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

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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 no intervention of dyslipidemia with quail egg yolk followed by a follow-up of 28 days. The intervention begins with 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 stroke1.

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), and HDL cholesterol level is < 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 HDL4. In addition, the substance content LCAT enzymes (Lecithin Cholesterol Atyltransferase) in coconut water can also transport fatty acids into the liver, liver lipogenesis, and VLDL secretion5.

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

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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 lanatus 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 \textit{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) \textit{Cocos nucifera} 1 ml, (P2) \textit{Citrullus lanatus} 1 ml, (P3) a combination of \textit{Cocos nucifera} and \textit{Citrullus lanatus} with a total dose of 1 ml, (P4) a combination of \textit{Cocos nucifera} and \textit{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 \textit{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).
Table 1. The results of one-way ANOVA analysis on lipid profile variables

<table>
<thead>
<tr>
<th>Group</th>
<th>LDL (Mean ± Standard Deviation mg/dL)</th>
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<th>TG (Mean ± Standard Deviation mg/dL)</th>
<th>CT (Mean ± Standard Deviation mg/dL)</th>
</tr>
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<tbody>
<tr>
<td>P1</td>
<td>23.50 ± 2.59</td>
<td>29.82 ± 5.2</td>
<td>64.90 ± 10.42</td>
<td>67.98 ± 23.10</td>
</tr>
<tr>
<td>P2</td>
<td>24.08 ± 6.6</td>
<td>24.52 ± 7.18</td>
<td>66.20 ± 15.75</td>
<td>73.62 ± 28.84</td>
</tr>
<tr>
<td>P3</td>
<td>25.68 ± 5.89</td>
<td>22.52 ± 5.81</td>
<td>65.30 ± 18.06</td>
<td>93.86 ± 45.82</td>
</tr>
<tr>
<td>P4</td>
<td>21.88 ± 8.68</td>
<td>21.00 ± 6.21</td>
<td>66.52 ± 19.42</td>
<td>74.32 ± 29.22</td>
</tr>
<tr>
<td>P5</td>
<td>24.18 ± 4.77</td>
<td>31.54 ± 3.72</td>
<td>66.42 ± 13.93</td>
<td>76.78 ± 29.65</td>
</tr>
</tbody>
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Normal Value

- LDL: 3.5 – 5.2
- HDL: > 1.5
- TG: < 1.7
- CT: < 0.8

Table 2.

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Normal Value

- LDL: 3.5 – 5.2
- HDL: > 1.5
- TG: < 1.7
- CT: < 0.8

CONCLUSIONS

Based on the research that has been carried out, it was concluded that the administration of young coconut juice alone or combined interventions with watermelon flesh and coconut meat was effective in reducing lipid profile variables, particularly HDL levels. The results of the study showed that the intervention of young coconut juice, watermelon flesh, and coconut meat had a significant effect in reducing lipid profile variables, particularly HDL levels.

REFERENCES

6. Rindeng, B. Young Coconut Potential and 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.


