


The Influence Of Mung Bean Extract Therapy And Avocado Juice On Reducing Cholesterol Levels In Hypercholesterolemia Patients In RT 003 RW 005, Pondok Benda Subdistrict, South Tangerang

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Article Info	ABSTRACT
<p>Keywords: Mung Bean Extract, Avocado Juice, Cholesterol Reduction, Hypercholesterolemia</p>	<p>Hypercholesterolemia is an increase in cholesterol levels in the blood, exceeding the normal limit, which is ≥ 200 mg/dl. If left untreated, it can lead to coronary heart disease, stroke, hypertension, and diabetes mellitus. The management of hypercholesterolemia can be done in two ways: pharmacological and non-pharmacological therapy. One non-pharmacological therapy that can reduce cholesterol levels is the consumption of mung bean extract and avocado. This study aims to determine the effect of mung bean extract therapy and avocado juice on reducing cholesterol levels in hypercholesterolemia patients in RT 003 RW 005, Pondok Benda Subdistrict, South Tangerang. The research design used a quasi-experimental method with a pretest-posttest non-equivalent control group design. The population in this study consisted of hypercholesterolemia patients, with a total sample of 26 respondents. The sampling technique used was probability sampling. The statistical tests used were the paired T-test and independent T-test. The results of the study showed that there was an effect of giving mung bean extract with a p-value = 0.001 ($p < 0.05$), there was an effect of giving avocado juice with a p-value = 0.001 ($p < 0.05$), and there was no difference between the administration of mung bean extract and avocado juice with a p-value = 0.925 ($p > 0.05$) on reducing cholesterol levels in hypercholesterolemia patients. The results of this study are expected to serve as independent nursing interventions in providing complementary therapy to reduce cholesterol levels in hypercholesterolemia patients.</p>
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INTRODUCTION

Hypercholesterolemia is a condition characterized by an increase in total cholesterol levels in the blood that exceeds the normal limit, which is ≥ 200 mg/dL [1][2]. Several factors can contribute to increased cholesterol levels in the body, including a history of hypertension, lack of physical activity, obesity, smoking habits, genetics, stress, age, and poor diet [3][4]. A normal total cholesterol level needed by the body is < 200 mg/dL; however, exceeding 200 mg/dL can lead to the accumulation and hardening of cholesterol in the blood vessels, increasing the risk of coronary heart disease and stroke[5].

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South Tangerang—Rahma Faizah et.al

According to the World Health Organization (2016), 17.5 million people worldwide die from coronary heart disease caused by hypercholesterolemia, accounting for about 31% of total deaths globally. Coronary heart disease and stroke rank as the leading causes of death worldwide (Kemenkes RI, 2017). Data from the Ministry of Health of the Republic of Indonesia (2019) shows that the prevalence of hypercholesterolemia in Indonesia among the 15-34 age group is 39.4%, increasing with age to 52.9% in the 35-59 age group. The 2020 Riskesdas survey reported that the prevalence of elevated total cholesterol levels among people over 15 years old in Indonesia was 7.6%, with a total population of around 34,820 people (Kemenkes RI, 2021).

Typical symptoms of hypercholesterolemia are often absent in patients, but commonly reported symptoms include headaches in the back of the head, stiffness in the neck and shoulders, tingling in the hands and feet, and chest pain on the left side that feels like stabbing [6]. If not treated, hypercholesterolemia can increase the risk of atherosclerosis, coronary heart disease (CHD), pancreatitis, type 2 diabetes, thyroid disorders, liver disease, and kidney disease[7].

Hypercholesterolemia management includes pharmacological and non-pharmacological therapies. Pharmacological therapy involves medication to reduce symptoms, such as cholesterol-lowering drugs [8]. However, long-term consumption of these drugs may have adverse effects on health, including increased kidney workload, myopathy, liver damage, and kidney failure[9]. Non-pharmacological or traditional therapies are also needed to lower cholesterol levels. One example of non-pharmacological therapy for hypercholesterolemia is consuming mung bean extract and avocado juice[10].

Mung bean extract, derived from mung beans, is widely available in Indonesia as a snack or beverage. The nutritional content of 100 grams of mung beans includes 323 kcal, 22.9 grams of protein, 1.5 grams of fat, 7.6 grams of fiber, and 4.3 grams of isoflavones. The type of fiber in mung beans is soluble fiber, which can bind fat in the intestines, thus lowering cholesterol levels in the blood by 5% or more[10].

