ORIGINAL ARTICLE

Predictors of depressive symptoms among people with type 2 diabetes mellitus in Indonesia: a cross-sectional study

Akhmad Azmiardi[1], Joko Tri Atmojo[1], Aris Widiyanto[1], Rejo Rejo[1], Nova Rahma Widyaningrum[1], Catur Setyorini[1], Siti Maesaroh[1], Rina Tri Handayani[1], Lilik Hanifah1, Tri Yuniarti[1]

[1]School of Health Sciences Mamba'ul 'Ulum, Surakarta, Central Java, Indonesia

Corresponding Author: Akhmad Azmiardi **Email:** aazmiardi@gmail.com

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ABSTRACT

Working conditions and quality of work life reflect a person's overall quality of life and well study to date has investigated the factors contributing to depressive symptoms in people with type 2 DM in Indonesia. This study aimed to investigate the predictors of depressive symptoms among people with type 2 DM in Indonesia. This was a cross-sectional study using secondary data from the Indonesian family life survey 5 (IFLS-5). A total of 774 respondents with type 2 DM were selected for this study. The dependent variable was depressive symptoms while the independent variables were demographics, economic status, smoking, duration of diabetes, chronic conditions, self-rated health, and physical function. The center for epidemiologic studies depression scale was used to measure depressive symptoms. The data were analyzed with multivariate logistic regression. The results showed that 70.70% of respondents had depressive symptoms. The risk of experiencing depressive symptoms decreased with age ≥ 50 years (AOR= 0.40; 95%CI 0.25 to 0.64; p<0.001) and good self-rated health (AOR= 0.54; 95%CI= 0.35 to 0.81; p= 0.003). Otherwise, the risk of experiencing depressive symptoms increased with a higher level of education (AOR= 1.78; 95%CI= 1.02 to 3.12; p= 0.042) and with chronic conditions (AOR= 1.64; 95%CI= 1.07 to 2.51; p= 0.023).

Depressive symptoms were significantly associated with personal health conditions including older age, level of education, self-rated health and chronic conditions. Individual and community level strategies that can improve personal health conditions can be further studied to address depressive symptoms in type 2 DM patients.

Key words:
depressive symptoms; IFLS; type 2 diabetes mellitus

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycemia caused by insulin insufficiency[1]. Every year, the global prevalence of T2DM continues to rise[2]. T2DM affects 463 million individuals aged 20 to 79, and this will increase to 738 million by 2045. The number of people with T2DM is rising in almost every country, and 80% of adults with diabetes mellitus live in low- and middle-income countries[3]. T2DM incidence in Indonesia is rapidly growing, from 6.9% in 2013 to 10.9% in 2018[4]. In 2019, Indonesia was ranked as one of the top ten nations in the world with the highest number of people living with diabetes mellitus (DM) with an estimated 10.1 million people suffering from the disease[5].

T2DM is linked to micro and macrovascular complications, including an increased risk of cardiovascular disease, diabetic nephropathy, retinopathy, neuropathy, and lower extremity amputations, as well as impacts on psychological functions and mental well-being[6]. Depressive symptoms are a common psychological condition among people with diabetes mellitus. The prevalence of depressive symptoms is two times higher in people with T2DM than in non-T2DM people =[7]. The previous meta-analysis showed that the prevalence of depressive symptoms among T2DM patients was 28% higher than that among the general population[8,9].

Depressive symptoms are indicated by a low mood, a lack of interest or pleasure, feelings of guilt, low self-worth, sleep or eating disturbances, low energy, and impaired focus[10]. Depressive symptoms in people with T2DM have a detrimental impact on their self-care activities, leading to decreased adherence to treatment, lower physical activity, and poor quality diet[11]. Depressive symptoms in combination with diabetes will result in poor metabolic control, a higher risk of complications, a higher mortality rate, and a lower quality of life[12]. A previous study has shown that depressive symptoms have a negative impact not only on people's moods but also on their psychosocial functioning[13].

Depressive symptoms among people with T2DM were associated with socioeconomic factors[14]. An extensive study has looked at the risk factors for depressive symptoms in people with T2DM with varied results[15]. Another study showed that mental health conditions, poor self-reported health status, and female gender were increasing the experience of depressive symptoms in people with T2DM[16].

