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Factors associated with diabetes distress and depression in diabetes mellitus patients in rural East Nusa Tenggara Indonesia

Factores asociados con la angustia y la depresión por diabetes en pacientes con diabetes mellitus en la región rural del este de Nusa Tenggara Indonesia

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SUMMARY

Introduction: *Patients with diabetes mellitus frequently experience depression and diabetes distress. Patients with diabetes mellitus who experience depression, diabetic distress, or both can find it difficult to manage their condition on their own, which can lead to complications, lower quality of life, or even death. The purpose of this research is to identify the risk variables for depression and diabetes distress in individuals with diabetes mellitus.* **Methods**: *This cross-sectional survey was conducted from February to April 2023. Consecutive sampling (n=72) was used to choose the study's sample. Patients with diabetes mellitus between 25 and 65 years and conscious (capacity to relate to oneself and surroundings) are inclusion criteria. The binary logistic regression test and Chi-Square were utilized in the data analysis.* **Results:** *The results of multivariate analysis showed that there was a significant relationship between glycemic control (AOR: 3.151.95 % CI: 1.014-9.794, p-value 0.047) and diabetes distress. There was a significant relationship between complications (AOR: 4.688.95 % CI: 0.990-22.202, p-value 0.052) and glycemic control (AOR: 8.471.95 % CI: .428-2.558, p-value 0.001) and depression.* **Conclusion:** *Individuals suffering from diabetes mellitus who maintain inadequate blood sugar levels are more susceptible to depression and diabetes-related distress compared to those who maintain appropriate blood sugar levels. Individuals with diabetes mellitus who have more than one complication or none at all are more likely to experience depression.*

Keywords: *Depression, diabetes distress, diabetes mellitus.*

RESUMEN

Introducción: *Los pacientes con diabetes mellitus frecuentemente experimentan depresión y malestar por diabetes. Los pacientes con diabetes mellitus que experimentan depresión, sufrimiento diabético o ambos pueden tener dificultades para controlar su afección por sí solos, lo que puede provocar complicaciones, una menor calidad de vida o incluso la muerte. El propósito de esta investigación es identificar las variables de riesgo de depresión y angustia diabética en personas con diabetes mellitus.* **Métodos:** *Esta encuesta transversal se realizó entre febrero y abril de 2023. Se utilizó muestreo consecutivo para elegir la muestra del estudio (n=72). Pacientes con diabetes mellitus entre 25 y 65 años, conscientes (capacidad de relacionarse con uno mismo y el entorno) son criterios*

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de inclusión. En el análisis de los datos se utilizaron la prueba de regresión logística binaria y Chi-Cuadrado. **Resultados:** *Los resultados del análisis multivariado mostraron que existía una relación significativa entre el control glucémico (AOR: 3,151,95 % IC: 1,014-9,794, valor de p 0,047) y el malestar por diabetes. Hubo una relación significativa entre las complicaciones (AOR: 4,688,95 % IC: 0,990-22,202, valor de p 0,052) y el control glucémico (AOR: 8,471,95 % IC: 2,428-29,558, valor de p 0,001) y la depresión.* **Conclusión:** *Las personas que padecen diabetes mellitus y mantienen niveles inadecuados de azúcar en sangre son más susceptibles a la depresión y a la angustia relacionada con la diabetes en comparación con aquellos que mantienen niveles adecuados de azúcar en sangre. Las personas con diabetes mellitus que tienen más de una complicación o ninguna tienen más probabilidades de experimentar depresión.*

Palabras clave: *Depresión, diabetes mellitus, malestar por diabetes.*

INTRODUCTION

Diabetes mellitus (DM) is a growing health issue in both industrialized and developing nations. Approximately 422 million people worldwide suffer from diabetes mellitus, with the majority residing in low- and middle-income nations (1). The prevalence of diabetes mellitus (DM) in Indonesia grew from 6.9 % in 2013 to 8.5 % in 2018, according to blood test findings (2). Anxiety and depression are two mental health conditions that people with diabetes mellitus are more likely to experience. Comorbid mental health issues make it difficult for patients with diabetes mellitus (DM) to follow their treatment regimens, which raises the risk of major short- and long-term complications. These complications can include blindness, amputation, stroke, cognitive decline, kidney failure, a lower quality of life, and early death (3,4).

