

# Factors Associated with Diabetes Mellitus Incidence

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## ABSTRACT

Diabetes mellitus is one of the main health problems, because the prevalence of diabetes mellitus continues to increase, both in developed countries and in developing countries. The purpose is to determine the factors associated with the incidence of diabetes mellitus. This research is descriptive analytic with 52 patient as respondent. Using Accidental Sampling Technique. The data collecting was taken by using questioner. The results showed. There is meaningful relations diet, heredity, and obesity with diabetes mellitus incidence ( $p < 0.05$ ). The result of this research is expected to be an input for the nurse and the institution to increase counseling and socialication activities related to Diabetes mellitus and how to prevent it.

**Keyword:** Diet, heredity, obesity and diabetes mellitus incidence

## 1. INTRODUCTION

Diabetes Mellitus is a metabolic and genetic disorder that includes heterogeneous manifestations in the form of loss of carbohydrate tolerance. If it is fully developed clinically, diabetes mellitus is characterized by hyperglycemia, atherosclerosis, microangiopathy and neuropathy [1]. Meanwhile, Diabetes Mellitus is a group of diseases characterized by hyperglycemia due to damage to insulin secretion, insulin action, or both. Based on the description above, Diabetes Mellitus is a metabolic disease with a increased blood sugar levels and insulin action in the pancreas [2].

Diabetes Mellitus is divided into 2 namely Type I Diabetes Mellitus and Type II Diabetes Mellitus. Type I Diabetes Mellitus is often also referred to as a disease that depends on insulin or Insulin Dependent Diabetes Mellitus (IDDM) while Type II Diabetes Mellitus is often also referred to as a disease that is not insulin-dependent ie Non-Insulin Dependent Diabetes Mellitus (NIDDM) [3]. Type II diabetes occurs because of resistance of insulin, insulin receptors numbers although insulin amount does decrease. Glucose cannot enter to beta cell in the pancreas. This is caused by obesitas, high fat and low carbohydrate diet, lack of physical activity and heredity [4].

Diabetes mellitus is widely experienced chronic disease, with 347 million people in the world [5]. It is to be doubled by 2030 [6]. According to the International Diabetes Federation (IDF), in 2014 there are currently 387 million people suffer diabetes, and it will be an increase to 592 million people in 2035 and 2040 to 642 million people [7].

Indonesia was among the 10 megara which had the highest number of people with diabetes mellitus in the world in 2015, which was ranked 7th after China,

India, the United States. In 2013 In Indonesia from 8.5 to 10 million at 2015 [7]. In 2040, Indonesia will rank 6th out of 10 countries that have the highest number of people with diabetes mellitus, namely 16.2 million people [7]

The prevalence of Diabetes Mellitus in Indonesia is 1.5% and the prevalence of Diabetes Mellitus in West Sumatra is 1.3%. West Sumatra ranks third number of suffer Diabetes Mellitus. Regencies /cities occupy the 5th highest prevalence of diabetes mellitus in West Sumatra Province are Bukittinggi City (2.6%), Pariaman City (2.6%), Sawah Lunto City (2.2%), South Coast (1.9%), and Pasaman Barat (1.6%) (handayani et al, 2013). One hospital in Bukittinggi diabetes mellitus cases experienced a significant increase from 2013 as many as 377 cases to 827 cases in 2015 (54.41%) [8].

Diabetes mellitus is caused by several factors one of which occurs in people who are obese due to the wrong lifestyle [4]. Obesity include that risk of factor for Diabetes mellitus incidence caused by excessive eating patterns. Where excess fat levels can cause decreased insulin production. Obesity or overweight is also influenced by a lack of bodily activity, not regulating diet, and eating more fatty foods such as meat. For diabetes mellitus, only a balanced diet and nutritional balance in food are needed [3]. Obesity is also a risk factor that plays an important role in diabetes mellitus. As a result, high blood glucose levels will eventually cause a person to suffer from Diabetes mellitus [9].

Nearly 80% of people affected by diabetes are obese and if they are obese, insulin production from the pancreas becomes less effective or is called insulin resistance. If you lose weight, insulin will work more effectively because it can lower blood sugar properly.

