parameters | Composition |
| Water (%) | 10.8 |
| Ash (%) | 8.88 |
| Protein (%) | 8.67 |
| Fat (%) | 1.44 |
| Carbohydrate (%) | 74.7 |

| Table 2  | Cholesterol level *in vitro* studies. |
|----------|----------------------------------------|
| Formula (mg/dL) | Cholesterol (mg/100 g) | Level of decrease (%) |
| 20 | 102 | 49% |
| 40 | 64.5 | 67% |
| 60 | 94.2 | 53% |
Bacillus sp. strain CK 11-4, which produces a potent fibrinolysis enzyme, was screened from Chungkook-Jang, a traditional Korean fermented-soybean sauce. The fibrinolytic enzyme (CK) was purified from the supernatant of Bacillus sp. strain CK 11-4 culture broth and showed thermophiles, hydrophilic, and vigorous fibrinolysis activity. Bacillus spp. produced a variety of extracellular and intracellular proteases. Bacillus sp. strain CK 11-4, produces a strongly fibrinolytic enzyme. Fibrinolytic enzyme prevents the formation of the plaque blood vessel. [14]. Fibrinolysis is the natural process that the body (human and animal) needs, so that no blood clotting occurs. This fact indicated that Bacillus sp. on Dyospiros kaki has potential in stroke case, a disease from the new lifestyle of the generation now. This fact also gives hope to make nutrition for chicken free-cholesterol in herbal formulation in the future.

4. Conclusions

This study showed that cholesterol level decreased from 200 mg/dL to 102 mg/100 g at dose 20 mg/dL, 64.5 mg/100 g, at dose 40 mg/dL, and 94.2 mg/100 g, at dose 60 mg/dL. The best dose to decrease blood cholesterol was 40 mg/dL. This study indicated that Dyospiros kaki is an agent of anti-cholesterol.

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