



# Factors Related to the Incidence of Diabetes Mellitus at the Trauma Health Center in Samarinda City

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## Abstract

A functional disorder known as diabetes mellitus results in a lack of insulin hormone, either because the pancreas is unable to produce it or because body cells are unable to properly utilize the insulin the pancreas has produced. Because of this disorder, blood sugar levels will rise uncontrollably. Continuously high glucose levels will poison the body, including its organs. The 2018 Riskesdas statistics show that 2% of Indonesians over the age of 15 have been diagnosed with diabetes mellitus. Compared to the 1.5% prevalence of DM in the 2015 Riskesdas data, this figure indicates a rise. Nonetheless, blood sugar levels rose from 6.9% to 8.5% in 2018 based on data from tests conducted in 2013. According to this statistic, about 25% of DM patients are aware that they have the disease. Finding the diabetes mellitus risk variables at the Trauma Center Health Center in Samarinda City is the aim of this study. The study uses a cross-sectional analytical survey that is directed at all 189 patients at the Trauma Center Health Center in Samarinda City who have diabetes mellitus. The study uses unintentional sampling and a questionnaire to gather data. To examine the data for persons with diabetes, we employ the chi-square test at a 5% confidence level.

**Keywords:** Medical History, Diabetes Mellitus, Heredity.

## 1. Introduction

In recent decades, disease patterns have shifted from infectious diseases to non-communicable or degenerative diseases. Until now, degenerative diseases have been the world's leading cause of death. This has also impacted the losses suffered by several countries around the world. Degenerative diseases were identified by the World Health Organization as the cause of up to 38 million (68%) of the 56 million deaths that occurred globally in 2012 [1]. As diabetes mellitus (DM) becomes more commonplace globally, in both industrialized and developing nations, it is being acknowledged as a global health issue. According to WHO estimates, DM affects over 346 million individuals globally. If nothing is done, this figure is probably going to more than double by 2030. Low- and middle-income nations account for over 80% of DM fatalities [2]. The Trauma Center Health Center saw 87 cases of DM patients in 2020. In Samarinda City, there were 359 cases in 2021 and 360 cases in 2022. In 2017, there were 12,688 new DM sufferers in East Kalimantan, with 4,794 male cases and 7,894 female cases. The number of old DM sufferers was 54,108, compared to 19,131 men and 34,977 women. The number of deaths due to DM in East Kalimantan in 2017 was 256 cases, from 93 male cases and 163 female cases. Indonesia has the world's sixth-highest prevalence of DM sufferers, with an estimated 10.3 million.

All bodily systems, including the endocrine system, deteriorate with age. Aging brings with it a host of health problems, including endocrine system problems. Factors such as aging, which regeneratively leads to decreased body function, cause age-related changes in insulin resistance conditions, unstable blood sugar levels, and many cases of diabetes mellitus [3]. Lifestyle changes, such as becoming obese and less active, can also increase the risk of diabetes mellitus, or impaired glucose tolerance, a condition that affects all people and nations [4]. Diabetes develops mostly as a result of genetic or inherited causes. Diabetes can be very hard to manage if there are genetic issues involved. It is essential to make dietary and lifestyle improvements to prevent diabetes in people with inherited causes [5]. Physical activity and regular exercise are generally very helpful for health when it comes to preventing the risk of diabetes. Insulin's role in skeletal muscle glucose and fat metabolism can be influenced by physical activity. The Ministry of Health [6] states that regular physical activity can help prevent diabetes mellitus by lowering body fat and boosting lean body mass.



A diet is a strategy or attempt to control the kind and quantity of food consumed for a particular goal, such as preserving nutritional status, promoting or inhibiting the recovery of illnesses, or preserving health. A person's daily eating habits are reflected in their daily eating patterns [7]. Health promotion is a revitalization of health education from the past. It encompasses not only raising public awareness by providing and increasing health-related knowledge, but also aims to bridge behavioral changes in society, organizations, and their environment. One of the efforts to change the lifestyle of DM sufferers is to promote health with promotional media such as leaflets, posters, and flipcharts. We hope that the health promotion efforts will enable DM sufferers in East Kalimantan, particularly in the Trauma Center Health Center area, to adopt healthier lifestyles. According to the International Diabetes Federation (IDF), 123 million people over 65 and 327 million people between 20 and 64 years old worldwide suffered from DM in 2017, and estimates indicate that this number will increase by 629 million people between 20 and 79 years in 2045. In Indonesia, the estimated number of DM sufferers is 10.3 million people. With the greatest frequency of DM patients worldwide, Indonesia now stands sixth thanks to this statistic. Additionally, according to IDF predictions, Indonesia will have 14.1 million DM patients by 2035, up from 9.1 million in 2014 [8]. The 2018 RISKESDAS results show that 2% of Indonesians over the age of fifteen have been diagnosed with diabetes mellitus (DM), according to medical professionals. This number represents an increase over the 1.5% prevalence of DM found in the results of the 2015 RISKESDAS. However, based on data from a blood sugar test conducted in 2013, the prevalence of DM rose from 6.9% to 8.5% in 2018. According to this statistic, about 25% of DM patients are aware that they have the disease.

