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The Effect of Consuming Sago (Metroxylon sago Rottb) Once a Day on Changes in Blood Glucose Levels of Diabetes Mellitus Sufferers in the Matandahi and Motui Community Health Centers

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ABSTRACT

Introduction: Diabetes Mellitus (DM) is a chronic disease that can lead to various complications such as premature death, blindness, heart disease, and kidney failure. The prevalence of DM at Matandahi Community Health Center in 2022 was 5.9% and increased to 6.8% in 2023. Meanwhile, at Motui Community Health Center, it was 7.1% in 2022 and 8.7% in 2023. The purpose of this study was to determine the effect of consuming sago (Metroxylon sago Rottb) once a day on changes in blood glucose levels of Diabetes Mellitus sufferers in the Matandahi and Motui Community Health Center work area.

Method: This type of research is quantitative (pre-experimental), with one group pre-test-post-test design. The sample is 30 type 2 DM patients registered at the Matandahi and Motui Community Health Centers, taken using a simple random sampling technique. Random blood glucose levels were obtained using a portable Easy Touch Meter. Data were analyzed using a paired t-test, one-way ANOVA, and continued with the Least Significant Difference (LSD) test.

Result: The results of the study showed that the average blood glucose level, before consuming sago once a day in the paired t-test, obtained a p value of 0.001 (sago consumption once a day).

Conclusion: There is an effect of consuming sago once, so it is recommended that Matandahi Health Center implement socialization of the importance of consuming sago for Diabetes Mellitus sufferers.

Introduction

Diabetes Mellitus (DM) is a chronic disease that occurs when the pancreas does not produce enough insulin or when the body cannot

effectively use the insulin it produces.^[1] This causes an increase in glucose concentration in the blood, DM is often called a silent killer because it causes various complications such as premature

death, blindness, heart disease and kidney failure.^[2]

The World Health Organization (WHO) reported in 2020 that 422 million people in the world suffer from DM.^[3] Then in 2021 there were 537 million people and it is estimated that the number of DM cases will be 643 people in 2030. Then the number of DM cases in 2022 will be 621 million people and in 2023 it will reach 738 million people.^[4] There are various types of DM, but the most common type of DM found, around 90-95%, is type 2 DM.^[5]

The 2013 Basic Health Research, the prevalence of DM in Indonesia was 1.5%, while the 2018 basic health research reached 2.0%, meaning the prevalence of DM in Indonesia increased by 0.5%.^[6] Then based on data obtained from BPJS Kesehatan, it shows that DM cases from year to year are increasing, namely in 2020 as many as 725,707 people, then in 2021 it increased to 958,265 people and in 2022 it reached 1,105,623 people and in 2023 DM cases for the January-July period reached 1,153,547 people with DM.^[7]

The prevalence of Diabetes Mellitus in one of Indonesia's provinces, specifically Southeast Sulawesi Province, showed an increase in 2022. In the report on the top 10 diseases, it can be seen that the morbidity rate for DM ranks second after hypertension.^[8] The prevalence of DM in Southeast Sulawesi in 2021 was 64.48% and increased in 2022 to 70.76%.^[9] The prevalence of DM cases in the regencies in 2023 was highest in Konawe Regency at 3.4%, Kolaka Regency at 2.8% and Kolaka Regency at 2.1%, while in North Konawe Regency it reached 1.67%, this data is higher than the previous year, namely in 2021 at 0.67%, then increased in 2022 by 1.03%.^[10]

Matandahi and Motui Community Health Centers provide treatment for DM patients, with a prevalence that increases annually, reaching 4.2% in 2021, 5.9% in 2022, and 6.8% in 2023. Meanwhile, the prevalence of DM at Motui Community Health Center was 6.4% in 2021, 7.1% in 2022, and 8.7% in 2023.^[10]

Strategies that can be implemented to slow the progression of diabetes mellitus include controlling blood glucose levels and limiting carbohydrate intake.^[11] Blood glucose levels can be controlled through pharmacological and non-pharmacological therapies. One non-

pharmacological method that can help control blood glucose levels is through food consumption.^[12] Sago flour and its processed products can be grouped as functional foods because they have a fairly high carbohydrate content (84.7%) and dietary fiber (3.69-5.96%), a low glycemic index (28), and contain resistant starch, non-starch polysaccharides, and short-chain carbohydrates.^[13] The energy content in 100 grams of sago flour (353 kcal) is almost equivalent to other staple foods in the form of flour, such as rice, corn, cassava, potatoes and wheat.^[14]

Sago (*Metroxylon sago* Rottb) is a starch-producing plant, which has great potential but its use is still very limited.^[15] Sago plants are widely found in Indonesia, particularly in eastern Indonesia, specifically in North Konawe Regency. Sago contains high levels of carbohydrates, making it a potential food substitute for rice in the future.^[16] Until now, many people in rural areas in Indonesia still consume sago as a staple food.^[17] Sago plants play a crucial role in reducing people's dependence on rice as a staple food. Sago's calorie and nutritional content is comparable to other food sources.^[18]

Sago is a food crop commodity that is used as a potential source of carbohydrates in Indonesia.^[19] Especially in the eastern part of Indonesia, sago has not been utilized optimally, even though sago has an important role in various fields, even though currently sago is still developed in a traditional and limited way.^[20] The government's efforts to develop national sago continue through various means. One such approach is prioritizing the development of a plantation-based sago industry, as mandated by Presidential Decree No. 18 of 2020 concerning the 2020-2024 National Medium-Term Development Plan.^[21] The government continues to encourage product and consumption diversification to maintain food security.^[22] Increasing local food diversification is done through the distribution of innovative healthy and nutritious food products.^[23] This can provide people with options to consume various other foods besides rice.^[24]

