Amerta Nutrition
e-ISSN: 2580-1163 (Online)
p-ISSN: 2580-9776 (Print)
Afifudin et al. | Amerta Nutrition Vol. 7 Issue 2 (June 2023). 279-282

RESEARCH STUDY
English Version
OPEN ACCESS

The Potential of a Combination Juice of Coconut Flesh *(Cocos nucifera)* and White Flesh of Watermelon *(Citrullus lanatus)* as a Preventive Modality of Dyslipidemia

Potensi Jus Kombinasi Daging Kelapa (Cocos nucifera) dan Daging Putih Semangka (Citrullus lanatus) sebagai Modalitas Preventif Dislipidemia

Hasnan Habib Afifudin[1], Muhammad Malik Fajar[1], Muhammad Hanif Al As'ad Budiyanto[1], Daeng Catur Dharma Rahmatullah[1], Andika Danendra Widyadana[1], Prabaswara Ulung Linuwih[1], Akmal Widi Rakhmanto[1], Miranti Dewi Pramaningtyas[2]*

[1]Fakultas Kedokteran, Universitas Islam Indonesia, Sleman, Yogyakarta, Indonesia
[2]Departemen Fisiologi, Fakultas Kedokteran, Universitas Islam Indonesia, Sleman, Yogyakarta, Indonesia

ARTICLE INFO

Received: *22-09-2022*
Accepted: *17-01-2023*
Published online: *09-06-2023*

Correspondent:
Miranti Dewi Pramaningtyas
miranti.dewi@uii.ac.id

DOI:
10.20473/amnt.v7i2.2023.279-282

Available online at:
https://e-journal.unair.ac.id/AMNT

Keywords:
Dyslipidemia, Cocos nucifera, Citrullus lanatus

ABSTRACT

Background: Dyslipidemia is a condition in which lipid levels are abnormal. Dyslipidemia can lead to diseases such as atherosclerosis and coronary heart disease. Coconut flesh and white flesh of watermelon are known to have antioxidant compounds that can prevent dyslipidemia.
Objectives: This study aimed to prove the potential of combining coconut flesh and watermelon flesh intervention to inhibit metabolic parameters in dyslipidemic conditions.
Methods: This study was an experimental study with a post-test only with a control group design involving five groups of 25 Wistar mice treated with dyslipidemia induction using quail egg yolk. Treatment followed by the intervention of coconut flesh juice, white flesh of watermelon juice, or a combination of both, and one control group with induction of dyslipidemia with quail egg yolk followed by aqueous intervention. The intervention duration is 28 days, with a blood draw carried out on the 29th day. The lipid profile test was carried out using blood plasma. Data analysis begins with the Shapiro-Wilk test and a one-way ANOVA test.
Results: There were no significant differences in the result of LDL, triglyceride, and total cholesterol between groups (P>0.05) and significant differences in HDL between groups (p< 0.05).
Conclusions: The intervention of watermelon white flesh juice and coconut flesh significantly affected HDL levels but did not significantly affect dyslipidemic rats' LDL, triglyceride, and total cholesterol.

INTRODUCTION

Dyslipidemia is a health problem that is often found in people around the world, including Indonesia. Dyslipidemia has several effects on the human body, such as narrowing of the arteries or atherosclerosis, which, if it occurs in the blood vessels in the brain, can cause a stroke. In addition, the impact of dyslipidemia is coronary heart disease which can lead to death. Coronary heart disease and stroke are ranked first in health problems that can cause death. In 2012, 14.1 million people died from coronary heart disease and stroke[1].

Dyslipidemia has the meaning of increasing lipid levels in the body, such as total cholesterol, triglycerides, VLDL (Very Low-Density Lipoproteins), and LDL (Low-Density Lipoprotein), as well as decreased levels of HDL (High-Density Lipoprotein). It can be said to be dyslipidemia if the total cholesterol level in the body is ≥ 6.22 mmol/L (≥ 240 mg/dL), triglyceride level is ≥ 1.70 mmol/L (≥ 150 mg/dL), LDL cholesterol level is ≥ 4.14 mmol/L (≥ 160 mg/dL), and HDL cholesterol level < 1.04 mmol/L (< 40 mg/dL)[1–3].

