Relationship of Type 2 Diabetes Mellitus Duration with The Occurrence of Erectile Dysfunction at Puskesmas Denpasar Barat I

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ABSTRACT

Background: Type 2 diabetes mellitus is a metabolic disease that characterized by high blood sugar levels. This condition is often not noticed immediately and usually patient starting to realize it when complications have been occurred. A long-term complication of type 2 DM that occurred in men is erectile dysfunction (ED). ED is a condition when a person is unable to achieve or maintain an erection for sexual intercourse. One factor that influence the occurrence of ED and its severity in type 2 DM patients is the duration of the disease.

Objective: The aim of this study was to determine the relationship of type 2 DM duration and the occurrence of ED.

Methods: This study is an observational analytic cross-sectional study conducted at the Puskesmas (Public Health Center) Denpasar Barat I. The research data was obtained through medical record data and fill the International Index of Erectile Function (IIEF-5) questionnaire on 36 type 2 DM patients aged around 40-60 years. The statistical analysis used was Fisher's exact test.

Results: The results showed that of the 36 samples, 19 (52.8%) samples had type 2 DM ≤24 months and 17 (47.2%) samples had type 2 DM >24 months. It was found that 5 (13.9%) samples did not experience ED while the rest experienced ED with different severity. There was a significant relationship between the type 2 DM duration and the occurrence of erectile dysfunction at Puskesmas Denpasar Barat I (p = 0.022).

Conclusion: Study has found that type 2 DM patients with the longer duration (>24 months) have a higher occurrence of ED and tended to be more severe compared to those with shorter duration (≤24 months). Further studies should be performed with higher number of patients and more controlled risk factor so it will be more accurate in determining the relationship between the duration of type 2 DM and ED.

Keywords: Duration of Type 2 Diabetes Mellitus, Erectile Dysfunction, IIEF-5 Questionnaire

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INTRODUCTION

Times have brought many advances in human life, especially technology that had both positive and negative impact. Many activities can be replaced by the presence of the latest technologies and the tendency to use it makes human physical activity reduced and indirectly causes health problems. One of them is type 2 diabetes mellitus (type 2 DM).[1]

Type 2 DM is a metabolic disease that characterized by uncontrolled blood sugar due to disturbances in insulin secretion, insulin performance, or both. The World Health Organization (WHO) notes that about 8.5% of the population aged 18 years or more suffer type 2 DM and the number continues to increase every year. In 2013, Indonesia was listed seventh most type 2 diabetes patients in the world and rose to fifth in 2018.[2,3]

Type 2 diabetes develops very slowly and a person usually realizes that he has it when complications have already occurred. In men with type 2 DM, there is complication that is often not taken seriously even though it affects the quality of life. This complication is erectile dysfunction (ED), an inability to achieve or maintain sufficient erection for sexual intercourse.[5]

Approximately 25% of patients with type 2 DM were found to have ED and had a fourfold higher risk of developing ED with a faster onset.[6] This can occur due to vasculopathy, neuropathy, hypogonadism, and psychological problems. The combination of these problems ultimately increases the risk of ED in type 2 DM patients. In addition, the frequency of occurrence and severity of ED in type 2 DM patients is also influenced by the duration a person has had the disease.[7]

Research conducted in China found a relationship between the duration of type 2 DM and the occurrence of ED. In type 2 DM patients >2 years, 60% of them were found to have ED with the severity of which also worsened as the duration of the disease increased.[8]

Research on the relationship of type 2 DM duration and the occurrence of ED in Bali, especially Denpasar has never been done. In 2013, Bali was ranked 14th out of 34 provinces in Indonesia in type 2 DM patients.[3] Therefore, it is necessary to have research on the relationship between type 2 diabetes mellitus duration and the occurrence of erectile dysfunction at Puskesmas (Public Health Center) Denpasar Barat I so that it can help prevent complications from type 2 diabetes mellitus, especially erectile dysfunction.

METHODS

This research is an analytic observational wth cross-sectional study approaches. The data was obtained from International Index of Erectile Function-5 questionnaire and respondent's personal data questionnaire which included age, body mass index (BMI), smoking, and alcohol consumption. The type 2 DM duration was obtained through medical records from Puskesmas Denpasar Barat I.

The sampling technique used was purposive sampling. Subjects in this research already met the inclusion criteria which is men with type 2 DM aged 40-60 years at the Puskesmas Denpasar Barat I, married and living with their wife, and willing to take part in research freely without coercion. Subjects who filled out an incomplete questionnaire were already excluded.

