

Pemberian Serbuk Kelopak Rosella Merah yang Diseduh Mampu Mencegah Penurunan HDL Pada *Sprague dawley* yang Dipapar Jelantah

(Brewed of Red Rosella Calyx Powder Prevent Decrease HDL on *Sprague dawley* Given Waste Cooking Oil)

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Abstrak: Gangguan metabolisme lipid disebabkan minyak jelantah yang merupakan sumber radikal bebas eksogen. Masyarakat mengetahui penggunaan kelopak bunga rosella merah sebagai minuman yang mengandung antioksidan. Penelitian ini bertujuan untuk mengetahui pengaruh pemberian kelopak bunga rosella merah pada metabolisme lipid tikus yang disebabkan oleh minyak jelantah terhadap nilai HDL (*High-density Lipoprotein*). Penelitian ini menggunakan 24 ekor tikus jantan yang dipilih menggunakan pengambilan sampel acak dan dibagi menjadi 4 kelompok, yaitu kontrol positif (2 ml/kg BB minyak jelantah diberikan), kontrol negatif (tanpa perlakuan), perlakuan 1 (2 ml/kg BB minyak jelantah diberikan dan pemberian 540 mg/kg BB seduhan kelopak bunga rosella merah), dan perlakuan 2 (2 ml/kg BB minyak jelantah diberikan dan pemberian 810 mg/kg BB seduhan kelopak bunga rosella merah). *One-way Analysis of Variance* ($\alpha = 0,01$) dan uji *Tukey honestly significant difference* menunjukkan bahwa nilai p HDL = 0,00. Semua kelompok memiliki pengaruh yang signifikan terhadap HDL. Nilai terbaik adalah pemberian seduhan kelopak rosella merah 810 mg/kg BB dosis (HDL 57,47 mg/dl). Pemberian kelopak bunga rosella merah yang diseduh sejumlah dosis 540 mg/kg BB (EC50 = 407,52 bpj) dan 810 mg/kg BB (EC50 = 247,82 bpj) dapat mencegah penurunan HDL. Kelopak rosella merah dapat memperbaiki profil lipid minyak jelantah yang diolah pada tikus Sprague Dawley (khususnya HDL pada penelitian ini).

Kata kunci: Minyak jelantah, lipoprotein densitas tinggi, rosella merah, antioksidan.

Abstract: Lipid metabolism disorder is caused by waste cooking oil that is one of the source of exogenous free radicals. Publics know the utilization of red rosella calyx is used as a brew that contains antioxidants. Purpose of this research is to find out the effect of giving brewed red rosella calyx to rat lipid metabolism caused by waste cooking oil on High-density Lipoprotein (HDL) value. This research used 24 male rats which were selected by random sampling and divided into 4 groups: positive control (2 ml/kg BW waste cooking oil given), negative control (without treatment), treatment 1 (2 ml/kg BW waste cooking oil given and giving of 540 mg/kg BW brewed red rosella calyx), and treatment 2 (2 ml/kg BW waste cooking oil given and giving of 810 mg/kg BW brewed red rosella calyx). *One-way Analysis of Variance* ($\alpha = 0.01$) and *Tukey honestly significant difference* test showed that HDL p-value = 0.00. All groups have a significant effect on HDL. The best value is giving of 810 mg/kg BW dose of brewed red rosella calyx (HDL of 57.47 mg/dl). Giving of brewed red rosella calyx dose of 540 mg/kg BW (EC50 = 407.52 bpj) and red rosella calyx dose 810 mg/kg BW (EC50 = 247.82 bpj) can prevent HDL decrease. Red rosella calyx can improve the lipid profile of waste cooking oil treated to Sprague Dawley rats (especially for HDL on this research).

Keywords: Waste cooking oil, hgh-density lipoprotein, red rosella, antioxidant.

