



Identification And Testing The Effectiveness of Bioactive Compounds in Buni Juice as an Antihypercholesterolemic Agent

Nuning Nurcahyani^{1*}, Endang L Widiastuti¹, Yulianty¹, Primasari Pertiwi¹, Dzul F Mumtazah¹

Biology Department, Faculty of Mathematics and Natural Sciences, University of Lampung, Jl. S Brojonegoro No 1 Gedung Meneng Bandar Lampung Indonesia, 35145

Received: 03 November 2025

Accepted: 09 December 2025

*Correspondent Email:
nuning.nurcahyani@fmipa.unila.ac.id



Abstract: Buni fruit (*Antidesma bunius* (L.) Spreng) is thought to be able to treat hypercholesterolemia, a condition where the concentration of cholesterol in the blood exceeds normal and is the main risk factor for Coronary Heart Disease. Scientific data supporting the efficacy of berry as an antihypercholesterolemic agent has not been widely studied, therefore this study aims to examine the chemical compound content and effectiveness of buni as an antihypercholesterolemic agent. Buni fruit juice was tested phytochemically. This study used a Completely Randomized Design (CRD) with 25 mice divided into 5 groups and 5 replications consisting of Negative Control (standard feed), Positive Control (High Fat Diet Food (HFDF) and simvastatin 0.52 mg), P1, P2, P3 (HFDF 14 days followed by 1 ml of 20%, 25%, 30% buni juice 14 days). The parameters measured were LDL (Low-Density Lipoprotein) levels in the blood, which were analyzed using ANOVA and LSD test at a 5% significance level. The results of the study, in the form of phytochemical tests, showed that berry fruit contains bioactive compounds, alkaloids, flavonoids, phenols, and tannins. Administration of buni fruit juice at a concentration of 25% was most effective in reducing LDL (Low-Density Lipoprotein) levels in the blood of hypercholesterolemic mice.

Keywords: *Antidesma bunius* (L.) Spreng., buni fruit, antihypercholesterol, phytochemical test

1. INTRODUCTION

Indonesia is one of the countries with the highest rates of cardiovascular disease (Chairani et al., 2024). There are many risk factors for cardiovascular disease, one of which is hypercholesterolemia (Sugiyama et al., 2020). Hypercholesterolemia can be influenced by excessive fat consumption (Melati et al., 2021). Saturated fat has the risk of blocking blood circulation to the heart, and saturated fat can also cause an increase in total cholesterol and LDL cholesterol (Yuningrum et al., 2022). To lower blood cholesterol levels, pharmacological and non-pharmacological therapies can be used (Agung, 2021). Pharmacological treatment includes the use of antihypercholesterolemic drugs such as 3-hydroxy 3-methyl-glutaryl coenzyme A-reductase (HMG CoA reductase) inhibitors, niacin, fibrates, bile acid-binding resins, and cholesterol absorption inhibitors (Benge, 2020). Cholesterol absorption inhibitors, niacin, bile sequestrates, and fibrates are other pharmacological agents commonly used to treat

hypercholesterolemia. However, these drugs have various negative effects that can hinder treatment and quality of life (Gusnelti and Nurjanah, 2022). Adverse effects of these drugs include myopathy, loss of cognitive function, neuropathy, pancreatic and liver dysfunction, and sexual dysfunction (Putri, 2020). Non-pharmacological treatments for lowering LDL cholesterol levels include lifestyle changes and a healthy diet. Furthermore, consuming herbal remedies can also help reduce hypercholesterolemia. One plant that has the potential to lower cholesterol levels is the buni plant (*Antidesma bunius* (L.) Spreng.). Buni fruit contains flavonoids and organic acids such as tartaric acid, ascorbic acid, citric acid, benzoic acid, malic acid, oxalic acid, lactic acid, and acetic acid (Jukyaningsih et al., 2022). Ascorbic acid and anthocyanin compounds play a role in lowering blood cholesterol levels. Low-density lipoprotein (LDL) is an important parameter in measuring blood cholesterol levels, which is used to assess the risk of cardiovascular disease. High LDL levels can cause plaque buildup in the arteries (Bakri, 2022). Based on the explanation above, this study

was conducted to determine the phytochemical content of active compounds in buni fruit and the most effective concentration of buni fruit juice (*Antidesma bunius* (L.) Spreng.) as an antihypercholesterol agent.

