



Risk Factors Influencing Type 2 Diabetes Mellitus In The Elderly

Nindya Anggiani Sembiring¹, Rahmi², Nikmatul Khoiriah Harahap³

^{1,2,3} *Departement of Public Health, STIKes Widya Husada Medan, Jl. Williem Iskandar,
Medan, Indonesia*

Email : anggiani93@gmail.com

Article details:

Published: 31th December 2022



Abstract

Diabetes mellitus is a progressive metabolic disease and has affected a percentage of the population worldwide. Epidemiological data shows that 2.8% of the world's population suffered from diabetes in 2000 and could develop to 4.4% of the world's population in 2030. The purpose of this study was to analyze the risk factors for the occurrence of Diabetes Mellitus Type II in the elderly (elderly) in the area of Tanjung Anom Village, Pancur Batu District and can collect and provide information for families who have elderly about the risk factors that affect the incidence of Type II Diabetes Mellitus, so that

they can immediately take action or early prevention so that the impact of the disease is not getting worse for the patient's health. The main problem of this study is that Type 2 Diabetes Mellitus probably accounts for about 90% to 95% of all diagnosed diabetes cases. Contributing factors for Type 2 diabetes include age, obesity, family history of diabetes, history of diabetes in a previous pregnancy, impaired glucose tolerance, physical activity, and race/ethnicity. Obesity is also associated with a higher risk. So that education to the public about diabetes is an important component that influences. This research method is analytic observational with a case control design. Cases were Type II DM sufferers of 66 respondents and controls were non Type II DM sufferers of 66 respondents or with a ratio of 1:1. Data were analyzed bivariately with simple logistic regression test and multivariately with multiple logistic regression test. Based on the results of statistical analysis tests, it can be seen that the significant factors that influence the incidence of type 2 diabetes mellitus are age, family history of diabetes, physical activity and eating patterns.

Keywords : *Diabetes Mellitus, ;Puskesmas, ;Obesity, ;Eating patterns, ;elderly*

To cite this article :

Rahmi, Nindya Anggiani Sembiring, S. R. M. P. (2022). Acute Toxicity Test Of Some Potential Plants As Natural Contraceptive Materials Using The Bslt Method. *International Journal of Health, Education and Social (IJHES)*, 5(12), 22–28.



Introduction

Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin (a hormone that regulates blood sugar) or in other words, when the body cannot use the insulin it produces effectively. The risk of death for diabetics is two times that of non-diabetics. Type 1 diabetes is characterized by a lack of insulin production. Without daily administration of insulin, type 1 diabetes is fatal. Meanwhile, around 90% of diabetics worldwide are type 2 diabetics. This is mostly caused by being overweight and lack of physical activity. Elevated blood sugar is a common effect in people with uncontrolled diabetes, and over time can damage the heart, blood vessels, eyes, kidneys and nerves. WHO projects that deaths from diabetes will double between 2005 and 2030.

Nearly half of diabetes deaths occur in people under the age of 70 years. Nearly 80% of diabetes deaths occur in low and middle income countries. Lifestyle factors important for the development of type 2 diabetes include obesity and overweight (defined by a body mass index greater than 25), physical inactivity, poor diet, stress, and urbanization. Smoking appears to increase the risk of type 2 diabetes. Sleep deprivation is also associated with type 2 diabetes. Laboratory studies have linked short-term sleep deprivation with changes in glucose metabolism, nervous system activity, or hormonal factors to diabetes.

Type 2 diabetes can be prevented through proper nutrition and regular exercise. Intensive lifestyle measures can reduce the risk by more than half. The benefits of exercise persist regardless of the person's initial weight or subsequent weight loss. A high level of physical activity reduces the risk of diabetes by about 28%. However, there has been a proven benefit of dietary changes in the prevention of DM, with some evidence for diets high in green leafy vegetables and some for limiting intake of sweet foods. So it can be said that the development of type 2 diabetes is caused by a combination of lifestyle and genetic factors.

So that further research is needed regarding the risk factors for the occurrence of Type II DM as information for the public to increase awareness for healthy living and prevent the risk factors for events that trigger Type II DM to get worse.

Methods

1. Location and Time of Research

The research was conducted in the area of Tanjung Anom Village, Pancur Batu District. The time of this research starts in 2022.

2. Population

The population of this study were all elderly people with Type II DM and those without Type II DM. The case group is the elderly who are declared to have Type II DM while the control group is the elderly who are declared not to have Type II DM.



