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# Risk Factors for the Incident of Type 2 Diabetes Mellitus in the 20-44 Years Age Group in the Working Area of the Ulee Kareng Health Center in 2023

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## ABSTRACT

**Introduction:** The increase in the incidence of type 2 diabetes mellitus indicates that many individuals are unaware of the urgency of this disease, especially in the working area of Puskesmas Ulee Kareng, which has the highest prevalence.

**Objective:** The study aims to identify the risk factors for the occurrence of type 2 diabetes mellitus in the age group of 20-44 years in the working area of Puskesmas Ulee Kareng in 2023.

**Method:** The research design is descriptive-analytical with a case-control approach in a 1:1 comparison. The study population consists of all patients aged 20-44 years at Puskesmas Ulee Kareng, totaling 162 individuals. Sampling was conducted using convenience sampling, and the sample size was determined using the Lameshow formula, resulting in 47 diabetes patients as cases and 47 non-diabetic samples as controls. Data were collected from December 19, 2023, to January 2, 2024, using questionnaires and secondary data. Data analysis was performed using Chi-Square tests and Odds Ratio (OR) calculations with SPSS software.

**Result:** The univariate analysis results indicate that respondents' knowledge about diabetes mellitus is low (42.6%), heavy physical activity (26.6%), poor dietary patterns (59.6%), hypertension (67.0%), and a family history of type 2 diabetes (50%). The bivariate analysis shows a significant relationship between knowledge (p=0.014; OR=3.157), physical activity (p=0.021; OR=14.103), dietary patterns (p=0.006; OR=3.348), hypertension (p=0.000; OR=36.667), and family history (p=0.015; OR=3.419) with the incidence of type 2 diabetes mellitus.

**Conclusion:** In conclusion, knowledge, dietary patterns, physical activity, hypertension, and family history are risk factors for type 2 diabetes mellitus. It is recommended that Puskesmas prioritize community education on healthy lifestyles, increase physical activity, improve dietary habits, and conduct regular health monitoring.

**Keywords:** Diabetes Mellitus; Knowledge; Physical Activity;  Diet; Hypertension; Family History

# INTRODUCTION

Diabetes Mellitus, or what is commonly known as diabetes, refers to a chronic condition in which the body cannot produce enough insulin or cannot use insulin effectively (1). Diabetes Mellitus is a condition characterized by increased blood glucose levels, which can be heterogeneous or hyperglycemic. Normal blood glucose is produced and distributed in appropriate amounts in the body, formed in the liver from processing the food consumed (2).

According to data from WHO in 2018, Non-Communicable Diseases (NCDs) cause death for 41 million people every year, equivalent to 71% of total deaths worldwide. In Indonesia, PTM is the main cause of death with a percentage reaching 64%. One of the main causes of death in the non-communicable disease category is diabetes mellitus (3). According to the International Diabetes Federation (IDF) in 2017, around 425 million individuals worldwide, which is equivalent to around 8.8% of the productive age population (20-64 years), experience diabetes mellitus (4). Productive age is the age range between 15 and 64 years, where individuals have the ability to work and meet their own living needs. The high number of cases of type 2 diabetes mellitus in this age group can be an obstacle to a person's productivity (5).

Among other countries, Indonesia is ranked fifth with the number of individuals suffering from diabetes reaching 19.47 million. With a total population of around 179.72 million, this shows that the prevalence of diabetes in Indonesia has reached 10.6% (6). According to the 2018 Basic Health Research, overall, the prevalence of diabetes in Indonesia has increased quite significantly. In 2013, the prevalence rate of diabetes in adults reached 6.9%, and in 2018, this figure continued to increase to 8.5% (7). Data from the Indonesian Ministry of Health in 2020 shows that there are 8.4 million diabetes mellitus sufferers and it is predicted that there will be an increase of 578 million sufferers in 2030 and 700 million sufferers in 2045 (8). Aceh as one of the provinces in Indonesia is also experiencing an increase in the number of sufferers of type 2 diabetes mellitus. It was recorded that in 2013 the prevalence of type 2 diabetes mellitus in Aceh was 1.8%, where this figure increased in 2018 with a prevalence of 2.5%. and Banda Aceh is the city with the highest incidence of diabetes mellitus in Aceh with a prevalence reaching 2.3% (9). Based on data obtained from the Aceh Provincial Health Service, it is recorded that in 2021 there will be 184,527 million people suffering from diabetes mellitus, so that Aceh province also ranks eighth with the highest population of people suffering from diabetes mellitus in Indonesia (10).