2. MATERIALS AND METHODS

2.1 Preparation of buni fruit juice

The buni fruit was washed thoroughly with water, then made into 3 concentrations. 20% concentration berry fruit juice (0.8 grams of berry fruit and 3.2 ml of water were ground, added with 0.8 ml of water, stirred, then filtered with filter paper); 25% concentration (1 gram of buni fruit and 3 ml of water were ground, added with 3 ml of water, stirred, then filtered with filter paper); 30% concentration (1.2 grams of buni fruit and 2.8 ml of water were ground, added with 2.8 ml of water, stirred, then filtered with filter paper). In the treatment, each mouse received 1 ml of buni juice.

2.2 Phytochemical Test of Buni Fruit Juice (*Antidesma bunius* (L.) Spreng.)

To indicate bioactive compounds, phytochemical procedures were applied as follows (Tasmin, et al., 2014) (Table 1).

Table 1. Phytochemical procedures

Bioactive Compounds	Treatment	Indicator (+)
Saponin	0.5 mL sample + 5 ml distilled water, shaken for 30 seconds	Foam is formed
Steroid	0.5 ml sample + 0.5 ml glacial acetic acid + 0.5 ml H ₂ SO ₄	Blue or turquoise
Terpenoid	0.5 ml sample + 0.5 ml glacial acetic acid + 0.5 ml H ₂ SO ₄	Orange, red or yellow
Tanin	1 ml sample + drops of FeCl ₃ solution	Bluish black color
Alkaloid	0.5 ml sample + 5 drops of chloroform + 5 drops of Meyer reagent (1 g KI dissolved in 20 ml distilled water and added 0.271 g HgCl ₂)	Brownish white color
Flavonoid	0.5 ml sample + 0.5 g Mg powder + 5 ml concentrated HCl	Red or yellow color and foams formed

2.3 Test the Activity of Buni Fruit Juice in Reducing LDL Levels

Before treatment, male mice (*Mus musculus* L.) were acclimatized for a week. Special high cholesterol feed to increase cholesterol levels is given every day for 14 days. High Fat Diet Food (HFDF) contains propylthiouracil (PTU) 1.8 mg/200g BW of mice suspended in 2% Pure Grain Alcohol (PGA) and quail egg yolk 10 mL/KgBW.

2.3 Experimental Design

The treatment mice P1, P2, and P3 were made hypercholesterolemic by giving HFDF orally for 14

days, then fasted before blood sampling on the 15th day to determine LDL levels after hypercholesterolemia.

The administration of buni juice was carried out on the 16th day after the HFDF administration. They put in 5 different group randomly: the negative control group (K-) was given standard feed and drinking water ad libitum; the positive control group (K+) was given HFDF and simvastatin 0.52 mg/head/day for 14 days; group P1 was given HFDF for 14 days and then given 20% buni juice as much as 1 ml for 14 days; group P2 was given HFDF for 14 days and then given 25% buni juice as much as 1 ml for 14 days; and group P3 was given HFDF for 14 days and then given 30% berry juice as much as 1 ml for 14 days.

2.4. Measurement of LDL

Measurement of LDL levels was carried out 3 times, namely before treatment to measure initial LDL levels, after giving a High-Fat Diet Food (HFDF) on the 15th day to show hypercholesterolemia blood cholesterol levels, and at the end of the treatment which was carried out on the 30th day after giving buni juice (*Antidesma bunius* (L.) Spreng.).

2.5. Data analysis

The data obtained during the measurements were analyzed using the One Way-Analysis of Variance (Anova) statistical method with a significance level of 5%. If there are real differences between groups, they will be analyzed further using the LSD (Least Significant Difference) test at 5% significance level.