This research has received an ethical approval from the Komisi Etik Fakultas Kedokteran Universitas Udayana. Univariate

analysis is presented to show the characteristics of the research subjects. Bivariate analysis was performed using Fisher's exact test to determine whether there was a relationship between the independent variable which is duration of type 2 DM and the dependent variable, occurrence of erectile dysfunction using Statistical Package for the Social Science (SPSS) 25 for MAC.

RESULTS

This research was conducted at one of the Puskesmas (Public Health Centre) at Denpasar in August-November 2020. The total samples that meet both inclusion and exclusion criteria were 36 samples. The research data were obtained from medical records and questionnaires. There were type 2 DM duration, occurrence of ED, ages, BMI, smoking habbits, and alcohol consumption. The research results are as follows:

Table 1. Sample distribution by ages

Age (Year)	Frequency	Percentage (%)
40-45	3	8.3
46-60	33	91.7
Total	36	100
Mean	53.67 year	

Table 1 presents the distribution of samples based on age. It is divided into 2 categories, which is 40-45 years and 46-60 years. Based on the data, there were 3 samples (8.3%) at 40-45 years category and 33 samples (91.7%) at the other category.

Table 2. Sample distribution based on BMI

BMI	Frequency	Percentage (%)
Underweight (<18 kg/m^2)	1	2.8
Normal (18-25 kg/m^2)	21	58.3
Moderate overweight (25-27 kg/m^2)	7	19.4
Severe overweight (>27 kg/m^2)	7	19.4
Total	36	100
Mean	24 kg/m^2	

Table 2 present the distribution of the samples based on BMI. Majority of the samples, have normal BMI with total 21 samples (58.3%). Meanwhile, one sample (2.8%) was found to be underweight and 7 samples (19.4%) each were in the moderate and severe overweight.

Table 3. Sample distribution based on smoking and alcohol consumption

	Yes		No	
	n	%	n	%
Smoking	14	38,9	22	61.1
Alcohol consumption	4	11.1	32	88.9

Table 3 presents the sample habit for smoking and alcohol consumption. It was dominated by non-smokers, 22 samples (61.1%) while the remaining 14 samples (38.9%) were active smokers. Moreover, 32 samples (88.9%) were found not to consume alcohol while 4 other subjects (11.1%) consume alcohol.

Table 4. Sample distribution based on type 2 DM duration

Type 2 DM Duration (months)	Frequency	Percentage (%)
≤24	17	47.2
>24	19	52.8
Total	36	100
Mean	31.7 bulan	

Table 4 presents samples distribution based on type 2 DM duration. There were 17 samples (47.2%) who had type 2 diabetes mellitus for ≤24 months and 19 samples (52.8%) who had type 2 diabetes mellitus >24 months. The mean duration for patients have type 2 diabetes was 31.7 months.

Table 5. Sample distribution based on IIEF-5 questionnaire score

IIEF-5 questionnaire score	Frequency	Percentage (%)
No ED (22-25)	5	13.9
Mild (17-21)	11	30.6
Mild-Moderate (12-16)	14	38.9
Moderate (8-11)	3	8.3
Severe (1-7)	3	8.3
Total	36	100

Table 5 presents the results of IIEF-5 questionnaire which is divided into 5 categories. It was found that the number of healthy samples was 5 samples (13.9%), 11 samples with mild ED (30.6%), and 14 samples with mild-moderate ED (38.9%). Then it was found 3 samples (8.3%) each in the moderate and severe ED category.

Table 6. Bivariate analysis of Type 2 DM duration and the occurrence of ED

IIEF-5 Questionnaire Score	Type 2 DM Duration (months)				Total		p-value
	≤24		>24				
	n	%	n	%	n	%	
No ED (22-25)	4	23.4	1	5.3	5	13.9	0.022
Mild (17-21)	8	47.1	3	15.8	11	30.6	
Mild-Moderate (12-16)	5	29.4	9	47.4	14	38.9	
Moderate (8-11)	0	0	3	15.8	3	8.3	
Severe (1-7)	0	0	3	15.8	3	8.3	
Total (n)	17	100	19	100	36	100	

The cross tabulation between type 2 DM duration and ED are presented in table 6, which divided into 5 categories according to the IIEF-5 questionnaire results. Of the 36 existing samples, it was found that the occurrence of ED was less common in type 2 DM patients ≤24 months, namely 4 samples (23.4%). Meanwhile, in the other group there was only one (5.3%) healthy sample and the rest had ED with different severity.