In 2017, there were 12,688 new cases of DM in East Kalimantan, consisting of 4,794 male cases and 7,894 female cases. The number of old DM sufferers was 54,108, compared to 19,131 men and 34,977 women. As per the data provided by the Samarinda City Health Office [9], there were 163 female cases and 93 male instances of DM-related deaths in East Kalimantan in 2017. To live a healthy lifestyle with diabetes, one must control their intake of food and drink, exercise, shed extra weight, manage stress, and check their blood sugar levels [10]. Lifestyle changes, such as becoming obese and becoming less active, can also increase the risk of diabetes or impaired glucose tolerance, a condition that affects everyone. Environmental factors, such as moving from rural to urban areas or urbanization, are estimated to increase the risk of DM. These factors can lead to lifestyle changes, including unbalanced eating habits, which can lead to obesity. Obese adults are four times more likely to develop diabetic mellitus (DM) than those with a normal nutritional condition. An additional significant risk factor for DM is physical activity. Frequent exercise can enhance blood vessel health as well as every facet of metabolism, including glucose tolerance and insulin sensitivity [11][12]. Urban lifestyles with diets high in fat, salt, and sugar cause people to consume food excessively; in addition, instant food patterns are currently popular with some people but can increase blood glucose levels. A healthy diet for diabetes is 25-30% fat, 50-55% carbohydrates, and 20% protein [13].

To emphasize the importance of understanding the relationship between these characteristics and the prevalence of diabetes mellitus at this location, this study sought to evaluate the factors associated with the incidence of diabetes mellitus at the Samarinda City Trauma Health Center. This research scheme serves as the foundation for researching community empowerment, to enhance community participation in the promotion and prevention of non-communicable diseases. We anticipate that the findings will enhance the capacity of researchers to plan, carry out, and generate valuable research outcomes.

## 2. Research Method

This study design employs a cross-sectional approach with an analytical survey method. The study included 189 registered diabetic patients from the Samarinda Trauma Center Health Center. In this study, the incidental sampling technique is utilized to get a population-wide representative sample. A questionnaire intended to uncover variables such as patient behavior, knowledge, attitudes, and demographics that might be connected to the quality of patients' diabetes management was used to collect data. Next, we examined the data collected using the chi-square statistical test to see how patient compliance with diabetes mellitus care, the dependent variable, and the independent variable related to each other. We select the chi-square test for categorical data analysis, which seeks to ascertain the relationship or association between two variables. If the findings of the statistical test in this study satisfy the 5% significance level, the results are considered significant because the probability (p-value) is less than 0.05. The goal of this project is to produce scholarly articles that can be published in research journals with national accreditation. We hope that this article will further health science, especially in the field of managing diabetes mellitus in primary care. The study's findings should also provide a solid basis for the creation of more potent intervention plans aimed at improving patient adherence to diabetes mellitus management.

## 3. Result And Discussions

The research's findings reveal that more respondents, 180 (60.0%), have diabetes mellitus than those who do not, 9 (40.0%). 110 respondents, or 93.3% of the 189 who had diabetes mellitus, were between the ages of 56 and 65 when they developed the condition. Diabetes mellitus is a condition in which blood sugar levels rise above normal because the body is unable to use or produce insulin when needed. Diabetes mellitus can also cause a variety of disorders affecting practically every physiological system in the human body, including the skin and heart. These consequences can include gangrene and skin ulcers, ocular tuberculosis, and high blood pressure. The two most common types of diabetes in the population are type 1 and type 2. But practically everyone on the planet suffers from type 2 diabetes. The number of instances of diabetes mellitus is rising as a result of changes in modern diet and lifestyle. It may be challenging to maintain normal blood sugar levels when following an unhealthy diet that includes a lot of sweets and/or fast food and beverages. This adds to the number of cases of diabetes mellitus, along with a sedentary lifestyle devoid of exercise and physical activity.