Coconut fruit has many benefits and is known by all humans because it tastes delicious and is fresh. All parts of the coconut are very beneficial for the human body, such as parts of coconut oil, coconut water, and coconut meat. Based on the article by Narayanankutty et al. in 2018, coconut oil can reduce blood lipid levels by performing the LCAT (Lecithin Cholesterol Acyltransferase) enzyme. The LCAT enzyme absorbs free cholesterol and converts it into cholesterol esters sequestered into the lipoprotein core to form significant HDL[4]. In addition, the substance content LCAT enzymes (Lecithin Cholesterol Acyltransferase) in coconut water can also transport fatty acids into the liver, liver lipogenesis, and VLDL secretion[5].

Coconut meat has excellent nutritional content, including high water content, carbohydrates, fiber, and unsaturated fatty acids. Coconut meat has high

How to cite: *Afifudin, H. H., Fajar, M. M., Budiyanto, M. H. A. A., Rahmatullah, D. C. D., Widyadana, A. D., Linuwih, P. U., Rakhmanto, A. W., & Pramaningtyas, M. D. The potential of a Combination Juice of Coconut Flesh (Cocos nucifera) and White Flesh of Watermelon (Citrullus lanatus) as a Preventive Modality of Dyslipidemia: Potensi Jus Kombinasi Daging Kelapa (Cocos nucifera) dan Daging Putih Semangka (Citrullus lanatus) sebagai Modalitas Preventif Dislipidemia. Amerta Nutrition, 7(2), 279–282.*

levels of unsaturated fatty acids, omega-6 and omega-9. Omega-6 is a group of Polyunsaturated fatty acids (PUFA). Meanwhile, omega-9 is a monounsaturated fatty acid (MUFA) group. Both are believed to improve HDL levels and reduce LDL levels in the body, so it is hoped that they can inhibit the progression of dyslipidemia conditions and eliminate blood vessel blockage by high LDL levels[6,7].

Besides coconuts, watermelon fruit with the Latin name Citrullus lanattus is also known to have anti-dyslipidemia potential. One part that has many benefits is the white skin of the watermelon in reducing dyslipidemia because this part has a high amino acid content. Watermelon has bioactive nutritional components such as vitamins A, B, C, iron, calcium, phosphorus, and citrulline. Citrulline is an amino acid that is rich in antioxidants in watermelon. Based on the article by Poduri et al. in 2014 stated that citrulline content could reduce dyslipidemia levels in induced rats[8].

So far, several studies have been found regarding the administration of coconut fruit or watermelon, which inhibits dyslipidemia conditions. However, until now, no research has examined the potential for intervention with a combination of coconut flesh and white watermelon flesh in inhibiting an increase in lipid profile. Therefore, this study was conducted to examine the potential of giving a combination of coconut flesh and white watermelon flesh to inhibit metabolic parameters in dyslipidemic conditions.

METHODS

Handling of Experimental Animals

This experimental research used a post-test research design with a control group design. This series of studies was conducted at the Laboratory of the Faculty of Medicine, the Indonesian Islamic University, Yogyakarta. The research subjects used were male *Rattus norvegicus* rats with an age range of 8-12 weeks and a weight of 200-300 grams obtained from the Islamic University of Indonesia. This study involved 25 subjects who were divided into five groups with standard feed intervention and quail egg yolk supplemented with (P1) *Cocos nucifera* 1 ml, (P2) *Citrullus lanatus* 1 ml, (P3) a combination of *Cocos nucifera* and *Citrullus lanatus* with a total dose of 1 ml, (P4) a combination of *Cocos nucifera* and *Citrullus lanatus* with a total dose of 2 ml, (P5) 1 ml of distilled water.

The standard feed used was AD-2 Comfeed, as much as 10 g/head/day accompanied by drinking water, both of which are given ad libitum. Acclimatization was carried out for seven days, followed by the intervention stage. The dose for each intervention was 1 ml/100 g BW except for the intervention in group P4, which was given 2 ml/100 g BW. The intervention was given for 28 days, and then the final blood specimen was taken through the retro-orbital vein at the end of the 28th day to determine lipid profile levels[9]. This research proposal was approved by the Ethics Commission of the Faculty of Medicine, Gadjah Mada University with the ethical number KE/FK/1162/EC/2020.

