THE EFFECT OF *VIRGIN COCONUT OIL* (VCO) ON REDUCING BLOOD SUGAR LEVELS IN PATIENTS WITH TYPE 2 DIABETES

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ABSTRACT

Diabetes mellitus is a type of non-communicable disease caused by the body's immune system attacking and damaging pancreatic cells that produce insulin. The number of people with Diabetes Mellitus (DM) tends to increase every year. The utilization of non-pharmacological therapy as a treatment option helps reduce the cost of therapy and treatment for people with VCO diabetes mellitus. The purpose of this study was to determine the effect of virgin coconut oil (VCO) on reducing blood glucose levels of patients with Type II DM at the Cisaga Health Center.This type of research is a pre-experiment with a one group pretest-postest design. Respondents were type 2 DM sufferers as many as 34 respondents who were calculated using G-Power Software. The research was conducted in the work area of the Cisaga Health Center, Ciamis Regency. The instrument used was glucometer (GDS) and the data was processed with SPSS. VCO given to respondents after pretest - postest obtained a sig p-value of 0.000 less than 0.05 and the z-Score is (-) 5.008. From the research that has been done, it can be concluded that there is a significant effect between the decrease in blood sugar in patients with Type 2 DM after being given VCO Virgin Coconut Oil.

Keywords: Type 2 Diabetes Mellitus, Virgin Coconut Oil (VCO), Blood Sugar at Time

INTRODUCTION

The International Diabetes Federation (IDF), estimates that about 483 million people worldwide between the ages of 20 and 79, or about 9.3% of the global population in that age range, have diabetes. The prevalence of diabetes will continue to increase as the population ages, with estimates reaching 111.2 million people or around 19.9% in the 65-79 age group (Sumiyati et al., 2021). In 2019, the number of Diabetes Mellitus (DM) cases in West Java reached 848,455, and increased to 1,012,622 cases in 2020. According to data from the Ciamis Regency Health Office in 2023, PKM Banjarsari recorded the highest percentage among the three regions, namely 124.91%. In addition, data from the Cisaga Health Center shows that the prevalence of diabetes mellitus in 2023 reached 282 cases.

Based on observations in the field, people routinely control and take drugs to regulate blood sugar levels, but the reduction in blood sugar levels is still difficult to achieve. This is influenced by various factors such as genetic factors, diet, obesity, lifestyle, lack of rest, and

stress levels (Derang et al., 2023). Given the high risks faced, blood glucose control is a major aspect of diabetes mellitus disease management. In the management of Diabetes Mellitus, there are two types of therapy, namely nonpharmacological therapy and pharmacological therapy. Nonpharmacological therapy is mostly related to lifestyle changes, including dietary adjustments which are often referred to as medical nutrition therapy (Diet), physical exercise (exercise), the use of Oral Hypoglycemic drugs, herbal therapy or traditional medicine, as well as education on various aspects related to Diabetes Mellitus disease (Alfiani et al., 2017). Nonpharmacological therapy is a foundation that is constantly applied in conjunction with pharmacological therapy. Meanwhile, pharmacological therapy involves the administration of drugs, both orally and by injection, such as insulin (Ernawati et al., 2021).

The trigger for diabetes millitus is eating habits that tend to consume fast food and high-carbohydrate foods, because basically foods that contain calories with high sugar levels are very easily digested by the body, so that blood sugar and insulin levels can spike quickly, and over time can lead to diabetes mellitus (Sudargo et al., 2018). There is a utilization of non-pharmacological therapy as a treatment option to help reduce the cost of therapy and treatment for people with diabetes mellitus. One type of nonpharmacological therapy that is effective and easily obtained for people with diabetes mellitus is *Virgin Coconut Oil* (VCO) or *virgin* coconut oil. VCO is coconut oil extracted from ripe coconut fruits, processed through fermentation without chemicals or enzymatically without heating (Mandei et al., 2020). This process produces high *medium* chain fatty acids (MCFA), vitamin E, antioxidants, and enzymes found in coconut fruit (Safitri et al., 2022).

Various health benefits of VCO have been reported, including the presence of*medium* chain*triacylglycerols* (MCT) in it. MCTs found in VCO undergo metabolic processes in the body in a different way compared to LCTs (Yudha & Tasminatun, 2008). The solubility of MCTs in water is higher compared to LCTs, so MCTs can enter the circulation system, directly reach the liver through the veins, and are quickly converted into energy. This means that MCTs are not stored in body tissues (Nurpalah, 2017). MCT contained in VCO has a gradual ability to regenerate pancreatic beta cells, stimulate insulin production with higher intensity, and increase insulin sensitivity.

Based on research conducted by Handajani & Dharmawan (2009) showed that the administration of VCO to mice experiencing hyperglycemia significantly affects the reduction of blood sugar levels. Coconut oil has many advantages, including 50% fatty acids in the form of lauric acid and 7% caprylic acid. Both acids are included in the medium chain fatty acid category or known as*lauric* acid, which can be easily metabolized and converted into energy. The content of *medium chain fatty acid* (MCFA) in *Virgin Coconut Oil* (VCO) can stimulate insulin production and can penetrate the intestinal wall without the help of enzymes, so that cells are able to produce energy more quickly (Syah, 2005).

