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The Role of Self-Monitoring of Blood Glucose in Reducing Blood Glucose Levels among Type 2 Diabetes Mellitus Patients at Kendari City Hospital

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ABSTRACT

Introduction: Diabetes mellitus is a silent killer that causes premature death, blindness, heart disease, and kidney failure. The number of DM in 2020 was 422 million people and 537 million in 2021. Indonesia in 2020 was 10.7 million and 19.5 million in 2021. DM cases in Southeast Sulawesi in 2020 were 60.31%, and in 2021 were 64.48%, and in 2022 were 70.76%. The prevalence of DM in Kendari City in 2020 was 12.7%, in 2021 it was 12.3% and in 2022 it was 12.6%. This study aims to determine the relationship between self-monitoring of blood glucose levels and decreasing blood glucose levels in patients with type 2 diabetes mellitus in the Internal Medicine Polyclinic of Kendari City Regional General Hospital.

Method: This study was quantitative and conducted using a cross-sectional design. The sample consisted of 178 type 2 diabetes patients visiting the internal medicine clinic of Kendari City Regional General Hospital, obtained through accidental sampling. Data were analyzed using the chi-square test, the correlation test, and binary logistic regression.

Result: Using the chi-square test, a p value of $0.000 < 0.05$ was obtained for the variable of monitoring glucose levels independently against decreasing blood glucose levels.

Conclusion: There is a relationship between monitoring blood glucose levels independently in Type 2 Diabetes Mellitus Patients at the Internal Medicine Polyclinic of Kendari City Regional General Hospital.

Introduction

The epidemiological transition from infectious diseases to non-communicable diseases is increasingly visible, the morbidity of non-communicable diseases is increasing.^[1] One of the

NCDs whose cases have increased is Diabetes Mellitus (DM), which is a condition where there is an increase in blood glucose levels due to a lack or resistance to insulin.^[2] DM is called a silent killer because it causes various complications for

sufferers, DM causes premature death, blindness, heart disease and kidney failure.^[3]

The World Health Organization (WHO) stated that Diabetes has become the fastest growing chronic disease in the world and in 2020 there were 422 million people.^[4] In 2021, the International Diabetes Federation (IDF) confirmed in its 10th edition of the Atlas that diabetes is one of the fastest-growing global health emergencies. The number of diabetes cases worldwide in 2021 reached 537 million, with 6.7 million deaths due to diabetes. This number is projected to reach 643 million by 2030 and 783 million by 2045.^[5]

The American Diabetes Association (ADA) classifies DM into 4 (four) types, namely type 1 DM, type 2 DM, gestational DM and other types of DM.^[6] Type 2 DM is one of the most common types of DM, namely more than 90-95%, besides that, type 2 DM is also experienced by more adults than children and adolescents.^[7]

The number of DM cases in Indonesia in 2020 was 10.7 million (Ministry of Health of the Republic of Indonesia, 2020). This figure increased to 19.5 million in 2021 and is expected to rise to 28.6 million in the next 20 years.^[8]

In 2020, Southeast Sulawesi Province was one of the provinces in Indonesia with an increasing prevalence of diabetes mellitus and the morbidity rate of diabetes mellitus was included in the top 10 non-communicable diseases, ranking second after hypertension.^[9] DM cases in Southeast Sulawesi also increased, reaching 60.31% in 2020, then increasing to 64.48% in 2021 and further increasing to 70.76% in 2022.^[9]

Kendari City is one of the cities in Southeast Sulawesi where diabetes cases are also increasing. The prevalence of diabetes in Kendari City was 12.7% in 2020, then 12.3% in 2021, and increased to 12.6% in 2022.^[10]

Health maintenance in DM patients can be done by keeping blood glucose stable.^[11] Uncontrolled blood glucose levels can lead to various complications, including low blood glucose levels (hypoglycemia), kidney damage, blindness, and nerve damage that can lead to gangrene and even amputation. These complications can be managed if patients adhere to their medication.^[12]