3. RESULTS AND DISCUSSIONS

3.1. Phytochemical Test Results of Buni Fruit Juice (*Antidesma bunius* (L.) Spreng.)

The phytochemical tests conducted in this study aimed to determine the various bioactive compounds contained in the extract of the buni fruit (*Antidesma bunius* (L.) Spreng.). The tests included tests for alkaloids, flavonoids, saponins, steroids, terpenoids, and tannins. Each test was carried out using appropriate reagents, and the test results were observed through color changes in each test tube to determine whether the reaction was positive or negative. The bioactive compounds contained in the buni fruit extract were alkaloids, flavonoids, phenols, tannins, saponins, and ascorbic acid. Where, previous research also

stated that the content of the buni fruit was anthocyanin, a pigment classified as a flavonoid

that is generally soluble in water because the fruit is red to purple (violet). The bioactive compounds of the buni fruit juice can be seen in Table 2.

Table 2. Phytochemical test results of buni fruit juice (*Antidesma bunius* (L) Spreng)

Compound	Buni fruit juice	Keterangan
Flavonoid	+	Positive
Terpeneoid	+	Positive
Fenolik	+	Positive
Tanin	+	Positive
Saponin	+ ++	Positive
Alkaloid	+	Positive

Based on the phytochemical test results in Table 2, it is known that the buni fruit extract used in this study positively contained the bioactive compounds alkaloids, flavonoids, terpenoids, phenolics, tannins, and saponins. These compounds are known to have the potential to fight free radicals. In addition, the phytochemical test results in Table 2 show that the buni fruit is negative for alkaloids and steroids so it does not contain these two compounds in it.

Based on the results of the one-way ANOVA test at a significance level of $\alpha = 5\%$, it is known that the Low Density Lipoprotein (LDL) levels on the 15th day after being given a high-fat diet in the negative control group (K-) were significantly different from the other treatment groups, namely with an average LDL level of 48.8 mg/dl with a standard deviation of 15.27. On the 30th day after being given berry juice, it was also known that the negative control group was significantly different from the other treatment groups with an average LDL level of 36.8 mg/dl and a standard deviation of 8.16.

3.2 Average Low Density Lipoprotein (LDL) Levels in Mice Blood (*Mus musculus* L.)

On the 15th day, with oral administration of HFDF, there was an increase in LDL levels in mice. On the 15th day, with treatment with buni fruit juice, the LDL levels of mice decreased. Giving HFDF showed an increase in the range of 10-20 mg/dL. HFDF induction increased LDL levels from each treatment. On the 15th day, after administering buni fruit juice, there was a decrease in LDL.

Based on the research conducted, the results showed that buni juice is capable and has the potential to reduce blood levels of Low Density Lipoprotein (LDL) in mice experiencing hypercholesterolemia after being induced by a High-Fat Diet Food (HFDF). The results of the analysis of the average LDL levels in mice are presented in Table 3.

On the 30th day, after being given buni juice, treatment group P2 had higher LDL levels (22.4 mg/dl) than the other treatment groups, namely P1 (19.25 mg/dl) and P3 (19.75 mg/dl). According to Kartikaningrum (2018), the normal limit for LDL levels in the blood of mice is around 7 – 27.2 mg/dl. In treatment group 1 (P1), there was a decrease of 47% with a decrease of 15.75 mg/dl. Treatment group 2 (P2) recorded a decrease in LDL levels of 39% with a decrease of 10 mg/dl. Meanwhile, treatment group 3 (P3) experienced a very significant decrease, namely 46% with a decrease of 9.75 mg/dl. Based on this, it is known that there was a decrease in the average LDL levels in the blood of mice in treatment groups P1, P2, and P3 after being given buni juice.

Table 3. Average LDL of Mice (*Mus musculus* L.) Blood (Mean \pm SEM, mg/dl)

Group	Day - 15 (After Giving HFDF)	Day - 30 (After Giving Buni Juice)
K	24,75 \pm 3,40 ^a	27,25 \pm 2,50 ^a
K-	48,8 \pm 15,27 ^b	36,8 \pm 8,16 ^b
K+	34 \pm 8,71 ^a	21,33 \pm 3,21 ^a
P1	35 \pm 5,94 ^a	19,25 \pm 3,94 ^a
P2	32,4 \pm 2,07 ^a	22,4 \pm 3,20 ^a
P3	29,5 \pm 9,03 ^a	19,75 \pm 4,70 ^a

