

RELATIONSHIP BETWEEN THE LONGEST OF DIABET 2 TYPE WITH PLASMA BLOOD SUGAR LEVELS IN PATIENTS WITH MELITUS TYPE 2 DIABETS

¹Jems KR Maay, Ester Rumaseb, Frengki Apay, Ray Ngardita,

***Abstrack---**Diabetes mellitus (DM) is a chronic disease that occurs when the pancreas produces insufficient amounts of insulin or if the body cannot use insulin effectively. WHO estimates that DM causes about 60% of deaths and 40% of illness worldwide (Maulana, 2009). Indonesia ranks 4th (four) with the largest number of people with DM in the world after India (19%), China (16%), and the United States (13.9%). The prevalence of DM in Indonesia in 2025 is 12.4 million people, has doubled compared to 1945 which was 4.5 million people (Maulana, 2009). According to Suyono (2006), the increase in the number of DM sufferers globally is due to an increase in prosperity and lifestyle changes. The prevalence of DM sufferers in Indonesia in 2000 was 8.4 million people and is expected to increase to 21.3 million in 2030 (PERKENI, 2006). According to basic health research (2013) conducted in Indonesia, the prevalence of DM in several areas including Jakarta the prevalence of 2.5%, West Java the prevalence of 1.3%, in East Java the prevalence of 2.4%, the prevalence of DM in Yogyakarta 2.6 %, North Sulawesi prevalence is 2.4%, Central Kalimantan is 2.3%, Bangka Belitung has a prevalence of 2.1%, Lampung has a prevalence of 0.7%, and Papua Province has a prevalence of 0.8%. While research that has been done in China some time ago, if someone in his life lacks physical exercise or sports, then glycogen or fat reserves will remain stored in the body, this is what triggers various degenerative diseases, for example, type II diabetes mellitus (Yunir and Soebardi, 2008). Research on the relationship between long-suffering with plasma blood sugar levels in patients with type 2 diabetes has not been widely studied in Papua. The number of people with type 2 diabetes in Papua is quite high.*

Keywords: Long Suffered, Type 2 Diabetes, Plasma Blood Sugar Levels

I. BACKGROUND

Diabetes mellitus (DM) is a chronic disease that occurs when the pancreas produces insufficient amounts of insulin or if the body cannot use insulin effectively. Insulin. Insulin is a hormone that delivers blood glucose. High blood glucose levels (hyperglycemia) are usually not controlled in people with DM, and the long term, this will trigger serious damage to various systems in the body [1].

Globally, WHO estimates that DM causes about 60% of deaths and 40% of illness worldwide [2]. The number of people with DM currently around the world around 154 million people and is expected to increase to double within the next 20

¹Jems KR Maay, Ester Rumaseb, Frengki Apay, Ray Ngardita, Nursing School, Nutrition Department, Health Polytechnic Ministry of Health Jayapura, Papua, Street Padang Bulan 2, Hedam, Districk Heram, Jayapura City, Papua, Indonesia.
Email : jemskrmaay@yahoo.co.id

years. Increasing the number of people with DM mainly occurs in developing countries and is estimated in 2025 to reach 286 million [3].

According to a survey conducted by WHO, Indonesia ranked 4th (four) with the largest number of DM sufferers in the world after India (19%), China (16%), and the United States (13.9%). The prevalence of DM in Indonesia in 2025 is 12.4 million people, has doubled compared to 1945 which was 4.5 million people [2]. According to Suyono et al [4], the increase in the number of DM sufferers globally is due to an increase in prosperity and lifestyle changes.

The prevalence of DM sufferers in Indonesia in 2000 was 8.4 million and is expected to increase to 21.3 million in 2030 [5]. The Ministry of Health of the Republic of Indonesia (DEPKES RI) reports that DM inpatients and outpatients in hospitals rank first of all endocrine diseases [6]. According to basic health research [6] conducted in Indonesia, the prevalence of DM in several areas including Jakarta the prevalence of 2.5%, West Java the prevalence of 1.3%, in East Java the prevalence of 2.4%, the prevalence of DM in Yogyakarta 2.6 %, North Sulawesi prevalence is 2.4%, Central Kalimantan is 2.3%, Bangka Belitung has a prevalence of 2.1%, Lampung has a prevalence of 0.7%, and Papua Province has a prevalence of 0.8%.

Seeing the tendency of increasing DM prevalence globally mainly due to the increased prosperity of a population, it is estimated that within the next 1-2 years DM in Indonesia will increase dramatically [7]. Other research states that the population of type II diabetes will increase 5-10 times due to rural-traditional changes to urban areas. Risk factors that change epidemiologically are estimated to be risky lifestyles.

The high prevalence of DM which is mostly classified as type 2 DM is caused by interactions between genetic susceptibility factors and exposure to the environment. Environmental factors that are expected to increase the risk of type 2 diabetes are migration from rural to urban areas or urbanization which then causes changes in a person's lifestyle. Among these are unbalanced eating habits that will cause obesity. The condition of obesity will trigger the onset of type 2 diabetes. In adults, obesity will have a risk of developing type 2 diabetes 4 times greater than the normal nutritional status.