# METHOD

This type of research is quantitative research using a descriptive analytical research design with a case control approach. In this study, researchers differentiated the population into two, namely the case population and the control population. The case population was all sufferers of type 2 diabetes mellitus aged 20-44 years in the working area of the Ulee Kareng Health Center obtained from medical record data at the Ulee Kareng Health Center in 2023 (January -November) as many as 162 people. The control population is all people who do not suffer from type 2 diabetes mellitus aged 20-44 years. The sample in this study was 47, for the case and control groups 1:1. The total sample was 94 people.

The types of data in this research are primary data and secondary data. Primary data is data obtained through questionnaires given by respondents who will be studied, while secondary data is data obtained using document study techniques, namely data on the incidence of diabetes mellitus from the Banda Aceh City Health Service and the Ulee Kareng Health Center.

The location of this research was carried out in the working area of the Ulee Kareng Community Health Center, Banda Aceh. This research was carried out on 19 December 2023 - 2 January 2024. Data analysis used in this research was using the Statistical for Social Science (SPSS) application. The data analyzed is univariate analysis, bivariate analysis.

# RESULTS

## Quantitative Research

The results of the research were 162 people, consisting of 47 cases and 47 controls in the working area of the Ulee Kareng Community Health Center, Banda Aceh City in 2023 - 2024.

**Table 1**. Respondent Characteristics

| Characteristics | Frekuensi | Persentase |
|---|---|---|
| **Age** | | |
| 20-25 Years Old | 12 | 12,8 |
| 26-35 Years Old | 33 | 35,1 |
| 36-44 Years Old | 49 | 52,1 |

| | | |
|---|---|---|
| **Gender** | | |
| Man | 14 | 14,9 |
| Woman | 80 | 85,1 |
| **Work** | | |
| Doesn't work | 9 | 9,6 |
| Student | 5 | 5,3 |
| Housewife | 44 | 46,8 |
| Workers/Farmers/Fishermen | 4 | 4,3 |
| Private employees | 26 | 27,7 |
| Government Employees | 6 | 6,4 |
| **Education** | | |
| Elementary School | 5 | 5,3 |
| Junior High School | 13 | 13,8 |
| Senior High School | 45 | 47,9 |
| University | 31 | 33 |
| **Duration of Suffering** | | |
| No Suffering | 47 | 50 |
| < 1 year | 10 | 10,6 |
| 1-5 years | 34 | 36,2 |
| > 5 years | 3 | 3,2 |
| **Family Income** | | |
| < 1 Million | 28 | 29,8 |
| 1-2 Million | 46 | 48,9 |
| > 2 Million | 20 | 21,3 |
| **Disease Status** | | |
| Diabetes Melitus | 47 | 50 |
| Not Diabetes Melitus | 47 | 50 |
| **Knowledge** | | |
| Not enough | 40 | 42,6 |
| Enough | 33 | 35,1 |
| Good | 21 | 22,3 |
| **Physical Activity** | | |
| Light Physical Activity | 24 | 25,5 |
| Moderate Physical Activity | 45 | 47,9 |
| Vigorous Physical Activity | 25 | 26,6 |
| **Dietary Habit** | | |
| Not good | 56 | 59,6 |
| Good | 38 | 40,4 |
| **Hypertension** | | |
| Hypertension | 63 | 67 |
| Not Hypertension | 31 | 33 |
| **Family History** | | |
| Diabetes Mellitus | 47 | 50 |
| Not Diabetes Mellitus | 47 | 50 |
| **Total** | **94** | **100%** |

