



Determinants of Depression among Diabetes Mellitus Patients in Indonesia: a Cross-sectional Study

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Abstract: Depression is a chronic disease among people around the world and seriously global health threat. People with diabetes are 2 to 3 times more likely to experience depression, someone who is depressed will be at bad risk during the treatment process so that it can increase the risk of morbidity and mortality prevalence. Depression can make a person pay less attention to self-care such as not complying with medication instructions, and at high risk for macrovascular and microvascular complications. This study aims to identify the determinants of depression among patients with diabetes mellitus. The method from this research is a cross-sectional approach using a convenience sampling technique with a sample size of 137 respondents. The research results is the prevalence of depression was 8.8%. Southeast Asia is the first ranks with the largest people with depression sufferers reach 27% compared to the West Pacific Region 21%. There was significant correlation between complications and depression in patients with diabetes mellitus ($P < .001$). However, there was no significant relationship between age ($P = .749$) employment status ($P = .179$), gender ($P = .082$), level of knowledge ($P = .968$), utilization of health facilities ($P = .504$, medication adherence ($P = .249$), level HbA1c ($P = .908$), and body mass index ($P = .573$). The results of the multivariable linear regression test showed that complications affected depression ($P = .002$, $r = .300$, $R^2 = .090$). The conclusion for this study, Complications are one of the determinants of depression in people with diabetes mellitus in the City of Banda Aceh and Aceh Besar.

Keywords: Determinants; Depression; Chronic Disease; Diabetes Mellitus

I. Introduction

Depression is the most common mental health that have an impact on a person's physical and mental health so that it is disturbed in carrying out activities, someone who is depressed will be at bad risk during the treatment process so that it can increase the risk of morbidity and mortality prevalence (1). Depression is not only a major public health concern in general but also in people with chronic diseases such as cancer, stroke, and diabetes mellitus (2). Depression is more experienced by women at 4.1% than men at 2.7% (3). As reported by data from the WHO that people with depression in the world reach 322 people and continue to increase, in the Southeast Asia Region people with depression reach 85.67 million people or 27%, Southeast Asia ranks first with the largest depression sufferers compared to the West Pacific Region 21% (66.21 million people). The Eastern Mediterranean Region 16% (52.98 million people), the Africa Region 9% (29.19 million people), the European Region 12% (40.27 million people), and the Americas Region 15% (48.16 people) (4).

Diabetics who experience depression will interfere with self-care, decrease quality of life, and reduce life expectancy. Not only that, depression can make a person pay less attention to self-care such as not complying with medication instructions and at high risk for

macrovascular and microvascular complications. People with diabetes are 2 to 3 times more likely to experience depression in both type 1 diabetes and type 2 diabetes (2). This is due to worry about treatment and prognosis of the disease in addition to having to adapt to some of the changes that occur (5).

Diabetes mellitus is a chronic metabolic disorder due to insulin deficiency or due to peripheral tissue resistance to insulin action (Yeni, et al. 2020). Diabetes mellitus causes complications so that life changes occur such as physical, psychological, and social interactions, as a result of psychological changes the patient will feel depression and anxiety, this is due to lifelong treatment, complications, and duration of illness (6). Women are twice as prone to depression as men. Symptoms of depression include low self-esteem, loss of appetite, impaired sleep quality, and reduced concentration (7). The prevalence of depression in diabetes mellitus reaches 10%-15%, twice as high as the prevalence of depression in non-diabetics (8).

Depression is a very serious global health threat. This is because the number of people with diabetes mellitus continues to increase, and it is very important to recognize the signs and symptoms of depression so that appropriate treatment can be given (9). Depression is the main obstacle to diabetes management so treatment becomes ineffective (10). Therefore, the researchers wanted to know about the determinants of depression in patients with diabetes mellitus in the cities of Banda Aceh and Aceh Besar.

II. Research Method

2.1 Study Population and Data

The study population consisted of patients with a confirmed diagnosis of type 2 diabetes mellitus in Indonesia. The sample population included those aged 22-80 years who were administered a PHQ-9 depression screen in January 2021. All 137 T2DM patients were enrolled in the study by convenience sampling.

2.2 Statistical Analysis

This study was cross-sectional design. Data were analyzed using SPSS version 23. Data were presented as mean with standard deviation for continuous variables and as the proportion for categorical variables. Numeric variables were compared using the correlation test and Mann-Whitney test. Kruskal Wallis test was used to compare variables of occupation. Linear regression was conducted to examine the effect of gender, complication, medical adherence, and employment on the factor of depression. The level of significance was set at $p < 0.05$ to determine statistical significance. The model utilized all variables, which included age, employment, sex, knowledge, complication, healthcare user, medical adherence, HbA1c level, and body mass index.

Depression was screened using Patient Health Questionnaire-9 (PHQ-9). The PHQ is an instrument that has been validated for the detection of general depressive symptoms and how often the respondent has experienced specific symptoms over the past two weeks. Assigning values of 0 to 3 points (0 – not at all, 1 - several days, 2 – more than half of the days, 3 – nearly every day (13) (22). Medical adherence was evaluated using MARS-5, the scores were categorized into 5 classes, scores 5-9: never adherent, 10-14: seldom adherent, 15-19: sometimes adherent, 20-24: often adherent, and 25 always adherent (28).

