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DIET WITH CHOCOLATE OR BLACK TEA? IS IT EFFECTIVE?

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ABSTRACT

Introduction: Based on national research 2018, in Indonesia, 21% of population is obesed. Obesity can lead to various metabolic Syndrome. The consumption of Chocolate and Black Tea can decrease insulin. BMI and Fasting Blood Glucose is use as an assessment to observe the effectivity of Chocolate and Black tea as a method of diet. **Methods:** This experimental study used *pre and post-test control group design.* Eighteen male BALB/c obese mice were randomly divided into three groups. Control group did not receive anything, 1st group treated with black tea extract, while 2nd group treated with chocolate extract. Data, such as body weight and glucose fasting level was acquired weekly. Fasting Blood Glucose was assessed with accu check. Data normality were tested using Saphiro-Wilk test. Then, Kruskall-Wallis was employed to determine whether the means of each groups differ significantly. **Results:** The average weight in P2 groups (31,75±3,40 gram) was significantly lower than Control (36,50±1,97 gram p=0.03) but not significantly lower than P1 (34,40±1,14 gram p=0.137) group. The average weight in P1 was not significantly lower than Control (p=0.089). There was no significant change of number in the average Glucose fasting level (p=0.21). **Conclusion :** Chocolate and Black Tea could affect body weight, but could not effect fasting blood glucose
Keyword: Black Tea, BMI, Body weight, Ch ocolate, Glucose fasting level

BACKGROUND

Obesity is a condition when a person have excessive amount of body fat. Every year, the world wide population of people with obesity is increasing significantly. People with obesity have bigger risk for developing many potentially serious health conditions such as metabolic syndrome.

Metabolic syndrome is usually controlled by observing Body Mass Index and Glucose fasting level. People tend to try reducing their Body Mass Index and control their blood glucose with diets. Various diets display various results. Part of the diets are Black tea and chocolate diet. Black tea and Chocolate diet have a wide range of enthusiast since this two substance is easily obtained and appetizing. Black tea and chocolate contain various bioactive substance such as polyphenol, flavonoid, and caffeine. This bioactive substance was reported as diet substance by decreasing insulin-resistance and boost fat metabolism.

METHODS

Experimental animals and study design

This experiment used Pre and Post Test Control Group Design. Eighteen male BALB/c mices 20-30 gr that has been acclimated for 7 days consumed the high-fat and high carb diet for 2 weeks until its body weight increased 1-5 gram. Male BALB/c mice were divided into three groups with simple random sampling, each group contain 6 mices. Control group received placebo for 30 days, 1st group were administered daily with 0,78ml of black tea orally, and 2nd group were administered with an oral solution of chocolate 1ml daily. Black tea and chocolate were given for 30 days.

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Body weights and blood sample were measured weekly. Blood sample was taken from tail vein and assessed with accu check.

Ingredients

White Mice, Pure chocolate powder with 10-12% fat, Dried black tea leaves, water, oil, starch, standard food for mice.

Tools

Accu check, intragastric gavage, electronic scale, animal cage, pipette, Spatula, beaker glass, glass rod, filter paper, porcelain bowl, glass funnel, glass bottle stainless steel container, water bath

Black Tea extract making

Dried tea leaves ground until all had passed a 100-*mesh* screen. Eight gram of ground tea leaves soaked with 160ml water with constant temperature 80-95°C for 2 hours. After 2 hours of extraction, the mixture was cooled, vacuum filtered, and the solvent evaporated under vacuum at 40 °C.

Chocolate extract making

The mixture of chocolate was made from mixing 23,4 gr pure powdered chocolate with 180ml water.

Statistical analysis

Data was analyzed statistically with SPSS. Saphiro-wilk test was employed to investigate the normality of the data. Then Kruskall-Wallis test was employed to determine between which group has statistically significant differences. The significance was established using Mann-Whitney test. The probability level of $p<0.05$ was considered significant.

ETHICAL CLEARANCE

Ethical approval was obtained from the Health and Medical Research Ethical Committe Medical Faculty, Diponegoro Univesity 96/EC/H/KEPK/FK-UNDIP/VII/2019.

RESULTS

All Data were assessed with Saphiro-Wilk to define data normality. Saphiro willk test revealed a non-significant data distribution since some data have $p<0.05$.

Body weight

Examination was carried out at the Animal Laboratory using electronic scale. Body weight was calculated up to 2 decimal.