Making Induction and Intervention Media

The dyslipidemia induction media used were quail eggs, and intervention media in coconut and watermelon were obtained from the Pakem Traditional Market. Then the yolk part of the quail eggs that had been obtained was taken as a medium given as an induction of dyslipidemia. Meanwhile, the coconut and white flesh of the watermelon extracted from the fruit were processed using a Cosmos CJ-355 food processor. The induction medium was given personalized in the morning, with the intervention medium given in the afternoon of the same day to study the inhibitory potential of the intervention compounds provided.

Determination of Lipid Profile Levels

Mice were injected with the anesthetic Zoletil (containing 250 mg tiletamine and 250 mg zolazepam) at 0.01 ml/100 g BW intraperitoneally. Rat blood samples were taken as much as 3 ml from the retroorbital artery. Then the blood is placed in a sterile microtube to be continued at the serum centrifugation stage at 3000 rpm for 10 minutes. Lipid profile levels were determined using Microlab 300 spectrophotometry and presented in mg/dL units.

Data Analysis

The data obtained is continued at the data normality test stage using the Shapiro-Wilk test because the number of research subjects is < 50. The data were normally distributed ($p>0.05$), followed by statistical analysis using the one-way ANOVA test and followed by systematic posthoc analysis. Suppose the results of the one-way ANOVA test show significant results. The entire process of statistical analysis was carried out using SPSS version 25.

RESULTS AND DISCUSSION

Normal LDL levels in *Rattus norvegicus* are in the range of 7-27.2 mg/dL. Meanwhile, normal HDL levels are ≥ 35 mg/dL. Normal triglyceride levels in mice are ≤ 150 mg/dL, and normal total cholesterol levels are 10-59 mg/dL[9,10]. This study showed that P1 to P5 decreased HDL and increased total cholesterol. The most common decrease in HDL was found in the P4 group, namely subjects with quail egg yolk induction and a combination of 2 ml of coconut meat and white flesh of watermelon. Meanwhile, the highest increase in total cholesterol was in the P3 group, namely the rat experiment with the induction of quail egg yolk and a combination of 1 ml of coconut meat and white flesh of watermelon (Table 1).

How to cite: *Afifudin, H. H., Fajar, M. M., Budiyanto, M. H. A. A., Rahmatullah, D. C. D., Widyadana, A. D., Linuwih, P. U., Rakhmanto, A. W., & Pramaningtyas, M. D. The potential of a Combination Juice of Coconut Flesh (Cocos nucifera) and White Flesh of Watermelon (Citrullus lanatus) as a Preventive Modality of Dyslipidemia: Potensi Jus Kombinasi Daging Kelapa (Cocos nucifera) dan Daging Putih Semangka (Citrullus lanatus) sebagai Modalitas Preventif Dislipidemia. Amerta Nutrition, 7(2), 279–282.*

Table 1. The results of one-way ANOVA analysis on lipid profile variables

Group	Mean ± Standard Deviation (mg/dL)			
	LDL	HDL	TG	CT
P1	23.50 ± 2.59	29.82 ± 5.2	64.90 ± 10.42	67.98 ±23.10
P2	24.08 ± 6.6	24.52 ± 7.18	66.20 ± 15.75	73.62 ± 28.84
P3	25.68 ± 5.89	22.52 ± 5.81	65.30 ± 18.06	93.86 ± 45.82
P4	21.88 ± 8.68	21.00 ± 6.21	66.52 ± 19.42	74.32 ± 29.22
P5	24.18 ± 4.77	31.54 ±3.72	66.42 ± 13.93	76.78 ±29.65
Normal Value	7 – 27.2	> 35	< 150	10 – 59
P value	0.903	0.036	0.763	0.858

HDL (High-Density Lipoprotein); LDL (Low-Density Lipoprotein); TG (Triglyceride); CT (Cholesterol)

Based on the results that have been obtained and analyzed, it can be concluded that for LDL, TG, and CT levels, there were no significant differences between the intervention groups, both in the combined intervention group and the solitary intervention group, compared to the control group with p values obtained in all five groups is p>0.05. There were significant results on HDL levels between groups with a p-value of 0.036. So far, no other studies have used intervention on the white part of the watermelon. However, in a study conducted by Arsyad Parama et al[11]. This result is due to the presence of more galactomannan in the administration of more juice volume[12].