About one-third of diabetics struggle with mental and social issues, which makes it difficult for them to manage their diabetes on their own. This affects low glycemic control, a rise in DM complications, early mortality, and rising healthcare expenses (5). Depression, anxiety, and post-traumatic stress disorder, which increase the risk of dying 10-20 years earlier, are among the mental health problems often experienced by diabetes mellitus patients. Depression increases between 40 % and 60 %, anxiety increases by about 20 %, and one in four diabetics will have diabetes distress (6). Patients with diabetes mellitus who live in rural locations report higher levels of diabetes distress (35.6 %) compared to those who live in urban areas (18.2 %) (7). Adult DM patients in Indonesia have mental health issues at a rate of 19.3 % (8). Poor food, low socioeconomic level, insufficient exercise, lack of physical activity, and poor sleep quality are all potential contributing factors to mental health issues (6,8).

One of the mental health issues that people with DM frequently experience is depression. Depression is twice as likely to strike people with DM. Women, young people, the elderly, poor glycemic control, prolonged DM symptoms, poverty, long-term consequences from DM, reduced physical activity, obesity, and psychological stress are risk factors for depression in DM patients. Depression can make diabetic patients' clinical problems worse since it can lower their drive to take care of themselves, stick to their treatment plan, and experience long-term complications and a lower quality of life (3,8). However, research on factors related to mental health problems, such as depression and diabetes distress in rural areas in Indonesia, is still limited.

Diabetes distress is another mental health problem DM patients frequently experience (9). Diabetes distress is the specific emotional distress related to the load, medication, and interpersonal aspects of managing diabetes daily (10). The National Diabetes Services Scheme (NDSS), an initiative of the Australia Government, administered by Diabetes Australia, defines diabetes distress as the emotional burden of individuals living with DM and managing diabetes (11). Patients with diabetes mellitus have an increased risk of developing diabetes distress, which, over time, can lead to both macrovascular and microvascular complications as well as an increased chance of dying (12). Diabetes distress ranges from moderate to high in about 41.6 % of adult DM patients (7). In Indonesia, 45.5 % of diabetes patients experience moderate levels of diabetes distress (13). According to study findings, interpersonal distress is more common among diabetic patients living in rural areas (35.6 %) than it is in urban areas (18.2 %) (7). Previous

research has identified several characteristics, including low education, complicated treatment, single status, obesity, overweight, and HbA1c values higher than 6.5, that are linked to diabetes distress (7).

Our research aimed to identify factors associated with depression and diabetes distress in a rural area in the province of East Nusa Tenggara, Indonesia. The conceptual framework used for this study is based on concepts of health promotion and the conclusions of previous studies on type 2 DM-related factors associated with depression and diabetes distress (14). These variables include glycemic control, gender, complication, and long-suffering from DM. These factors were selected because the rural study site has few infrastructure options, low income, and very limited facilities. As a result, patients with diabetes who have had the disease for longer than five years may have poor glycemic control and experience numerous complications, which can worsen depression and diabetes-related distress.

METHODS

This research is a quantitative study with a cross-sectional design that aims to determine the factors associated with mental health problems: depression and diabetes distress in diabetes mellitus patients, especially in rural areas in Indonesia. The population in this study was diabetes mellitus patients in Manggarai Regency, NTT, with a total sample of 72. The Lemeshow formula is used to calculate sample size, confidence level 95 %, anticipated population proportion (P) = 0.05, and absolute precision required on either side of the proportion (d) = 0.05 (15). The Lemeshow formula:

$$n = z^2_{1-\alpha/2} P(1-P)/d^2$$

Sampling techniques used consecutive sampling based on certain criteria. This sampling technique is used to find respondents who meet the inclusion criteria throughout the research period so that the required number of respondents is reached. Inclusion criteria include diabetes mellitus patients aged 25-65 years, conscious (capacity to relate to oneself and surroundings), and willing to be involved in research. Exclusion criteria: DM patients with severe hypoglycemia and diabetic retinopathy. Data were gathered in the Manggarai region of East Nusa Tenggara province, at the Ruteng General Hospital, and in the city health center's operational area. Before any research was conducted, the investigator explained the study's goals and requested informed consent from the respondents. This research was conducted in February-April 2023.