In terms of severity, the distribution of IIEF-5 scores results in the sample who experienced type 2 diabetes mellitus ≤24 months and >24 months also has a difference. The total IIEF-5 score which was categorized as mild-moderate to severe was dominated by samples who had type 2 diabetes >24 months, namely 9 (47.4%) mild-moderate ED, 3 (15.8%) moderate ED and 3 (15.8%) severe ED. From 17 samples who had diabetes ≤24 months, only 5 samples (29.4%) had mild-moderate ED and none had moderate or severe

ED. The relationship between type 2 DM duration and the occurrence of ED was obtained from bivariate analysis performed with Fisher's exact test shown p-value of 0.022 indicating that there was a significant relationship between them ($p < 0.05$).

DISCUSSION

This research shown that there is a relationship of type 2 DM duration and the occruance of erectile dysfunction. Type 2 DM patient tend to have complications of vasculopathy, both macrovasculopathy and microvasculopathy, neuropathy, and hypogonadism. The presesnce of chronic hyperglycemia is said to be the cause of complications that mentioned before to be happen. In addition, type 2 DM is a slow progressing disease. Patient often realized that they have this disease when complication already happen when in fact hyperglycemia has occurred long before that.[9]

The emergence of psychological problems in type 2 DM patients also have a role in the occurrence of ED. Approximately 10-30% of ED cases can be occurred due to psychogenic problems in which depression is the condition most frequently experienced by type 2 DM patients. Psychological problems could be the cause of ED by inhibiting the central nervous system resulting in excess sympathetic nervous response that reduced corpus cavernosum smooth muscle relaxation.[10]

The occurrence of erectile dysfunction in type 2 DM patients is associated with multiple condition and biopsychosocial factors that can be related one another apart that those mentioned above, including age, body mass index, sedentary lifestyle, and several heatlh condition such as hypertension, metabolic syndrome, and coronary artery diseases. Patient with this health problem need to take medication to control the disease and this medication actualy turn out to be the cause of erectile dysfunction, such as antidepressants (especially SSRIs) and antihypertensives (especially thiazide diuretics). Other than that, antihistamin, sympathetic blocker (methyldopa, clonidine, and guanethidine), and antiandrogens drugs can also be the cause of erectile dysfunction.[5]

This research is more focused on the relationship between the duration of Type 2 DM and the occurrence of ED along with its severity. Several data regarding ED risk factors were collected in this research but not investigated deeply. The measurement of body mass index, age, smoking habits, and alcohol consumption has been conducted, but futher investigation is necessary to carry out the relationship between them.

In this research, it is found that there is significant relationship between type 2 DM duration with the occurrence of erectile dysfunction. The longer someone is having type 2 DM, microvascular and macrovascular complications will increase which can occur due to poor glycemic control. Hyperglycemia will cause edothelial dysfunction which lead to oclussion of blood entering the penis resulting in ED. As the duration of type 2 DM increases, age also increases constantly. This condition eventually can increase the likelihood of hypogonadism which is also a cause of ED.

CONCLUSION

There is significant relationship between type 2 DM duration and the occurrence of ED where the longer the duration of the patient experienced type 2 DM, the more frequent ED to be occurred. Aside from that, the severity of

ED tends to be more severe in patients who have type 2 DM for a longer period of time.

There is a need for further research with samples from several other Puskesmas in Bali to represent the population in Bali more comprehensively. In addition, it is necessary to control other risk factors for erectile dysfunction so that a more accurate relationship can be seen between the duration of Type 2 DM and ED, including assessment of psychological condition, measuring blood pressure, and exclude subjects with other health problems. It should also be noted the used of antidepressant, antihypertensives, antihistamines, sympathetic blockers, and antiandrogens can be the cofounders of ED. Blood sugar level and HBA1c also need to be measured because as already explained that hyperglycemia is the main cause of vascular complications that eventually lead to ED.

Finally, from this research it can be seen the importance of screening and routine checkups of blood sugar level. It is important to prevent delays in treatment of the disease, especially in men over 40 years. Type 2 DM patients need to control their blood sugar level by getting used to a healthy lifestyle and taking their prescription regularly.

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