In Indonesia, there are very few studies regarding the prevalence and predictors of depressive symptoms among people with T2DM[17,18]. However, these studies have only been carried out in a small number of areas in Indonesia. This study used national data from a longitudinal survey to provide more information for deciding the necessary prevention strategies, while research assessing the relationship between personal health conditions and depressive symptoms in Indonesians is still limited. This study aimed to investigate the predictors of depressive symptoms among people with T2DM in Indonesia.

MATERIALS AND METHODS

Study design

Data were analyzed from the Indonesia Family Life Survey (IFLS-5). The IFLS is a continuing survey of socioeconomic and health status. The survey collected data on individuals, families, households, and communities, as well as the health and educational services using a multistage stratified sampling design. The IFLS survey began in 1993 and had a five-wave survey of data collection. The fifth wave (IFLS-5) was conducted in late 2014 and concluded

in 2015[19]. The IFLS was approved by the RAND Corporation and the Universitas Gadjah Mada ethics review committees. The IFLS-5 data are open for public use after registration on their website at http://www.rand.org/labor/FLS/IFLS.html.

Sampling

This study used data from Indonesia Family Life Surveys-5 (IFLS-5). The IFLS is a cross sectional survey conducted to obtain a nationally representative sample of Indonesia. The IFLS randomly selected 321 enumerations in 13 provinces. The 17,334 respondents' IFLS survey analysis was limited to IFLS 5. The inclusion criteria in this study were people diagnosed with T2DM by medical doctors, paramedics, nurses, or midwives, and those who had been diagnosed with diabetes at the age of ≥18 years. On the other hand, the exclusion criteria were people that never had been diagnosed with DM, people who had diabetes during childhood, from birth to age 15, people who replied, "I don't know", and had missing data were excluded from the sample. After applying these criteria, a total sample of 774 respondents was obtained.

Measures

The dependent variable was depressive symptoms. Depressive symptoms were measured by a short form of the center for epidemiologic study depression scale (CESD). This is a brief self-report questionnaire developed in 1977 by Laurie Radloff to measure depressive symptoms severity in the general population. Each statement of CESD was assessed by the following categories: rarely or none (≤ 1 day), some days (1-2 days), occasionally (3-4 days), and most of the time (5-7 days). A clinically significant degree of depressive symptoms is defined as a cutoff point of 16 or higher. Individuals with a score of 16 or more are classified as having higher depressive symptoms while those with a score of less than 16 are classified as having lower depressive symptoms[20].

The respondent's self-rated health was assessed by asking how they felt about their present health situation in general. The question items were coded as 1= very healthy, 2= somewhat healthy, 3= somewhat unhealthy, and 4= unhealthy. Respondents who replied very healthy and somewhat healthy had a positive self-perception of their health. Meanwhile, respondents had a negative self-perception of their health if they replied somewhat unhealthy or very unhealthy. Physical functioning was assessed by using the physical functioning scale, which consisted of 11 statement items. Each statement item was classified into 1= Easily, 3=With difficulty, and 5=Unable to do it. Physical functioning was categorized into poor and good based on the median cutoff point. Physical function was poor if the score was greater than 13 and good if the score was less than 13[21].

The respondent's subjective economic status was assessed by asking them about their economic status by choosing the number ranging from 1 to 6, where on the bottom or lowest score were the poorest people, and on the highest number were the richest. Cutoff point 3 was used to classify the economic status into low or high. It was considered high if the score was greater than 3 and low if the score was less than 3[22].

Sociodemographic and other factors as individual-level determinants were based on the self-report and included age, sex, marital status, education, employment, duration of diabetes, adherence to diabetic medications, and the number of comorbidities and smoking status. Age was measured based on the age of the respondents during the survey. It was categorized into less than 50 years and more than 50 years. Sex consisted of male

and female. Marital status was categorized into married and unmarried or single (separated, widowed, and divorced). Education was categorized into low and high education. It was considered low education if the respondent had less than 12 years of attainment and high education if they had more than 12 years of attainment. Employment was classified into employed and unemployed.