Avocados are known to reduce cholesterol levels. They contain monounsaturated fats (MUFA), which are 20-30 times higher or 15.41 grams per 100 grams of avocado, compared to other fruits such as oranges, mangoes, and guavas[6]. Avocados are rich in protein, riboflavin (vitamin B2), niacin (vitamin B3), potassium, vitamin C, and omega-3 fatty acids, which help maintain heart health, lower cholesterol, and provide brain nutrition. MUFAs help reduce LDL (bad cholesterol) levels, while niacin in avocados increases HDL (good cholesterol) levels. The reduction in LDL and increase in HDL improves blood flow, preventing atherosclerosis (Nurman & Afifah, 2019). Previous research by Sulistyaningsih & Mulyati[10], titled "The Effect of Mung Bean Extract on Total Cholesterol Levels in Women with Hypercholesterolemia," showed that consuming 75 grams of mung bean extract per day significantly reduced total cholesterol levels in hypercholesterolemic women.

Another study by Kunci et al [11], titled "The Potential of Mung Bean Extract in Reducing Cholesterol Levels in Progestin Contraceptive Users with Hypercholesterolemia," found that the average total cholesterol level before the intervention was 236.50 mg/dL,

which decreased to 210.50 mg/dL after consuming mung bean extract. This indicates that mung bean extract is effective as a non-pharmacological therapy for reducing cholesterol levels. Similarly, a study by Widia et al[12], titled "The Effect of Avocado Juice (*Persea americana* Mill) on Cholesterol Reduction in the Elderly," revealed that before the intervention, all elderly participants had high cholesterol levels. After consuming avocado juice, 85% of the participants achieved normal cholesterol levels, and 15% experienced borderline high levels. This confirms that avocado juice has a positive effect on elderly women with hypercholesterolemia.

Based on a preliminary study conducted by the researcher on April 1, 2024, in RT 003 RW 005, Pondok Benda Subdistrict, there are 324 residents across 147 households. The area is densely populated, and health cadres reported several health issues among residents, including high cholesterol (10%, or 32 people), hypertension (8%, or 26 people), uric acid (5%, or 16 people), and diabetes (2%, or 6 people). The most prevalent health issue in the area is high cholesterol (hypercholesterolemia).

Interviews conducted on April 1, 2024, with 10 hypercholesterolemic patients revealed that 3 (30%) were aware of their high cholesterol and knew about traditional therapies as alternatives but had never tried mung bean extract or avocado juice. They had only occasionally taken simvastatin when symptoms worsened but did not use it regularly. Meanwhile, 7 (70%) knew about their high cholesterol but had never taken medication or were aware of traditional therapies, such as mung bean extract and avocado juice, to reduce cholesterol. Untreated hypercholesterolemia led to back-head pain, swollen legs, and disrupted sleep and daily activities.

METHOD

This research design uses a quasi-experimental method with a pretest-posttest non-equivalent control group design. The population in this study consists of hypercholesterolemia patients with a total sample of 26 respondents, using probability sampling as the sampling technique. The statistical tests used are the paired T-test and independent T-test. The instruments used in this study are a questionnaire on respondent characteristics, observation sheets, tools and materials for making mung bean extract, tools and materials for making avocado juice, and tools for measuring cholesterol levels. This study has passed the ethical review by the Health Research Ethics Committee of Universitas Muhammadiyah Purwokerto, with registration number KEPK/UMP/70/VII/2024.

RESULTS AND DISCUSSION

Univariate Analysis

- a. Frequency distribution of characteristics of hypercholesterolemia sufferers based on age

Table 1. Frequency Distribution Based on Respondents' Age in Hypercholesterolemia Patients

Age	Frequency	Percentage
17-25 Years	5	19.2
26-45 Years	6	23.1
46-65 Years	15	57.7
Total	26	100

Table 1 shows that of the 26 respondents aged 46-65 years, there were 15 respondents (57.7%), 6 respondents aged 26-45 years (23.1%) and 5 respondents aged 17-25 years (19.2%).

- b. Frequency distribution of characteristics of hypercholesterolemia sufferers based on gender

Table 2. Frequency Distribution Based on Respondents' Gender in Hypercholesterolemia Patients

Gender	Frequency	Percentage
Man	6	23.1
Woman	20	76.9
Total	26	100

Table 2 shows that of the 26 respondents, 20 were female (76.9%) and 6 were male (23.1%).