Study from Tarwoto found a correlation between self-management in diabetes treatment and fasting blood glucose levels in patients with

diabetes mellitus. Self-management is a process undertaken by individuals to manage diabetes, including nutritional management, regular exercise, blood glucose monitoring, medication adherence, and foot care.^[13] The quality of life of people with diabetes is highly dependent on self-management, which includes diet, physical activity, blood glucose control, and regular medication intake.^[14]

Chantya and Harison's 2023 study found a relationship between dietary adherence and physical activity and blood glucose levels in patients with type 2 diabetes mellitus at Tais Regional General Hospital. Physical activity can be a trigger for increased blood glucose levels, and blood glucose levels are controlled by the activity performed. If an individual engages in minimal physical activity, it can trigger a high blood glucose increase. Low physical activity can also result in high blood glucose levels, leading to pre-diabetes.^[15]

Blood glucose levels are also influenced by medication adherence, this is reinforced by research by Rismawan et al., conducted in 2023 which found that there was a significant relationship between medication adherence and random blood glucose levels in type 2 diabetes mellitus sufferers.^[16] Likewise, research of Agustina et al., found that there is a significant relationship between the level of medication adherence to blood glucose levels in geriatric type 2 DM patients at the Nanggalo Community Health Center in Padang City. Most patients are classified as less compliant (82.2%) in undergoing treatment and the majority of patients have uncontrolled blood glucose levels, the results of statistical analysis show that there is a significant relationship between the level of medication adherence to blood glucose levels in geriatric patients.^[17] Type 2 DM patients with a frequency of once-daily medication use have 2.53 times higher compliance compared to patients with a frequency of more than once-daily medication use.^[18]

The public perception of diabetes as a disease that tends to affect adults aged 32 to the elderly and is inherited from parents to children, leading them to neglect prevention and awareness. However, the reality is that this disease can affect all age groups if poor lifestyle habits are consistently adopted. The Kendari City

Government has implemented DM control through blood glucose monitoring, education, and pharmacological therapy, but the prevalence of diabetes mellitus continues to rise.

Based on the above considerations, it is necessary to conduct a study entitled "Factors Associated with the Decrease in Blood Glucose Levels in Type 2 Diabetes Mellitus Patients in the Internal Medicine Clinic of Kendari City Hospital."

Method

The type of research is quantitative, Cross Sectional Study design. The population is all patients with type 2 diabetes mellitus who were treated at the internal polyclinic of RSUD Kota in 2023, totaling 320 people. The sample is a portion of type 2 diabetes patients who visited the internal polyclinic of RSUD Kota Kendari, totaling 178 people obtained by accidental sampling. Data were analyzed using the chi-square test, the tightness test, and the binary logistic regression test.

Result

Table 1 showed that of the 178 samples, the majority did not routinely check their blood glucose levels independently, as many as 108 people (60.7%) and routinely as many as 70 people (39.3%).

Table 2 showed that out of 178 samples, there are 70 people who routinely monitor their blood glucose levels independently. Then of the 70 people who routinely monitor their blood glucose levels independently, there are 49 people (70.0%) whose blood glucose levels are normal. Meanwhile, out of 108 people who do not routinely monitor their blood glucose levels independently, there are 97 people (89.4%) whose blood glucose levels are high. This means that respondents who monitor their blood glucose levels independently are more likely to have normal sugar levels. The results of statistical analysis using the Chi-Square test obtained a p value of $0.000 < \alpha (0.05)$, $\phi (0.618)$ and $X^2 \text{ Calculate } (68.003) > X^2 \text{ Table } (3.841)$, then the alternative hypothesis is accepted so it is concluded that there is a strong relationship between monitoring blood glucose levels independently with a decrease in blood glucose levels in patients with type 2 Diabetes Mellitus in the Internal Medicine Polyclinic of Kendari City Hospital.

