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Development of a Type 2 Diabetes Mellitus Incidence Control Model in Sibolga City in 2023

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ABSTRACT

Type 2 diabetes mellitus is a degenerative disease that affects many people worldwide and to date, no truly effective treatment has been found. Epidemiological studies in Indonesia indicate that the prevalence of type 2 diabetes mellitus ranges from 1.5% to 2.3% in the population aged 15 years and above. In North Sumatra Province, the number of outpatient visits due to type 2 diabetes mellitus ranked fifth in 2000. Dr. Ferdinand Lumbantobing Regional General Hospital reported an increase in the proportion of type 2 diabetes mellitus patients by 91.42% from 2002 to 2003. Based on the high proportion of type 2 diabetes mellitus sufferers in Sibolga, this study aims to find an appropriate control model for type 2 diabetes mellitus in Sibolga in 2005 using a risk factor approach. This research is an analytical study with a case-control approach in the population aged 40 years and above. The sample consisted of 100 patients with type 2 diabetes mellitus and 100 individuals without type 2 diabetes, matched for characteristics such as gender and residence. Data were analyzed univariately, bivariately using the chi-square test, and multivariately using logistic regression.

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1. Introduction

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disease characterized by hyperglycemia due to impaired regulation of glucose metabolism, caused by a combination of insulin resistance in peripheral tissues and dysfunction of insulin secretion by pancreatic beta cells.(PERTIWI, 2023),(Arfan, 2023)Physiologically, insulin resistance causes a reduction in the ability of tissues such as muscle, liver, and adipose tissue to respond to insulin, so that glucose cannot enter cells efficiently and accumulates in the blood.(Agus, 2019),(Dolo, 2023).

Type 2 diabetes mellitus (T2DM) is a serious health problem that continues to increase throughout the world, including in Indonesia.(HAREFA & LINGGA, 2023),(Hardianto, 2020)In Sibolga City, the prevalence of DMT2 cases has shown a significant increase, with reports from Dr. Ferdinand Lumbantobing Regional Hospital noting a surge in patient visits due to this disease.(Hasibuan, Fitriani, & Theo, 2020),(Siregar, 2016)This study aims to develop a risk factor-based control model for T2DM, with the hope that it can serve as a reference for regional health policymaking. By analyzing risk factors such as family history, obesity, physical activity, and diet, this model is expected to help reduce the incidence of T2DM in the community.(Yunara et al., nd),(Priyanto & Suprayetno, 2022).

2. Methods

2.1 Research Design

This study used a quantitative design with an analytical and case-control approach. The subjects were divided into two groups: those with type 2 diabetes mellitus and a control group without diabetes. Data were collected through interviews and direct observation to obtain information related to risk factors.(Sagala, 2023),(Rahajeng & Wahidin, 2020).

2.2 Population and Sample

The population in this study was all individuals aged 40 years and above living in Sibolga City. The sample consisted of 200 individuals: 100 with type 2 diabetes mellitus and 100 without diabetes. The sampling technique used was purposive sampling, taking into account the established inclusion and exclusion criteria.(Swarjana & SKM, 2022),(Sukabumi, 2022).

2.3 Data Collection Techniques and Instrument Development

Data were collected through a questionnaire designed to evaluate risk factors for type 2 diabetes mellitus. The questionnaire included questions about family history, obesity status, physical activity, and dietary habits. Weighing and height measurements were also taken to calculate Body Mass Index (BMI).(Wati, Pratiwi, Dewi, & Muharramah, 2022), .

2.4 Analysis Techniques

Data analysis was conducted in two stages: univariate and bivariate analysis. Univariate analysis aimed to describe the characteristics of the respondents, while bivariate analysis used the chi-square test to examine the relationship between risk factors and the incidence of type 2 diabetes mellitus. Logistic regression was used to identify the dominant risk factors.

3. Results and Discussion

The study results showed that family history was the most dominant risk factor, with an odds ratio (OR) of 11.3. Furthermore, obesity and lack of physical activity also showed a significant association with the incidence of type 2 diabetes mellitus. These findings align with previous research emphasizing the importance of risk factor modification for diabetes prevention.

The frequency distribution of respondents based on nutritional status and other risk factors showed that most respondents had a family history of diabetes and were obese. This study reinforces the importance of risk-based interventions to reduce diabetes prevalence in the community.

Table1.
Distribution of Respondents Based on Family History

Family History	n	%
There is	62	62.0
There isn't any	38	38.0
Amount	100	100.0

Table 2.
Distribution of Respondents Based on Nutritional Status (BMI)

Nutritional Status (BMI)	n	%
Normal	28	28.0
Overweight	31	31.0
Obesity	41	41.0
Amount	100	100.0

Table3.

Distribution of Respondents Based on Physical Activity

Physical Activity	n	%
Enough	29	29.0
Not enough	71	71.0
Amount	100	100.0

4. Conclusions

Family history was shown to be the most dominant risk factor for the occurrence of type 2 diabetes mellitus in Sibolga City with an Odds Ratio (OR) of 11.3. Obesity was significantly associated with the occurrence of type 2 diabetes mellitus with an OR of 4.9. Lack of physical activity was significantly associated with the occurrence of type 2 diabetes mellitus with an OR of 5.2. Unhealthy diet was also associated with the occurrence of type 2 diabetes mellitus with an OR of 1.9. The results of the multivariate analysis showed that family history, obesity, physical activity, and diet together formed a type 2 diabetes mellitus control model that could predict the likelihood of disease occurrence. The developed control model can be used as a reference in efforts to prevent and control type 2 diabetes mellitus through a risk factor approach in Sibolga City.

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