3. Case Samples

The sample cases in this study were elderly (≥ 60 years) who had Type II DM. Control Sample The control sample in this study was the elderly (age ≥ 60 years) who did not suffer from Type II DM.

4. Type of Research

This research is an observational analytic study using a case control design (case control study). Sample size Determination of sample size can use the sample size formula to test the hypothesis of the proportion of two population data. To get the minimum sample size using the formula, first look for P1 and P2 from previous research results, where the sample size for each variable with $\alpha = 0.05$ in comparison to one case and one control can be calculated with the minimum sample size. The sampling technique in this study was non-probability sampling (consecutive sampling).

5. Data Collection Methods

Primary data

Methods or ways to achieve the goals that have been set are written not to exceed 1000 words. This section is equipped with a flowchart of the research that will be carried out during the proposed time. The research chart must be made as a whole with clear stages, all stages to achieve the output along with targeted achievement indicators. This section should also explain the duties of each proposing member according to the proposed research stages. Primary data were obtained through interviews and observations (measurement of blood sugar levels), eating patterns using a questionnaire that will be assisted by health workers, while obesity by measuring BMI using a scale and meter.

Secondary Data

Secondary data was obtained from the Health Service Reports and Profiles which included the population situation and other data relevant to the aims and problems of the research.

6. Variables and Operational Definitions

Dependent Variable

The dependent variable is the variable that is affected or which is the result because of the independent variable. The dependent variable in this study was Type II DM in the elderly as measured by blood sugar levels using a blood sugar meter.

Independent Variable

Independent variables are variables that influence or cause changes or the emergence of the dependent variable. The independent variables in this study are:

- a. Family history, namely the history of heredity that is owned and related to Type II DM, namely the mother, father and indirectly, namely the biological grandfather and biological grandmother.



- b. Obesity is the result of measuring Body Mass Index (BMI) based on the weight/height of the elderly being measured.
- c. Smoking is a person's habit of smoking cigarettes.
- d. Physical activity, namely the intensity of physical activity carried out daily, includes activities related to work, sports and activities in spare time.
- e. Dietary habit :
 - Carbohydrate consumption is the amount of carbohydrate intake as measured by calculating the amount of the respondent's carbohydrate consumption based on the number of calories consumed per day.
 - Fat consumption is the amount of fat intake as measured by calculating the amount of fat consumed by the respondent based on the number of calories consumed per day.
 - Consumption of fiber (vegetables and fruit) is the amount of vegetable and fruit intake measured by calculating the average portion in a day

Results and Discussion

1. Univariate analysis

Univariate analysis aims to explain or describe data on the characteristics of respondents and research variables. Respondent characteristic data in this study were seen in terms of age, education, type of work. The independent variables in this study were family history of DM, obesity, physical activity, smoking and diet. The following data has been collected by the research implementation team, namely:

1.1 Characteristics of Respondents

Respondent characteristic data in this study were seen in terms of age, education, type of work. The following data on the characteristics of the respondents are shown in table 1.1

Table 1.1 Frequency Distribution of Respondent Characteristics by Age, Education and Occupation

Characteristics of Respondents	Respondent Status			
	Case		Control	
	n = 66	%	n = 66	%
AGE				
46-60	23	34.85	26	39,4
61-75	43	65,15	40	60,6
Total	66	100	66	100
EDUCATION				
SD	25	37,9	31	47.0



**The International Journal of Health, Education and
Social (IJHES)**

Junior high school	15	22,7	17	25,8
Senior high school	23	34,8	14	21,2
College	3	4,5	4	6,1
Total	66	100	66	100
PROFESSION				
Retired	4	6,1	3	4,5
Civil				
Servants/Private	18	27,3	20	30,3
Self-employed	12	18,2	15	22,7
IRT	32	48,5	28	42,4
Total	66	100	66	100

Based on Table 1 above , it can be seen that the temporary data that has been collected by the majority of respondents is aged 45-60 years, with details of the case group as many as 66 people and the control group as many as 66. Based on the last education of the respondents , the majority of the last education in the control group was SD as many as 31 people and the majority of the last education in the case group was SD as many as 25 people. Based on the type of work, the majority of respondents in the control group were IRT, as many as 28 people and the majority of jobs in the case group were housewives/ IRT, namely 32 people.

The risk increases with age. The incidence of Type II DM increases with age (the number of β cells produced decreases with age). Try to check fasting blood sugar if you are over 45 years old, or immediately if there are other risk factors (Arisman, 2013) . In line with Wicaksono's research (2011) that age ≥ 45 years is a risk factor for type two Diabetes Mellitus.

