

Analysis of Determinants of NCD Diabetes Mellitus in Tilango Health Centre

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ABSTRACT

The incidence and prevalence of type 2 diabetes in adolescents varies according to ethnicity and other factors. Populations with a high incidence and prevalence of type 2 diabetes in young people also have a higher risk of developing type 2 diabetes in adults. This research aims to analyze the determinants of PTM Diabetes Mellitus at the Tilango Community Health Center. Analytical survey research method with a cross-sectional study design. The population is all Prolanis patients at the Tilango Community Health Center in 2023 totaling 104 people. Sampling used total sampling, so the total sample was 104 people. Analysis was carried out using the chi-square test and multiple logistic regression test. The research results of the multiple logistic regression test obtained the variables diet (0.016) and hypertension (0.003). The largest OR value was obtained for the diet variable (11.075). This research concludes that there is a relationship between diet, obesity, genetic history, hypertension, physical activity, and the incidence of PTM diabetes mellitus at the Tilango Health Center. Diet is the variable most related to the incidence of PTM Diabetes Mellitus at the Tilango Community Health Center, excessive eating patterns have an 11.075 times greater chance of developing diabetes mellitus.

KEYWORDS: Diet, Obesity, Genetic History, Hypertension, Physical Activity, Diabetes Mellitus.

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I. INTRODUCTION

Diabetes mellitus (DM) has been increasing at an alarming rate since the beginning of the 21st century, driven by health determinants largely related to lifestyle changes and their consequences, such as obesity and inactivity. The burden of diabetes has burdened many healthcare systems, particularly in low- and middle-income countries. Reversing the rapid increase in the number of cases, and preventing the onset and progression of diabetes complications, must be a common goal. This is important to ensure that people with diabetes achieve full life expectancy without reducing their quality of life while reducing the economic impact of the condition.

An estimated 537 million adults aged 20-79 years worldwide (10.5 % of all adults in this age group) suffer from diabetes. By 2030, there will be 643 million people, and by 2045, 783 million adults aged 20-79 are expected to have diabetes. Therefore, although the world population is

expected to grow by 20% in this period, the number of people with diabetes is expected to increase by 46%.

Diabetics in 2021 show an increase in diabetes prevalence based on age, a similar trend is expected to occur in 2045. The lowest prevalence occurs in adults aged 20-24 years (2.2 % in 2021). Among adults aged 75-79 years, the prevalence of diabetes is estimated at 24.0% in 2021 and is expected to increase to 24.7% in 2045 (IDF, 2021).

The incidence and prevalence of type 2 diabetes in adolescents varies according to ethnicity and other factors. Populations with a high incidence and prevalence of type 2 diabetes in young people also have a higher risk of developing type 2 diabetes in adults. Obesity is an important modifiable risk factor for type 2 diabetes. However, some populations that have a low prevalence of childhood obesity, for example in East Asia, report higher incidence rates of type 2 diabetes affecting adolescents than populations with a greater burden of childhood obesity. Genetic predisposition, disparities in socio-economic status, access to health

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services, and cultural practices around the world of people from different ethnic backgrounds or countries may also contribute to differences in the risk of type 2 diabetes in adolescents (IDF, 2021).

In the 10th edition of the IDF Atlas, it is stated that in Indonesia, the estimated adult diabetes population aged 20-79 years is 19,465,100 people. Meanwhile, the total adult population aged 20-79 years is 179,720,500, so if calculated from these two figures it is known that the prevalence of diabetes among those aged 20-79 years is 10.6 %. In other words, if calculated in the 20-79 year age group, this means 1 in 9 people have diabetes (Ministry of Health of the Republic of Indonesia, 2022).

Data from the Gorontalo District Health Service shows that Tilango District is one of the sub-districts that has the highest number of diabetes mellitus sufferers in Gorontalo District. According to Tilango Health Center medical record data, the number of Diabetes Mellitus sufferers in 2021 was recorded at 52 patients, in 2022 there were 100 patients and in 2023 there will be 132 patients. These data show that there is an increase every year in diabetes mellitus sufferers.

Diabetes Mellitus cases in Gorontalo Regency are relatively high, which is influenced by several causes, namely, heredity or genetics. If one of the family members has a history of diabetes mellitus, it is very likely to increase the risk of developing diabetes in a person. Age, where there is a decline in organ function. Lifestyle, including unhealthy eating patterns, lack of exercise or physical activity, and obesity.

Several studies on the determinants of PTM Diabetes Mellitus state that there is a relationship between lifestyle, eating patterns, family history of DM, hypertension, and many more which the author includes in the relevance of this thesis research. Based on these studies, the author wants to examine several determinant factors for PTM Diabetes Mellitus at the Tilango Community Health Center, Gorontalo Regency.