In addition to an unbalanced diet and over nutrition, physical activity is also a major risk factor in triggering DM. Regular physical exercise can improve blood vessel quality and improve all aspects of metabolism, including increasing insulin sensitivity and improving glucose tolerance. The results of the study at an Indian Pima, people who have low physical activity 2.5 times more at risk of developing DM compared with people who are 3 times more active [8]. While research that has been done in China some time ago, if someone in his life lacks physical exercise or sports, then glycogen or fat reserves will remain stored in the body, this is what triggers various degenerative diseases, for example, type II diabetes mellitus [8],

Research on the relationship between long-suffering with plasma blood sugar levels in patients with type 2 diabetes has not been widely studied in Papua. The number of people with type 2 diabetes in Papua is quite high. This is the reason the researchers chose this study.

II. RESULTS AND DISCUSSION

This study was conducted on patients with type II DM and non-DM in the disease treatment room in men and women in the Jayapura II Regional Hospital. Data were obtained from 20 respondents with type II DM and 20 non-DM respondents both male and female. Data from DM type II respondents consisted of 12 men and 8 female respondents. While the non-DM respondent group data consisted of 10 male respondents and 10 female respondents.

Table 1. Characteristics of research subjects in DM type 2 and group Non-DM group

Variable	Non Group DM	Group DM type 2	p
N	20	20	
Gender			

a. Male	10	12	
b. Female	10	8	
Age	46,87 ± 6,90	53,30 ± 4,36	
Blood pressure			
a. Systole	110,00 ± 8,16	124,00 ± 9,32	0,000 [□]
b. Diastole	77,17 ± 4,86	78,67 ± 6,29	0,000 [□]
Body mass index	22,03 ± 2,96	26,27 ± 3,36	0,404 [□]
(kg/m ²)	-	7,13 ± 5,01	0,000 [□]
Long suffered (years)	-	46,3 ± 6,50	-
DM onset type 2			-

Note: Value is the average ± standard deviation or number (%). P-value is obtained from the unpaired t-test: % p-value obtained from the Mann Whitney test. □P <0.05 between type 2 DM group and DM group.

Table 2. Characteristics of research subjects DM group type 2 with long suffered <5 years and ≥ 5 years

Variable	Group DM type 2		p
	< 5 Year	≥ 5 Year	
N	10	10	
Gender			
a. Male	5	5	
b. Female	5	5	
Age	53,60 ± 4,36	53,00 ± 4,50	0,714
Blood pressure			
c. Systole	126,00 ± 7,37	122,00 ± 10,82	0,367
d. Diastole	80,00 ± 6,55	77,33 ± 5,93	0,325
Body mass index	27,10 ± 4,10	25,36 ± 3,27	0,468
(kg/m ²)	3,53 ± 1,09	10,65 ± 4,90	0,000 [□]
Long suffered (years)	50,07 ± 4,89	42,53 ± 5,77	0,001 [□]
DM onset type 2			

Note: Average value ± standard deviation or amount (%). The p-value is obtained from unpaired t-test: % p-value obtained from the Mann Whitney test. □P <0.05 between type 2 DM groups <5 years and ≥ 5 years

Plasma Glucose Levels in Each Group

The mean fasting plasma glucose level in the non-DM group was 85.07 ± 13.10 mg/dl and the type 2 DM group was 135.107 ± 34.70 mg/dl. The average postprandial 2 hours plasma glucose level in the non-DM group was 102.33 ± 22.93 mg/dl and the type 2 DM group was 149.73 ± 52.02 mg/dl. The mean fasting plasma glucose levels and 2 hours postprandial between the non-DM group and type 2 DM groups showed significant differences (Table.3)

Table 3. Plasma glucose levels in the non-DM group and group DM type 2

Variable	Non Group DM	Group DM type 2	p
N	20	20	
Fasting plasma glucose levels (ml/dl)	85,02 ± 13,18	135,17 ± 34,70	0,000 [□]
Posprandial 2 hour plasma glucose level (ml/dl)	102,33 ± 22,93	149,73 ± 52,02	0,000 [□]

Note: The p-value is obtained from the unpaired t-test. The value is \pm average standard deviation. $\square P < 0.05$ between Non-DM group and DM type 2 group

In the type 2 DM group, plasma glucose levels were compared between the sexes of men and women. The mean plasma glucose and 2-hour postprandial levels between men and women showed no significant differences (Table 4). The mean fasting plasma glucose level in the type 2 DM group with a duration of < 5 years was 127.33 ± 31.44 mg/dl and in the group with a length of ≥ 5 years 143.00 ± 37.07 mg/dl.

Table 4. Plasma glucose levels in the DM group 2 type of male and female

Variable	Male	Famale	p
N	12	8	
Fasting plasma glucose levels (ml/dl)	$132,6 \pm 36,24$	$137,62 \pm 34,29$	0,686
Posprandial 2 hour plasma glucose level (ml/dl)	$165,79 \pm 58,30$	$173,19 \pm 47,52$	0,705

Note: The p value is obtained from the unpaired t test. The value is \pm average standard deviation. $\square P < 0.05$ between male and female.