Insulin resistance is very related to body weight. Reducing weight or just maintaining it is very good for diabetics because a small amount of fat can reduce insulin resistance [10].

In addition to obesity, the diet in patients with Diabetes Mellitus aims to control glucose and hypertension. Eating arrangements must be of sufficient nutritional content and accompanied by a reduction in total fat, especially saturated fat. Arrangement of food portions in such a way that nutritional intake is fulfilled throughout the day. Light loss of weight (5-10 kg), proven to diabetes of control, though the ideal of weight is not reached Loss of weight can be achieved well with a decrease in modern energy intake and an increase in energy expenditure [4].

Diet is the main therapy for diabetes mellitus, so every patient should have a positive attitude (support) towards the diet so that complications do not occur, both acute and chronic. If the patient does not have a positive attitude towards the diabetes mellitus diet, complications will occur and will eventually lead to death. To maintain quality of life and avoid complications from diabetes mellitus, each patient must adopt a healthy lifestyle, which is to carry out a diabetes mellitus diet [11].

Another factor for diabetes mellitus after obesity and diet is heredity. Heredity is a risk factor for diabetes mellitus, which is included in the family history of parents, brothers, and sisters [3]. Risk a child suffer of diabetes mellitus is 15% if one of his parents suffers from diabetes mellitus. If parents have Diabetes Mellitus then suffering is 75%. People who have mothers with diabetes mellitus have 10-30% more than people who have fathers with DM. so it can be said that heredity factors has a influence on the Diabetes mellitus incidence. Based on the results of an initial survey conducted by researchers on May 12, 2016 at one of the hospitals in Bukittinggi, from 10 respondents with diabetes mellitus who were obese 5 people, who were influenced by 2 people's diets, and who were affected by 3 people's offspring.

**2. METHODS**

This research uses descriptive-analytic design with 52 respondents. The sampling technique is accidental sampling [12]. The study was conducted from May to September 2016. Data collection was carried out using a questionnaire. Sample criteria taken are Inclusion Criteria: Willing to be a respondent, Be in the research area when the research is conducted, Diabetes Mellitus Patients Can write and read and Able to communicate well. Exclusion criteria: Diabetes mellitus patients who have physical or mental limitations that can interfere with research (blind, deaf,

disabled, mental) and the patient is undergoing medical treatment [13].

**3. RESULTS**

**1. Univariate Analysis**

a. Dependent and Independent Variable Frequency Distribution

Table 1. Frequency Distribution of Respondents Based on Factors of Diet, Heredity, Obesitas and diabetes mellitus incidence

No	Variable	f	%
1	Diet		
	No.	19	36.5
	Yes	33	63.5
	Total	52	100
2	Heredity		
	No	19	36.5
	Yes	33	63.5
	Total	52	100
3.	Obesity		
	Malnutrition	4	7.7
	Normal	34	65.4
	Obesity	14	26.9
	Total	52	100
4	Incidence of DM		
	Yes	41	78.8
	No	11	21.2
	Total	52	100

Table 1, 52 respondents, more than half (63.5%) of respondents went on a regular diet, more than half (63.5%) of respondents had a history of diabetes mellitus, more than half (65.4%) ) respondents have normal weight and more than a portion (78.8%) of respondents suffer from Diabetes Mellitus.

**2. Bivariate Analysis**

a. Relationship between dietary factors with Diabetes Mellitus Incidence

Table 2. Frequency Distribution of Respondents Based on the Relationship Between Dietary Factors and Diabetes Occurrence

Diet DM	Diabetes Melitus				Total		Pvalue
	Yes DM		No DM		N	%	
	N	%	N	%			
No	18	94,7	1	5,3	19	100	0,040
Yes	23	69,7	10	30,3	33	100	
Total	41	78,8	11	21,2	52	100	

Table 2 there is 19 respondents the percentage of Diabetes Mellitus patients who did not go on a diet (94.7%) was higher than that of Diabetes Mellitus patients who went on a diet (69.7%). From the results of the chi-square , there is a relationship between diet and the incidence of diabetes mellitus.

