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MODIFICATION OF HIGH FAT DIET AND CATTLE BRAIN SONDE TO WEIGHT CHANGES IN WISTAR DYSLIPIDEMIA RATS

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Abstract. Dyslipidemia is a change in blood lipid profile level marked by an increase in total cholesterol, triglycerides, Low Densitity Lipoprotein and decreased High Density Lipoprotein. The main trigger for changes in blood lipid profile is free radicals. In addition, an increase free radicals in the body can cause a decrease in the activity of the enzyme lipoprotein lipase which causes fat degeneration around cells. This study aims to determine the effect of high-fat feeding compared to standard feed (Rat Bio) on the body weight of dyslipidemic white rats. The research was conducted during June-November 2019 in the Biomedical Laboratory of Dentistry Faculty University of Jember. This research method is experimental with pre-post control group design. The subjects were 12 male Wistar white rats. The control group was given the standard Rat Bio diet while the treatment group was given modified diet (High fat Modified diet and cattle brain sonde) for 60 days. The result of paired T-Test in the treatment group and control group showed that there was significant weight difference between pretest and posttest (p = 0,01). T-test result of body weight difference between the two groups showed no significant difference (p = 0,195), where the difference of weight gain in treatment group was lower than control group. From this study it can be concluded that feeding of modified diet has an effect on the increase in body weight of wistar rat, but still lower than rat bio. This explains that a modified can increase lipid profile without having to increase body weight.

Keywords: body weight, high-fat diet, cattle brain, wistar, rat bio.

1. Introduction

Dyslipidemia is a change in blood lipid profile level marked by an increase in total cholesterol, triglycerides, Low Densitity Lipoprotein (LDL) and decreased High Density Lipoprotein [1]. The main trigger for changes in blood lipid profile is free radicals. Excessive and uncontrolled amounts of free radicals cause oxidative stress. In addition, an increase in free radicals in the body can cause a decrease in the activity of the enzyme lipoprotein lipase (LPL) which causes fat degeneration around cells. Being overweight can be caused by an increase in consumption of high-energy foods such as fat and carbohydrates accompanied by low physical activity. A diet high in fat and carbohydrates with less physical activity causes an increase in the rate of fat accumulation. Fat will be deposited peripherally and centrally, the accumulation of central fat triggers the process of lipolysis to produce free fatty acids [2,3,4,5].

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2. Materials and Methods

2.1. Experimental Animals

Experimental with *pre -postest control group design* was used in this study. A total of 12 wistar rats. The inclusion criteria of this study were male rats, age 3-4 months, weight 200-300 gram, and active motion. Exclusion citeria were dead at the time of the study.Rats are kept in Biomedical Laboratories Faculty of Dentistry at Jember University.In this study rats were divided into 2 groups, control group (n=6) and treatment group (n= 6).

2.2. Modified diet

The control group received standard feed (Rat Bio) which contained (60% carbohydrate, 20% protein, 4% fat, 4% crude fiber, 12% calcium, and 0.7% phosphorus). The treatment group received modified diet, with a composition of 50% Rat Bio, 35% Wheat Flour, 5% Cholesterol (cattle brain), and 5% pork oil. High-fat feed is also made from steamed cattle brain blended with a blender with the addition of water with a cattle brain ratio: water 2: 1. Cattle brain juice is given as much as 3 ml / head /day through a gastric sonde. The modification of high-calorie diets for rats was made at the Jember State Polytechnic Feed Unit.

2.3. Determination of Body Weight

The body weight was determined using an analytic scale (OHAUS). The Rat body weight was be measured 2 times, that is before and after 60 day of treatment modified diet.

2.4. Statistical Analysis

The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 22 software. Data are expressed as the means and standard deviations (SD). The difference in body weight before and after the study was tested by Paired T-Test. The difference in weight difference and between the two groups tested with the Independent-T Test was used to compare the differences among groups, $p < 0.05$ was considered statistically significant.

3. Results and Discussion

Statistical test results showed data on pretest and posttest weight in both groups were normally distributed ($p > 0.05$, Shapiro Wilk test), so to determine differences in body weight of rat Wistar before and after the study using Independent T-Test and Paired T-test.

Weighing the rats was carried out once every 7 days so that we could know the gradual weight gain. Weight gain is known by calculating the final and initial weight gain in the study. The mean posttest body weight in the control group (303.7 ± 42.3 g) and the treatment group (298.7 ± 45.4 g) were found to be higher than the pretest group. Weight gain in the control group was higher when compared to weight gain in the treatment group. Based on the results of the independent T-Test statistical tests showed no significant difference in pretest weight ($p = 0.534$) and posttest ($p=0.848$) in rats in both the control group and the treatment group.

Table 1. Statistical test results of differences in body weight pretest and postest between two groups

Group	Mean ± SD		p*
	Control	Treatment	
Pretest	219,8±21,1	231,3±38,3	0,534
Posttest	303,7±42,3	298,7±45,4	0,848

* independent T-Test, p<0,05

Paired T-Test statistical test results showed that there were significant differences between pretest and posttest weight in the control group ($p = 0.01$) and the treatment group ($p = 0.01$).

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Table 2. Statistical test results of differences in body weight between pretest and postest in each groups

Group	Mean ± SD	Mean ± SD	p*
	Pretest	Postest	
Control	219,8±21,1	303,7±42,3	0,01
Treatment	231,3±38,3	298,7±45,4	0,01

* Paired T-Test, p<0,05

The results of the Independent T-Test statistic showed that there was no significant difference in body weight difference between rats in the control group and the treatment group (p = 0.195).

Table 3. Statistical test results of difference in increase body weight between two groups

Group	Mean ± SD		p*
	Control	Treatment	
Differences (posttest-pretest)	83,83±22,2	67,33±18,7	0,195

* Independent T-Test, p<0,05

The results of this study indicate changes in body weight of pretest and posttest rats. This difference in body weight is influenced by the size of the food intake of each experimental group. Consumption of a diet that is rich in carbohydrates and fats will cause an increase in the amount of fat deposited in adipose tissue, especially those under the skin and in the abdominal cavity. Any excessive and indirect amount of food fat and carbohydrate used will be stored in adipose tissue in the form of triglycerides. Triglycerides will be hydrolyzed into free fatty acids and glycerol. Free fatty acids undergo oxidation to produce energy. Excess fat in the form of triglycerides in adipose tissue under the skin or in the abdominal cavity can cause weight gain. The more the number of fat cells in the body, the greater the size of fat cells. Excessive storage of triglycerides can be used as an ingredient in the formation of VLDL and LDL in the liver, and is at risk of increasing blood LDL levels [6]. Level of LDL are related to the development of atherosclerosis [1].

Excess body weight occurs due to decreased sensitivity of leptin, resulting in an increase in NPY secretion and appetite. Decreased sensitivity of leptin is influenced by consumption of a high-fat diet. A high carbohydrate diet can increase leptin levels, decrease appetite and increase energy expenditure [1]. In this study there was a higher weight gain in the control group compared to the treatment group. This study is not in line with other studies which state that the provision of a high-fat diet in the treatment group can increase body weight of rats compared to the control group given a high-carbohydrate diet. The effect of giving a high-fat diet can reduce levels of the hormone leptin, so that with low levels of leptin, appetite and food intake in the treatment group will increase, and body weight will experience a higher increase than the control group given a high carbohydrate diet [7].

4. Conclusion

The research showed that high fat diet modification and cattle brain sonde can increase the body weight of wistar rats**.**

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