

The Combination of Papaya Seed Juice (*Carica papaya L*) and Turmeric Juice (*Curcuma domestica val*) to Reduce Total Cholesterol Levels in Hypercholesterolemic Rat

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ABSTRACT

The cholesterol is found naturally in the blood. Most of it is produced in the liver. Cholesterol is very important for maintaining health and can be a problem if blood levels are too high. High serum cholesterol levels in the blood cause atherosclerosis, which in turn results in cardiovascular disorders. This study aims to determine the effect of giving a combination of papaya seed juice and turmeric to reduce total cholesterol in hypercholesterolemic rats. This is an experimental study with a pretest posttest control group design. The research subjects were 25 white rats, consisting of five groups, namely group 1 (negative control), group 2 (standar), group 3 (papaya seed juice 100 mg/kgBW/day and turmeric juice 70 mg/kgBW/day), group 4 (papaya seed juice 200 mg/kgBW/day and turmeric juice 70 mg/kgBW/day), group 5 (papaya seed juice 400 mg/kgBW/day and turmeric juice 70 mg/kgBW/ day). The treatment was given for 21 days in each group. Measurement of total cholesterol levels using the colorimetric enzymatic GPO method. Research results: the results obtained based on the paired samples T-test conducted in each group before and after treatment that group 2 has $P > 0.05$ and the test group 1, 3, 4, and 5 have $p < 0.05$ so that it can be concluded that the combination of papaya seed juice and turmeric juice can reduce total cholesterol levels in hypercholesterolemic rats.

Keywords: Papaya seeds, Turmeric, Total Cholesterol, *Rattus Norvegicus*

1. BACKGROUND

Hypercholesterolemia is a condition in which the total cholesterol level in the blood is higher than what is considered normal. Hypercholesterolemia is the leading cause of death from cardiovascular disease.

Concurring to the Framingham Heart Study, individuals with blood cholesterol levels over 300 mg/dL have a three to five times higher chance of creating cardiovascular illness than individuals with blood cholesterol levels underneath 200 mg/dL.[1] Concurring to a World Wellbeing Organization (WHO) populace investigate from 2008, 17.3 million people passed on from cardiovascular illness caused by tall cholesterol. It is assessed that 23.3 million individuals will pass on from this infection by 2030.[2]

In Indonesia, hypercholesterolemia affects 9.3% of those aged 25 to 34 years old and 15.5 percent of those aged 55 to 64 years old. Hypercholesterolemia is most commonly associated with fat or older person, however it can also strike slim people at any age. This is linked to a number of risk factors, including genetics, food, and lack of exercise. [3]

Hypercholesterolemia can be treated or managed utilizing both pharmacological (the use of cholesterol-lowering medicines) and non-pharmacological (the use of lifestyle

changes) (diet and exercise). According to the results of the Centralized Pan-Asian Survey study on the undertreatment of hypercholesterolemia (CEPHEUS) in Indonesia, 65.1 percent of patients receiving statin monotherapy as a cholesterol-lowering medication failed to meet the target.[4]

When treating hypercholesterolemia with non-pharmacological means, such as nutrition, a natural product, such as papaya and turmeric, can be used. Saponins, tannins, flavonoids, papain enzymes, vitamin A, B vitamins, vitamin C, vitamin E, magnesium, potassium, fiber, folate, and antioxidants are all found in papaya. Flavonoids can be found in practically every part of the papaya plant, including the fruit, roots, leaves, and outer bark. [5] Flavonoids have a number of advantages, including reducing cholesterol. [6]

Phytochemical examination of papaya appeared the nearness of alkaloids, flavonoids, saponins, tannins, anthraquinones, and anthocyanosides. The substance of papaya seeds that have the potential to cause hypocholesterolemic impacts are flavonoids, saponins, and tannins. [7]

The many benefits and potential of the content of papaya seeds and turmeric as natural ingredients that can lower cholesterol levels in the blood need to be known by the wider

community, because these plants are suitable for climatic conditions in Indonesia.

Based on this description and the fact that hypercholesterolemia is one of the leading causes of death, more research into the effect of combining papaya seed juice (*Carica papaya* L) and turmeric juice (*Curcuma domestica* val) on total cholesterol levels in hypercholesterolemic rats is needed.

2. METHOD

2.1. Experimental Design

This investigate utilized exploratory research facility plan by employing a pre-test post-test control gather. The subjects were 25 Wistar rats taken by stratified irregular inspecting. The autonomous variable in this investigate was combining papaya seed juice and turmeric juice of different concentrations. The subordinate variable was the cholesterol add up to level. The controlled variable was a trial creature with the same strain, sex, weight, age, nourish, and person cage.