This percentage frequency table shows the frequency distribution of several individual characteristics. First, there is the age distribution, where 12.8% of individuals are 20-25 years old, 35.1% are 26-35 years old, and 52.1% are 36-44 years old. Furthermore, there is a gender distribution, where 14.9% of individuals are men, while 85.1% are women. Individual employment is also distributed, with 9.6% not working, 5.3% are students, 46.8% work in domestic households, 27.7% work in the private sector, and 4.3% work as laborers/farmers/fishermen. Individual education is also distributed, with 5.3% elementary school graduates, 13.8% middle school graduates, 47.9% high school graduates, 33% PT graduates, and 5.3% other graduates. The distribution of duration of suffering was also apparent, with 50% of individuals never suffering, 10.6% suffering for less than one year, 36.2% suffering for one to five years, and 3.2% suffering for more than five years. Individual family incomes were also distributed, with 29.8% of families having incomes of less than one million, 48.9% having incomes between one and two million, and 21.3% having incomes of more than two million.

Individual disease status was also distributed, with 50% of individuals suffering from diabetes mellitus and 50% not suffering from diabetes mellitus. Individual knowledge about disease is also distributed, with 42.6% of individuals having poor knowledge, 35.1% having sufficient knowledge, and 22.3% having good knowledge. Individual physical activity was also distributed, with 25.5% of individuals doing light physical activity, 47.9% doing moderate physical activity, and 26.6% doing heavy physical activity. Individual diets are also distributed, with 59.6% of individuals having poor diets and 40.4% having good diets. Individual hypertension was also distributed, with 67% of individuals suffering from hypertension and 33% not suffering from hypertension. Finally, individual family history is also distributed, with 50% of individuals having a history of diabetes mellitus and 50% having no history of diabetes mellitus.

**Tabel 2.** Results of bivariate tests examining the relationship between each independent variable and the dependent variable of the study

| Variabel | DM Inceden | | | | | | P- Value | OR | 95% Cl |
| | cases | | Control | | Total | | | | |
| | N | % | n | % | N | % | | | |
| **Knowledge** | | | | | | | | | |
| Not Enought | 26 | 65 | 14 | 35 | 40 | 100 | | | |
| Enought | 15 | 45,5 | 18 | 54,5 | 33 | 100 | 0,014 | 3,157 | 1,346-7,407 |
| Good | 6 | 28,6 | 15 | 71,4 | 21 | 100 | | | |
| **Physical activity** | | | | | | | | | |
| Light | 18 | 75 | 6 | 25 | 24 | 100 | | | |
| Moderate | 18 | 40 | 27 | 60 | 45 | 100 | 0,021 | 4,103 | 1,444 -11,657 |
| Vigorous | 11 | 44 | 14 | 56 | 25 | 100 | | | |
| **Dietary Habit** | | | | | | | | | |
| Not Good | 34 | 60,7 | 22 | 39,3 | 56 | 100 | 0,006 | 3,348 | 1,404 – 7,986 |
| Good | 13 | 34,2 | 25 | 65,8 | 38 | 100 | | | |
| **Hypertension** | | | | | | | | | |
| Hypertension | 45 | 71,4 | 18 | 28,6 | 63 | 100 | 0,000 | 36,667 | 7,917 -169,809 |
| Not Hypertension | 2 | 6,5 | 29 | 93,5 | 31 | 100 | | | |
| **Family History** | | | | | | | | | |
| Diabetes Mellitus | 31 | 66 | 16 | 34 | 47 | 100 | 0,004 | 3,419 | 1,465-7,978 |
| Not Diabetes Mellitus | 16 | 34 | 31 | 66 | 47 | 100 | | | |

People who have less knowledge about DM have a higher risk of suffering from DM (65% - 35%), P-Value = 0.014, OR = 3.157, 95% CI = 1.346-7.407). People who do light physical activity have a risk higher risk of suffering from DM (75% vs 25%, P-Value = 0.021, OR = 4.103, 95% CI = 1.444-11.657). People who have a poor diet have a higher risk of suffering from DM (60.7% - 39.3%), P-Value = 0.006, OR = 3.348, 95% CI = 1.404-7.986). People who have hypertension have a higher risk of suffering from DM (71.4% - 28.6%), P-Value = 0, OR = 36.667, 95% CI = 7.917-169.809). People who have a family history of DM have a higher risk of suffering from DM (66% - 34%, P-Value = 0.004, OR = 3.419, 95% CI = 1.465-7.978).

