Effectivity Virgin Coconut Oil Decrease Blood Glucose Levels on Gestational Diabetes Mellitus

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**Abstract**

**Introduction:** 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.

**Method**: Research design was quasi-experimental with one group pre-test and post-test. Time research was start March to September 2020. Population were pregnant with GDM from two hospitals in Mojokerto East Java. Sample size were 46 respondents with purposive sampling. The treatment given was VCO at a dose of 5 ml, 6 times a day and lowcarb diet. Instrument used VCO and measurement of fasting blood glucose with a glucose stick. Data analyzed with paired t-test.

**Result**: Result showed blood glucose levels before intervension average of 155.19 mg/dL and after 153.50 mg/dL. The t-test value 14.442 and p value 0.000 which means that VCO and low carb diet was more effective in reducing blood glucose levels on GDM.

**Discussion**:Give VCO with low carb diet is an effort to restrict glucose levels in the body without hypoglycemia. It is safe to use for both mother and fetus as an alternative non-pharmalogical therapy on GDM and prevent preterm labor.

**Keywords: Virgin Coconut Oil, Blood Glucose Level, Gestational Diabetes Mellitus, Hypoglicemi**

**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). 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 (Trisnawati, Shara dkk, 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.

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. Incidence 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 (PERKENI, 2015). Risk factors for women with GDM are women diagnosed with gestational diabetes who are at high risk for epan diabetes, with 17% -63% of type 2 diabetes within 5-16 years in ethnic groups different (Sajeevika, et.al*.*, 2017).

Anti diabetic mendicine is drugs work to help enter glucose into cells, so that glucose levels in the blood decreases (Trisnawati, Shara 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 without fear of disturbing fetal growth and development. VCO contains saturated fat from coconuts that can be consumed by people without fear of diabetes mellitus, namely fat from coconut oil. VCO fat levels 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 (Wan-Wan Ji, *et.al*., 2017). 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.

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, Oludare & Olubiyi, 2013). Unlike other fats, MCFA in VCO does not experience deposition during circulation in the bloodstream, but directly to the liver which will soon be converted to 100% energy. So, 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.

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 purpose of study was 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 quasy 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 study. 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 are VCO and blood glucose. Instrument used VCO and measurement of fasting blood glucose with a 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. Characteristic Respondent Based on Age, Parity and Age Gestation**

|  |  |  |  |
| --- | --- | --- | --- |
| Characteristic | Indicator | Treatment | |
| ∑ | % |
| 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 shows, there were 18 responden (39.2%) age >35 years. Statistic data shows there were 28 respondens first pregnancy (60.9%). The statistical data shows that there were 26 responden (56.6%) whose gestational age between 28 until 31 weeks.

**Table 2. Results of descriptive analysis of**

**blood glucose levels before and after given**

**VCO and lowcarb diets**

|  |  |  |
| --- | --- | --- |
| Variable | Mean | Standart Deviation |
| Blood glucose before treatment | 155.19 | 11.365 |
| Blood glucose after treatment | 151.50 | 11.788 |

Based on table 2 mean fasting blood glucose levels before treatment VCO and lowcarb 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.

**Table 3 Result Paired t-test**

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

Based on data analysis in table 3 used paired t-test with value correlation p= 0.000. This means effect given VCO and lowcarb diets on decrease fasting blood glucose levels in gestational diabetes mellitus. Paired t-test shows value p= 0.000 (≤ 0.05) this means a significant difference between fasting blood glucose levels before and after given VCO and lowcarb diets. VCO and low carb diets is more effective in reducing blood glucose in pregnant women with diabetes mellitus.

**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 (Noer, Agus, Andriani, 2015). The first pregnancy at the age of >35 years are at risk of pregnancy disorders example preeklampsi, gestational diabetes or other disorders (Joeliantina, et.al, 2019). Statistic data shows there were 28 respondens 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 (Fouzia, Hayet & Abdenacer, 2016). There were 26 responden (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, 2013; Soliman, 2017). 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.

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).

Diabetes Mellitus in pregnancy causes complications in pregnancy and will prevent fetal well-being which can lead to preterm labor. Besides that 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. It is reported that coconut oil extract, called 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, 6.9 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.