The respondent's smoking status was determined by asking if they had ever smoked, had the habit of chewing, smoking tobacco using pipes or rolling it themselves, or smoking cigarettes or cigars, and whether the habit continues today. If the respondents answered that it was still going on, it was coded as 1, and if they answered "no" and had stopped, it was coded as 0. The duration of diabetes was determined by the year when diabetes was first diagnosed or the age when the respondent was first diagnosed. It was separated into two categories, less than ten years and more than ten years.

Adherence to diabetic medications was determined by the question of whether the respondent was prescribed on a weekly basis. If they answered "yes", it was coded as 1, and if they answered "no", it was coded as 0. The chronic medical condition was assessed with the question of whether a doctor, paramedic, nurse, or midwife had ever told them that they had some medical problems. By definition, chronic conditions are long-lasting diseases and are not easily cured. The chronic conditions included hypertension, tuberculosis, asthma, other lung problems, coronary heart disease or other heart problems, liver disease, stroke, cancer, rheumatism, high cholesterol, kidney disease, and digestive disease. Answer "yes" was coded as 1 if there was one or more of these diseases and 0 if there was none.

Data analysis

Descriptive analysis was used to describe each of the study variables. Chi-square test was used to assess the relationship between independent and dependent variables. Multiple binary logistic regression was used to determine the predictors of depressive symptoms. Missing data were excluded from the analysis. Results were presented in terms of the adjusted OR (AOR) with 95% CIs, and a $p < 0.05$ was considered statistically significant. The data were weighted to make the IFLS-5 sample representative. Both the 95%CI and p values were adjusted considering the survey design of the study. STATA software version 16.0 was used to perform all analyses.

RESULTS

A total of 774 respondents aged ≥ 18 years were included in this study. They were then stratified into groups < 50 years and ≥ 50 years. Most of the respondents are over 50 years old (65%). The proportion of women was 53.75% and 81.14% of the respondent were married. The percentage of respondents who have a higher level of education (attained more than senior high) was 18.99%. Regarding the employment status, 54.59% were employed. 87.34% of respondents are non-active smokers, and 67.15% had a low economic status.

Regarding various health condition variables, 85.40% of the participants reported having DM for less than 10 years. 52.84% of those adhere to their diabetic medications. 67.96% of those were reported having chronic conditions besides T2DM such as hypertension, tuberculosis, asthma, coronary heart disease, liver issues, stroke, cancer, rheumatism, high cholesterol, kidney disease, and digestive disease. More than half or 70.70% of respondents had higher depressive symptoms. The proportion of respondents who rated good health condition was 50.90%; 74.81% of the respondents rated their physical functioning as good. Table 1 illustrates the description of each study variable.

Table 1. Chararesteristics of study subjects

Variables	N	%
Age		
< 50 years	271	35.01
≥ 50 years	503	64.99
Sex		
Women	416	53.75
Men	358	46.25
Marital status		
Unmarried or single	146	18.86
Married	628	81.14
Level of education		
Low (≤ Senior high school)	593	81.01
High (> Senior high school)	139	18.99
Employment status		
Unemployed	351	45.41
Employed	422	54.59
Subjective economic status		
Low	460	67.15
High	225	32.85
Smoking status		
Non active smoking	676	87.34
Active smoking	98	12.66
Duration of diabetes		
< 10 years	661	85.40
≥ 10 years	113	14.60
Adherence to diabetic medications		
No	365	47.16
Yes	409	52.84
Chronic conditions		
None	248	32.04
Yes, more than 1	526	67.96
Depressive symptoms		
Lower	201	29.30
Higher	485	70.70
Self-rated health		
Poor	380	49.10
Good	394	50.90
Physical function		
Poor	195	25.19
Good	579	74.81

Table 2 illustrates bivariate analysis results. Age, chronic condition, and self-rated health had a significant relationship with depressive symptoms in people with T2DM. Other variables in this study including sex, education, marital status, employment status, economic status, smoking status, duration of diabetes,

adherence to diabetic medications, chronic conditions, self-rated health, and physical function might become potential confounders.