2.2. Animals

This consider utilized 25 male Wistar rats (*Rattus norvegicus*) matured between 2 - 3 months with \pm 150-200 g of weight and physical wellbeing as the test. The avoidance criteria were rats that appeared a diminish within the physical condition amid the adjustment stage. The rats were adjusted for 7 days at Pusat Antar Universitas (PAU) building, Central Research facility for Nourishment and Sustenance Think about, Universitas Gajah Mada with satisfactory nourishing with standard pellet rats count calories, drinking, and lighting at room temperature. The 25 male Wistar rats were divided into 5 groups (n = 5) consisting of group 1: negative control (hypercolesterolemia rats without intervention treatment), group 2: standard (lovastatin), group 3: Dose 1 (papaya seed juice 100 mg/kgBW/day and turmeric juice 70 mg/kgBW/day), group 4: Dose 2 (papaya seed juice 200 mg/kgBW/day and turmeric juice 70 mg/kgBW/day), group 5: Dose 3 (papaya seed juice 400 mg/kgBW/day and turmeric juice 70 mg/kgBW/ day). For 21 days, the treatment group received a single dosage of juice through sonde technique.

This research has received ethical approval from the Ethics Commission of Faculty of Medicine and Health Sciences UMY.

2.3. Materials and Tools

The material and tools: papaya seed (*Carica papaya* L) and turmeric (*Curcuma domestica* val), rodent cages, gloves, scales, small scale tube, test tube racks, miniaturized scale hematocrit pipettes, clocks, spectrophotometers. Metabolic estimations utilized 5 mL sinus vein orbital blood collected in EDTA blood tubes after 10 hours fasting. Cholesterol add up to level were measured by enzymatic colorimetric procedures based on the manual auto-analyzer strategy.

2.3.1. Making Papaya Seed Juice

A blender is used to mash ripe papaya seeds, which are then weighed to the proper level. After that, distilled water was added to make a volume of 1 mL, and the mixture was homogenized for 2 minutes using a homogenizer at 6612 rpm.

2.3.2. Making Turmeric Juice

Turmeric that has been cleaned, chopped, and blended in a blender before being weighed to the proper level. After that, distilled water was added until it reached a volume of 1 mL, and the mixture was homogenized for 2 minutes using a homogenizer at 6612 rpm.

2.4. Statistical analysis

The basic data of investigate with proceeding factors were tried for typicality utilizing Shapiro-Wilk. In case the information were not ordinary, at that point the change and ordinarieness tests were performed. Numerical factors were displayed within the frame of the cruel (cruel) and standard deviation (SD). Comparison of normal cholesterol level utilized combined t-tests. One Way ANOVA test was utilized to analyze the viability of combining papaya seed and turmeric juice in cholesterol levels within the standard gather compared to the treatment bunches (Dosage 1, Dosage 2, Dosage 3). The comes about of factual examination were noteworthy in the event that the p-value was <0.05 .

3. RESULT

This research showed the difference between pre-test and post-test Cholesterol levels in rats' hypercholesterolemic model induction of combining papaya seed and turmeric juice on control, Dose 1, Dose 2, Dose 3 groups analyzed by paired t-test are significant ($p < 0.05$). It is indicated that administering the intervention reduced overall cholesterol levels. There was no significant difference in total cholesterol levels before and after treatment in the control group ($p > 0.05$) (Table 1).

Table 1. The Average Levels of Pre-test and Post-test Cholesterol

Groups	Average Levels of Blood Cholesterol (mg/dL) \pm SD		p-value
Control	82.60 \pm 2.78	88.27 \pm 3.22	0.633
Standard	190.68 \pm 1.49	193.56 \pm 2.94	0.000
Dose 1	188.36 \pm 1.54	125.67 \pm 4.69	0.000
Dose 2	187.40 \pm 1.80	120.76 \pm 1.92	0.000
Dose 3	186.85 \pm 2.39	107.12 \pm 1.47	0.000

The data were tested by paired sample t-test and expressed as mean \pm SD (Standard deviation). Data would be significantly different if the p-value was <0.05 . Confidence Interval is 90%.

The results of one-way ANOVA data processing showed that there were significant differences between the standard group and the treatment group (Dose 2, Dose 3) with a p-value < 0.05 . There was no significant difference between the

standard group and the treatment group Dose 1 with a p-value > 0.05 (Table 2). This condition indicates that the treatment groups at doses 3 and 4 have the same effectiveness as the standard group.