Table 1.
Sample Distribution Based on Self-Monitoring of Blood Glucose Levels at the Internal Medicine Clinic of Kendari City Hospital

Monitoring Your Blood Glucose Levels Independently	n	%
Routine	70	39.3
Not Routine	108	60.7
Total	178	100.0

Table 2.
Distribution of Self-Monitoring of Blood Glucose Levels Based on Decreasing Blood Glucose Levels in Type 2 Diabetes Mellitus Patients at the Internal Medicine Clinic of Kendari City Hospital

Monitoring Blood Glucose Levels Independently	Blood Glucose Levels				Total	
	Normal		Tall		n	%
	n	%	n	%		
Routine	49	70.0	21	30.0	70	100.0
Not Routine	11	10.2	97	89.4	108	100.0
Total	60	33.7	118	66.4	178	100.0

Discussion

Of the 178 samples, 108 (60.7%) did not routinely monitor their blood glucose levels independently, based on their responses stating that they did not regularly monitor their blood glucose levels each month. Meanwhile, the regular sample consisted of type 2 diabetes sufferers who routinely checked their blood glucose levels every month at a healthcare facility, whether a hospital, clinic, or community health center.

Furthermore, among the 70 respondents who routinely monitor their blood glucose levels independently, 21 (30%) had high blood glucose levels. This was because the respondents did not comply with the diet provided by health workers and tended to consume foods high in glucose and fat. In addition, there are other factors that cause high blood glucose levels, such as stress conditions experienced by respondents, which triggers an increase in blood glucose levels. Then, this study also showed that among the 108 people who did not routinely monitor their blood glucose levels, 11 people (10.2%) had normal blood glucose levels. This is because there are other factors that dominate to maintain normal blood glucose levels, such as respondents consuming foods low in sugar and processed carbohydrates can help maintain stable blood glucose levels.

The results of this study show that respondents who monitor their blood glucose levels independently, more people had normal blood sugar levels. The chi-square test concluded that there was a relationship between self-monitoring of blood glucose levels and reduced blood glucose levels in patients with type 2 diabetes mellitus at the Internal Medicine Clinic of Kendari City Hospital.

The results of this study are comparable to research¹⁹The P-value obtained was 0.000, which is lower than 0.05. Therefore, there is a relationship between self-management of medication and blood glucose levels, with a Spearman rank correlation coefficient of 0.598. Similarly, the study Hidayatin shows that based on 10 research articles obtained, self-care management is related to blood glucose levels.^[20]

This research is supported by the Self-Monitoring of Blood Glucose (SMBG) theory. This theory stems from research in health and diabetes management, which suggests that routine self-monitoring of blood glucose levels can help

individuals better control and manage their diabetes. Regular blood glucose monitoring makes people with diabetes more aware of fluctuations in their blood glucose levels. This helps them understand how food, physical activity, stress, and medications affect blood glucose levels. With regular and consistent blood glucose monitoring, individuals can be more proactive in managing their diabetes, ultimately improving quality of life and reducing the risk of complications associated with diabetes mellitus.

Based on the researchers' assumptions, the more regularly blood glucose levels are checked, the more normal they will be. Therefore, the solution is for people with type 2 diabetes to regularly monitor their blood glucose levels at least once a month, which can be done at health care facilities such as community health centers, hospitals, or health clinics. Schedule regular visits with a doctor or diabetes educator to monitor progress and receive appropriate advice. These meetings can also be an opportunity to evaluate blood glucose monitoring habits. Additionally, technology such as smartphone apps can be used to record and monitor results, as well as automatic reminders to check blood glucose levels.

Conclusion

There is a relationship between monitoring blood glucose levels independently so that a dietary approach and nutritional intervention are needed to control blood glucose levels and to examine the effect of using information technology in controlling dietary compliance and taking medication for type 2 DM sufferers.

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