Semi polar compounds from lemon-local: Focus on lipid metabolism

A B Yulianti1*, S I Raudina2, R M Amrulloh2, R A R Ekowati1, A R Furqaani1, M Tejasari1 and M K Dewi3

1 Department of Histology & Medical Biology, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia
2 Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia
3 Department of Pharmacology, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia

*ab.yulianti@unisba.ac.id

Abstract. The study aim was analyzed the potential of semi polar compounds from lemon-local on old mice lipid profile with high fat dietary. Experimental study using DDY mice, males, 50–55 weeks. Five of 30 mice were sacrificed before treatment (group 6), group 1 (negative control), groups 2,3,4 and 5 were fed high fat dietary, group 3, 4 and 5 were treated doses 1, 2 and 3, respectively, orally. Parameters measured were body weight, HDL, TAG, total cholesterol. The results showed body weight of mice were above normal and dose 2 treatment cause weight loss (p=0.658). The highest cholesterol level was in positive control and the lowest was in the group given doses 2 (p=0.042). The highest triglycerides level was in the pretreatment group and the lowest was in the group given doses 2 (p=0.148). The highest HDL was in the positive group and the lowest was in the group given doses 2 (p=0.278). Semi polar compound from lemon-local at dose 2 could be regulated profile lipid on old mice with high fat dietary. This research needs to be improved, especially biomechanism of active substances.

1. Introduction

Lemon (Citrus lemon) are plants originating from India and Pakistan [1] that is widely used in dishes and drinks, especially the role of enhancing the taste of food. It is also used as a medicine due to its content vitamin C which acts as an antioxidant. Lemon also is used as a medicine, especially as a drug to prevent obesity, diabetes mellitus, hypertension, cardiovascular disease and cancer, even though the mechanism is unclear. And lemon have bioactive compound such as flavonoids, polyphenol, alkaloid [2] where its juice and peel have bioactive compound similarly [3].

Obesity is closely related to energy intake increase cause blood lipid increase and adipose tissue pile up. This is related to various diseases including hypertension, heart disease and stroke [4]. To reduce lipid levels in the blood used standard drugs as statin [5] or herbal medicines such as lemon [6].

Previous research has emphasized that lemon as a correction of taste for certain herbs that are not palatable, such as bitter taste or a pungent odour [7]. The study of bioactivity of natural compound for medicine is a main topic of our research. Are the semi-polar compounds contained in lemon-locals potentially in lipid metabolism? This study aims to analyse the potential of semi polar compound of lemon-local to regulate lipid profiles of old mice high-fat fed dietary.
2. Method

Semi polar compound from lemon-local were isolation in Central Laboratory, Padjadjaran University. Experiment animal was DDY mice, male, age 50–55 weeks, weight 40–50 g, from Biopharma. The ethics clearance got from Ethics Commission of the Faculty of Medicine, Bandung Islamic University. Adaptation and treatment were carried out in Animal Laboratory, School of Pharmacy, ITB. The dose used was 2n, 4n and 8n with n is the dose used in humans (4g/Kg BW) [7] and converted to the dose with factor of 0.0026 [8] and converted to ratio semi polar compound to total fractionation. The treatment was given for 24 days, then the mice were sacrificed and measured blood plasma lipid profile. Five of 30 mice were sacrificed before treatment (group6), group1 (negative control), groups2,3,4 and 5 were fed high fat dietary, group3, 4 and 5 were treated doses1, 2 and 3, respectively, orally. Parameters measured were body weight before and after, high density lipoprotein (HDL), triglyceride (TAG), and cholesterol-total. Analyse data using IBM SPSS 21.

3. Results

Average body weight before and after treatment respectively were 48.60±0.52, 49.16±0.52 g (p=0.658) (Figure 1).

![Figure 1. Mice body weight before and after treatment.](image-url)

The average cholesterol-total was 95.84 mg/dL, with highest cholesterol-total level was in positive control and the lowest was in the doses2 group (p=0.042) (Figure 2).

The average of triglyceride (TAG) was 126.04±3.87 mg/dL, the highest triglycerides level was in the pre-treatment group and the lowest was in the doses2 group (p=0.148) (Figure 2).

The average high-density lipoprotein (HDL) was 67.45±1.55 mg/dL, the highest HDL was in the positive group and the lowest was in the doses2 group (p=0.278) (Figure 2).
4. Discussion
The weight of old mice is not more than 40 g [9]. In this study the average of mice body weight more than 40 g. Thus, the mice body weight would not be affected by the treatment, but it might be affected their lipid profile.

In this study, administration of semi polar lemon-local had a positive effect on reducing total cholesterol levels, especially in mice treated with a dose 0.292 mg/Kg BW, likewise with TAG and HDL. This is accordance with previous research, using pure bioactive limonene [10].

The active compound in semi-polar fraction of lemons-local are mainly alkaloids, flavonoids, and polyphenols. Alam et al, said that naringin, flavonoid family could fat accumulation through pathways suppressing LDL receptors (LDLR) [6]. It was same with our research that semi polar compound from lemon-local decrease cholesterol-total levels. Thus, further study is needed, especially related to the active compound of genuine herbs.

In this study, the mice used were old with high-fat dietary. In predictable that profile lipid in blood plasma increase, cause of decreased of metabolism rate with high-fat dietary. So that the administration of semi-polar fraction from lemon-local could regulate the lipid.

5. Conclusion
Semi polar compound from lemon-local with dose 0.292 mg/Kg BW could be regulated profile lipid on old mice with high-fat dietary. This study needs to be further research in isolation bioactive compound which play a role in regulating lipid profiles and metabolism.

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