One of the things that affects a person's health behavior is their age. The study's conclusions show that 79 respondents, or 6.7%, do not have this risk, while 110 respondents, or 93.3%, are at risk for developing diabetes mellitus if they are under 45 years old. Blood glucose levels affect how the body uses carbohydrates and releases insulin as we age, which prevents glucose from entering cells. Risk factors are going to rise sharply and considerably. Decreased bodily function, particularly pancreatic failure, is another effect of aging. The study's findings indicate that 135 respondents (53.3%) and 54 respondents (46.7%), respectively, have a history of diabetes mellitus. Hereditary history is defined by genetics as the combination of a family history of disease and genetic variables. An individual may be more susceptible to contracting an illness, especially diabetes mellitus if they have a family history of the condition. People who have one or more family members with diabetes, such as parents, siblings, or children, are more likely to develop diabetes than those without a family history of the disease, according to the CDC (2011) in Imelda (2018).

The research reveals that 110 respondents (54.4%) have poor eating patterns, while 79 respondents (45.6%) have good eating patterns. A diet is an approach or attempt to control the quantity and kind of food consumed for a particular goal, such as preserving nutritional status or avoiding or treating disease. According to the notion, a bad diet that is, a diet heavy in carbs with a high glycemic index can impact insulin resistance and lower blood sugar levels when it is consumed often, over an extended period, and in big quantities (Sutanto, 2010). The majority of study participants with diabetes mellitus who sought treatment also had poor diets because they continued to enjoy sugary drinks and foods, as well as high-fat and high-carbohydrate foods that aggravate the disease. People's eating habits are impacted by changes in their lifestyles. As a result, to prevent numerous other ailments, it is imperative to keep a nutritious diet. According to the study's findings, 107 respondents (54.4%) had healthy physical activity habits, while 82 respondents (45.6%) had less physical activity. Participants in this study participated in sports, such as walking, running, cycling, and other popular sports, at least three times a week. According to the notion, the body burns a variety of sugars when it vibrates or engages in physical activity to use them as a motive force. The body will then see a decrease in sugar levels, which will lessen the need for the hormone insulin. Physical activity and regular exercise can affect insulin's action on glucose and fat metabolism in skeletal muscles. People who do not exercise or engage in physical activity regularly store food as fat and glucose instead of burning it, which can result in obesity and diabetes. According to the study's findings, 59.3% of the 112 respondents who were 45 years of age or older had diabetes mellitus, which is a larger percentage than the 36.0% of younger respondents. The Samarinda City Trauma Center Health Center's jurisdiction in 2024 has a substantial association between age and the incidence of diabetes mellitus, resulting in the rejection of the null hypothesis (H0) ( $p\text{-value} = 0.028 < \alpha = 0.05$ ). These findings are consistent with the studies conducted by Isnaini and Ratnasari (2016). Trisnawati & Setyorogo (2012) found a strong correlation between age and the occurrence of type 2 diabetes mellitus at Samarinda City Trauma Center Health Center in 2024 ( $p\text{-value} = 0.028 < \alpha = 0.05$ ). The study's premise ties age to the prevalence of diabetes mellitus, implying that age has a major impact on health-related behaviors. Specifically, after 45 and especially after 65, the risk of developing diabetes mellitus increases. Glucose intolerance and a deterioration in physiological function, namely in the pancreas's capacity to make insulin, are linked to this increased risk. Insulin resistance and decreased insulin production result in unstable blood sugar levels. Therefore, diabetes mellitus often appears after someone enters this vulnerable age.