**b. The Relationship of Hereditary Factors with the Occurrence of Diabetes Mellitus**

**Table 3. Frequency Distribution of Respondents Based on the Relationship of Heredity Factors and the Incidence of Diabetes Mellitus**

Here dity	Diabetes Melitus				Total		Pvalue
	Yes DM		No DM				
	n	%	N	%	N	%	
No.	18	94,7	1	5,3	19	100	0,040
Yes	23	69,7	10	30,3	33	100	
Total	41	78,8	11	21,2	52	100	

Table 3 , 19 respondents the percentage of people with diabetes mellitus who have no hereditary history (94.7%) is higher than those who have a hereditary history (69.7%). P-value = 0.040 there is relationship with the offspring with the incidence of Diabetes Mellitus.

**c. Relationship between Obesity Factors and Diabetes Mellitus**

**Table 4. Frequency Distribution of Respondents Based on the Relationship between Obesity Factors and Diabetes Mellitus**

Obesity	Diabetes Melitus				Total		Pvalue
	Yes DM		No DM				
	n	%	n	%	N	%	
Malnutri tion	4	100	0	0	4	100	0,025
Normal	23	67,6	11	32,4	34	100	
Obesity	14	100	0	0	14	100	
Total	41	78,8	11	21,2	52	100	

Table 4 that 4 respondents the percentage of people with Diabetes Mellitus who have malnutrition there are 4 (100%) respondents who suffer from Diabetes Mellitus. Compared to 34 respondents who have normal weight there are 23 (67.6%) Diabetes Mellitus suffers. While from 14 respondents who have obesity there are 14 (100%) Diabetes Mellitus suffers.

The results Pvalue = 0.025 (p <0.05) means that there is relationship between obesity and diabetes mellitus incidence.

**4. DISCUSSION**

Relations dietary factors and diabetes mellitus incidence, it was found that from 19 respondents the percentage of Diabetes Mellitus patients who did not go on a diet (94.7%) was higher than that of Diabetes Mellitus patients who went on a diet (69.7%). P-value = 0.040 means there is relations diet and diabetes mellitus incidence.

In line with the results of Silalahi's research, that the majority of respondents did not regularly follow diets (60%) and those who regularly took diets (40%) [4] and the frequency distribution of respondents who did not comply on a diet of 31 (57.4%) and obedience who followed a diet of 23 (42.6%).[11].

Diet is a dietary arrangement, both portion, size, and nutritional content. The emphasis of the diet in patients with Diabetes Mellitus is aimed at controlling glucose, lipids, and hypertension. Eating arrangements must be of sufficient nutritional content and accompanied by a reduction in total fat, especially saturated fat. Arrangement of food portions in such a way that nutritional intake is fulfilled throughout the day. Light of loss of weight (5-10 kg), proven to controlled diabetes, though the ideal weight not reached. Loss of weight can be achieved well with decrease of moderate in energy intake and energy expenditure increased [14].

According to the researchers' assumptions there is relationship diet and diabetes mellitus incidence. this is due to the wrong dietary arrangements, there is no glucose control, and consuming foods that are high in fat, do an unbalanced diet so that it cannot control diabetes and the effectiveness of its treatment being traveled.

**The Relationship of Hereditary Factors with the Occurrence of Diabetes Mellitus**

Based on the results of the study, it was found that from 19 respondents the percentage of people with diabetes mellitus who do not have offspring are (94.7%) higher than those who have offspring (69.7%). The value of Pvalue = 0.040 means there is relationship the offspring and diabetes mellitus incidence.

According to WHO, heredity can be involved of pancreatic function  $\beta$  cells, metabolism of insulin or glucose, or conditions metabloic that will increase the diabetes mellitus risks (eg energy intake / expenditure, lipid metabolism). Risk of child with diabetes mellitus type II is 15% if one parent has diabetes mellitus too and 75% chance if both of them have diabetes mellitus.

In general, if a person has diabetes mellitus, his siblings have a 10% risk of diabetes mellitus. Therefore, family history of diabetes mellitus has influence of diabetes mellitus incidence [5].