The research instrument used a questionnaire consisting of demographic data, depression and diabetes distress questionnaires. The demographic data questionnaire contains the respondent's name (initial), age, gender, highest level of education, length of time suffering from DM, employment status, use of anti-diabetic drugs, blood sugar test results in the last month, complications (hypertension, stroke, kidney failure, heart disease), and family history of mental disorders. Depression questionnaire was the Patient Health Questionnaire (PHQ-9). This questionnaire consists of nine question items. The depression questionnaire evaluates the respondent's state during the previous two weeks, evaluating lack of motivation, feeling hopeless or depressed, sleeping diffigulties, appetite loss or overeating, low self-esteem, difficulty focusing, moving or speaking slowly, and feeling better off quickly. Each of the nine DSM-IV depression criteria is scored from 0 (not at all) to 3 (almost daily). If a total score of ≥ 10 out of a total score of 27, this indicates depression (16). The diabetes distress questionnaire used the Diabetes Distress Scale (DDS-17). The diabetes distress questionnaire contains emotional burdens, physical, medication-related, and interpersonal distress. The questionnaire consists of 17 items and is given a score of 0 (not a severe problem) to a score of 6 (a severe problem). The total means score of 1-2.9 is categorized as mild-moderate diabetes distress, while the total means score ≥ 3 is categorized as severe diabetes distress (16). According to reliability test results, Cronbach's alpha values for the depression and diabetic distress questionnaires were 0.926 and 0.915, respectively. The validity test results using

Pearson correlation on the diabetes distress and depression questionnaire for all question items were considered valid with a calculated r value > r table (0.361).

Data analysis was using Chi-Square and binary logistic regression tests. The Chi-Square test was carried out on bivariate analysis to find out the relationship between gender, duration of diabetes, complications, and glycemic control with depression and diabetes distress. Binary logistic regression predicts the dependent variable (depression and diabetes distress) by assessing the relationship between the independent variables (gender, duration of diabetes, complications, and glycemic control) and the dependent variables. This research has passed the ethical test carried out by the ethics commission of the Catholic University of Indonesia Santu Paulus Ruteng with ethical test number 17a / USP / R01 / PE02 / K / 01/2023.

RESULTS

Table 1 shows the characteristics of DM respondents. Most respondents, 45 (62.5 %), aged 45-59 years, 36 (50 %) were female and male 36 (50 %). 22 (30.6 %) had a recent college education, 54 respondents (75 %) were jobless (did not have a fixed income), 38 respondents (52.8 %) were long-suffering from DM > 5 years, and 33 respondents (45.8 %) were taking oral anti-diabetic drugs, and 39 respondents (54.2 %) had complications of hypertension.

Table 1

Characteristics of Diabetes Mellitus Respondents (n = 72)

No.	Characteristics of Respondents	n	%
1	**Age (years)**		
	25-44 (youth)	5	6.9
	45-59 (middle-age)	45	62.5
	≥ 60 (elderly)	22	30.6
2	**Gender**		
	Female	36	50
	Male	36	50
3	**Education**		
	No education	7	9.7
	Elementary School	13	18
	Junior High School	12	16.7
	Senior High School	18	25.0
	College	22	30.6
4.	**Employment status**		
	Jobless	54	75
	Work	18	25
5	**Long-suffering from DM**		
	≤ 5 years	34	47.2
	>5 years	38	52.8
6	**Anti-diabetic Drugs**		
	Not taking medication	4	5.6
	Oral	33	45.8
	Insulin	16	22.2
	Oral insulin and insulin	19	26.4
7	**Complications**		
	No complications	10	13.9
	Hypertensive	39	54.2
	Stroke	3	4.2
	Renal failure	14	19.4
	Heart disease	6	8.3

