

SUMMARY

THE GIVING EFFECT OF RED ROSELLA CALYX EXTRACT TOWARDS NITRIC OXIDE (NO), SUPEROXIDE DIMUSTASE (SOD), AND MALONDIALDEHYDE (MDA) ON WISTAR RATS GIVEN WASTE COOKING OIL

People of Indonesia tend to use used waste cooking oil for processing foodstuffs. Used waste cooking oil differentiated from waste cooking oil as it has been used for many times with high temperatures in frying process and contains saturated fatty acids as well as free-radicals. The bond of fatty acids is not easily processed by human body and when carried in the blood stream it results to settling on heart's the blood vessels, blocking the flow of blood hence increasing the levels of cholesterol in the blood. The effect of this high-levels of cholesterol in the blood caused by saturated fatty acids can be in form of damage to the endothelial cells hence causing the failure of endothelial cell to release NO as a mediator in vasodilation, since the is a decrease its formation. Excessive free radicals cause oxidative stress that triggers the process called as lipid peroxidation.

Oxidative stress is a state of imbalance between free radical with the body's antioxidant system. The increase in the MDA can be used as one sign of oxidative damage by free radicals on the cell membranes. The existence of MDA in the blood forces the SOD as a primary antioxidant, to neutralize the former preventing adverse effect to the tissues fed by the blood. In the end, the ratio of MDA / SOD becomes an index of oxidative stress.

Oxidative damage to the oil or fat and toxic free radicals content in the body can be known through the peroxide. One effort that can be done to minimize the negative impacts from the use of used waste cooking oil is by the use of red roselle calyx extracts in an aqueous solvent. Red roselle calyx extracts (*Hibiscus sabdariffa* Linn.) is one of several plants that can be used as a source of antioxidants which could inhibit the oxidation of free radicals in human body.

The purpose of this study was to analyze the effect of red roselle calyx extracts towards conditions of oxidative stress in wistar rats which used waste cooking oil was provided to, by testing the levels of NO, SOD and MDA in serum.

This study used True Experimental Laboratory with Completely Randomized Design (CRD) and Post-test. The sample consisted of 24 male rats selected using random sampling for then being divided into four groups: negative control (being given standard fed), positive control group (standard fed + used waste cooking oil as much as 2.1 ml/ kg bw), dose treatment group 1 (standard fed + extract of red petals of roselle with the dosage of 540 mg/ kg bw + used waste cooking oil for as much as 2.1 ml/ kg bw), and dose treatment group 2 (standard fed + extract of red petals of roselle with the dosage as much as 810 mg/ kg bw + used waste cooking oil as much as of 2.1 ml/ kg bw). Each group consisted of 6

rats. The data collected were then being analyzed using One Way ANOVA and Tukey HSD statistical tests ($\alpha = 0.05$).

The results showed that the lowest mean of NO levels in serum was in the positive control group that amounted to 47.156 μM . In the treatment group, the closest NO levels in serum was in negative control group that treated with extract of red petals of roselle with dose of 810 mg/ kg bw at 47.156 μM . Statistical analysis showed significant differences existed in NO levels in serum ($p = 0.000$) between treatment groups. Treatment groups with extract dose of 810 mg/ kg bw and 540 mg/ kg bw were differ significantly with the positive control group ($p = 0.000$) while treatment group with dose of 540 mg/ kg bw was differ significantly with the negative control group ($p = 0.000$).

The lowest mean of the levels of SOD in serum was in positive control group which was 1,344 U/ ml, while the highest ones was found in the negative group which was 3.113 U/ ml. Statistical test concerning to the levels SOD in serum showed significant difference existed ($p = 0.000$) between treatment groups. The treatment groups with extract dose of 810 mg / kg bw and 540 mg / kg bw were differ significantly from the positive control group ($p = 0.000$). Treatment group with extract dose of 540 mg/ kg bw was differ significantly with the negative control group ($p = 0.000$). However, overall treatment groups were effectively preventing decrease in the level of NO and SOD in serum of wistar rats that were given used waste cooking oil.

The highest levels of MDA in serum was in positive control group that amounted to 18.0554 nmol/ ml, while the lowest levels of MDA in serum was in negative control group that amounted to 8.8999 nmol/ ml. Levels of MDA in the treatment group approaching the lowest level of negative control group (ie. extract at a dose of 810 mg/ kg bw; 9.3818 nmol/ ml). According to the statistical test, it showed significant difference existed in the levels of MDA in serum ($p = 0.000$) between the treatment groups. Treatment group with dose of roselle extract of 810 mg/ kg bw and 540 mg/ kg bw were differ significantly from the positive control group ($p = 0.000$). Treatment groups with dose of 810 mg/ kg bw and dose of 540 mg/ kg bw were insignificant with negative control group, in which groups consisted of treatment dose of 810 mg/ kg bw ($p = 0.988$) and 540 mg/ kg bw ($p = 0.183$).

It can be inferred that the red roselle calyx extract with dose of 810 mg/ kg bw and dose of 540 mg/kg bw may decrease the levels of NO and increase SOD in serum, as well as lower the levels of MDA in serum in wistar rats which were given used waste cooking oil. The most effective dose of the treatment was treatment group with extract dose of 810 mg/ kg bw. This was due to higher antioxidant activity (67.33%) such dose contained compared to the 540 mg/ kg bw dosage.

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GIVEN WASTE COOKING OIL**

Waste cooking oil which has been repeatedly used contains bonds of saturated fatty acids and free radicals which are harmful to our health. One method that can be done to minimize the negative impacts from the use of waste cooking oil is by consuming the calyx extract of red roselle. To analyze the effect of giving the calyx extract of red roselle toward the condition of oxidative stress of wistar rats given waste cooking oil by testing the NO, SOD, and MDA in the serum. This study were an experimental-laboratory study, which consists of 24 rats as the sample of this study that are selected randomly and divided into 4 groups: negative control (normal), positive control, treatment groups with the dosage of calyx extract of red roselle as much as 540 mg/kg bw, and as much as 810 mg/kg bw. The data collected were then analyzed using One Way ANOVA and Tukey HSD ($\alpha = 0.05$) statistical test. There were a significant difference ($p = 0.000$) at levels of NO, SOD and MDA in serum between the groups. The treatment group with extract dose as much as 810 mg/ kg bw and 540 mg/kg bw are significant to positive control group ($p=0.000$) using all variables of measurement. The levels of NO and SOD show that treatment group of extract dose as much as 540 mg/kg bw were significant with the negative control group ($p = 0.000$), whereas levels of MDA show insignificant results between treatment groups with extract dose of 810 mg/kg bw ($p = 0.988$) and 540 mg/kg bw ($p = 0.183$) with negative control group. The calyx extract of red roselle with the dosage of 810 mg/kg bw and 540 mg/kg bw may decrease levels of NO and increase SOD in serum, as well as lower the level of MDA in serum in Wistar rats which were given waste cooking oil. The most effective dose of the treatment was treatment group with extract dose of 810 mg/kg bw.

Keywords: red roselle, antioxidant, NO, SOD, MDA, waste cooking oil