Another study proves that relations hereditary history and Diabetes Mellitus incidence. People who have a diabetes mellitus history have risk 3 times to suffer from diabetes mellitus than those who do not have a history of heredity [15]. Research conducted by Kekenusa, etc that relations hereditary history and diabetes mellitus incidence. This shows that people who have a history of offspring suffering from diabetes mellitus, 5 times risk of diabetes mellitus. It will be compared with People have no history of offspring suffering from diabetes mellitus [16].

This condition accordingly with the results of research Wicaksono on 30 outpatients in the Internal Medicine Polyclinic Dr. Kariadi Semarang, hereditary history of suffering from diabetes mellitus is a risk factor for the occurrence of diabetes mellitus which is statistically significant and influence 75% diabetes mellitus incidence [17].

According to the researchers' assumptions, respondents have not diabetes mellitus history but did not suffer from diabetes mellitus were caused because they had made prevention efforts such as regulating a healthy lifestyle so as not to suffer from diabetes mellitus. For respondents who do not have a history of diabetes mellitus but suffer from diabetes mellitus because they have other factors that can affect the occurrence of diabetes mellitus, such as physical activity, blood pressure. In addition they tend to be ignorant and do not make efforts to prevent the Diabetes mellitus occurrence.

#### **Relations Obesitas Factors and Diabetes Mellitus**

Based on the results, it was found that from 4 respondents have malnutrition there is 4 (100%) respondents Diabetes Mellitus suffer. Compared 34 respondents who have normal weight there are 23 (67.6%) diabetes mellitus suffers. While 14 respondents who have obesity there are 14 (100%) respondents diabetes mellitus suffer. The value of P-value = 0.025 means that there is relations obesity and the diabetes mellitus incidence.

The Results accordingly with Banner, etc there is relations obesity and diabetes mellitus incidence [18]. Also, stated that obesity has a significant relationship with the incidence of diabetes mellitus with  $p = 0.14$  and  $OR = 0.037$ . [19]. The relations obesity and diabetes mellitus incidence is strengthened because people with obesity have larger fat cells in their bodies. It is believed that larger fat cells do not respond properly to insulin.

Obesity is a measure of body mass pressure and can be used to assess the state of human nutrition. Maintaining weight is the key to every prevention or management program for Diabetes Mellitus. The most common cause of insulin resistance is being overweight or obese.

Obesity is the main factor causing DM, it is increasing that 80% to 90% of diabetes mellitus patients are obese. In a state of, obesity the pancreatic beta cell response to an increase in blood sugar is often reduced. In addition, insulin receptors on targeted cells throughout the body, including muscle, are reduced in number and active so that the presence of insulin in the blood is lacking or cannot be utilized.

The results of other studies also showed that obesity was seen to be significant in the incidence of diabetes mellitus. Research found that obese people have a 6.7 times risk of getting Diabetes Mellitus compared with people who are not obese [20]. The relationship between obesity and diabetes mellitus is caused by physical activity and consumption of carbohydrates, proteins, and fats, which are risk factors for obesity. This causes increased Fatty Acid or Free Fatty Acid (FFA) in cells. This increase in FFA will reduce the translocation of glucose transporters into the plasma membrane, and cause insulin resistance in muscle and adipose tissue [21].

According to the researchers' assumptions, the relations obesity and the incidence of diabetes mellitus because obese people tend to do less activity than non-obese people. This causes a lot of fat tissue in the body, so that the body is increasingly resistant to the action of insulin, especially if body fat or excess body weight is collected in the central area or the stomach (central obesity), it is more likely to be exposed to type II diabetes mellitus (not insulin-dependent).

#### **5. CONCLUSION**

There was a significant relationship between diet, heredity, and obesity with the incidence of diabetes mellitus ( $p < 0.05$ ). This research is expected to be input and evaluation for nurses and related institutions to further enhance counseling and outreach activities related to Diabetes Mellitus and how to prevent it, namely to promote promotive and preventive actions by providing health education to the community through direct explanation, distribution of leaflets, posters etc. so that the public can know the factors that influence the occurrence of DM and be able to prevent by recognizing risk factors, changing and maintaining a healthy lifestyle and being willing to carry out examinations and treatment at the nearest health service.

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