# Potensial Risk of Type 2 Diabetes Mellitus

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ABSTRACT

Type 2 Diabetes Mellitus (Type 2 DM) is a chronic disease also called kencing manis which is caused by a metabolic disorder characterized by an increase in blood sugar due to a decrease in insulin secretion by pancreatic beta cells or due to impaired insulin function (insulin resistance). There are several factors that are a potential risk of DM disease that are inherent in the individual and also their lifestyle. This study aims to analyze the potential risks of diabetes mellitus. The research design was case control with 54 respondents consisting of 27 case groups and 27 control groups. Data collection was carried out by interviews at each respondent's home. Data were analyzed using a measure of the relationship between exposure (risk factors) and disease incidence which is called Odd Ratio (OR) analysis or what is called opportunity analysis. Individuals with a habit of consuming sweet foods have a 1.39 times greater risk of developing Type 2 DM compared to those who rarely consume sweet foods. Individuals with a habit of rarely exercising have a 4.73 times greater risk of developing Type 2 DM compared to those who have a habit of exercising regularly. And individuals with a nuclear family history of suffering from DM have a 6.25 times greater risk of developing Type 2 DM compared to those who do not have a nuclear family history of suffering from DM. Type 2 DM can be caused by people's consumption patterns, one of which is the habit of consuming sweet foods or foods that contain high levels of glucose. Other causes are physical activity habits, including exercise habits, and family history, which are factors that can cause Type 2 DM.

## I. Introduction

Diabetes Mellitus (DM) is a condition where a person's blood sugar levels in their body are above normal. This disease is a chronic disease caused by metabolic disorders due to failure of the pancreas to produce the hormone insulin adequately. This disease is said to be a chronic disease because it can occur for years. A cure for DM has not been found (Sulistyowati, 2017).

DM is a metabolic disorder characterized by hyperglycemia with abnormalities in carbohydrate, fat and protein metabolism caused by decreased insulin secretion or decreased insulin sensitivity or both and causes chronic complications, microvascular, macrovascular and neuropathy (Sari, 2016).

There are several types of DM, namely type 1 DM is caused by an autoimmune reaction which causes the body's immune system to attack the beta cells in the pancreas so that they cannot produce insulin at all. Meanwhile, type 2 DM occurs due to insulin resistance where the cells in the body are unable to fully respond to insulin. Gestational diabetes is caused by increased levels of various hormones during pregnancy which can inhibit insulin action.

The incidence of Type 2 DM in children and adolescents in the world is increasing along with the increase in the incidence of obesity. Even in the United States today, more

than 1 in 3 new cases of diabetes mellitus that occur in children and adolescents is Type 2 DM. This trend occurs throughout the world and it is predicted that by 2030 around 366 million people in the world will experience diabetes (Utari et al., 2018).

Based on reports from Basic Health Research (RISKESDAS) in 2018, there was an increase in the prevalence of DM by 10%. In 2019, the International Diabetes Federation (IDF) ranked Indonesia 6th with a total of 10.3 million DM sufferers. IDF also predicts that there will be an increase in DM cases by 13.7 million in 2030 (Soelistijo, 2021).

The main causes of the incidence of DM are changes in lifestyle and urbanization and the incidence seems to be increasing from year to year. It seems that about a third of people diagnosed with DM are willing to undergo both pharmacological and non-pharmacological treatment. In Indonesia, it is estimated that 50% of people with diabetes who have not been diagnosed (Adi, 2019). DM is a very dangerous and frightening disease. There are many factors that can cause someone to suffer from DM, such as obesity (excess body weight), genetic factors, unhealthy lifestyle (rarely exercising), lack of sleep, and many others (Sari, 2016).

With these various backgrounds, where there are many factors that cause type 2 DM, researchers want to prove how big the risk is from the habit of consuming sweet foods, exercise habits, and family history of having suffered from TB.

## II. Methods

The design of this study was a case control with 54 respondents consisting of 27 people in the case group, namely type 2 DM sufferers and 27 people in the control group, namely non-type 2 DM sufferers. In this study, several variables were also taken that were factors causing the incident. Type 2 DM includes the habit of consuming sweet foods, exercise habits and a family history of having suffered from DM. Data collection was carried out by interviews at each respondent's home to explore their daily habits. Data were analyzed using a measure of the relationship between exposure (risk factors) and disease incidence which is called Odd Ratio (OR) analysis or what is called opportunity analysis or statistical measurement that quantifies the strength of the association between an exposure and an outcome.

## III. Results and Discussion

### 1. Habit of Consuming Sweet Foods

**Table 1. Habit of Consuming Sweet Foods with the incidence of type 2 DM in 2x2 table processing**

| Risk Factor | Disease | | Total |
|---|---|---|---|
| | Positive | Negative | |
| At Risk (consuming sweet food) | 9 | 2 | 11 |
| No Risk (rarely cinsuming sweet food) | 18 | 25 | 43 |
| Total | 27 | 27 | 54 |