LITERATURE REVIEW

Diabetes Mellitus (DM), commonly referred to as diabetes, is a metabolic disorder that causes a number of symptoms to appear in a person due to high blood glucose levels exceeding normal limits. Diabetes mellitus (DM) is caused by impaired glucose metabolism due to insulin deficiency, either absolutely or relatively. There are two types of diabetes mellitus, namely type I diabetes or juvenile diabetes, which usually appears in childhood, and type 2 diabetes, which usually occurs after a person becomes an adult (Anri, 2022).

The disease is not caused by just one factor, but is the result of the interaction of various factors over a long period of time, including heredity and daily lifestyle. In general, the results of many studies show that diabetes is caused by a combination of these factors.

Virgin Coconut Oil (VCO), is a processed coconut oil product produced through various processing methods. Currently, VCO is in great demand because it is believed to have medicinal benefits. According to Sutarmi and Hartin Rozaline's explanation in their work, saturated fats found in coconut oil are medium and short chain saturated fats. This type of fat is considered easier to digest and absorb by the body than long-chain saturated fats found in vegetable oils such as soybean oil, peanut oil, and corn oil.

According to international standards, Virgin Coconut Oil (VCO) is considered beneficial if it contains at least 25% lauric acid. In principle, the human body needs oil or fat as an essential nutrient. Furthermore, fat has an important role as a solvent for vitamins A, D, E, K, and carotenoids. In addition, fat can also produce as much as 9 kilocalories of energy, a higher amount compared to protein and carbohydrates that produce 4 kilocalories.

The purpose of this study was to determine the effect of virgin coconut oil (VCO) on reducing blood glucose levels of patients with Type II Diabetes Mellitus at the Cisaga Health Center.

RESEARCH METHOD

This study is a *pre-experimental* study on patients with Type 2 Diabetes Mellitus in the Cisaga Health Center working area from May-June 2024. The number of participants involved was 34 people with a sampling method using G-power software to calculate the research sample as shown in Figure 1.

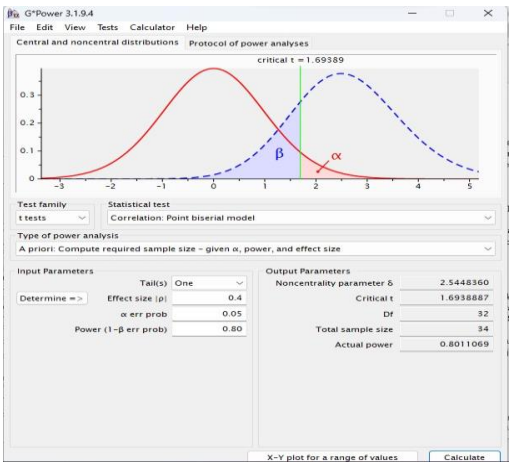

Figure 1. Using G-Power Software To Calculate The Research Sample

Participants who were involved met the inclusion criteria, including the late adult and elderly groups, routinely taking treatment at the health center, suffering from DM for at least 5 years. The exclusion criteria include suffering from other chronic diseases, currently taking psychosis drugs. The intervention was to give VCO to respondents every day twice in the morning and evening, 2 spoons per meal for 7 days. VCO administration was carried out by the nurse. (Explain where the VCO comes from and how it is made).

The instrument used in this study is a glucometer (GDS) that has been certified ISO 15197 by Roche Diabetes Care, Inc, USA for quality testing with no: 080790048003 in 2018, explaining that the *Blood Glucose Meter* has been calibrated based on; CEP: 05321-010-Jaguare'-SaoPaulo/SP-Brazil, CNPJ: 23.552.212/0001-87, S/N: 96002339767, LOT: 205402, EXP: 2022-08-03, GTIN: 04015630067305 with a normal blood sugar level of 80-120 mg/dl. Data collection is carried out by nurses every 17.00 WIB. The measurement results were recorded in the observation sheet for analysis. The data entry and coding process was carried out in ms excel while the data analysis process used SPSS Version 26 software with the Wilcoxon range test statistical test. Data on participant characteristics are displayed in frequencies and percentages while the effect of the intervention is expressed in P-Value and Z score.

RESEARCH RESULT

Table 1. Participant Characteristics

Variabel	F	%
Age	17	50
	17	50
Gender		
Male	15	44.1
Female	19	47.1
Occupation		
Housewife	18	52.9
Farm Laborer	16	47.1
Education		
Elementary School	15	44.1
Junior High School	14	41.2
High School	5	14.7
Income		
<UMR	18	52.9
>=UMR	16	47.1
Length of Sickness		
> 5 Years	19	55.9
<= 5 Years	15	44.1

In table 1 about the characteristics of the participants, there are results in the age category that have the same frequency and the same percentage, namely 50%. In the gender category, the most sufferers were female, and most of the occupations were housewives as

much as 52.9%. In the education category, most of them graduated from elementary school with a percentage of 44.1%. While the income category is mostly below the minimum wage as much as 52.9%. And the length of illness of DM sufferers is mostly above 5 years as much as 55.9%.

