EFFECT OF MELINJO PEEL EXTRACT ON TRIGLYCERIDES LEVEL OF THE RATS FED A HIGH CHOLESTEROL DIET

Athira Demitri1*, Bambang Wirjatmadi2, Merryana Adriani2

1 Master Programme of Public Health Faculty, Universitas Airlangga
2 Department of Public Health Nutrition, Faculty of Public Health, Universitas Airlangga

*Corresponding author: Athira Demitri, athira.demitri@gmail.com

https://doi.org/10.32827/ijphcs.5.6.301

ABSTRACT

Background: Hypertriglyceridemia is a risk factor for coronary heart diseases and strokes may be prevented high antioxidant food that found in plants. One of plants that use to prevent this, called Melinjo peel. Melinjo peel contains flavonoid can lower triglyceride levels. The objective of this study is to measure triglyceride levels before and after being given extract of Melinjo peel treatment.

Materials and Methods: The type of research that used in this study is true experimental, by pre-test post-test control group design. High cholesterol diet is given by oral gavage for each of rats as much as 1,8 grams per day. The doses of Melinjo peel extract are given for 54,15 mg/kg, 108,3 mg/kg, and 216,6 mg/kg. Statistical analysis that used is Paired Sample T-Test and MANOVA (Multivariate Analyses of Variance).

Result: Based on statistical analysis, showed that there are differences of triglyceride levels in the high cholesterol diet group, first treatment, second and third treatment before and after treatment significant (p. < 0.05). Levels of triglycerides in the normal diet group compared with the high cholesterol group and third treatment showed a significant difference (p. < 0.05).

Conclusion: Melinjo peel extract can decreased triglyceride levels after treatment, those can be due to the flavonoid, lycopene, and vitamin C of Melinjo peel extract.

Keywords: hypertriglyceridemia, Melinjo peel, flavonoid
1.0 Introduction

Hypertriglyceridemia is a risk factor for coronary heart diseases and strokes. According to Harti (2014, p.119), high triglyceride levels tend to cause blood pressure disorders and diabetes mellitus risk. Hypertriglyceridemia can be prevented if a certain person consumes high antioxidant food, which is widely found in plants to prevent high levels of triglycerides in the body (Sayuti and Yenrina, 2015). One of plants that used to prevent is Melinjo peel. In previous research (Rakhmayati, Nilapsari, Rakhmatullah, 2017), Melinjo peel used to decrease uric acid level. Melinjo peel which contains flavonoid can lower triglyceride levels (Muvihill, Burke, and Huff, 2016). The objective of this study is to measure triglyceride levels before and after being given extract of Melinjo peel treatment.

2.0 Materials and Methods

The type of research that used in this study is true experimental, with pre-test post-test control group design, and the subject is rats strain Wistar. The number of samples that used are five per treatment group (normal diet; high diet; high diet and Melinjo peel extract with three doses). High cholesterol diet that given to rats are quail egg yolk, cattle brain and pure glucose which are mixed together.

This diet is given by oral gavage for each rats as much as 1.8 grams per day for 14 days. The doses of Melinjo peel extract are 54.15 mg/kg, 108.3 mg/kg and 216.6 mg/kg. Melinjo peel extract is given by oral gavage for 14 days after the cholesterol diet.

The last of the treatment (29th days), the rats are drawn the blood to measure triglyceride levels after treatment. Statistical analysis is using Paired Sample T-Test to compare triglyceride levels before and after treatment. Then, used MANOVA (Multivariate Analyses of Variance) to notice the difference of triglyceride levels in each group.

3.0 Result

3.1 Triglyceride levels before and after treatment analysis

The mean of triglyceride levels between groups before and after treatment in normal diet group is 55.82 (pretest) and 57.58 (posttest), high cholesterol diet, 56.38 (pretest) and 191.78 (posttest), first treatment (54,15 mg) is 58.58 (pretest) and 54.08 (posttest), second treatment (108,3 mg) is 56.36 (pretest) and 50.68 (posttest), and third treatment (216,60 mg) is 55.60 (pretest) and 49.46 (posttest).
Table 1. The Mean Difference of Triglyceride Levels Before and After Treatment of Rats Fed High Cholesterol Diet

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Pretest Mean ± SD (mg/dl)</th>
<th>Posttest Mean ± SD (mg/dl)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Diet (ND)</td>
<td>5</td>
<td>55.82 ± 4.17</td>
<td>57.58 ± 3.95</td>
<td>0.632</td>
</tr>
<tr>
<td>High Cholesterol Diet (HCD)</td>
<td>5</td>
<td>56.38 ± 5.31</td>
<td>191.78 ± 3.25</td>
<td>0.000</td>
</tr>
<tr>
<td>First Treatment (T1) (54,14 mg extract)</td>
<td>5</td>
<td>58.58 ± 2.19</td>
<td>54.08 ± 2.14</td>
<td>0.027</td>
</tr>
<tr>
<td>Second Treatment (T2) (108,3 mg extract)</td>
<td>5</td>
<td>56.36 ± 3.10</td>
<td>50.68 ± 1.54</td>
<td>0.026</td>
</tr>
<tr>
<td>Third Treatment (T3) (216,6 mg extract)</td>
<td>5</td>
<td>55.60 ± 3.60</td>
<td>49.46 ± 1.04</td>
<td>0.009</td>
</tr>
</tbody>
</table>

The mean difference of triglyceride levels in each group before and after treatment is shown in Figure 1. below.