Note: Numbers followed by different superscript letters indicate significant differences at the 5% level ($P < 0.05$). K= Control (fed only standard feed); K- = Negative Control (fed a high-fat diet Food); K+ = Positive Control (fed simvastatin); P1= Treatment 1 (fed 20% buni juice); P2= Treatment 2 (fed 25% buni juice); P3= Treatment 3 (fed 30% buni juice)

The decrease in LDL levels after giving berry juice is caused by the flavonoid content in berry fruit. According to Rusmini et al. (2019), flavonoids can increase the excretion of bile acids to be used as energy and reduce the absorption of cholesterol and bile acids back in the small intestine, resulting in increased excretion of cholesterol and bile acids through feces. Therefore, cholesterol circulating in the blood does not exceed normal limits, thus helping to inhibit the process of LDL oxidation and preventing oxidized LDL from attaching to injured

endothelial cells. Injured endothelial cells will also be repaired by flavonoids by acting as antioxidants that can capture free radicals, thereby preventing the inflammatory process and reducing the risk of atherosclerosis.

The increase in LDL was caused by cholesterol and saturated fatty acids in HFDF. Cholesterol originating from the HFDF is absorbed by the small intestine and then combined with cholesterol biosynthesis in the liver in the form of cholesterol esters. Cholesterol esters together with triglycerides which are also synthesized in the liver from free fatty acids will form Very Low Density Lipoprotein (VLDL) which then becomes Intermediate Density Lipoprotein (IDL) and LDL in the body. Saturated fatty acid content can also increase LDL levels by increasing LDL formation in serum, reducing LDL receptor activity, and inhibiting the clearance of triacyl glycerol-rich lipoproteins. Beef brain contains 3% cholesterol and 2.3% saturated fatty acids. The main saturated fatty acids in HFDF are 1.26% stearic acid, 0.92% palmitic acid, 0.03% behenic acid, 0.03% margaric acid, 0.03% myristic acid, and 0.02% arachidic acid (Sayekti and Rustanti, 2014).

There is an increase in LDL due to the accumulation of cholesterol in the blood due to induced hypercholesterolemia. Increased LDL levels are due to excess cholesterol, which causes a buildup of cholesterol in the body. Furthermore, the build up of cholesterol followed by free radical activity causes oxidative damage to several tissues. High cholesterol levels in the blood cause VLDL. forms LDL, as a result LDL in the blood increases. Continuously increasing LDL levels make HDL depressed and unable to get rid of excess cholesterol in the blood, so HDL decreases. Hypercholesterolemia results in lipoprotein metabolism disorders, which include increased LDL levels and decreased HDL levels (Wannasiri, 2017).

4. CONCLUSIONS

Based on the research results, it can be concluded that the extract of the buni fruit (*Antidesma bunius* (L.) Spreng):

1. Contains flavonoids, anthocyanins, phenols, tannins, saponins, and ascorbic acid.

2. Has potential as an antihypercholesterolemic agent

ACKNOWLEDGMENTS

We would like to thank the University of Lampung through the Institute for Research and Community Service, Department of Biology, Faculty of Mathematics and Natural Sciences, especially the Zoology Laboratory and Botany Laboratory of the University of Lampung for providing support in this research research. The thank you subtitles are not numbered.