Table 2 Bivariate analysis of variables in association to depressive symptoms

Variables	Depressive symptoms				COR	95% Confident interval		p-value
	Lower		Higher			lower	upper	
	n	%	n	%				
Age								
< 50 years	47	23.38	207	42.68	0.41	0.28	0.59	<0.001
≥ 50 years	154	76.62	278	57.32				
Sex								
Women	105	52.24	266	54.85	0.90	0.64	1.25	0.533
Men	96	47.76	219	45.15				
Marital status								
Unmarried or single	33	16.42	80	16.49	0.99	0.63	1.55	0.980
Married	168	83.58	405	83.51				
Level of education								
Low (≤Senior high school)	160	83.77	368	79.31	1.35	0.86	2.10	0.190
High (>Senior high school)	31	16.23	96	20.69				
Employment status								
Unemployed	91	45.27	195	40.29	1.23	0.88	1.70	0.228
Employed	110	54.73	289	59.71				
Subjective economic status								
Low	132	65.67	328	67.77	0.91	0.64	1.29	0.595
High	69	34.33	156	32.23				
Smoking status								
Non active smoking	178	88.56	428	88.25	1.03	0.62	1.72	0.908
Active smoking	23	11.44	57	11.75				
Duration of diabetes								
< 10 years	175	87.06	416	85.77	1.12	0.69	1.81	0.656
≥ 10 years	26	12.94	69	14.23				
Adherence to diabetic medications								
No	99	49.25	234	48.25	1.04	0.75	1.45	0.810
Yes	102	50.75	251	51.75				
Chronic conditions								
None	79	39.30	145	29.90	1.52	1.07	2.14	0.017
Yes, more than 1	122	60.70	340	70.10				
Physical function								
Poor	60	29.85	122	25.15	1.26	0.88	1.82	0.205
Good	141	70.15	363	74.85				
Self-rated health								
Poor	74	36.82	246	50.72	0.56	0.40	0.79	0.001
Good	127	63.18	239	49.28				

The results of a multivariate binary logistic regression analysis are shown in Table 3. Age, level of education, chronic conditions, and self-rated health were associated with depressive symptoms in people with T2DM. Respondents with an age equal to or more than 50 years had 0.40 times lower risk to have depressive syndrome than respondents aged less than 50 years (AOR; 0.40; 95CI% 0.25 to 0.64; p < 0.001). Respondents who attained a higher level of education or attained more than senior high (> Senior high school) had 1.78 times higher odds than respondents who had attained lower education (≤ Senior high school) (AOR: 1.78; 95%CI: 1.02 to 3.12; p = 0.042). Respondents with chronic conditions besides T2DM had 1.64 times higher odds than respondents who did not have chronic conditions (AOR: 1.64; 95%CI: 1.07 to 2.51; p = 0.023). In addition, respondents who had good self-rated health had 0.54 times lower odds of experiencing depressive symptoms than those who did not (AOR: 0.54; 95%CI: 0.35 to 0.81; p = 0.003).

Table 3. Adjusted odds ratio of depressive symptoms in people with type 2 diabetes mellitus

Variables	AOR	95% Confident interval		p-value
		lower	upper	
Age				
< 50 years	Ref			
≥ 50 years	0.40	0.25	0.64	<0.001
Sex				
Women	Ref			
Men	0.91	0.56	1.47	0.701
Marital status				
Unmarried or single	Ref			
Married	1.08	0.61	1.91	0.786
Level of education				
Low (≤Senior high school)	Ref			
High (>Senior high school)	1.78	1.02	3.12	0.042
Employment status				
Unemployed	Ref			
Employed	1.27	0.84	1.95	0.252
Subjective economic status				
Low	Ref			
High	0.66	0.43	1.01	0.059
Smoking status				
Non active smoking	Ref			
Active smoking	1.34	0.69	2.63	0.380
Duration of diabetes				
< 10 years	Ref			
≥ 10 years	1.24	0.71	2.15	0.454
Adherence to diabetic medications				
No	Ref			
Yes	1.18	0.80	1.76	0.390