- c. Frequency distribution description of characteristics of hypercholesterolemia sufferers based on education

Table 3. Frequency Distribution Based on Respondents' Education in Hypercholesterolemia Patients

Education	Frequency	Percentage
SD	13	50.0
Junior High School, Senior High School	9	34.6
Diploma, Bachelor	4	15.4
Total	26	100

Table 3 shows that of the 26 respondents who had elementary school education, there were 13 respondents (50.0%), those who had junior high school education, high school education were 9 respondents (34.6%), and those who had a diploma or bachelor's degree were 4 respondents (15.4%).

- d. Frequency distribution description of characteristics of hypercholesterolemia sufferers based on occupation

Table 4. Frequency Distribution Based on Respondents' Occupation in Hypercholesterolemia Patients

Work	Frequency	Percentage
Work	11	42.3
Doesn't work	15	57.7
Total	26	100

Table 4 shows that of the 26 respondents, 15 respondents (57.7%) were unemployed and 11 respondents (42.3%) were employed.

e. Average cholesterol levels before and after being given green bean extract therapy.

Table 5. Average Cholesterol Levels Before and After Green Bean Extract Therapy in Hypercholesterolemia Patients

Cholesterol Levels	Mean	Standard Deviation	Min	Max
Pre Test	233.15	20,379	206	267
Post Test	188.61	22,119	161	234

Based on table 5, it shows that before the administration of green bean extract, the average cholesterol level was 233.15 mg/dl with a standard deviation of 20.379. The lowest cholesterol level was 206 mg/dl and the highest cholesterol level was 267 mg/dl. Then after the administration of green bean extract, the average cholesterol level was 188.61 mg/dl with a standard deviation of 22.119. The lowest cholesterol level was 161 mg/dl and the highest cholesterol level was 234 mg/dl.

f. Average cholesterol levels before and after avocado juice therapy.

Table 6. Average Cholesterol Levels Before and After Avocado Juice Therapy in Hypercholesterolemia Patients

Cholesterol Levels	Mean	Standard Deviation	Min	Max
Pre Test	226.38	22,437	202	276
Post Test	189.53	27,045	150	242

Based on table 6, it shows that before avocado juice was given, the average cholesterol level was 226.38 mg/dl with a standard deviation of 22.437. The lowest cholesterol level was 202 mg/dl and the highest cholesterol level was 276 mg/dl. Then after avocado juice was given, the average cholesterol level was 189.53 mg/dl with a standard deviation of 27.045. The lowest cholesterol level was 150 mg/dl and the highest cholesterol level was 242 mg/dl.

Bivariate Analysis

1. Effect of Giving Mung Bean Extract on Reducing Cholesterol Levels.

Table 7. Effect of Giving Green Bean Extract on Reducing Cholesterol Levels in Hypercholesterolemia Patients

Cholesterol Levels	Mean	Std. deviation	P value
Pre Test	233.15	20,379	0.001
Post Test	188.61	22,119	

The results of the study showed a p value of 0.001 ($p < 0.05$) meaning that H_a was accepted and H_0 was rejected, so there was an effect of giving green bean extract on reducing cholesterol levels in patients with hypercholesterolemia. This is in line with research conducted by [13] obtained a p value of 0.000 ($p < 0.05$), it can be concluded that there is an effect of green bean consumption on cholesterol levels using the CHOD-PAP method at RSU Medika Madura.

According to the researcher's analysis, there is an effect of green bean extract therapy on reducing cholesterol levels in hypercholesterolemia patients. From the results of the pre-

test and post-test, cholesterol levels have a significant difference. The difference in cholesterol levels is because respondents routinely consume green bean extract once a day for 7 days. The content of green bean extract such as isoflavones, fiber, carbohydrates, unsaturated fats and saturated fats that can bind bile acids, making it very possible to lower cholesterol levels. Green bean extract therapy can be chosen as an alternative in lowering cholesterol levels.

2. Effect of Giving Avocado Juice on Reducing Cholesterol Levels.

Table 8. Effect of Giving Avocado Juice on Reducing Cholesterol Levels in Hypercholesterolemia Patients

Cholesterol Levels	Mean	Std. deviation	P value
Pre Test	226.38	22,437	0.001
Post Test	189.53	27,045	

The results of the study showed a p value of 0.001 ($p < 0.05$) meaning that H_a was accepted and H_0 was rejected, so it can be concluded that there is an effect of giving avocado juice on reducing cholesterol levels in patients with hypercholesterolemia. In line with research conducted by [12] showed a p value of 0.001 ($p < 0.05$), which means that there is an effect of giving avocado juice on reducing cholesterol levels in the elderly. Another study was conducted by [6] The results of the paired t-test on sig (2-tailed) obtained a p value of 0.000 ($p < 0.05$), so that H_a was accepted and H_0 was rejected, which means that there is a significant effect between giving avocado juice on reducing cholesterol levels in hypercholesterolemia sufferers in Ngabenrejo Village, Grobogan District.