REFERENCES

1. Agung, L. R. (2021). Pengaruh daun salam (*Syzygium polyanthum*) terhadap kadar trigliserida dan kolesterol total darah pada penderita dislipidemia. *Jurnal Ilmiah Kesehatan Sandi Husada*, 10(2), 408–412.
2. Bakri, N. F. (2022). Uji efektivitas hipokolesterolemik jus buah buni (*Antidesma bunius* Linn.) pada mencit jantan (*Mus musculus*). *Jurnal Biogenerasi*, 7(2), 100–105.
3. Benge, M. E. (2020). Pengaruh pemberian ekstrak etanol daun afrika (*Vernonia amygdalina*. Del) terhadap Kadar LDL Serum Tikus Hiperkolesterolemia. *CHMK Pharmaceutical Scientific Journal*. 3(1): 103-108.
4. Chairani, F., Pembayun, M., & Mursyid, A. (2024). Aktivitas antihiperlipidemia pada uji *in vivo* dari kombinasi ekstrak daun alpukat (*Persea americana* Mill) dan rimpang temulawak (*Curcuma xanthorrhiza* Roxb) pada tikus dengan hiperkolesterolemia. *Jurnal Ilmiah Farmasi Farmasyifa*, 7(2), 97–105.
5. Gusnelti, Y., & Nurjanah, E. (2022). Pengaruh pemberian ekstrak etanol daun sirsak (*Annona muricata* L.) terhadap kadar kolesterol total pada mencit (*Mus musculus*). *Jurnal Medisains Kesehatan*, 3(1), 6–13.
6. Julyaningsih, A. H., Yuliana, I., & Binalopa, T. (2022). Penentuan perlakuan terbaik formulasi sari buah buni sebagai minuman fungsional menggunakan *Analytic Hierarchy Process* (AHP). *Dewantara Journal of Technology*, 3(1), 5–9.
7. Melati, F. D. P., Widiyanti, F. L., & Inayah, I. (2021). Asupan lemak jenuh dengan kadar kolesterol low density lipoprotein pada lansia hiperkolesterolemia. *Jurnal Nutrisia*, 23(1), 44–51.
8. Putri, B. F. J. (2020). Evaluasi Penggunaan Statin dan Prediksi Risiko Penyakit Kardiovaskular Aterosklerosis Pada Pasien Dislipidemia Dengan Metode Pooled Cohort Risk Assessment Equation. *Jurnal Mahasiswa*

- Farmasi Fakultas Kedokteran UNTAN*, 4(1).
9. Rusmini, H., Marlina, D., dan Lestari, P. (2019). Pengaruh Flavonoid Dalam Ekstrak Mentimun (*Cucumis Sativus* L.) Terhadap Kadar Kolesterol Total Darah Mencit (*Mus Musculus* L.) Yang Mengonsumsi Makanan Cepat Saji. *Jurnal Ilmu Kedokteran Dan Kesehatan*. 6(3): 166-175.
 10. Sasmita, S., Djabir, Y. Y., dan Yustisia, I. (2023). Efek Pemberian Dangke terhadap Kadar Kolesterol dan Trigliserida Darah Tikus Pemodelan Hiperkolesterolemia dan Hipertrigliseridemia. *Majalah Farmasi dan Farmakologi*. 27(2): 43-46.
 11. Sayekti, N. A., dan Rustanti, N. (2014). Pengaruh Pemberian Yoghurt Koro Pedang (*Canavalia ensiformis*) terhadap Kadar Kolesterol LDL dan HDL Serum Tikus Sprague Dawley Dislipidemia. *Journal of Nutrition College*, 3(1), 125-133.
 11. Sugiyama, D., Turin, T. C., Yeasmin, F., Rumana, N., Watanabe, M., Higashiyama, A., & Miyamoto, Y. (2020). Hypercholesterolemia and lifetime risk of coronary heart disease in the general Japanese population: Results from the Suita Cohort Study. *Journal of Atherosclerosis and Thrombosis*, 27(1), 60–70.
 12. Tasmin, N., Erwin, Kusuma, I.W. (2014). Isolasi, identifikasi, dan uji toksisitas senyawa flavonoid fraksi kloroform dari daun terap (*Artocarpus odoratissimus* blanco). *Jurnal Kimia Mulawarman*, 12(1), 45-47.
 13. Wannasiri S, Chansakaow S, and Sireeratawong S. (2017). Effects of *Solanum torvum* Fruit Water Extract On Hyperlipidemia And Sex Hormones In High-Fat Fed Male Rats. *Asian Pacific Journal of Tropical Biomedicine*. Thailand :7(5). 401-405.
 14. Yuningrum, H., Rahmuniyati, M. E., & Lende, T. D. P. (2022). Konsumsi gorengan dan asupan kolesterol berhubungan dengan kejadian hiperkolesterolemia pada mahasiswa. *Jurnal Kesmas (Kesehatan Masyarakat) Khatulistiwa*, 9(2), 98–108.