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The Effectiveness of Virgin Coconut Oil on the Decrease of Blood Glucose Levels on Gestational Diabetes Mellitus



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Abstract

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Gestational Diabetes Mellitus (GDM) was medical complication that occurs during pregnancy and caused preterm labor. Efforts reduce blood glucose levels and improve pancreatic performance must be safe both for mother and fetus. The research aimed to prove VCO can reduce blood glucose levels in GDM. The research design was quasi-experimental with one group pre-test and post-test. The research started on March to September 2020. The population was pregnant mother with GDM from two hospitals in Mojokerto East Java. The sample was 46 respondents with purposive sampling. The treatment given was VCO at a dose of 5 ml, 6 times a day and lowcarb diet. The instrument used to measure the fasting blood glucose was glucose stick. The data was analyzed with paired t-test. The result showed blood glucose levels before intervention average of 155.19 mg/dL and after 153.50 mg/dL. The t-test value 14.442 and p value 0.000 which meant that VCO and low carb diet was more effective in reducing blood glucose levels on GDM. The administration of VCO with a low carb diet is an effort to restrict glucose intake in the body without hypoglycemia. It is safe to use for both mother and fetus as an alternative non-pharmacological therapy on GDM and prevent preterm labor.

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INTRODUCTION

Diabetes mellitus in pregnancy (Gestational Diabetes Mellitus abbreviated as GDM) is a normal pregnancy accompanied by an increase in insulin resistance (pregnant women fail to maintain euglycemia). The risk factors for GDM are a family history of DM, obesity, and glycosuria. This GDM increases the incidence of preeclampsia so that babies are born preterm and neonatal morbidity, for example hypoglycemia, jaundice, polycythemia, and macrosomia (Setyorogo *et.al.*, 2013). This happens because gestation diabetes mellitus secretes greater insulin and stimulates the growth of the baby and macrosomia. The frequency of about 3-5% and the risk of the mothers increasing to become DM in the future (Setyorogo *et.al.*, 2013).

In Indonesia, the prevalence of GDM is around 1.9–3.6% and about 40-60 women who have experienced GDM in postpartum follow-up will develop Diabetes Mellitus or impaired glucose tolerance. Incident of GDM increased in pregnant women with risk factors such as increasing body weight during pregnancy >0.5 kg/week, age more than 25 years, history of family DM, GDM history, and ethnicity (Soelistijo *et.al.*, 2015). Risk factors for women with GDM are women diagnosed with gestational diabetes with 17% -63% of type 2 diabetes within 5-16 years in ethnic groups different (Daundasekara *et al.*, 2017).

Anti-diabetic medicine is drugs work to help enter glucose into cells, so that glucose levels in the blood decreases (Setyorogo *et.al.*, 2013). But this mechanism does not repair cell damage in producing insulin and does not help receptors in binding to insulin. The alternative that is conserved in this study is Virgin Coconut Oil (VCO). VCO is a type of fat that can be consumed by pregnant women with diabetes mellitus which have no impact to fetal growth and development (Purnamasari *et.al.*, 2013). VCO contains saturated fat from coconuts that can be consumed by people with diabetes mellitus. VCO fat will regulate blood glucose levels and improve the work system of the pancreas that supplies insulin in the body. The body will gain energy due to the pancreatic gland being able to convert glucose to energy. In a normal body, insulin functions to convert glucose into energy. VCO contains high chain saturated fatty acids (medium chain fatty acids or MCFA), especially lauric acid with a content of between 43 - 53% of total fatty acids. The

presence of MCFA has a dual role, which can induce insulin secretion and improve insulin function. In contrast to other fats, MCFA in VCO does not experience deposition during circulation in the bloodstream, but directly to the liver which will soon be converted into 100% energy (Kabisch *et al.*, 2018).