The results indicated VCO reduced blood glucose and lipids total cholesterol (TC), triglycerides (TG), Low and Very Low Density Lipoprotein (LDL + VLDL) and thiobarbutyric acid reactive substances (TBARS) increased the antioxidant status by elevating activities of anti-oxidant enzymes such as superoxide dismutase (SOD), catalase, glutathione peroxidase (GSH-Px), glutathione (GSH) concentration and de-creased lipid peroxidation in liver than VCO. The content of the polyphenolics and antioxidants is present in VCO (Siddalingaswamy, et.al., 2013).

This is research gestational diabetes mellitus who 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, Oludare & Olubiyi, 2013). Besides 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).

Thus this study has clearly demonstrated the anti-diabetic effects of VCO and lowcarb. The overall effect of VCO is better than anti-diabetics in reducing blood glucose levels. Better health benefits of VCO can be associated with higher levels of lauric acid and also the possibility of increasing nutrient bioavailability and antioxidant bioavailability.

**CONCLUTION AND SUGGESTION**

VCO and lowcarb diet is more effective in reducing blood glucose in Gestational Diabetes Mellitus. 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.

**REFERENCE**

American Diabetes Association. Management Diabetes Mellitus in Pregnancy. Diabetes Care (2015). Supplement 1, DOI : 10.2337/dc15-S015

Fouzia, T., Hayet, O., & Abdenacer, A. (2016). Early weight gain during pregnancy: Which women are the most affected?. *International Journal of Public Health Science*, *5*(2), 151-157.

Iranloye, B., Oludare, G., & Olubiyi, M. (2013) Anti-diabetic and antioxidant effects of virgin coconut oil in alloxan induced diabetic male Sprague Dawley rats. Journal of Diabetes Mellitus. ;*3* (04):221.

Joeliantina, A., Agil, M., Qomaruddin, M. B., & Soedirham, O. (2019). Family support for diabetes self-care behavior in t2dm patients who use herbs as a complementary treatment. *Medico-legal Update*, *19*(1), 238-243.

Kabisch, S., Bäther, S., Dambeck, U., Kemper, M., Gerbracht, C., Honsek, C., ... & Pfeiffer, A. F. (2018). Liver fat scores moderately reflect interventional changes in liver fat content by a low-fat diet but not by a low-carb diet. *Nutrients*, *10*(2), 157.

Noer, S., Agus, S., & Adriani, M. (2015). Model of Independency Mother in Caring for Preterm Infant based on Experiential Learning Care (ELC). *International Journal of Evaluation and Research in Education*, *4*(4), 200-206.

PERKENI. (2015), *Konsensus Pengelolaan & Pencegahan Diabetes Mellietus*. PB PERKENI. Jakarta

Purnamasari, D., Waspadji, S., Adam, J. M., Rudijanto, A., & Tahapary, D. (2013). Indonesian Clinical Practice Guidelines for Diabetes in Pregnancy. *Journal of the ASEAN Federation of Endocrine Societies*, *28*(1), 9-9.

Sajeevika Saumali Daundasekara, Anitra Danielle Beasley, Daniel Patrick O'Connor, McClain Sampson, Daphne Hernandez, and Tracey Ledoux. (2017). “Validation of the intuitive Eating Scale for pregnant women,” Appetite, American Journal of Medical GeneticsPart A,. p22.3. 2017.

Setiadi (2013), Konsep dan Praktik Penulisan Riset Keperawatan, ed.2.Graha Ilmu, Jogjakarta

Stocker, R. K., Bally, L., Nuoffer, J. M., & Stanga, Z. (2019). Ketogenic diet and its evidence-based therapeutic implementation in endocrine diseases. *Praxis*, *108*(8), 541-553.

Soliman, A. M., Lin, T. S., Ghafar, N. A., & Das, S. (2018). Virgin coconut oil and diabetic wound healing: histopathological and biochemical analysis. *Eur. j. anat*, 135-144.

Trisnawati, Shara K, dkk. (2012) Faktor Risiko Kejadian Diabetes Melitus Tipe II di Puskesmas Kecamatan Cengkareng Jakarta Barat. *Jurnal Ilmiah Kesehatan*. Vol.5 No.1:1-11.

Wan-Wan Ji, Dong-An Yu, Min Fan, Meng You, You Lu, Er-Bing Li, Ning Xie, and Shou-Sheng Yan. (2017) “Effects of GW002, a novel recombinant human glucagon-like peptide-1 (GLP-1) analog fusion protein, on CHO recombinant cells and BKS-db mice,” *Acta Diabetologica*. Vol 9:243-251

WHO. (2013). Diagnostic and Classification of Hyperglicemia First Detection in Pregnancy