III. Results and Discussion

3.1 Results

Table 1. Respondent Characteristic

No.	Variables	Frequency (%)
1	Employment status	
	Regular employment	0 (0%)
	Irregular employment	1 (0,7%)
	Not employed	34 (24,8%)
	Farmer on own plot / fisher	14 (10,2%)
	Self-employed	17 (12,4%)
	Housewife	71 (51,8%)
2	Gender	
	Men	39 (28,5%)
	Women	98(71,5%)
3	Knowledge Level	
	High Level	62(45,3%)
	Low Level	75(54,7%)
4	Complication	
	Only 1 complication	94 (68,6%)
	> 1 complication	43 (31,4%)
5	Health Facilities Utilizing	
	Utilized Health Facilities	119 (86,9%)
	Unutilized Health Facilities	18 (13,1%)
6	Medication adherence	
	Lower treatment adherence	33 (24,1%)
	Perfect treatment adherence	104 (75,9%)
7	Age (year)	
	Minimal - Maximal	22 – 80
	Mean $\pm$ SD	53,58 $\pm$ 10,14
8	Body Mass Index (kg/m²)	
	Minimal - Maximal	17-47
	Mean $\pm$ SD	26,2 $\pm$ 25,5
9	Kadar HbA1c (%)	
	Minimal - Maximal	4,7-16,9
	Mean $\pm$ SD	10 $\pm$ 10
10	Depression	
	Yes	12 (8,8%)
	no	125 (91,2%)

The study involved a total of 137 patients. The mean age of subjects was 53,58 $\pm$ 10,14. Most of the subjects 98(71,5%) were women, with men 39 subjects (28,5%) of the study population. housewife is the most group of employment status 71 (51,8%). Most of the knowledge level was low 75 (54,7%). Of the patients at least had one complication disease 94 (68,6%). Most of the patients utilized health facilities 119 (86,9%). 104 patients (75,9%) had lower adherence to treatment. The mean body mass index of the respondent was 26,2 $\pm$ 25,5. The last, mean HbA1c level of the subject was 10 $\pm$ 10. The respondent felt depression was 8,8% or 12 respondents but which no depression was 125 respondents (91,2%).

Table 2. Correlation between Gender, Knowledge Level, Complication, Health Facilities Utilizing and Medication Adherence with depression

No	Variables	n	Median (Minimum – Maximum)	Mean Rank	p-value (Mann Whitney test)
1. Gender					
	Men depression scores	39	2,00 (0 – 11)	59,82	0,082
	Women depression scores	98	3,00 (0 - 22)	72,65	
2. Knowledge Level					
	High knowledge depression scores	62	3.00 (0-22)	68,85	0,968
	Low knowledge depression scores	75	2.00 (0-17)	69,12	
3. Complication					
	Only 1 complication depression scores	94	2,00 (0-13)	61,57	0,001
	> 1 complication depression scores	43	4,00 (0-22)	85,23	
4. Health Facilities Utilizing					
	Utilized health care facilities depression scores	119	3,00 (0-22)	69,87	0,504
	Unutilized health care facilities depression scores	18	1,50 (0-12)	63,28	
5. Medication Adherence					
	Perfect treatment depression scores	33	3,00 (0-22)	75,82	0,249
	Lower treatment depression scores	104	2,50 (0-17)	66,84	

Table 3. Correlation between Age, HbA1c Level, Body Mass Index, and Employment Status with depression

Variables	n	r	p value (Correlation test)
Age	137	-,028	0,749
HbA1c Level		0,010	0,908
Body Mass Index		0,049	0,573
Employment Status			p value (Kruskal Wallis test) 0,179

The bivariate correlation in our study showed complication is significantly correlation with depression $P < .001$. In other variables showed that gender ($P = .082$), Knowledge Level ($P = .968$), Health Facilities Utilizing ($P = .504$), Medication Adherence ($P = .249$), Age ($P = .749$), HbA1c level ($P = .908$), Body Mass Index ($P = .573$), and Employment status ($P = .179$) no significant correlation between depression.

Table 4. Multivariate logistic analysis

Models	Variables	<i>p-value</i>	<i>r</i>	<i>R</i> ²
1	Gender	0.198	0.306	0.094
	Complication	0.004		
	Medication adherence	0.484		
	Employment status	0.784		
2	Gender	0.093	0.305	0.093
	Complication	0.004		
	Medication adherence	0.490		
3	Sex	0.096	0.300	0.090
	Complication	0.002		

Multivariate logistic linear regression was used to evaluate relationship between depression and risk factors of depression. The table showed complication is significantly related as depression factors.

3.2 Discussion

The results of our study indicate that complications are associated with depression in patients with diabetes mellitus. Respondents in this study had at least one complication disease as much as 68.6%, while those who had more than one complication were 31.4%. The incidence of complications is influenced by various factors such as lack of adherence to treatment regimens, and the low level of knowledge possessed by these two factors is interrelated because these factors will affect an action.