Giving VCO with a low carb diet is an attempt to restrict glucose levels in the body. The role of energy sources due to glucose (low carb) restriction will be replaced by VCO so that pregnant women with GDM are fulfilled by their caloric needs. VCO is proven to be an antidiabetic alternative (Iranloye *et.al.*, 2013). The intake of coconut oil will soon be converted into energy and not stored as body fat so that it has a very positive effect on weight loss for people with diabetes mellitus (Kabisch *et al.*, 2018).

Intake of coconut oil is also proven to increase the absorption of minerals Ca and Mg if there are deficiencies of both minerals in the body, which is a condition that is often encountered in people with diabetes mellitus. Calcium supplementation can increase insulin sensitivity in certain populations, while magnesium supplementation can increase insulin secretion and or increase insulin sensitivity and peripheral glucose intake. In addition, VCO supplementation can also improve antioxidant status. The aim of this study is to prove that VCO and low carb diets can reduce blood glucose levels in GDM. So that it can prevent babies born preterm and can reduce neonatal mortality.

METHOD

Research design used quasi experiments with one group pre-test and post-test design. Population were pregnant with GDM from two hospitals in Mojokerto East Java. There were 46 respondents involved in this research. The sampling technique used purposive sampling. The treatment given was VCO at a dose of 5 ml, 6 times a day and lowcarb diet. Variable research were VCO and blood glucose. The instrument used to measure the fasting blood glucose was glucose stick before and after treatment on day 21th. Analysis of data used paired t-test with a 0.05 level of confidence (Setiadi, 2013). The willingness of respondents was stated with informed consent and the research had gone through the ethical test from College of Health Science Maluku Husada. The time of research is starting from March to September 2020.

RESULT

The Characteristic of Responden

Table 1 The characteristic of Respondent Based on Age, Parity and Age Gestation

Characteristic Indicator	Treatment		
	Σ	%	
Age	20-25 years	8	17.4
	26-30 years	6	13
	31-35 years	14	30.4
	>35 years	18	39.2
Parity	1th	28	60.9
	2th	12	26.1
	3th	6	13
Age gestation	28-31 weeks	26	56.5
	32-35 weeks	20	43.5
	36-40 weeks	0	0
Total		46	100

Resource : Primary data, 2020

Based on Table 1, it showed, there were 18 respondents (39.2%) age >35 years. Statistic data shows there were 28 respondents first pregnancy (60.9%). The statistical data shows that there were 26 respondents (56.6%) whose gestational age between 28 until 31 weeks.

Based on Table 2 mean fasting blood glucose levels before treatment VCO and low carb diets is 155.19 mg/dL and mean fasting blood glucose levels after treatment is 151.50 mg/dL. It is mean blood glucose levels after treatment lower than before treatment.

Based on data analysis in Table 3 used paired t-test with value correlation $p=0.000$. This means the effect of VCO and low carb diets on decrease fasting blood glucose levels in gestational diabetes mellitus. Paired t-test shows value $p=0.000 (\leq 0.05)$ this means a significant difference between fasting blood glucose levels before and after given VCO and low carb diets. Combination of VCO and low carb diets could decrease blood glucose in pregnant women with diabetes mellitus.

Table 2 Results of Descriptive Analysis of Blood Glucose Levels Before and After Given VCO and Lowcarb Diets

Variable	Mean	Standard Deviation
Blood glucose before treatment	155.19	11.365
Blood glucose after treatment	151.50	11.788

Table 3 Result Paired t-test

Variable	Paired samples correlation		Paired sampel t-test	
	correlation	significant	t-tes	Sig. (2-tailed)
Blood glucose before and after	0.989	0.000	14.224	0.000