Table 1. *Average Body weight in all groups*

Body weight	Control	P1	P2
Pre-experiment	(32,50±2,17)	(31,50±3,15)	(32±1,83)
Post experiment	(36,50±1,97)	(34,40±1,14)	(31,75±3,40)

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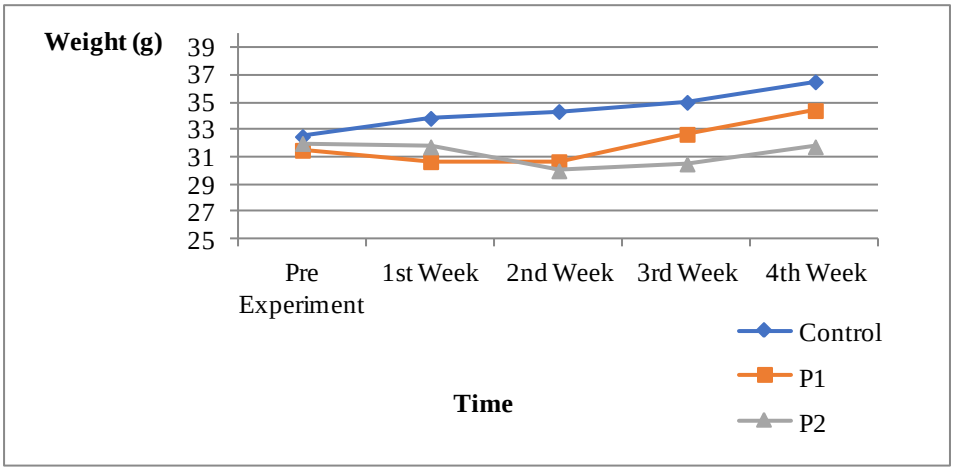


Graph 1. *Body Weight*

Table 2. *Mann-Whitney Test*

Group	Control	P1	P2
C	-	p=0.089	p=0.03*
P1		-	p=0.137
P2			-

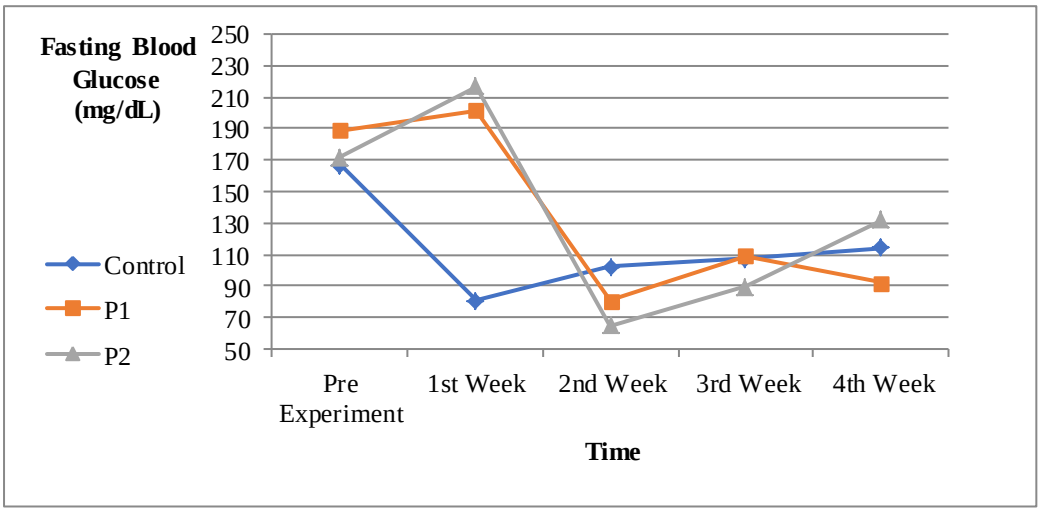
Kruskall Wallis test shown a significant result (p=0.039). Mann-Whitney test result revealed a significant difference between Control and P2 group (p=0.03) and non-significant result on Control-P1 group (p=0.089) and P1-P2 group (p=0137).

Fasting Blood Glucose

Fasting Blood Glucose was examined with Accu Check.

Table 3. *Average Fasting Blood Glucose level in all groups*

Fasting Blood Glucose level	C	P1	P2
Pre-experiment	(166,67±9,50)	(189,33±17,88)	(173,00±9,27)
Post experiment	(114,17±35,73)	(91,80±18,83)	(131,75±40,58)



Graph 2. *Fasting Blood Glucose level*
Kruskall Wallis test shown a non-significant result (p=0.21).

DISCUSSIONS

Mann-Whitney test revealed a significant result on body weight but not on Fasting glucose level. Body weight consist of fat, sugar, and other. Active substance in Chocolate and Black Tea such as Caffeine, and Polyphenol. Caffeine increases metabolic rate by its character as adenosine receptor antagonist. Adenosine receptor antagonist will result in acute insulin decrease and also increasing gluconeogenesis in liver. By all means, gluconeogenesis breakdown fat to stabilize glucose in blood. While Polyphenol inhibits fat absorption in intestine and lipase enzyme. Polyphenol also increase *Peroxisome proliferator-activated receptors* (PPARs) that will affect Adiponectin and *glucose transporter* 4. Polifenol also inhibits LDL oxidation by decreasing *F2-isoprostane level*. Result from this experiment is different from previous experiment it may be because of stress factor. Stress increase Cortisol, which increase insulin production and increase abdominal body fat. Cortisol last longer than other hormone in blood, and induce long-lasting hypoglycemic effect on mice. Hypoglicemic effect increase appetite on mice. Mice that consume chocolate revealed a decrease in body weight. It is caused by chocolate that have can increase serotonin and endorphine hormone production. Increased Endorphine and Serotonin make mice more relaxed and decrease cortisol production

CONCLUSION

Chocolate and Black Tea could affect body weight, but could not effect fasting blood glucose

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