Sago as a traditional food source, is developed in food diversification to support local and national food security.^[22] This traditional food ingredient has nutritional value that is not inferior to other food sources such as rice, corn, cassava and potatoes.^[25] Previous study found that giving

sago rice combined with red beans to pre-diabetic patients for four weeks had a positive effect on lowering blood sugar levels.^[26] Therefore, sago rice is considered a health food that can lower blood sugar levels in people with type 2 diabetes.^[27]

The people of North Konawe Regency, particularly those in the Matandahi and Motui Community Health Centers, have a habit of consuming sago as an alternative food for people with diabetes mellitus. A preliminary survey conducted in January 2024 at the Matandahi Community Health Center of 10 people with type 2 diabetes mellitus found that 90% consumed sago rice and 10% did not.

Method

This study used a quantitative research design with a pre-experimental approach and a one-group pre-test-post-test design.^[28] The study was conducted from May to June 2024 in the working areas of the Matandahi and Motui Community Health Centers in North Konawe Regency, Southeast Sulawesi Province.

The population in this study consisted of all 59 patients with Diabetes Mellitus registered at the Matandahi and Motui Community Health Centers during the January–February 2024 period, including 26 patients from the Matandahi Community Health Center and 33 patients from the Motui Community Health Center.

This study involved three treatment groups, resulting in a total sample of 30 patients with type

2 Diabetes Mellitus selected using a simple random sampling technique. Respondent identity data, including age, education level, occupation, and duration of Diabetes Mellitus, were obtained through interviews using a structured questionnaire.

Data on sago consumption were obtained through an intervention administered for three weeks, with a portion of 120 grams per meal. Blood glucose level data among Diabetes Mellitus patients were measured using a portable EasyTouch meter through direct observation. Data analysis was performed using a paired t-test and one-way ANOVA, followed by the Least Significant Difference (LSD) post hoc test.

Result

Table 1 shows that after conducting a normality test using Shapiro Wilk, a p value of $> \alpha$ (0.05) was obtained for all variables, so that all sago consumption data were normally distributed, namely sago consumption once a day obtained a p value of (0.100), sago consumption twice a day obtained a p value of (0.054), sago consumption three times a day obtained a p value of (0.637).

Table 2 shows that the results of the paired t-test obtained a p value of $0.001 < \alpha$ (0.05), so H_a is accepted and H_0 is rejected, so it is concluded that there is an effect of consuming sago (*Metroxylon sago* Rottb) once a day on changes in blood glucose levels of Diabetes Mellitus sufferers in the Matandahi Health Center work area.

Table 1.
Normality Test Results for Random Blood Glucose Levels

Intervention (Sago)	<i>P-value</i>	Information
Consume Sago once a day		
Before intervention (Pre Test)	0.161	Normal
After intervention (Post Test)	0.057	
Difference	0.100	

Table 2.
The Results of The Test on Sago Consumption (Metroxylon Sagu Rottb) Once A Day on Changes in Blood Glucose Levels of Diabetes Mellitus Sufferers in The Matandahi Health Center Work Area

Consume sago twice a day	n	P-value
Before intervention (Pre Test)	10	0.001
After intervention (Post Test)	10	

Discussion

The results of this study indicate that there is an effect of consuming sago (Metroxylon sago Rottb) once a day on changes in blood glucose levels of Diabetes Mellitus patients in the Matandahi Community Health Center work area. Based on the results of the data recapitulation, it can be seen that the average blood glucose level, before consuming sago once a day was 283.5 mg/dl and after being given sago once a day for 1 week, there was a decrease in random blood glucose levels to 263.9 mg/dl. The amount of decrease was 19.6 mg/dl. During the administration of sago, patients' intake was controlled by providing education to reduce foods high in glucose such as rice. This study used sago as the basic ingredient for making sinonggi, a traditional food often consumed by people in several regions of Indonesia, including in the Matandahi Community Health Center work area.

This research is in line with research conducted by Laila et al., in 2024, which found that giving sago to mice once a day was able to reduce blood sugar levels in type 2 diabetes sufferers.^[29] In 20 individuals, the intervention period was 4 weeks. Sago rice was made from a mixture of sago starch and red bean flour in 90% and 10% proportions.^[30] Furthermore, sago rice was given to volunteers with prediabetes, given 120 grams of sago rice every day and other menus were free except for side dishes containing carbohydrates such as crackers, potato cakes, noodles and so on.^[14] The results of the study showed that the intervention of sago rice and red beans in prediabetic volunteers for 4 weeks can reduce glucose, so that sago rice as a local food has the advantage of being able to maintain blood sugar in prediabetic patients.

According to researchers, sinonggi made from sago tends to have a lower glycemic index than white rice, meaning it has a slower effect on blood glucose levels. If sinonggi has a lower

glycemic index, then consuming it may help lower or stabilize blood glucose levels compared to other high-carbohydrate foods.

Conclusion

Daily consumption of sago (Metroxylon sago Rottb) has an effect on blood glucose levels in diabetes mellitus patients in the Matandahi Community Health Center. The effect of daily sago consumption suggests that health center should implement public awareness campaigns on the importance of sago consumption for diabetes mellitus patients.

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