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INTRODUCTIONS

THE prevalence of coronary heart disease in Indonesia in 2013 is 1.5%⁽¹⁾. One of main risk factors for coronary heart disease is dyslipidemia⁽²⁾. Sign of dyslipidemia includes LDL (low density lipoprotein) concentration is above normal limits⁽³⁾. Dislipidemia is a metabolic disorder, characterized by increased concentrations LDL and decrease HDL (high density lipoprotein) in the blood circulation⁽⁴⁾. Coronary heart disease is one of cardiovascular disease. Cardiovascular disease are believed as major concern responsible or mortality of human being among foremost causes death preventable⁽⁵⁾. Indonesian people have behavior of consuming fatty foods, consuming containing cholesterol and fried foods by 40.7% as much as ≥ 1 time/ day⁽¹⁾.

Consuming fatty food caused lipid metabolic disorder. To prevent and overcome this, it needs intake of bioactive compounds that can help to improve lipid profile. Ethanol extract of rosella calyx (*Hibiscus sabdariffa* L.) can lower LDL⁽⁶⁾. Scientific research on the effect brewed of red rosella calyx consumption on HDL is still limited. Previous research has mostly used rosella calyx extract, whereas people generally consume brewed of red rosella calyx. Based on this, the researcher wants to know the extent to which the effect brewed of red rosella calyx can lower LDL of *Sprague Dawley* rat that has been conditioned hyperlipidemia with giving of waste cooking oil. Waste cooking oil can reduce malondialdehyde (an indicator of oxidative stress)⁽⁷⁾ and prevent SOD decrease in wistar rats given waste cooking oil⁽⁸⁾.

Oxidative stress accelerates the occurrence of dyslipidemia. Stress reaction oxidative stress triggers an increase in lipid peroxides that play a role in the process of atherosclerosis, and increase the risk of developing degenerative diseases such as heart disease, stroke, accelerate the aging process and the emergence of various pathogenesis of diseases including cancer⁽⁹⁾. This research aims to analyzing the effect brewed of red rosella calyx powder on HDL value and the different research group between positive control, negative control, treatment brewed of red rosella calyx powder of 540 mg/ kg BW/ day orally and 810 mg/ kg BW/ day orally. This dose is based on a previous study which stated that red rosella extract at a dose of 540 mg/kg bw prevented the increase in rats malondialdehyde exposed to cigarette smoke⁽¹⁰⁾. Malondialdehyde is a biomarker of exposure to free radicals in the body. Exposure to free radicals can trigger oxidative stress which can increase lipid peroxidation and can accelerate the occurrence of dyslipidemia⁽⁹⁾.

METHODS

This research conducted at Gadjah Mada University, Center for Food and Nutrition Studies. This research used experimental laboratory with post test only control group design was conducted for the in vivo stage. This research has approval ethical clearance No. 702-KE by Faculty of Veterinary Medicine Airlangga University (Ethical Review Committee).

The treatment design in this research is Completely Randomized Design. This research conducted 7 day for animal adaptation and 28 day research treatment were given to rats. The sample consisted of 24 male rats selected by random sampling to be divided into one negative control group (normal), one positive control group, and two treatment groups. Each group consisted of 6 rats with the following explanation :

1. Group I: negative control, given standard feed, given 2 ml aquades orally in the morning, not given brewed of rosella calyx powder, and not given used cooking oil
2. Group II: positive control, given standard feed, given 2 ml aquades orally in the morning and given waste cooking oil of 2 ml/kgBW/ day orally.
3. Group III: given standard feed, brewed of red roselle calyx powder 540 mg/kgBW/ day orally in the morning and given waste cooking oil of 2 ml/kgBW/ day orally
4. Group IV: given standard feed, brewed of red rosella calyx powder 810 mg/kgBW/day orally in the morning and given waste cooking oil of 2 ml/kgBW/ day orally.

Levene test to known normally distributed and Shapiro-Wilk test to known homogeneous used to analyze research. One-way Analysis of Variance ($\alpha = 0,01$) and Tukey honestly significant difference to test the significant difference between the sample.