According to the researcher's analysis, there is an effect of avocado juice on reducing cholesterol levels in hypercholesterolemia patients. From the results of the pre-test and post-test, cholesterol levels have a significant difference. The difference in cholesterol levels is because respondents routinely consume avocado juice once a day for 7 days. The content of avocados such as monounsaturated fatty acids, namely single oleic acid, a group of MUFA (Monounsaturated Fatty Acid) which has been proven to be able to reduce LDL and triglyceride levels and increase HDL in the blood. So avocado juice therapy can also be chosen as an alternative in lowering cholesterol levels.

3. Differences in Blood Cholesterol Levels After Green Bean Extract and Avocado Juice Therapy in Hypercholesterolemia Patients.

Table 9. Differences in Blood Cholesterol Levels After Being Given Green Bean Extract and Avocado Juice Therapy in Hypercholesterolemia Patients

Cholesterol Levels	Group	Mean	SE	p-value	N
Post-Test	Green Bean Extract	188.61	6,134	0.925	13
	Avocado juice	189.53	7,500		

The results of the study obtained a mean value of green bean extract of 188.61 and a mean value of avocado juice of 189.53. The results of the analysis using the Independent t-test statistical test obtained a p value = 0.925 ($p > 0.05$) which means that H_a is rejected and H_0 is accepted, so there is no significant difference in the average blood cholesterol levels

after being given green bean extract and avocado juice therapy in hypercholesterolemia patients in RT 003 RW 005, Pondok Benda Village, Pamulang District, South Tangerang in 2024.

Green beans and avocado fruit extracts both contain substances that can lower blood cholesterol levels such as fiber, protein, carbohydrates, unsaturated fats, niacin, beta-sitosterol, isoflavones, vitamin A, vitamin C, vitamin E, and magnesium[14]. The type of fiber contained in green beans is water-soluble fiber that can bind fat in the intestines, so it can lower cholesterol levels by up to 5% [10].

While in avocado butter that can lower cholesterol levels are beta-sitosterol and monounsaturated fatty acids (MUFA). Beta-sitosterol works to lower cholesterol levels by reducing cholesterol absorption in the intestines, while monounsaturated fats or MUFA groups can lower blood cholesterol levels when used as a substitute for saturated fat, by lowering LDL cholesterol and increasing HDL cholesterol in the blood[15].

According to the researcher's analysis, there was no significant difference in the average cholesterol levels after being given green bean extract and avocado juice therapy, because both therapies have been proven to be able to lower cholesterol levels in hypercholesterolemia patients. However, in this case, green bean extract lowers cholesterol levels faster than avocado juice.

CONCLUSION

Based on the research results and discussion regarding the differences before and after the intervention of Mung Bean Extract and Avocado Juice on the Reduction of Cholesterol Levels in Hypercholesterolemia Patients in RT 003 RW 005, Pondok Benda Subdistrict, the researcher can conclude that: The characteristics of the respondents based on age show that the majority are aged 46-65 years, with 15 respondents (57.7%). In terms of gender, the majority are female, with 20 respondents (76.9%). In terms of education, most respondents have elementary school education, with 13 respondents (50.0%). In terms of occupation, most respondents are unemployed, with 15 respondents (57.7%). The average cholesterol level before the intervention of mung bean extract was 233.15 mg/dL, and after the therapy, the average cholesterol level was 188.61 mg/dL. The average cholesterol level before the intervention of avocado juice was 226.38 mg/dL, and after the therapy, the average cholesterol level was 189.53 mg/dL. There is an effect of mung bean extract on reducing cholesterol levels in hypercholesterolemia patients in RT 003 RW 005, Pondok Benda Subdistrict, with a p-value of 0.001 ($p < 0.05$). There is an effect of avocado juice on reducing cholesterol levels in hypercholesterolemia patients in RT 003 RW 005, Pondok Benda Subdistrict, with a p-value of 0.001 ($p < 0.05$). There is no significant difference in the average cholesterol levels after the therapy of Mung Bean Extract and Avocado Juice in Hypercholesterolemia Patients in RT 003 RW 005, Pondok Benda Subdistrict, Pamulang District, South Tangerang in 2024, with a p-value of 0.925 ($p > 0.05$).

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