Figure 1. Graph of Triglyceride Levels Before and After Treatment Between Groups

Based on the Paired T-Test exhibit that there are differences of triglyceride levels in the high cholesterol diet group, first treatment, second treatment, and third treatment before and after treatment significant (< 0.05). However, in the normal diet group, there is no significant difference (p > 0.05).

3.2 Triglyceride levels changes analysis

Based on the MANOVA test, the significance value obtained is 0.000 (p < 0.05). Consequently, there are differences in triglyceride levels in among groups (normal diet, high cholesterol diet, first treatment, second treatment, and third treatment). Then, to find out the different groups significantly based on p. value can be seen in the following table 2.
Levels of triglycerides in the normal diet group compared with the high cholesterol group and third treatment showed a significant difference ($p < 0.05$). Levels of triglycerides in the high cholesterol diet group compared with first treatment, second treatment and third treatment group showed a significant difference ($p < 0.05$). Levels of triglyceride in first treatment group compared with third treatment group exhibit a significant difference ($p < 0.05$).

### 4.0 Discussion

Based on statistical analysis, triglyceride levels before and after treatment is significant ($p < 0.05$), except on normal diet group. The difference means of those among group are increased. Triglyceride increased in high cholesterol diet group because the rats consume high cholesterol diet every day without treatment.

In this research, using quail egg yolk, cattle brain and pure glucose as ingredients of high cholesterol diet. 1 gram of quail egg yolk contains higher total cholesterol, triglyceride, and low density lipoprotein (LDL) content than the chicken egg yolk (Ukachukwu, et.al, 2017). All organ meats are highly cholesterol, especially brains, and mostly low in sodium (Williams, 2007). Glucose can increase linearly with triglyceride, total cholesterol, cholesterol esters, and free cholesterol because excess glucose carbons can be directed toward cholesterol, free fatty acid, and glycerolipid synthesis (Mugabo, et.al, 2017).

Triglyceride decreased in treatment with Melinjo peel extract, because it contains phenolic compounds, flavonoids, β-carotene, lycopene, carotenoids, vitamin C, and antioxidant activity (Siregar, dkk., 2009). Flavonoid treatment reduced triglyceride and cholesterol levels in the blood and increased serum HDL-C levels (Bao, et.al., 2016). Flavonoids can clearing triglyceride and reduce lipid by regulating of lipoprotein lipase expression through their pleiotropic effects (Fan, et.al., 2006). Lycopene can reduce triglyceride if its compare to the rats fed high diet for 8 weeks (El-Nashar and Abduljawad, 2012). Lycopene could decrease triglyceride through mechanisms may be involved in Liver X receptor α (LXRα) activation and subsequent downregulation of Niemann-Pick C1-like 1 (NPC1L1) expression, because intestinal cholesterol absorption is considered to be mediated by NPC1L1 (Zou and Feng, 2015). Supplementation with 2 grams of vitamin C in daily, for 3 months, can decrease serum total cholesterol, LDL-C and triglyceride contents (Sunga and Pascual, 2012). Hypertriglyceridemia can occur in ascorbic acid deficiency cause it relations to lipoprotein lipase activity (Ginter, Bobek, and Jurcovicova, 1982).
5.0 Conclusion and recommendation

In this study, Melinjo peel extract could decrease triglyceride levels after treatment. These effects can be due to the flavonoid, lycopene, and vitamin C of Melinjo peel extract, which may affect activity of lipoprotein lipase enzym. Consumption of Melinjo peel in daily life must be along with physical activity or exercise to prevent hypertriglyceride and require further research about mechanism of flavonoid in Melinjo peel to decrease triglyceride levels.

Acknowledgement

The ethical clearance of this research had been accepted and proved with ethical approval certificate from Health Research Ethics Comittee Faculty of Public Health Universitas Airlangga. Authors thank to colleague, Public Health Nutrition Department, Faculty of Public Health, Universitas Airlangga and Biochemistry Laboratory, Department of Biochemistry, Faculty of Medicine, Universitas Airlangga, Surabaya for their support and cooperation.

Declaration

Author(s) declare that there’s no conflict of interest in this research.

Authors contribution

Author 1: Concept, idea, data collection, statistical analysis, and manuscript writing
Author 2: Concept, idea, literature review and manuscript writing
Author 3: Concept, idea, literature review, and manuscript writing

References


Fan, Chunlei, Jin Yan, Ying Qian, Xingde Wo, and Liping Gao. (2006). Regulation of Lipoprotein Lipase Expression by Effect of Hawthorn Flavonoids on Peroxisome


Sunga, Maria Nerissa S. and Antonio Pascual. (2012). Effect of Ascorbic Acid on Dyslipidemia (A Study among Philippine Heart Center Employees). *Phil Heart Center Journal*, 16(2), 7-11.