Table 2

Bivariate and Multivariate Analysis: Factor Influencing Diabetes Distress in Diabetes Mellitus Patients (n = 72)

Variable	Bivariate Analysis					Multivariate Analysis			
	Diabetes distress				P	AOR	P	95 %CI	
	Mild-moderate		Severe					Lower	Upper
	n	%	n	%					
Gender:									
Female	22	61.1	14	38.9		1.000		0.154	1.438
Male	27	75	9	25	0.226	0.470	0.186		
Long Suffering from DM:									
≤ 5 years	27	79.4	7	20.6		1.000		0.648	6.707
>5 years	22	57.9	16	42.1	0.006	2.085	0.218		
Complications:									
No or only one complication	43	72.9	16	27.1		1.000		0.736	12.894
More than one complication	6	46.2	7	53.8	0.061	3.081	0.123		
Glycemic control									
Good	27	81.8	6	18.2		1.000		1.014	9.794
Bad	22	56.4	17	43.6	0.021	3.151**	0.047		

Table 2 shows the bivariate and multivariate analysis results of factors affecting diabetes distress in patients with diabetes mellitus. The bivariate analysis using the Chi-Square test showed a significant relationship between the duration of suffering from DM (p-value 0.006) and glycemic control (p-value 0.021) with diabetes distress in DM patients. The multivariate analysis using binary logistic regression showed a significant relationship between glycemic control (AOR: 3.151.95 % CI: 1.014-9.794, p-value 0.047) and diabetes distress in DM patients. DM patients who have poor glycemic control are 3,151 times more likely to experience diabetes distress compared to DM patients with reasonable glycemic control.

Table 3

Bivariate and Multivariate Analysis: Factors Influencing Depression in Diabetes Mellitus Patients (n=72)

Variable	Bivariate Analysis					Multivariate Analysis			
	Depression				P	AOR	P	95 %CI	
	Not depressed		Depression					Lower	Upper
	n	%	n	%					
Gender:									
Female	21	58.3	15	41.7		1.000		0.216	2.016
Male	24	66.7	12	33.3	0.465	0.659	0.465		
Long Suffering from DM:									
≤ 5 years	24	70.6	10	29.4		1.000		0.408	4.103
>5 years	21	55.3	17	44.7	0.180	1.293	0.622		
Complications:									
No or only one complication	40	67.8	19	32.2		1.000		0.990	22.202
More than one complication	5	38.5	8	61.5	0.048	4.688**	0.052		
Glycemic control:									
Good	28	84.8	5	15.2		1.000		2.428	29.558
Bad	17	43.6	22	56.4	0.0001	8.471***	0.001		

Table 3 shows the results of bivariate and multivariate analysis of factors affecting depression in patients with diabetes mellitus. The results of bivariate analysis using the Chi-Square test showed a significant association between DM complications (p-value 0.048) and glycemic control (p-value 0.048) and glycemic control (p-value 0.0001) with depression in DM patients. The results of multivariate analysis using binary logistic regression showed that there was a significant relationship between DM complications (AOR: 4.688.95 % CI: 0.990-22.202, p-value 0.052) and glycemic control (AOR: 8.471.95 % CI: 2.428-29.558, p-value 0.001) with depression in DM patients. DM patients who had more than one DM complication were 4.688 times more likely to develop depression compared to DM patients who had no or only one complication. DM patients who had poor glycemic control had an 8.471 times higher risk of depression compared to DM patients with reasonable glycemic control.

DISCUSSION

Factors affecting diabetes distress in patients with diabetes mellitus

Poor glycemic control was found to be a significant factor associated with diabetes distress in patients with diabetes mellitus. The findings are consistent with Nagabhushana (2021), who found a strong correlation between diabetic distress and inadequate glycemic control (17). Poor glycemic control is strongly linked to higher healthcare expenses and utilization, which can be stressful emotionally (18). DM patients who live in rural areas with poor glycemic control are at higher risk of experiencing diabetes distress for three reasons. First, patients with poor glycemic control require more complex treatment, which requires more effort and costs for DM patients, which can cause a psychological burden. Second, patients with poor glycemic control usually experience complications due to limited costs for self-care and the inadequate availability of facilities in rural areas. This causes patients to feel guilty for failing to treat DM (19). Third, demographic characteristics such as gender, insufficient family income, and being jobless also influence poor glycemic control, which has an impact on increasing psychological burdens, one of which is diabetes distress (20). The results of our research show that the majority of DM patients who experience diabetes distress are female, have low income, and are jobless (do not have a fixed income).