Based on experimental research conducted by Fany Lairin D. and Diana Lyrawati, which involved intervention in the form of white watermelon flesh extract for four weeks at doses of 250 and 500 mg/kg BW/day, showed relatively significant results in reducing CT levels (p=0.038) and increased HDL levels (p=0.021). This research has differences in intervention selection, which in this study used the white part of the watermelon, both in combination and solitary compounds, with different doses and duration of intervention[13]. Watermelon contains flavonoids and citrulline. The longer the duration of giving watermelon, the more flavonoids and citrulline content in watermelon will be. In addition, watermelon also contains lycopene which has inhibitory activity on LDL[14].

Various forms of coconut preparations are also frequently studied for their anti-dyslipidemic potential. Based on research by Augus Venty et al. Provides the result that administration of Virgin coconut oil (VCO) from the species Cocos nucifera is known to be effective in preventing dyslipidemia in Rattus norvegicus in reducing CT, TG, and LDL levels and increasing HDL levels (p=0.05) compared to the control group with intervention for 28 days. The dose of VCO was 0.8 ml/200 gBB[15]. Based on another study conducted by Feti Fatimah and Barlina Rindengan, it has also been studied that administration of VCO emulsion diets can effectively improve lipid profile levels (p=0.05) compared to the study control and the pure VCO intervention group after seven days of intervention[16]. Processed coconut oil in the form of VCO contains phenolic active substances. The amount of phenolic is influenced by the type of processing, the type of coconut, and the addition of chemicals in manufacturing VCO. The type of coconut with the epidermis has a greater concentration of phenolics[17].

Meanwhile, based on research by N. Radenahmad et al. argues that giving young coconut juice can inhibit pathological changes in metabolic parameter levels, which are illustrated by increasing HDL levels and maintaining CT, LDL, and TG levels after ovariectomy intervention as a medium for inducing atherosclerosis. The administration of young coconut juice was carried out for 7-14 days prior to post-intervention testing. These studies have differences in the use of the combination and the dose and duration of the intervention applied[18].

CONCLUSIONS

Based on the research that has been carried out, it was concluded that the intervention of watermelon white flesh juice and coconut meat, in general, did not significantly affect the lipid profile of rats induced using quail egg yolk because it only gave significant results on differences in HDL levels. There were no significant differences between groups in LDL, TG, and total cholesterol levels.

ACKNOWLEDGEMENTS

The researcher would like to thank the UII Faculty of Medicine for funding this research. The researcher also expressed his gratitude to Ernadita Budiastuti as laboratory assistant for the Department of Physiology, FK UII, who has assisted in this research.

Conflict of Interest and Funding Disclosure

There is no conflict of interest in the research or writing of this publication. StudyThis was funded by a grant from the Faculty of Medicine, Islamic University of Indonesia, grant number 621/Dek/70Student Grant Team/IX/2020.

REFERENCES

1. Be safe, AM*et al.* Guidelines for the Management of Dyslipidemia in Indonesia 2019. Pb Perkeni (2019).
2. Mancini, GBJ, Hegele, RA & Leiter, LA Dyslipidemia.*Canadian Journal of Diabetes* **42**, S178–S185 (2018).
3. Ekananda, NA Bay Leaf in Dyslipidemia Therapy. *J Majority* **4**, 64–69 (2015).
4. Narayanankutty, A., Illam, SP & Raghavemenom, AC Health Impacts of Different Edible Oils Prepared from Coconut (Cocos Nucifera): A Comprehensive Review.*Trends in Food Science and Technology* **80**, 1–7 (2018).
5. Lima, EB C*et al.*Cocos nucifera (L.) (arecaceae): A Phytochemical And Pharmacological Review. *Brazilian Journal of Medical and Biological Research* **48**, 953–964 (2015).
6. Rindeng, B. Young Coconut Potential and

How to cite: Afifudin, H. H., Fajar, M. M., Budiyanto, M. H. A. A., Rahmatullah, D. C. D., Widyadana, A. D., Linuwih, P. U., Rakhmanto, A. W., & Pramaningtyas, M. D. The potential of a Combination Juice of Coconut Flesh (Cocos nucifera) and White Flesh of Watermelon (Citrullus lanatus) as a Preventive Modality of Dyslipidemia: Potensi Jus Kombinasi Daging Kelapa (Cocos nucifera) dan Daging Putih Semangka (Citrullus lanatus) sebagai Modalitas Preventif Dislipidemia. Amerta Nutrition, 7(2), 279–282.