**Table 1.** The Relationship between Heredity and the Incidence of Diabetes Mellitus in the Trauma Center Health Center Work Area of Samarinda City in 2024

Descendants	Incidence of Diabetes Mellitus				Total	<i>p-value</i>	
	DM		No DM				
	N	%	n	%			
Available	135	71,4%	0	0,0%	135	100%	0,000
None	45	23,8%	9	4,8%	54	100%	
<b>Total</b>	180	95,2%	9	4,8%	189	100%	

The study's findings revealed that 135 respondents (71.4%) with diabetes mellitus had a hereditary history, compared to 45 respondents (23.8%) who had no history. With a significant value of 0.000, the chi-square test findings show that the null hypothesis (H0) was not supported. This shows that the amount of diabetes mellitus cases in the Samarinda City Trauma Center Health Center's service region in 2024 may be inherited. These findings are consistent with Miratu Megasari's (2016) study, which looked at a similar location and showed a link between family history and the prevalence of diabetes mellitus in the elderly population. Megasari's study found that people with a family history of diabetes mellitus are 13.286 times more likely to develop the disease. The p-value, or less than 0.05, obtained by the statistical test was 0.000. These findings, however, contradict those of a 2016 study by Dindi Paizer, which did not discover any proof of a significant hereditary component to diabetes mellitus. The majority of diabetics did not acquire the disease from their parents, according to Paizer's findings. An additional finding of the statistical test was a p-value of  $0.000 > \alpha = 0.05$ . However, the study's premise suggests a genetic predisposition, stating that people with a family history of diabetes that is, from a parent or other close relative have a 2–6 times higher risk of acquiring the condition. The literature states that the risk of developing diabetes mellitus increases to 15% if one parent has it, and to 7.5% if both parents have it. Of course, individuals with or without a history of diabetes can prevent this by adopting a healthy diet and lifestyle.

The study's findings showed that 108 respondents (57.1%) with diabetes mellitus had a higher likelihood of eating poorly than 72 respondents (38.1%) with a healthy diet. The chi-square test findings indicated that the null hypothesis (H0) was not supported, with a significant value of  $p = 0.036$ . This indicates that there is a link between the percentage of diabetes cases in the Samarinda City Trauma Center Health Center's service area in 2024 and the type of food consumed. Minda Patia Sari (2016) observed a p-value of value + 0.036  $< \alpha = 0.05$  link between food intake and the incidence of diabetes mellitus in older employees of the Samarinda City Trauma Center Health Center. This study is consistent with her findings. Putri Dafriani's (2017) study demonstrated a link ( $p\text{-value} = 0.036 < \alpha = 0.05$ ) between diabetes mellitus incidence and diet in the trauma center health center region, supporting the findings of this analysis. Based on the fact that the majority of participants, particularly those with diabetes mellitus, frequently reported consuming foods and beverages high in fat, sugar, and carbohydrates, the study assumes that there is a connection between diet and the development of diabetes mellitus. Moreover, eating and drinking a lot of sugar, fat, and carbs is a common part of bad diets. Furthermore, research indicates that the majority of people with diabetes tend to drink sweet beverages like tea, coffee, and syrup more frequently during the day. Interviews frequently disclose their propensity to eat items heavy in fat, such as fried foods and foods made with coconut milk. The establishment of unhealthy diets that lead to the development of diabetes mellitus is mostly caused by a person's drive for a certain lifestyle and habits that lead them to consume food excessively.

According to the study's findings, 135 respondents (7.4%) who have diabetes mellitus report being physically active, compared to only 45 respondents (51.4%) who report being inactive. The chi-square test statistical analysis yielded an insignificant result ( $p\text{-value} = 0.043 > \alpha = 0.05$ , indicating H0). This suggests that there is no link between the prevalence of diabetes mellitus and physical activity at the Samarinda City Trauma Center Health Center's workplace. This supports the conclusions of Novita Sari's (2019) study, which asserts that physical activity and diabetes mellitus prevalence are linked. Her research is predicated on the supposition that the majority of respondents participate in little to no physical activity and never exercise. The majority of them opt to watch TV at home, which leaves them with little opportunity for exercise. After that, the p-value is  $= 0.043 < \alpha = 0.05$ . The statistical test's higher-than-0.05 p-value of

0.634, however, indicates that this study is compatible with Nuraini & Supriyatna's (2015) study, which found a link between physical activity and type 2 diabetes mellitus. Out of 34 samples, the study found that 5 persons had diabetes mellitus, 3 (20.0%) of whom showed good physical activity, and 2 (10.5%) of whom showed low physical activity. The study's underlying presumptions state that frequent exercise, or physical activity, does help regulate blood sugar levels. The majority of responders who have diabetes exercise regularly. Diabetes mellitus can result from several causes, including physical activity, but food is also a major contributing component. The study's findings indicate that the majority of respondents who have diabetes had poor eating habits. The imbalance between physical activity and diet can cause someone to get diabetes. Most individuals with diabetes engage in light exercise, like walking, and their body absorbs a relatively small amount of sugar compared to the energy they consume.