RESULTS AND DISCUSSION

Antioxidant. Antioxidant testing by DPPH method, absorbance used of $\lambda=516.5$ nm. Analysis results of antioxidant activity (DPPH test) from brewed of red rosella steeping with dose of 540 mg/ kgBW has EC_{50} 407.52 ppm, while brewed of red rosella calyx with dose of 810 mg/kgBW has EC_{50} 247.82 ppm. Peroxide number value of 8.92 meq/kg on waste cooking oil. The analysis result of the different of HDL value is presented in the Table 1.

From data above, it is known that HDL score of negative control is the highest, the score positive control is the lowest among others. For treatment group, giving a brewed of red calyx of rosella containing 810

mg/kgBW/ day orally has higher HDL score than giving it containing 540 mg/kgBW/ day orally. It proves that giving it containing 540 mg/kg and 810 mg/kg can make lipid profile better. In this case it can prevent the decrease of HDL of *Sprague dawley* rat. Giving a brewed of red calyx of rosella containing 810 mg/kgBW/ day orally is better than giving 540 mg/kgBW/ day orally. Giving oil on treatment group can trigger fat metabolism disorder because oil contains free radical and saturated fats⁽¹¹⁾. Based on the research result, we have obtained HDL value of *Sprague dawley* rat. The analysis result of the average of HDL value is presented in the Figure 1.

Table 1. The different of HDL value at each research group.

Research Group	Average HDL Serum
Negative control group	73,56 ± 3,39 nmol/ml (a)
Positif control group	20,98 ± 2,36 nmol/ml (b)
Red roselle dose 540 mg/kgBW/day orally	39,37 ± 3,92 nmol/ml (c)
Red roselle dose 810 mg/kgBW/day orally	57,47 ± 4,21 nmol/ml (d)

*Research group that marked of different alpabet indicate significant difference.

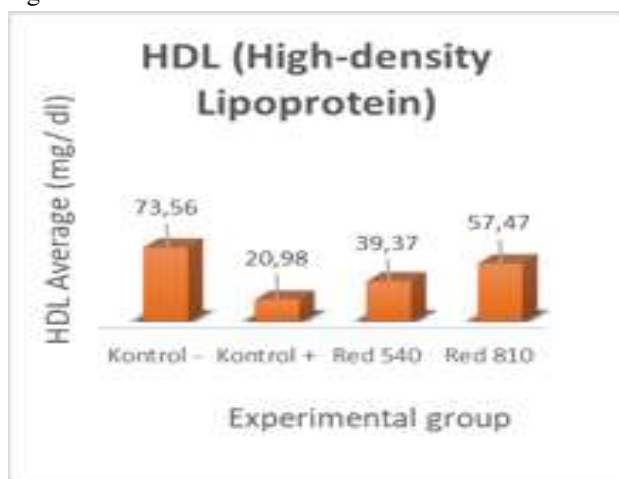


Fig 1.HDL average based on experimental groups.

Researching on rosella hipolipidemic of rat conducted for 6 weeks, can decrease LDL significantly to the rat given rosella extract with dose 500 mg/kg and 1000 mg/kg⁽¹²⁾. Bioactive inside rosella may help fat metabolism process easily to absorb. Finally it can decrease LDL score. It happens because rosella contains polyphenol, β -carotene, and vitamin C⁽¹³⁾. The capability of rosella in decreasing the LDL score is by mechanism of preventing the triasilgloserol synthetic or by other hipolipidemic effect through anti-oxidant activity in against LDL oxidation. Some molecules predicted having these capabilities are anthocyanin

and the branch of flavonoid molecule⁽¹⁴⁾.

CONCLUSIONS

Brewed of red rosella calyx with dose of 540 mg/kgBW/day orally and dose of 810 mg/kgBW/day orally prevent the decrease of HDL of rats (*Sprague dawley*) effectively. Brewed of red rosella calyx with dose of 810 mg/kgBW/day orally most prevent the decrease of HDL of rats (*Sprague dawley*) effectively. Negative control group, the HDL value is the highest compared to the other groups. Positive control group, the HDL value is lowest compared to the other.

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