## DISCUSSION

Diabetes Mellitus (DM) is a metabolic disease that causes increased blood sugar levels. 50% of respondents contracted DM, which can have a significant impact on health. Type 2 DM, the most common, is caused by insulin resistance and relative insulin deficiency. Common symptoms include polyuria, polydipsia, polyphagia, and non-healing wounds. Knowledge has a significant relationship with the incidence of diabetes mellitus. Respondents

who did not have knowledge about diabetes mellitus had a 3.157 times higher risk of experiencing the disease than those who had knowledge. These results are consistent with previous research and theory which says that knowledge is the main domain that influences behavior. Univariate analysis shows that the majority of respondents who do not understand the incidence of type 2 diabetes mellitus increase their chances of developing the disease (11).

Apart from knowledge, physical activity also has a relationship. Based on the chi-square test, this research shows that p-value = 0.021 and OR = 4.103, which means that respondents with minimal physical activity have a 4.103 times higher risk of developing diabetes mellitus than those who are regularly active. These results are in line with research (12) which found a relationship between the level of knowledge and the incidence of diabetes mellitus, as well as research (13). which stated that low physical activity increases the risk of diabetes mellitus. Low physical activity causes muscle inactivity, reduces glucose permeability, and increases the risk of insulin resistance, which contributes to diabetes mellitus.

Research also shows that diet has a significant relationship with the incidence of diabetes mellitus in the Ulee Kareng Community Health Center working area, with a p-value of 0.006 and an OR of 3.348. These results are in line with previous research which shows a significant relationship between diet and the incidence of type 2 diabetes mellitus. A poor diet can increase the risk of diabetes mellitus, while a good diet can help in the prevention and control of diabetes. Not only does diet have a significant relationship (Widiyanto, 2019), hypertension also has a relationship with Diabetes Mellitus (DM), with a p-value of 0.000 and OR 36.667; CI 7.917-16.98, indicating that individuals with a history of hypertension are 36.667 times more likely to suffer from DM. This is in accordance with previous research which found a relationship between hypertension and the incidence of DM, and is supported by the theory which states that hypertension can cause insulin resistance and ultimately Type II Diabetes Mellitus (14).

Family history is related to the incidence of diabetes mellitus (DM) in the working area of the Ulee Kareng Community Health Center. The results of the study showed that respondents who had a family history of DM had a 3.419 times higher risk of developing DM than those who did not have a history of DM. This is in line with findings from a case-control study in Semarang Regency which shows that a family history of DM increases the risk of type 2 DM. Genetic theory also supports this relationship, with type 2 DM having a complex genetic component and being influenced by interactions between genetic and environmental factors (15).

## CONCLUSION

Based on the results of research at the Ulee Kareng Community Health Center, Banda Aceh City, there are several significant risk factors associated with diabetes mellitus. First, 65% of respondents with less knowledge about diabetes had a 3.157 times higher risk of experiencing this disease (p=0.014; OR=3.157; CI 1.346-7.407). In addition, 75% of respondents who did light physical activity had a 4.103 times greater risk of suffering from diabetes (p=0.021; OR=4.103; CI 1.44-11.65). Respondents with poor eating patterns also showed a high risk, with 60.7% having a risk 3.348 times greater (p=0.006; OR=3.348; CI 1.40-7.98). Hypertension was the most significant risk factor, where 71.4% of respondents who had it had a 36.667 times higher risk of suffering from diabetes (p=0.000; OR=36.667; CI 7.917-169.98). Finally, 66% of respondents with a family history of diabetes had a 3.419 times greater risk (p=0.015; OR=3.419; CI 1.46-7.97). These findings emphasize the importance of increasing knowledge, physical activity and healthy eating patterns for the prevention of diabetes mellitus.

## SUGGESTION

The suggestion for the author is, for researchers who will conduct research in the future and educational institutions, it is hoped that this research can be a useful reference, especially in understanding the factors that influence the incidence of diabetes mellitus. It is also hoped that this research can increase insight and enrich existing literature. For respondents, it is important to understand the results of this research so that they pay more attention to a healthy lifestyle. Improving diet and regular health monitoring are highly recommended. Involving families in prevention efforts is also the key to success. It is hoped that synergy between health agencies and active participation from patients can reduce the risk of diabetes mellitus and improve the health of the community as a whole.

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