1.2 Factors Associated with Type II Diabetes Mellitus

The independent variables in this study were family history of DM, obesity, physical activity, smoking and eating patterns. The following independent variables are shown in table 1.2

Table 1.2 Frequency Distribution of Factors Associated with Type II Diabetes Mellitus

INDEPENDENT VARIABLES	Factors Associated with DM TYPE II			
	Case		Control	
	n = 66	%	n = 66	%
DM FAMILY HISTORY				
There is	53	80.3	14	21,2
Not	12	18,2	52	78.8
OBESITY				



**The International Journal of Health, Education and
Social (IJHES)**

Yes (BMI > 25)	33	50.0	28	42,4
No (BMI ≤ 25)	33	50.0	38	57,6
PHYSICAL ACTIVITY				
Less (PAL 1.40-1.69)	35	53.0	16	24,2
Adequate (PAL 1.70-2.40)	31	47.0	50	75.8
DIETARY HABIT				
At risk	50	75.8	26	39,4
No risk	16	24,2	40	60,6
SMOKE				
Yes	3	4,5	3	4,5
Not	63	95.5	63	95.5
BIRTH HISTORY				
Yes	63	95.5	66	100.0
Not	3	4,5	0	0.0

Based on Table 2 above, it is known that the majority of respondents in the case group had a family history of DM as many as 53 people, respondents with risky obesity (BMI > 25) were as many as 33 people, less physical activity was as many as 35 people, unbalanced eating patterns, namely as many as 50 people and smoking as many as 3 people. The majority of respondents in the control group who did not have a family history of DM were 52 people, respondents with obesity were not at risk (BMI ≤ 25) were 38 people, sufficient physical activity was 50 people, a balanced diet, namely as many as 40 people and smoking as many as 3 people.



Table 1.3 The Relationship between Modifiable and Non-Modifiable Factors and the Incidence of Type II Diabetes Mellitus in Elderly Women Based on the *Simple Logistic Regression Test*

Dependent Variables	Diabetes	95% Confidence Intervals		p-Value
		LowerBound	Upperbound	
Age	Control	1924	2045	0.015
	Case	1,818	1939	
Education	Control	1630	2097	0.240
	Case	1827	2,294	
Work	Control	2,865	3,317	0.925
	Case	2,850	3.302	
R. Family	Control	.089	.275	0.000
	Case	.740	.926	
R. Give birth	Control	1,000	1,000	-
	Case	1,000	1,000	
Obesity	Control	.287	.531	0.225
	Case	.394	.637	
Physical Activity	Control	.114	.340	0.000
	Case	.433	.658	
Dietary habit	Control	.241	.456	0.000
	Case	.695	.911	

Based on the results of statistical analysis tests, it can be seen that the significant factors that influence the incidence of type 2 diabetes mellitus are age, family history of diabetes, physical activity and eating patterns. While education, type of work, history of childbirth and obesity did not affect the incidence of type 2 diabetes mellitus in elderly women at the Sentosa Baru Health Center.

In this study, diet is the most dominant factor in the incidence of Type II Diabetes Mellitus, for this reason, people should pay more attention to regulating their diet and maintaining physical activity so that obesity does not occur as a result of setting wrong eating patterns. It is hoped that the role of Puskesmas health workers will be more active in providing information about good eating patterns, what physical activities should be done by the community to maintain physical fitness so as to avoid obesity which can cause Type II Diabetes Mellitus. This can be done by health workers during the implementation of Posbindu for the elderly to be more active in



providing this information. So that it is expected that Puskesmas officers have the education and background of public health workers as informants.

The results of Nuryati's research (2009) state that the habit of consuming risky foods, namely sweet foods/drinks, has a significant relationship with the incidence of DM. Sweet foods/drinks are a source of energy. Frequently consuming sweet foods/drinks causes a person to experience *overnutrition*, where *overnutrition* is one of the factors causing DM. Meanwhile, people who rarely consume sweet foods/drinks have a 60% smaller risk of developing DM than those who frequently consume them.

This is in line with Suyono's research (2015) that obesity is a risk factor that plays an important role in Diabetes Mellitus. In DM sufferers, the pancreas actually produces sufficient amounts of insulin to maintain blood glucose levels at normal levels, but this insulin cannot work optimally to help the body's cells absorb glucose because it is disturbed by obesity complications, one of which is high blood fat levels. (especially cholesterol and triglycerides).