Based on table 3.1, it is described that the respondents interviewed stated that there were 9 people who had Type 2 DM with a habit of consuming sweet foods and there were also those who did not have a habit of consuming sweet foods but suffered from Type 2 DM

amounting to 18 people. There were 2 people who were accustomed to consuming sweet foods but did not suffer from Type 2 DM and there were 25 people who did not suffer from Type 2 DM and did not even have a habit of consuming sweet foods. The calculation of the risk of exposure to the habit of consuming sweet foods and drinks is as follows:

$$Odd\ Rasio\ (OR) = \frac{Exposure\ odds\ for\ cases}{Exposure\ odds\ for\ ccontrol}$$

$$Odd\ Rasio\ (OR) = \frac{{}^{9}/_{18}}{{}^{2}/_{25}}$$

$$Odd\ rasio\ (OR) = \frac{9x25}{2x18}$$

$$Odd\ Rasio\ (OR) = \frac{190}{136}$$

$$Odd\ Rasio\ (OR) = 1{,}39$$

Individuals with a habit of consuming sweet foods have a 1.39 times greater risk of developing Type 2 DM compared to those who rarely consume sweet foods. Eating habits in this study are the habit of consuming risky foods, namely sweet foods/drinks and processed foods from wheat flour (instant noodles, wet noodles, bread, and biscuits). Consumption of sweet and fatty foods is significantly associated with the incidence of diabetes mellitus. Diabetes mellitus will affect the metabolism of carbohydrates, proteins, and fats in the body. The breakdown of glucose from protein and fat stores in the body can be done if cells lack glucose (Nur et al., 2017).

Frequent consumption of sweet foods/drinks will increase the risk of type 2 DM because it increases the concentration of glucose in the blood. The results of this study indicate that people who have a habit of frequently consuming sweet foods/drinks are at greater risk of developing type 2 DM than those who rarely do (Wicaksono, 2011).

A sweet food diet is related to the occurrence of type 2 DM. Excessive consumption of sweet foods can increase the risk of diabetes because continuous sugar consumption can cause the body to be unable to use insulin effectively.

**2. Habit Of Exercise**

**Table 2. Habit Of Exercise with Type 2 DM Incidence in 2x2 Table Processing**

| Risk Factor | Disease | | total |
|---|---|---|---|
| | Positif | Negatif | |
| At Risk (don't have a habit of exercising) | 22 | 13 | 35 |
| No Risk (have a habit of exercise) | 5 | 14 | 19 |
| Total | 27 | 27 | 54 |

Based on table 3.2, it is described that the respondents interviewed stated that there were 5 people who had type 2 DM who did not have a habit of exercising and there were also 22 of them who had a habit of exercising but suffered from type 2 DM. There were 13 people

who did not have a habit of exercising with type 2 DM and there were 14 people who did not suffer from type 2 DM and even had a habit of exercising. The calculation of the risk of exposure to the habit of consuming sweet foods and drinks is as follows:

$$Odd\ Rasio\ (OR) = \frac{Exposure\ odds\ for\ cases}{Exposure\ odds\ for\ ccontrol}$$

$$Odd\ Rasio\ (OR) = \frac{22/5}{13/14}$$

$$Odd\ rasio\ (OR) = \frac{22x14}{13x15}$$

$$Odd\ Rasio\ (OR) = \frac{308}{65}$$

$$Odd\ Rasio\ (OR) = 4{,}73$$

Individuals with a habit of rarely exercising have a 4.73 times greater risk of developing Type 2 DM compared to those who have a habit of exercising regularly. This research is also proven by one study which states that the results of the Odds Ratio test can be interpreted that those who do not exercise have a five times greater risk of developing diabetes than those who do enough exercise. Research which has been carried out prospectively also shows that exercise reduces the risk of Type 2 DM (Sudaryanto et al., 2014).

The frequency of exercise has been shown to be related to blood sugar levels in people with Type 2 DM. Physical exercise if done three times a week will increase insulin activity in DM patients. In addition, the permeability of contracting muscles will increase. So that when doing physical exercise, insulin receptors become more numerous and will be more sensitive. The types of exercise recommended for DM patients are aerobic (endurance) sports such as walking, swimming, gymnastics, jogging, and leisurely cycling. (Mahdia et al., 2018).

### 3. Family History

**Table 3. Family History of DM with Type 2 DM Occurrence in 2x2 table processing**

| Risk Factor | Disease | | Total |
|---|---|---|---|
| | Positif | Negatif | |
| At Risk (have a family history of DM) | 9 | 2 | 11 |
| No Risk (don't have a family history of DM) | 18 | 25 | 43 |
| Total | 27 | 27 | 54 |

Based on table 3.3, it is illustrated that respondents who experience type 2 DM with a family history of DM are 9 respondents, while 18 respondents who suffer from DM don't have a family history of DM. Respondents who suffer from type 2 DM with a family history of DM are 2 people, and 25 respondents do not suffer from type 2 DM and also don't have a

family history. The calculation of the risk of exposure to the habit of consuming sweet foods and drinks is as follows:

$$Odd\ Rasio\ (OR) = \frac{Exposure\ odds\ for\ cases}{Exposure\ odds\ for\ ccontrol}$$

$$Odd\ Rasio\ (OR) = \frac{9/18}{2/25}$$

$$Odd\ rasio\ (OR) = \frac{9x25}{2x18}$$

$$Odd\ Rasio\ (OR) = \frac{225}{36}$$

$$Odd\ Rasio\ (OR) = 6{,}25$$

Individuals with a nuclear family history with DM have a 6.25 times greater risk of developing Type 2 DM compared to those who do not have a nuclear family history of with DM. These results are in accordance with the results of one study, namely that there is a complex interaction of genetic and environmental factors in Type 2 diabetes. Respondents who have a family history of diabetes mellitus are four times more at risk of developing type 2 diabetes mellitus. In this study, the family members who suffered the most from diabetes mellitus were the biological mother and siblings (Desi et al., 2018).

From the statement of the results it is known that there is a complex interaction of genetic factors. Respondents with a family history of diabetes mellitus have a higher risk of developing type 2 diabetes mellitus compared to people who do not have a family history of diabetes.

## IV. Conclusion

Individuals who have a history of the habit of consuming sweet foods, rarely exercise, and have a nuclear family history of DM have a greater risk of developing Type 2 DM compared to individuals who do not have a history of this disease.

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