This is in line with the research conducted by Sharif et al. (2019) state that diabetics who have complications are more prone to depression than diabetics who do not experience complications. DM patients with complications of retinopathy are 3.8 times more likely to experience depression, while those with nephropathy are 4.2 times more likely to experience depression and patients with neuropathy complications are 2.1 times more likely to experience depression than patients without complications. The emergence of complications can occur as a result of poor glycemic control status so there is a risk of various complications of diabetes, so it is necessary to educate people with diabetes to control blood sugar regularly to prevent the risk of complications (11). The risk of depression is higher in patients who have more than one disease complication (9) (6).

People with diabetes are at high risk for depression. The HPA (Hypothalamus Pituitary Adrenal) axis is the center of the stress response system. HPA hyperactivation is one of the biological factors that can cause depression in DM patients. In addition, the activated HPA Axis and excessive release of hypercortisolism have a negative effect, causing metabolic disorders and immune disorders resulting in hyperglycemia, hyperlipidemia, insulin resistance, and inflammation. Diabetics who have complications such as neuropathy show elevated HPA levels and excessive cortisol secretion (12). Patients who have complications are the impact of not complying with the rules of the diet, lack of physical activity (exercise), and consumption of drugs with inappropriate doses (13). However, in this study, it was found that age had no relationship with depression with a *p*-value of 0.749 and an *r* value of -0.028. Depression in the 20-60year age group was higher with the percentage experiencing depression as much as 9.2%. While in the age group > 60 years they feel depression with a percentage of 7.7%. Depression is often found in patients aged 40 to 60 years but is rarely found in patients aged less than 40 years or more than 60 years (11). Ages under 60 years are more at risk for depression, it is because people with DM are chronic and require lifelong treatment (14). Depression is felt more in young people with diabetes mellitus than in elderly patients. The impact of depression will result in less adherence to the treatment process (15).

Employment status is not associated with depression, working as a housewife has a higher risk of depression (11.3%). Housewives have a higher frequency of depression compared to working women (11). Workload and pressure at work can affect coping mechanisms so that they can be applied as self-control when experiencing depression (16). In addition, the interaction between colleagues in the workplace can also reduce symptoms of depression because of the interaction of sharing experiences and also the existence of social support that mutually reinforces one another.

In addition, gender is not associated with depression. Gender is not a factor that causes a person to feel symptoms of depression (17). Women who experience depression are 11.2% while men are 2.6%. The high rate of depression in women is influenced by various factors, such as social factors, biological factors, and hormonal factors (18). The level of knowledge is also not related to depression, the level of knowledge of the respondents in this study is still classified as low at 54.7%. Someone who has a high level of knowledge will easily change behavior in a better direction, this is because there has been an awareness of the importance of these actions for self-interest. If the level of knowledge is low, it will have an impact on poor health quality, thereby increasing the risk of complications (19). Utilization of health facilities was not significantly associated with depression. In this study, it was found that 86.9% of people with diabetes mellitus used health facilities to undergo treatment and conduct consultations regarding their disease conditions. In line with the research conducted by Ahmadiéh et al. (2018) stated that there was no significant relationship between diabetics who visited clinical practice in the last 6 months and patients who visited during the last 6 months with the incidence of depression (17). Visits to health facilities are generally carried out by women because they want to express their feelings of anxiety related to illness (20). Diabetes patients in this study lacked adherence to medication 75.9% found that there was no relationship between medication adherence and depression. this is also influenced by the level of knowledge of respondents where the level knowledge of respondents is still relatively low (54.7%). A person's level of knowledge greatly influences medication adherence because by having a good level of knowledge the patient can take care of himself so that self-awareness arises to improve his disease condition (21). Adherence to medication instructions can maintain blood sugar stability and protect against possible depressive symptoms. The presence of depressive symptoms can worsen the effectiveness of medication management (22), in addition to maintaining blood sugar stability to prevent complications (19). Social support has a positive impact on the quality of life of diabetic patients so it is necessary to achieve medication adherence (23). HbA1c levels are not associated with depression. In this study, it was found that the average HbA1c level of 10% was above the normal limit (87.6%). This means that blood glucose levels are high in the last three months. High levels of HbA1c are at risk for other complications in diabetics (24) (25) (17). Other studies conducted by Ahmadiéh (2018) and Akpalu (2018) also stated that glycemic status was not associated with depression (17) (13).

Several risk factors that lead to poor sugar control statuses such as diabetes suffered in the long term and the combination of treatment between the use of insulin and oral drugs. Patients who take insulin and oral medications have a higher risk of depression than those who take insulin alone (26).

Body mass index is not associated with depression, this is in line with research conducted by (14). Obesity in diabetics is caused by the release of excessive fatty acids, resulting in insulin resistance and hyperglycemia. Insulin resistance that occurs as a consequence of increased cytokine secretion by adipose tissue which results in the development of diabetes. However, it can be prevented by maintaining an ideal body weight (27).

IV. Conclusion

Symptoms of depression quality of life in diabetics. It is important to do a proper examination of mental health problems by involving health workers to assess symptoms, so that they can provide optimal therapy and can decrease risk of morbidity and mortality prevalence.

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