Table 2. The Results of The Inter-Group Comparison Test of Cholesterol Levels

Groups	Intergroups	p-value
Standard	Dose 1	0.055
	Dose 2	0.000
	Dose 3	0.000
Dose 1	Standard	0.055
	Dose 2	0.000
	Dose 3	0.000
Dose 2	Standard	0.000
	Dose 1	0.000
	Dose 3	0.000
Dose 3	Standard	0.000
	Dose 1	0.000
	Dose 2	0.000

*Post Hoc Test Tukey HSD with $p < 0.05$ showed a significant difference. Confidence Interval is 95%.

4. DISCUSSION

Cholesterol is made in the body. Endogenous cholesterol is manufactured by the liver from acetyl CoA (acetyl CoA is produced by the breakdown of carbs and lipids) while exogenous cholesterol is obtained from outside the body (exogenous). Exogenous cholesterol is derived from animal-based foods like egg yolks, liver, brain, butter, beef, and milk. Even though they include fat, vegetable products do not contain cholesterol. Cholesterol is a plasma lipoprotein that is an amphipathic lipid that is found in the exterior layer of cell membranes and serves as an important structural component. [8]

Cholesterol levels that are higher than usual might cause a variety of health issues. Consuming natural nutrients that do not create negative effects, such as papaya and turmeric, is one way to combat this. In both groups, there are substantial variations in total cholesterol levels before and after treatment, as shown in table 1. In the previous research, a 50.20 percent reduction in cholesterol in rats given 400 mg papaya juice. Saponins and flavonoids, which are found in papaya, are responsible for this. Saponins in seed juice papaya forms an insoluble complex with cholesterol to prevent cholesterol absorption in the small intestine. In addition, saponins reduce absorption of bile by forming micellar complex that cannot be absorbed due to the molecular weight is too high. [9] According to a study published in the journal that rats given a dose of 200 mg had lower total cholesterol levels. [10]

Based on Table 2 show that intervention in Dose 2 and 3 groups have significantly with standard group. Its mean that Dose 2 and Dose 3 groups has same effectiveness to reduce the cholesterol levels. Turmeric and papaya seeds are natural components with health advantages.

Flavonoids, tannins, and saponins are chemical substances found in papaya seeds. Several research looked into the anticholesterol properties of papaya seeds, which are mediated by flavonoids, tannins, and saponins. Flavonoids reduce cholesterol levels by increasing bile excretion, tannins increase bile acid excretion and reverse cholesterol transport, and saponins limit bile absorption. In order to lower cholesterol levels in the body. [11] While tannins in papaya seeds, like saponins, can limit cholesterol absorption in the small intestine and enhance bile acid output, they can also accelerate reverse cholesterol transport. [12]

Turmeric contains curcumin, a polyphenolic molecule that is the yellow colour. Curcumin contains anti-tumor, antioxidant, fart straighteners (carminative), anti-amyloid, anti-ischemic, and anti-inflammatory effects, according to animal studies. [13]

Turmeric is cholesterol-free, but it is tall in cancer prevention agents and fiber, which can offer assistance lower LDL levels within the blood. Curcumin can moreover lower cholesterol levels by anticipating the reabsorption of cholesterol from the exterior (exogenous) and expanding the chemical HmgCoA reductase inhibitor, permitting fat union to continue regularly. [14,15]

Phytochemicals have been demonstrated to have anti-dyslipidemia properties in several investigations. Through inhibition of the arachidonic acid cascade and eicosanoids derivates, polyphenol content can promote downregulation of pro-inflammatory cell signal modulation such as nuclear factor-B, activated protein-1, and mitogen activated protein kinase. The control of gut microbiota is another mechanism that permits polyphenol compounds to have anti-dyslipidemia actions. In addition to usu bacteria such as Akkermansia municipiphilia sp., polyphenol compounds in the usu will interact with the gut microbiota, enhancing different beneficial metabolite products such as short-chain free fatty acids. Improve intestinal permeability and inslin sensitivity by restoring inflammatory conditions in the intestines. Furthermore, improving the gut microbiota protects the gut-liver axis, decreasing body lipid profiles. [16,17]

Based on these findings, it can be concluded that combining papaya seed juice and turmeric can be more successful in lowering total cholesterol levels.

5. CONCLUSION

The combination of papaya seed juice and turmeric juice was found to have a significant correlation with decreased total cholesterol levels in hypercholesterolemic rats in this study.

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