METHODS

The research was conducted at the Tilango Health Center, Gorontalo Regency, Gorontalo Province. The research was carried out from March 7 2024 to April 30, 2024. This research uses the Analytical Survey method which aims to determine the relationship between the determinants of PTM Diabetes Mellitus at the Tilango Community Health Center.

The design used in this research is a Cross-Sectional Study. The population in this study was all 104 Prolanis patients at the Tilango Community Health Center in 2023. Before being used as a data collection tool, the questionnaire used in this research had gone through the questionnaire testing stage which included testing the validity and reliability of the research data. The results of the validity and reliability tests. The validity test calculation is carried out by comparing the calculated r-value obtained with the table r-value. The calculated r value is obtained from the results of validity tests using statistical tests using computer equipment and the Statistical Program for Social Science (SPSS) program, where the results can be seen in the corrected item-total correlation column. Meanwhile, the r table value is obtained using the formula $df = n - 2$. In this study, the questionnaire test was carried out on 132 respondents so that the value of $df = 132 - 2 = 130$. At a significance level of 5%, the r-table value was 0.143. Each question is compared between the calculated r-value obtained and the r-table value, where the question is said to be valid if the calculated r-value $>$ r table. The reliability test is carried out by comparing the Cronbach's Alpha value in statistical tests (SPSS), where if the Cronbach's Alpha value $>$ r table then it is reliable.

In this study, a multivariate test was carried out using a multiple logistic regression test because the dependent variable was categorical data. The logistic regression test used is a multiple logistic regression test with predictive modeling. Predictive modeling aims to obtain a model consisting of several independent variables that are considered the best for predicting dependent events. The multiple linear regression equation for this research model is as follows.

$$Y = \alpha + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + e$$

Where :

Y = Diabetes Mellitus Type 2

α = constant

b = Regression coefficient

X= Independent variable

e = Error variable

RESULTS AND DISCUSSION

Table 1: Analysis of Selection of Candidate Variables Most Associated with the Incident of PTM Diabetes Mellitus at the Tilango Community Health Center

No.	Variable	ρ Value	Condition	Conclusion
1.	Dietary habit	0,000	0.25	Eligible to enter the multivariate model
2.	Obesity	0,000	0.25	Eligible to enter the multivariate model
3.	Genetic	0.012	0.25	Eligible to enter the multivariate model
4.	Hypertension	0.003	0.25	Eligible to enter the multivariate model
5.	Physical Activity	0.002	0.25	Eligible to enter the multivariate model

Source : Primary Data, 2024

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The table shows that all independent variables in this study, namely diet, obesity, genetics, hypertension, and physical activity have a ρ value $< \alpha$ (0.25), so it is stated

that all independent variables are suitable for entering the multivariate model.

Table 2: Final Modeling Analysis of Variables Most Associated with the Incident of PTM Diabetes Mellitus at the Tilango Community Health Center

No.	Variable	ρ value	Condition α value	Conclusion	OR
1.	Dietary habit	0.016	0.05	Significant	11,075
2.	Obesity	0.145	0.05	Not significant	1,883
3.	Genetic	0.154	0.05	Not significant	0.251
4.	Hypertension	0.003	0.05	Significant	0.169
5.	Physical Activity	0.334	0.05	Not significant	0.649

Source : Primary Data, 2024

The table shows that the variables that have a ρ value $< \alpha$ (0.05) are the variables of diet (0.016) and hypertension (0.003). The largest OR value was obtained for the diet variable (11.075). So it is stated that the dietary pattern variable is the variable that is most related to the incidence of PTM Diabetes Mellitus at the Tilango Health Center. An OR value of 11.075 means that excessive eating patterns have an 11.075 times greater chance of developing diabetes mellitus.

The results of the study showed that based on the multiple logistic regression test, variables were obtained that had a ρ value $< \alpha$ (0.05), namely diet variables (0.016) and hypertension (0.003). The largest OR value was obtained for the diet variable (11.075). So it is stated that the dietary pattern variable is the variable that is most related to the incidence of PTM Diabetes Mellitus at the Tilango Health Center. An OR value of 11.075 means that excessive eating patterns have an 11.075 times greater chance of developing diabetes mellitus.