Arisman's research (2013) states that family history also has an important role as a trigger for pre-diabetes, around 40% of diabetics are shown to be born into families that also have diabetes and 60% to 90% of identical twins are diabetics. Having a history of DM during pregnancy or having given birth to a baby weighing more than 4 kg, physical trauma and psychological stress can reduce insulin secretion and sensitivity. This is in accordance with the opinion of the Journal of Diabetes UK, 2010 that the risk of a child getting Type II Diabetes Mellitus is 15% if one of the parents has DM. If both parents have DM, the risk of suffering from DM is 75%. People who have mothers with DM have a 10-30% greater risk than people who have fathers with DM. This is due to the decrease in the gene when in the womb is greater than the mother. If a sibling suffers from DM, the risk of suffering from DM is 10% and 90% if the sufferer is an identical twin. This is in accordance with the results of Syamiah's research (Syamiyah, 2014), that people who have a family history of DM are at risk of developing DM 4.784 times compared to those who do not have a family history of DM.

Physical activity also has an important role as a trigger factor for type 2 diabetes. Regular physical activity increases insulin sensitivity and increases glucose tolerance. Physical activity causes insulin to increase so that blood sugar levels will decrease. In people who rarely exercise, food substances that enter the body are not burned but are stored in the body as fat and sugar (Ministry of Health, 2011). The results of this study are in line with the results of Wandasari's research (2013) at Dr. Moewardi Surakarta, that is, there is a relationship between physical activity and the incidence of Type II Diabetes Mellitus. Someone who regularly does sports, namely 3 times/week for a minimum of 30 minutes can reduce the occurrence of Diabetes Mellitus.

Smoking can also be a factor that influences the incidence of DM. Cigarettes are the main product of tobacco which contains the element tar, which belongs to the group of polycyclic aromatic hydrocarbon compounds, containing CO, HCN, nicotine and benzopyrene. Nicotine can cause a reduction in insulin sensitivity and increase the occurrence of insulin resistance. In conditions of hyperglycemia, nicotine and carbon monoxide accelerate the occurrence of blood clots. Diabetics who smoke tend to experience diseases related to blood vessels so that they



experience more complications such as blindness, impotence, kidney failure, and amputations (Ministry of Health, 2011).

Conclusion and Recommendation

Based on the results of statistical analysis tests, it can be seen that the significant factors that influence the incidence of type 2 diabetes mellitus are age, family history of diabetes, physical activity and eating patterns. While education, type of work, history of childbirth and obesity did not affect the incidence of type 2 diabetes mellitus in elderly women at the Sentosa Baru Health Center. This research is expected to be implemented up to the community service stage to improve people's welfare, especially in the health sector.

Acknowledgment

On this occasion, the author expresses his infinite gratitude to Allah SWT. The acknowledgments include the appreciation given by the author to those who have played a role in the research, to the Directorate of Research, Technology and Community Service (DRTPM) who have provided funds for the implementation of activities and the STIKes Widya Husada Medan which have provided assistance in the form of financial support, permits, consultants, and assist in data collection.

International Journal of Health, Education and Social (IJHES)



References

- Arisman. 2013. Textbook of Nutrition Science: Obesity, Diabetes Mellitus & Dyslipidemia Mahode, AA ed. Jakarta: EGC
- Indonesian Ministry of Health. 2011. Technical Guidelines for Measuring Risk Factors for Diabetes Mellitus. Directorate General of PP & PL. Jakarta
- Nuryati, S. 2009. Lifestyle and Nutritional Status and Their Relationship with Diabetes Mellitus in Adult Women in DKI Jakarta.
- Suyono, S,. 2015. Textbook of Internal Medicine, Central Jakarta: Department of Internal Medicine FKUI
- Shamiah, N. 2014. Risk Factors for Type 2 Diabetes Mellitus in Women at the Pesanggahan District Health Center, South Jakarta in 2014. Public Health Study Program, Faculty of Medicine and Health Sciences, Syarif Hidayatullah State Islamic University, Jakarta
- Wandasari, K. 2013. Relationship between diet and physical activity with the incidence of type 2 diabetes mellitus at Dr. Moewardi Surakarta. FIK UMS
- Wicaksono, RP. 2011. Factors Associated with the Incidence of Type 2 Diabetes Mellitus, Case Studies at the Internal Medicine Polyclinic at Dr. Kariadi. Bachelor of Medicine Education Program, Faculty of Medicine, Diponegoro University, Semarang

International Journal of Health, Education and Social (IJHES)