DM patients in the Manggarai district are at high risk of experiencing diabetes distress. This is due to low socioeconomic conditions, where most Manggarai people are farmers with low incomes, limited health facilities, and cultural influences on DM management. Uncontrolled hyperglycemia conditions make DM patients feel burdened because they require high treatment costs, low income, and limited health facilities that support DM patient care. Cultural influences are also closely associated with poor glycemic control and diabetes distress in DM patients in Manggarai Regency. In DM patients with low self-awareness, the habit of eating foods high in carbohydrates and fats in traditional feast dishes can affect dietary adherence.

Factors affecting depression in patients with diabetes mellitus

The findings demonstrated that poor glycemic control and the existence of complications from diabetes mellitus were the two characteristics that were strongly linked to depression in people with the disease. Patients with diabetes mellitus who live in rural areas with poor glycemic control and complications may develop depression because of treatment barriers brought on by cultural factors, poverty, stigma, and limited access to services (20,21). Previous research has shown that there is a positive association between diabetes complications and persistent depressive symptoms with AOR (adjusted ORs) of depressive symptoms 1.025 (95 % CI: 0.606, 1.733) (22). Another study conducted in rural areas by Yu (2016) showed that one of the factors that were significantly associated with depression in diabetes mellitus patients in rural areas was diabetes mellitus patients living with more than two additional diseases (23). The results of this study are also supported by Chew (2016), that

there is a relationship between microvascular complications and depression in DM patients with a value of 0.014 (24).

DM patients living in rural areas, especially in Manggarai Regency, have a high risk of DM complications, both microvascular and macrovascular complications, due to poor glycemic control, which has an impact on increasing depression in DM patients. This can be seen from the results showing that most DM patients have poor glycemic control. This condition can trigger the occurrence of diabetes distress in patients with DM and further progression to depression. The lack of health facilities that support DM management, low income, cultural influences that have the habit of consuming foods that are high in carbohydrates and fats, smoking and consuming alcohol can be factors that contribute to the increase in complications in DM patients in Manggarai district and trigger depression.

Depression in individuals with diabetes mellitus is also substantially correlated with inadequate glycemic management. The findings are supported by earlier research showing a substantial relationship between glycemic control and depression symptoms in individuals with diabetes mellitus (25). Individuals with diabetes mellitus who reside in rural locations, particularly in the Manggarai district, often have inadequate glucose regulation, which might exacerbate their depressive symptoms. Poverty, cultural impacts on DM management, and limited access to DM treatment are the causes of this. The findings of this study are consistent with earlier research on the prevalence of depression in developing nations, which demonstrated that low socioeconomic status and complications were linked to higher rates of depressive symptoms in DM patients in these regions and that depression was linked to inadequate glycemic control (26).

CONCLUSION

Depression and diabetes distress are the two mental health problems that DM patients in rural locations are most likely to experience. In people with diabetes, inadequate glycemic control is one condition that is strongly associated with diabetes, distress and depression. DM patients who have poor glycemic control have a higher risk of experiencing distress and depression compared to DM patients with good glycemic control. Another factor that is significantly associated with depression in DM patients is DM complications. DM patients who have more than one complication are at higher risk of depression than DM patients without complications or only one complication. It is recommended for health workers to screen earlier for symptoms of diabetes distress and depression in DM patients and intervene with a cultural approach to factors related to diabetes distress and depression in DM patients. We recommend further research to develop culture-based interventions that reduce symptoms of diabetes distress and depression in DM patients and glycemic controls.

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Conflict of interest

The researcher discloses no conflicts of interest.

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