Fasting plasma glucose levels between type 2 DM groups with a duration of < 5 years and ≥ 5 years did not have significant surgery ($p = 0.223$). The mean postprandial 2-hour plasma glucose level in the type 2 DM group with a duration of < 5 years and ≥ 5 years was $156.33 \pm 36, 14$ g / dl and 183.13 ± 62.56 mg/dl. The mean postprandial 2-hour plasma glucose level between type 2 DM groups with a length of suffering, 5 years and ≥ 5 years there was no significant difference ($p = 0.256$). Table 5.

Table 5. Plasma glucose levels in DM group 2 with duration suffer < 5 years and ≥ 5 years.

Variable	Group DM type 2		P
	Long suffered < 5 Year	Long suffered ≥ 5 Year	
N	10	10	
Fasting plasma glucose levels (ml/dl)	$127,33 \pm 31,44$	$143,00 \pm 37,07$	0,223
2-hour postparandial plasma glucose level (ml/dl)	$156,33 \pm 36,14$	$183, 13 \pm 62,56$	0,256

Note: The p-value is obtained from the unpaired t-test. Values are \pm average standard deviation. $\square P < 0.05$ (compared to type 2 DM group suffering from DM < 5 years with group ≥ 5 years).

Antidiabetic therapy used is a combination of 2 oral hypoglycemic drugs (OHO), namely metformin, sulfonylurea and insulin monotherapy and a combination of insulin with OHO. Drug combination therapy and insulin monotherapy are more widely used in the type 2 DM group with a duration of < 5 years, while the combination of insulin and OHO is more widely used in the type 2 DM group with a duration of ≥ 5 years. (Table 6).

Table 6. Plasma glucose levels in the DM type 2 group with lam suffering <5 years and ≥ 5 years

Variable	Group DM type 2	
	Long suffered	Long suffered
	< 5 Year	≥ 5 Year
2 OHO	3	2
combination	4	3
Insulin	3	5
Insulin + OHO		

Note: Value is the number of subjects (%). OHO is a hyperglycemic drug oral (metformin, sulfonylurea, acarbose).

The relationship between the length of suffering from glucose levels plasma

Data on fasting glucose and postprandial 2 hours in the type 2 DM group were normally distributed, while the old data suffering from type 2 DM were not normally distributed. In the old data suffering from type 2 diabetes, the transformation was done with SORT (long-suffering) to normalize the virgin. Then the Pearson correlation test was performed. Results of correlation analysis between duration of type 2 DM with fasting plasma glucose levels 2 hours postprandial (table 7).

Table 7. Results of correlation analysis between the duration of suffering and levels plasma glucose in people with type 2 diabetes.

Variable	Score p	Correlation coefficient
fasting plasma glucose (ml/dl)	0,398	0,160
2-hour postprandial plasma glucose level	0,230	0,226

III. CONCLUSIONS

Based on the results of the study it can be concluded that the study of the relationship between duration of type 2 diabetes with plasma blood sugar levels in patients with type 2 diabetes mellitus there are significant differences in fasting plasma glucose levels and 2 hours postprandial between subjects type 2 DM and non-DM. There is a positive and insignificant positive relationship between patients with fasting plasma glucose levels and 2 hours postprandial in patients with type 2 diabetes.

REFERENCES

- [1] Buchanan, T. A., & Anny H. Xiang, A. H, Gestational Diabetes Mellitus, Published in Volume 115, Issue 3 on March 1, J Clin Invest.;115 (3) : 485–491, The American Society for Clinical Investigation, <https://doi.org/10.1172/JCI24531>, 2005.
- [2] Maulana. M, Knowing Diabetes Mellitus, Practical Blend regarding diabetes. Ed 2. Katahati, Yogyakarta, 2009.
- [3] Hamer, R. A., & Nahas, A. M. E, The burden of chronic kidney disease. BMJ. 332: 568, 2006.
- [4] Suyono S., Wapadji S., Soegondo S., Soewondo P., & Subekti. I, Guided Diabetes Mellitus Management, Guidelines for Management of Diabetes Mellitus for Doctors and Educators, FKUI. Jakarta, 2009.
- [5] PERKENI, Consensus on Diabetes Management and Prevention Mellitus type-2 in Indonesia, Executive Manager of the Indonesian Endocrinology Association, 2006.
- [6] Ministry of Health, Basic Health Riser Report Yogyakarta 2007. Indonesian Ministry of Health, Jakarta, 2008.
- [7] Istanto, Relationship between Prisoners, Agents and Environment Factors to increased prevalence of DM in Ternate. FKUI., Jakarta, 2009.

- [8] -, T., -, S., & Jatmika, H. M, Development of Validity and Reliability of Net Game Performance-Based Assessment on Elementary Students' Achievement in Physical Education. *Asian Journal of Assessment in Teaching and Learning*, 6, 41-49, 2016.