Table 2. Effect Of VCO Intervention On Blood Sugar

Wilcoxon Signed Ranks Test

Variable	Positive Range		Negative Range		Ties		Z	p
Blood	f	%	f	%	F	%		
Sugar	0	0	34	100	0	0	(-) 5.088	0.000

Based on table 2, the following information is obtained from the pretest and posttest results showing a significance value of p-value 0.000 which is smaller than 0.05 with a Zscore in this study of (-) 5.008.

DISCUSSION

Participant Characteristics

The results of research on 34 respondents in the Cisaga Health Center area show that, according to table 1, it was found that people with diabetes mellitus were the elderly category, both early and late elderly. The vulnerable age in the elderly is the early elderly 46-55 years, the late elderly 56-65 years. This is in line with (Gunawan & Rahmawati, 2021), there is a relationship between age and the incidence of diabetes mellitus. In his research, it states that someone aged 45 years and over has a risk of 18.14 compared to people aged less than 45 years. The risk of diabetes mellitus continues to increase with age.

Gender in the application of this study found that most people with diabetes are women and have a job in the house as housewives. This is in line with the results of research in general which states that most people with diabetes are women such as the results of research from (Arania, Triwahyuni, Esfandiari, et al., 2021). that in his research it was found that the female gender had more diabetes mellitus, namely 65%. Gender is also called a risk factor for type II diabetes mellitus, in his research it was stated that women have a greater risk of suffering from diabetes mellitus. The difference in blood sugar levels in women is motivated by the fact that women's cholesterol is found to be higher than women. Differences in lifestyle and activities are important in controlling blood sugar. In another study, it was found that the amount of fat in women was 20-25% while men had 15-20 fat, this can be explained that the female gender is more at risk than men (Arania, Triwahyuni, Esfandiari, *et al*., 2021).

The work factors affecting the risk of diabetes mellitus are jobs with low / light physical activity. The lack of activity carried out will cause a lack of metabolism in the body, causing excess energy to be produced by the body, this excess will be stored in the form of fat so that it will cause obesity which is one of the risk factors for diabetes mellitus (Arania, Triwahyuni, Prasetya, *et al*., 2021). Judging from the category of work where someone who has a high level of daily activity or work and lacks physical activity, irregular eating and sleeping schedules is a risk factor in

increasing diabetes mellitus.

The results of research on the characteristics of education level also found that most respondents had elementary school education. this is in line with research by Pahlawati (2019), that education has an influence on the incidence of diabetes mellitus. People who have higher education usually have a greater level of knowledge about health. It is hoped that when having more knowledge the person will have good awareness in maintaining their health. Education is believed to be a very important factor in understanding health management, controlling blood sugar levels, overcoming signs of diabetes symptoms that appear and preventing fatal complications that can arise (Pahlawati & Nugroho, 2019).

The length of illness in respondents in this study varied, but most of the respondents had diabetes for more than 5 years. The length of time sick with DM sufferers in this study is in line with research from Galvani (2020), the results of which show a significant relationship between the length of time suffering from diabetes mellitus and the occurrence of complications, the longer a person suffers from diabetes mellitus the greater the occurrence of wounds with various causes.

Other factors that can be modified are dietary factors, smoking habits, obesity, hypertension, stress, physical activity, alcohol and so on (Arisma et al., 2017). The shift in time has caused a shift in people's diets, where natural diets have turned into modern ones. As modern food contains a lot of high fat, high sugar and high salt. As well as fast food that can increase blood sugar levels. Defriani's research results say that there is a relationship between diet and the incidence of diabetes mellitus.

Effect of VCO on Blood Sugar Values

Based on research on 34 respondents in the intervention group, table 2 shows that there are respondents experiencing a decrease in blood sugar levels. Based on the explanation above, researchers believe that VCO is proven effective in controlling, controlling, and lowering blood sugar. This is in accordance with the opinion of Masjhoer, a clinical pharmacologist at Diponegoro University (Jufri, 2009) who said that lauric and caprylic acids in virgin coconut oil VCO stimulate insulin secretion in pancreatic cells (Parinduri & Antoni, 2020). VCO is not only able to control blood sugar, the virgin coconut oil can also prevent the onset of diabetes complications.

The results of the Wilcoxon pretest and posttest tests showed that in the group that received the treatment of virgin coconut oil (VCO), all respondents (34 people or 100%) experienced a decrease in blood sugar levels after treatment. Based on table 2, the results show a significance value of p-value 0.000 which is smaller than 0.05 with Zscore in this study is (-) 5.008. From the above results that the administration of VCO proved effective in reducing blood sugar levels. In line with the research of Handajani & Dharmawan (2009), medium chain triglycerides (MCFA) can stimulate insulin release due to the content of lauric acid in VCO itself.

CONCLUSION

Based on the results of research and discussion, it can be concluded that the administration of VCO shows a significant effect on lowering blood sugar levels in 34 respondents. For further research

can use supplementation for the same monitoring.

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