DISCUSSION

Pregnant women over the age of 35 years have a higher risk of developing gestational diabetes due to the influence of pregnancy hormones and risk for preterm labor (Saudah *et al.*, 2015). The first-pregnancy at the age of >35 years are at risk of pregnancy disorders example preeclampsia, gestational diabetes or other disorders (Joeliantina *et al.*, 2019). Statistic data shows there were 28 respondents first pregnancy (60.9%). This shows that the first pregnancy at non-productive age >35 years is

very risky to the safety of the mother and fetus. It is very important to increase the knowledge and understanding women reproductive and families about gestational age before 35 years. This can prevent the high rate of pregnancy with diabetes mellitus (Tebbani *et al.*, 2017). There were 26 respondents (56.6%) whose gestational age between 28 until 31 weeks. Gestational diabetes mellitus can occur at any gestational age, but usually occurs between 24 and 30 weeks of gestation (Purnamasari *et al.*, 2013; Soliman *et al.*, 2018). Examinations

that must be done to determine the presence of gestational diabetes in pregnant women after fasting 8-14 hours and plasma blood sugar after 2 hours of fasting.

Diabetes Mellitus in pregnancy causes complications in pregnancy and will prevent fetal well-being which can lead to preterm labor. Besides, it can cause metabolic disorders in the mother's body. Anti-diabetic drugs for a longer period of time may have undesirable effects on both pregnant women and the fetus. In addition, drug dependence will have an impact on the economy. The solution to this problem is in the form of natural anti-diabetic foods with the lowest pain effects and low costs are the most desirable. VCO, contains medium chain saturated fatty acids (MCFA), especially lauric acid with a content of between 43-53% of total fatty acids. Lifestyle intervention reduced the incidence by 58 percent (95 percent confidence interval, 48 to 66 percent) and metformin by 31 percent (95 percent confidence interval, 17 to 43 percent), as compared with placebo; the lifestyle intervention was more effective than metformin. To prevent one case of diabetes during a period of three years, 6 from 9 persons would have to receive metformin. Person changes and treatment with metformin in persons at high risk The intervention lifestyle was more effective than metformin (Iranloye *et.al.*, 2013).

In this research gestational diabetes mellitus were given VCO and low carb. Giving VCO with a low carb diet is an attempt to restrict glucose levels in the body. The role of energy sources due to glucose (low carb) restriction will be replaced by VCO so that gestational diabetes mellitus are fulfilled by their caloric needs. VCO is proven to be an antidiabetic alternative (Iranloye *et.al.*, 2013). Beside that VCO is an antioxidant can increase sensitivity to insulin or vice versa can also reduce insulin resistance and repair damage to pancreatic beta cells with the process of reactive oxygen (ROS) in diabetic patients.

Gestational diabetes has various impacts on the mother and fetus, including increasing the risk of the mother experiencing preterm labor. In addition, large gestational age and macrosomia are often found in infants born to mothers with gestational diabetes. This can be prevented by carrying out various interventions before and during pregnancy. The indicator of the success of prevention is the results of examination of fasting blood glucose levels <91 mg/dL and blood sugar after meals <200

mg/dL (WHO, 2013).

VCO is an antioxidant can increase sensitivity to insulin or vice versa can also reduce insulin resistance and repair damage to pancreatic beta cells with the process of reactive oxygen (ROS) in diabetic patients (Kabisch *et al.*, 2018; Stocker *et al.*, 2019). Low carb diet is an attempt to restrict glucose levels in the body. The role of energy sources due to glucose (low carb) restriction will be replaced by VCO so that pregnant women with diabetes mellitus are fulfilled by their caloric needs (ADA, 2015).

CONCLUSION

VCO and a low carb diet is way more effective in reducing blood glucose in Gestational Diabetes Mellitus. Low carb diet can restrict glucose intake in the body without hypoglycemia because the role of energy sources were replaced by VCO. It is safe to use for both mother and fetus as an alternative non-pharmacological therapy on GDM and prevent preterm labor.

SUGGESTION

Pregnant women who are at risk of diabetes mellitus should maintain a good lifestyle including reducing high-carbohydrate foods so that there is no increase in blood sugar during pregnancy.

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