

Response of blood glucose level in hyperglycemic *Rattus norvegicus* towards giving of mixture of VCO and Olive oil with Vitamine E and their effects on the liver

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Submission date: 10-Feb-2020 08:56AM (UTC+0700)

Submission ID: 1254307067

File name: and_Olive_oil_with_Vitamine_E_and_their_effects_on_the_liver.pdf (457.35K)

Word count: 1741

Character count: 9007

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To cite this article: E Y W Yuniwati *et al* 2019 *J. Phys.: Conf. Ser.* **1217** 012162

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Response of blood glucose level in hyperglycemic *Rattus norvegicus* towards giving of mixture of VCO and Olive oil with Vitamine E and their effects on the liver

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Abstract. Virgin coconut oil (VCO) and olive oil are edible oil containing antioxidant that can prevent free radicals in *Rattus norvegicus* hyperglycemic due to the damage of pancreatic beta cell after alloxan injection. Virgin coconut oil and olive oil are fatty acids that when being consumed will affect the diameter of hepatocyte cells. This study aims to analyze the response of blood glucose levels in hyperglycemic *Rattus norvegicus* after administration of a mixture of VCO and olive oil with vitamin E and its effects on the liver. Research materials were twenty male *Rattus norvegicus* were. Randomized Factorial Design was used in four treatment groups including P1 was control, P2 was mice injected with alloxan, P3 was mice injected with alloxan plus 0.1 ml/BW of each VCO and vitamin E and P4 was mice injected with alloxan plus 0.1 ml/BW of each olive oil and vitamin E. Each treatment was replicated 5 times. Feed and water were provided ad libitum for four weeks. The result showed that there was no significant difference in the level of blood glucose between P3 and P4 but significant difference with P1 and P2. The diameter of hepatocyte cells and Hepatosomatic Index not significant than the other treatments. It can be concluded that VCO and olive oil are equally capable of decreasing blood glucose and does not cause negative effects on the liver.

1. Introduction

Observation of the efficacy of various herbal medicines on the ill condition will greatly determine the successful use of such herbal medicines. Virgin coconut oil is an herbal remedy that can show an increase in macrophage phagocytosis activity [1] and also increase the number of lymphocytes [2]. Virgin Coconut oil also contains antioxidants [3], while olive oil is thought to also act as an antioxidant [4]. Hyperglycemic or diabetes mellitus is one of the degenerative diseases triggered by carbohydrate, fat and protein metabolism. Metabolic disorders are associated with the occurrence of insulin hormone deficiency or reduced action of the hormone insulin [5]. The hormone insulin is secreted by the pancreatic langerhans beta-insula cells. Beta cell damage can cause insulin hormone deficiency [6]. Antioxidants are capable of repairing damaged cellular insula cells caused by free radicals, which are indicated by the cell response to pancreatic beta cells [7;6]. Hyperglycemic conditions can cause an increase in blood cholesterol. These conditions can occur because of the increase in blood glucose levels cause low glucose levels in the cell, resulting in decreased glucose oxidation and decreased energy production. The decrease in the energy produced by the cells will lead to an increase in lipid catabolism [8]. Increased lipid catabolism will lead to an increase in damage to the hepatocyte structure and hepatosomatic index, so it should be investigated further, whether the



provision of VCO and olive oil in hyperglycemic rats will decrease glucose in the blood and its effect on the liver.

2. Materials and Methods

This study used twenty rats of male *Rattus rattus noevigicus*. Test animals are fasted for 12 hours to measure blood glucose levels during fasting. Alloxan injection of 150mg / kg BW in intraperitoneal [9]. After three days for three consecutive days, the blood glucose level is checked to make sure alloxan is functional, and the glucose level is stable. The hyperglycemic effect test begins with the administration of VCO oil and Olive oil mixed with Vitamin E, each of 0.1 mL per body weight. The treatments were divided into four groups, each of which P1 was the control group, P2 alloxan injected control group, P3 was an alloxan group given a mixture of VCO and vitamin E, P4 was an alloxan group given a mixture of olive oil and vitamin E. Each treatment group repeated five times. Treatment was performed for four weeks and at the end of the study examined the effect of VCO and Olive oil on blood glucose, the diameter of hepatocyte cells, and hepatosomatic index obtained from ratio of the liver weight divided by body weight multiplied by 100 [10]. The reduction of blood glucose, the diameter of hepatocyte cells and the hepatosomatic index were analyzed by ANOVA using a complete randomized design.

3. Results and Discussion

The result showed that there was no significant difference in the level of blood glucose between P3 and P4 but significant difference with P1 and P2. The diameter of hepatocyte cells and Hepatosomatic Index not significant than the other treatments. Blood glucose levels in the controls were significantly different from all diabetic rats, either given the drug or not, and diabetic rats treated with VCO and Vitamin E were not significantly different from diabetic rats treated with Olive oil and vitamin E. Measurements of hepatocyte cell and hepatosomatic index showed that there was no significant between the treatment of diameter hepatocyte cell and hepatosomatic index (Table 1.)

Table 1. Blood Glucose Level, Diameter of Hepatocyte Cell and Hepatosomatic Index after Treatment

Parameter	control	Control alloxan	VCO+vit E	Olove Oil+vit E
Blood glucose level (mg/dl)	107,4 ^a ±9,1	132,6 ^c ±3,2	118,0 ^b ±2,1	116,2 ^b ±3,1
Hepatocyte cell (μm)	10,8 ^a ±1,4	11,2 ^a ±1,9	11,5 ^a ±0,8	11,5 ^a ±0,2
Hepatosomatic Index	3,7 ^a ±0,4	4,6 ^a ±0,6	4,5 ^a ±1,0	4,0 ^a ±0,6

Different superscripts on the same row show significant different

Normal blood glucose levels are an expression of carbohydrate metabolism that runs normally. The administration of VCO and Olive oil, each mixed with vitamin E gave the same response as indicated by the results of the analysis which were not significantly different. It is suspected, both VCO and Olive oil have the same antioxidant activity that can counteract free radicals that damage the pancreas due to alloxan. The pancreas will then produce insulin to normalize the process of carbohydrate metabolism. Virgin Coconut oil contains anti-oxidants [3], while olive oil is able to act as an antioxidant [4] so that both VCO and olive oil have the same ability to reduce blood glucose levels in hyperglycemic *Rattus norvegicus*.

The diameter of hepatocyte cells of hyperglycemic mice showed no significant differences in all treatments, both VCO and Olive oil. These conditions indicate that the administration of alloxan for hyperglycemic induction does not interfere with the liver structure. Liver contains intra hepatic stem cells which are precursors to the replication of hepatocyte cells. This hepatocyte cell replication

will greatly help cell regeneration so that the growth and development of the liver that experience disturbances can be quickly overcome [11]. Cell enlargement is generally due to the presence of necrotic occurrence in cells initiated by fatty and followed by cell membrane damage that causes cell enlargement [12]. Based on these results histological conditions of hepatic treatments and controls did not change.

Liver is an organ that plays an important role in the metabolic process, so the size changes shown through the hepatosomatic index are important for analysis. The results of this study indicate that there was no difference in the hepatosomatic index between treatments, which could mean that there was no change in the weight of the liver structure treated with controls. The increased hepatosomatic index can be used as an indicator of cellular hepato proliferation due to physiological stress or excessive cell division [13].

4. Conclusion

VCO and olive oil are equally capable of decreasing blood glucose without changing the structure of hepatocyte cells and hepatosomatic index.

Acknowledgment

Thanks to PNBIP UNDIP on RPP 2017 research funding awarded

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