Variables	AOR	95% Confident interval		p-value
		lower	upper	
Chronic conditions				
None	Ref			
Yes, more than 1	1.64	1.07	2.51	0.023
Self-rated health				
Poor	Ref			
Good	0.54	0.35	0.81	0.003
Physical function				
Poor	Ref			
Good	1.36	0.181	0.86	2.16

DISCUSSION

This present study aimed to determine the predictors of depressive symptoms among people with T2DM. The results showed that the prevalence of depressive symptoms among people with T2DM was 71%. The significant risk factors for depressive symptoms were age, education status, chronic conditions, and self-rated health status. This study found that respondents with older age (≥ 50 years) had a lower risk of depressive symptoms than younger respondents (<50 years). This finding is in line with the previous studies showing that respondents aged 40–49 years were significantly associated with depressive symptoms than older respondents[23,24]. The meta-analysis results by Harding et al. also found that prevalence rates of depressive symptoms were higher in younger respondents[25]. Different pathophysiological processes might explain the differences in how depressive symptoms manifests in younger and older people. Physical abnormalities such as lack of energy, weight changes, food changes, and sleep disturbances are common in younger people experiencing depressive symptoms. In older people, depressive symptoms are more likely to have anhedonia/loss of interest, as well as attention issues[26].

The study from Bawadi et al., (2021) showed that respondents with a higher level of education had a higher risk of depressive symptoms than those with a lower level of education[27]. Collins et al. found that educational level was associated with higher depression scores. The results of the study showed high levels of anxiety and depressive symptoms in diabetic patients; 22.4% (95%CI= 20.2–24.7%)[28] . These findings were in line with the present study. People with higher level of education are prone to stress rather than depression. Prevalence of depression is lower among the highly educated population as they can tackle ways to handle depression compared to those who are less educated.

Depressive symptoms are affected by chronic health conditions. It is shown by the number of chronic diseases increase the risk of developing depressive symptoms [29]. Depressive symptoms become more prevalent because of chronic diseases such as hypertension, tuberculosis, asthma, stroke, cancer, rheumatism, high cholesterol, kidney disease, and digestive disease[30]. The previous meta-analysis showed that people with multiple chronic conditions or morbidities were two to three times more likely to be depressed than people who have no chronic condition[31]. Chronic conditions change people's lifestyles, impair mobility, and inhibit their ability to interact with others[32]. In the present study, respondents with chronic conditions experience more depressive symptoms than respondents without chronic conditions besides Type 2 DM.

According to this finding, respondents with good self-reported health

have a lower chance of experiencing depressive symptoms than those with poor self-reported health. This is consistent with the prior study finding, which demonstrated that respondents with poor self-rated health conditions had a higher risk of experiencing depressive symptoms than those who felt healthier[21]. Poor self-rated health is not only associated with a higher risk of depressive symptoms but also reduces perceived physical health[33]. A cross-sectional study conducted in Taiwan by Lin (2020) showed that self-related health was statistically correlated with happiness. People with good self-rated health are happier than people with poor self-rated health[34]. In older people, depressive symptoms are significant measures of the quality of life [35]. Self-rated health is measured with a unique subjective question on a Likert scale. Through a single subjective question, self-rated health provides a convenient and quick method of reliably assessing an individual's health status[36]. In type 2 DM patients, depressive symptoms may lead to poorer diabetes self-care, poor glycemic control, and decreased adherence to diabetic medications. If left unattended, it can lead to poor quality of life, increased medical complications and can cause death[37].

This study has several limitations. Firstly, the data are limited to existing factors because this study used secondary data. Secondly, the assessment of chronic disease and depressive symptoms was confined to self-reported data. Furthermore, health status is only assessed by asking a single question regarding the general state of health. This may not accurately reflect the respondent's overall health.

In conclusion, the study found that depressive symptoms are highly prevalent among people with T2DM. This risk of experiencing depressive symptoms decreases with age ≥ 50 years and good self-rated health and increases with a higher level of education status and chronic conditions. The findings of this study suggest the need for effective intervention programs and strategies to increase awareness and maintain personal well-being. A diabetes education program is needed to increase patient and community awareness about depressive symptoms and prevention.

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