#### 4. Conclusion

The study revealed several key findings. Of the 189 respondents studied, 60% (180 respondents) suffered from diabetes mellitus, with the highest prevalence in the 56-65 age group (93.3%), indicating that diabetes mellitus is more common in older ages. The results also demonstrated a considerable rise in the risk of diabetes mellitus after the age of 45 and a dramatic increase after the age of 65, which is consistent with earlier research demonstrating an age-related link with diabetes mellitus. Furthermore, 71.4% of respondents with diabetes mellitus reported having a family history of the disease, indicating that genetic factors are a significant risk factor for the development of this condition. A poor diet has been linked to an increased chance of acquiring diabetes mellitus, according to research; of those surveyed, 57.1% routinely ate foods heavy in fat and sugar. According to statistical analysis, there was no substantial correlation between physical activity and the incidence of diabetes mellitus in the research area, even though 54.4% of respondents reported engaging in healthful physical activity. In contrast, it is crucial to promote a healthy lifestyle as a preventative measure, particularly for individuals with a family history of diabetes, by promoting optimal dietary practices and increased physical activity. In conclusion, the research indicates that the most significant risk factors for the high prevalence of diabetes mellitus in the region are age, familial history, and a poor diet.

#### References

- [1] WHO. (2014). "global report on noncommunicable disease 2014 worth health".
- [2] Dharmawan, A., Istia, M. J., Tan, H. T., Suparto, S., Anastasia, M. C., & Layanto, N. (2021). The outcome of patients with sepsis at Tarakan Hospital Central Jakarta in 2018. *Muhammadiyah Medical Journal*, 2(2), 49-54.
- [3] Tannady, H., Tannady, H., & Zami, A. (2019). The Effect of Organizational Culture and Employee Engagement on Job Performance of Healthcare Industry in Province of Jakarta, Indonesia. *Quality-Access to Success*, 20(169).
- [4] Azis, W. A., Muriman, L. Y., & Burhan, S. R. (2020). Hubungan Tingkat Pengetahuan dengan Gaya Hidup Penderita Diabetes Mellitus," *Jurnal Penelitian Perawat Profesional*, 2(1), 105-114.
- [5] Isnaini, N., & Ratnasari, R. (2018). Faktor Risiko Mempengaruhi Kejadian Diabetes Mellitus Tipe Dua," *Jurnal Kebidanan dan Keperawatan Aisyiyah*, 14(1), 59-68.
- [6] Dharmawan, A., Wijaya, P. I. G. I., Septiana, Y., Pasaribu, D. M. R., Tan, H. T., & Simanjuntak, L. S. F. (2024). Antibiotic Susceptibility Profile in Urinary Tract Infection Patients at Tarakan Regional Hospital. *Muhammadiyah Medical Journal*, 5(1), 28-35.
- [7] Tan, H. T., Dharmawan, A., Cahyadi, A., Layanto, N., & Harahap, E. (2020). Gyssens Evaluation On Antibiotics Usage On Inpatients With Urinary Tract Infection In Hospital X, Central Jakarta, on January 2017–June 2019. *Afiasi: Jurnal Kesehatan Masyarakat*, 5(3), 96-102.
- [8] Fitriana, R., & Rachmawati, S. (2016). *Cara Ampuh Tuntas Diabetes*. Yogyakarta: Medika.
- [9] Kemenkes RI. (2018). *Balithbangkes, Hasil Utama Riskesdas*. Jakarta.
- [10] Saqila, R. L., & Muflihatin, S. K. (2021). Hubungan Pengetahuan Dengan Manajemen Diri Pada Penderita Diabetes Mellitus Tipe II Di Wilayah Kerja Puskesmas Palaran Kota Samarinda. *Borneo Student Research (BSR)*, 2(2), 872-878.
- [11] Kurniawaty, E., & Yanita, B. (2016). Faktor-faktor yang berhubungan dengan kejadian diabetes melitus tipe II. *Jurnal Majority*, 5(2), 27-31.
- [12] Fabiani, H., & Tan, H. T. (2021). The Importance of Dietary Fiber on Stress Hormone in Pregnancy: A Literature Review. *Journal of Midwifery*, 5(1), 13-19.
- [13] Puskesmas Trauma Center. (2022). *Laporan Tahunan 10 Penyakit Terbanyak. Puskesmas Trauma Center*. Kota Samarinda.