Processing.*Indonesian Coconut and Palmae Research Institute*3, 46–60 (2004).
7. Deshmukh, CD Phytochemical and Pharmacological profile of Citrullus lanatus (THUNB). *Biolife* 483–488 (2015) doi:10.17812/blj2015.32.18.
8. Poduri, A., Rateri, DL, Saha, SK, Saha, S. & Daugherty, A. Citrullus lanatus 'sentinel' (Watermelon) Extract Reduces Atherosclerosis in LDL Receptor-Deficient Mice. *Journal of Nutritional Biochemistry* **24**, 882–886 (2013).
9. Fitriani, D., Rusmini, H. & Marek, YW Effect of Giving Papaya Flower Extract (Carica papaya L) Lipoprotein (LDL) Blood of Sprague Dawley Male Rats (Rattus Novergicus) Strain Given a High-Fat Diet. *Journal of Medical and Health Sciences* **6**, 247–256 (2019).
10. Fajrin, SA & Athiroh, N. Study of Triglyceride Lipid Levels in Wistar Rats After Administration of Methanolic Extract of Scurrula atropurpurea (Bl.) Dans Subchronically for 90 Days. *Bioscientific (Bioscience-Tropic)* **3**, 24–29 (2017).
11. Santosa, AP, Trimurtini, I. & Hasan, K. Anti-Hyperlipidemic Effects of Ethanol Extract of Red Watermelon (Citrullus Lanatus) Fruit Flesh on Low Levels. *JIMKI* **6**, 41–48 (2018).
12. Subagio, A. Potential of Coconut Flesh as a Valued Food Raw Material. *Food* **20**, 15–26 (2011).
13. Djala, FL, Lyrawati, D. & Soeharto, S. Watermelon (Citrulus vulgaris) Extract Lowers Total Cholesterol and Hydroxy-Methylglutaryl-CoA Reductase Activity in Hypercholesterolemic Rats. *Brawijaya Medical Journal* **29**, 104–109 (2016).
14. Tristiyanti, D., Hamdani, S. & Rohita, D. Determination of Lycopene Levels from Several Red-Flesh Fruits by Spectrophotometric Method. *Indonesian Journal of Pharmaceutical Science and Technology* **2**, 11–21 (2013).
15. Venty, A., Aman, IGM & Pangkahila, W. The Effect of Virgin Coconut Oil (Cocos nucifera) Administration on Dyslipidemia in Wistar Strain Male White Rats Given a High Cholesterol Diet. *WMJ (Warmadewa Medical Journal)* **1**, 58 (2017).
16. Fatimah, F. & Barlina, R. Effect of Virgin Coconut Oil (VCO) Emulsion Diet on the Lipid Profile of White Rats (Rattus norvegicus). *Literary Journal* **17**, 18 (2021).
17. Raharjo, TJ*et al. I*n Vivo Study of Phenolic Compounds Role on Antihypercholesterol Activity of Virgin Coconut Oil. *Indonesian Journal of Chemistry* **8**, 119–123 (2010).
18. Radenahmad, N., Sawangjaroen, K., Mitranun, W. & Sayoh, I. Beneficial Effects of Young Coconut Juice Feeding on the Lipid, Renal and Liver Profiles, in Ovariectomized Rats: Preliminary Novel Findings. *Songklanakarin Journal of Science and Technology* **38**, 57–65 (2016).

How to cite: *Afifudin, H. H., Fajar, M. M., Budiyanto, M. H. A. A., Rahmatullah, D. C. D., Widyadana, A. D., Linuwih, P. U., Rakhmanto, A. W., & Pramaningtyas, M. D. The potential of a Combination Juice of Coconut Flesh (Cocos nucifera) and White Flesh of Watermelon (Citrullus lanatus) as a Preventive Modality of Dyslipidemia: Potensi Jus Kombinasi Daging Kelapa (Cocos nucifera) dan Daging Putih Semangka (Citrullus lanatus) sebagai Modalitas Preventif Dislipidemia. Amerta Nutrition, 7(2), 279–282.*