The researchers assume this is because diet has a direct and broad influence on various biological mechanisms that contribute to diabetes mellitus. This makes it the most crucial variable to change in efforts to prevent and manage diabetes mellitus. Diet directly affects blood sugar levels through the intake of carbohydrates, sugar, and fat. Foods high on the glycemic index such as sugar and refined carbohydrates can cause rapid spikes in blood sugar levels, which in turn increases insulin demand. If this eating pattern continues, the body can become less sensitive to insulin (insulin resistance), which is a major factor in the development of diabetes mellitus.

Researchers assume that a diet high in calories, unhealthy fats and sugar can cause weight gain and obesity. Obesity, especially visceral obesity, is one of the greatest risk factors for the development of diabetes mellitus. Although obesity itself is an important variable, the root of the problem is often a poor diet that causes obesity. Unlike genetic factors which cannot be changed, or hypertension which may require medical intervention for control, diet is a factor that can be changed through education and lifestyle changes.

Adopting a healthy diet can significantly reduce the risk of developing diabetes mellitus.

In addition, poor diet is often associated with an overall less healthy lifestyle, including a lack of physical activity and an increased risk of hypertension. For example, high salt consumption may increase the risk of hypertension, which in turn may increase the risk of developing diabetes mellitus. Thus, poor diet can be an underlying cause that influences several risk factors at once. Although genetics plays an important role in a person's predisposition to developing diabetes mellitus, genetic expression can be influenced by environmental factors such as diet. A healthy diet can help reduce the risk of developing diabetes mellitus even in individuals who are genetically predisposed to the disease.

Eating patterns decrease with age, this is because as the patient gets older, the patient's metabolism and ability to carry out activities decreases. Controlling blood sugar levels at any time is very important in regulating a balanced diet in terms of quantity, frequency, quantity, and content so that the body can regulate blood glucose levels so that they are not too high or too low in people with diabetes mellitus (Eltrikanawati et al., 2020).

Almaitsier (2013) explains that food plays an important role in increasing blood sugar levels. Wrong eating patterns are caused by consuming foods that contain excessive amounts of sugar or high carbohydrates, namely increasing sugar intake in the body. There is no doubt that nutrition is an important factor in the onset of diabetes mellitus.

Food plays a role in increasing blood sugar levels. Several studies show that there is a relationship between diet and the incidence of diabetes mellitus. In the process of eating, the food eaten will be digested in the digestive tract and then converted into a form of sugar called glucose. The aim of regulating eating patterns (diet) in diabetes mellitus sufferers is to help sufferers improve eating habits and reduce calorie (energy) content. If calorie intake exceeds its use, if there are no other modifying factors, then this excess calorie will be directed to the body's energy storage area, namely fat tissue. Therefore, a diet that is appropriate between calorie intake and output is the key to preventing overweight and obesity, as well as diabetes. Foods that

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contain a lot of calories, such as foods that are high in fat (cheese, ice cream, sweet pastries, syrup, jelly, rock sugar, preserved fruit, sweetened condensed milk, bottled soft drinks, fried foods, processed meat) is a common diet component that leads to weight gain, obesity, and ultimately diabetes (Trisnawati & Setyorogo, 2019).

Tarihoran & Silaban (2022) in their research obtained a statistical test using Chi-square, obtained a p-value of 0.003 because the p-value <0.05 then H_0 was rejected, meaning that there was a significant relationship between eating patterns and the incidence of diabetes mellitus at the Namorambe Community Health Center, Deli Regency. Serdang 2021. Prevalence Ratio (RP) = 9.5, $RP > 1$ means it is true that an incorrect diet is 9.5 times more risky for diabetes than a correct diet.

Research by Sukmaningsih (2023) found that diet is a determinant variable that can be paired with other factors in influencing the occurrence of diabetes mellitus in the work area of the Purwodiningratan Surakarta Health Center. The probability that someone will suffer from diabetes mellitus if their diet is poor is 18%. The probability that someone will suffer from diabetes mellitus if they have a family history of diabetes mellitus and have a poor diet is 44%. The probability that someone will suffer from diabetes mellitus if their diet is poor and their physical activity is low is 76%. The probability that someone will suffer from diabetes mellitus if they have a poor diet and smoke is 38%. The probability that someone will suffer from diabetes mellitus if they have a family history of diabetes mellitus, have a poor diet, and have low physical activity is 92%. The probability that someone will suffer from diabetes mellitus if they have a family history of diabetes mellitus, have a poor diet, and smoke is 70%. The probability that someone will suffer from diabetes mellitus if they have a poor diet, low physical activity, and smoke is 90%.

CONCLUSIONS

Diet is the variable most related to the incidence of PTM Diabetes Mellitus at the Tilango Community Health Center. An OR value of 11.075 means that excessive eating patterns have an 11.075 times greater chance of developing diabetes mellitus.

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