

Depression and potential risk factors among the elderly with Type 2 Diabetes Mellitus in Kedah, Malaysia

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ABSTRACT

Objective: Elderly with diabetes has been found to have a higher chance of depression. Therefore, the aim of this study is to determine the prevalence of depression and its associated factors among elderly with Type 2 Diabetes Mellitus in Kedah.

Methods: A cross-sectional study was conducted at the Klinik Kesihatan Bandar, Sungai Petani, Kedah. The inclusion criteria were patients aged ≥ 60 years with Type 2 Diabetes Mellitus. Those with cognitive impairment, presence of organic brain syndrome, presence of severe mental disorder and patients who are either deaf or mute were excluded. The Malay version of Geriatric Depression Scale (M-GDS-14) was used to assess the depressive symptoms. The data was analysed using descriptive statistic and multiple logistic regression.

Results: A total of 511 patients participated in the study. The mean age of the respondents is 64.5 (Standard Deviation 7.0) years old. There were slightly more males (53.8%). Majority were Malay (63.0%), married (76.9%) and has a household income of less than RM1000 (67.5%). The prevalence of depression was 32.1%. The number of elderly people living with their children (Adjusted Odds Ratio, aOR0.20, 95%CI: 0.07, 0.55), elderly living with spouse, children, in law and grandchildren (aOR2.95, 95%CI: 1.18, 7.37), diabetic complication (aOR4.68, 95%CI: 2.63, 8.35) and HbA1c (aOR1.23, 95%CI: 1.09, 1.39) are significantly associated with depression.

Conclusion: The level of depression was found to be high. Factors contributing to the significantly high level of depression are found to be associated with living arrangements, diabetic complication and HbA1c were significantly associated with depression.

KEY WORDS:

Depression; elderly; Type 2 diabetes mellitus

INTRODUCTION

The overall prevalence of Type 2 Diabetes Mellitus in Malaysia is increasing. By the year 2020, the prevalence of diabetes among the adult population in Malaysia is projected to be 21.6%.¹ For patients older than 60 years old, the prevalence of diabetes in 2012 was already at 23.8%.²

Elderly patients with diabetes are 1.5 times more prone to have depression compared to patients without diabetes.³ In a meta-analysis conducted by Anderson et al., which involved 42 studies in Western countries, the occurrence of depression in the middle-aged adult and the elderly with Type 2 Diabetes Mellitus was 27%.⁴ In Malaysia, Roshana et al., reported the prevalence of depression among young and middle-aged adult patients with Type 2 Diabetes Mellitus in the North-eastern part of Malaysia was 12.3% using the Hospital Anxiety and Depression Scale (HADS) questionnaires.⁵ Meanwhile, a study in Hong Kong documented a 42% occurrence among their Chinese elderly patients with Type 2 Diabetes Mellitus using Geriatric Depression Scale (GDS) questionnaire.⁶

Several factors contribute to the depression in people with diabetes. The factors include glycaemic control, eating habits and exercise adherence.⁷ Non-compliance oral medication to is also link closely to depression.⁸ Complications either macro or micro vascular were shown major contributors to depression.^{9,10} Among the contributors are neuropathy and retinopathy.^{8,11} High prevalence is expected to amplify the health burden, worsen patients' quality of life and even increase the mortality if occurred concomitantly with depression. However, little data is available regarding the contributor to depression in elderly with Type 2 Diabetes Mellitus in Malaysia. The data of specific complications and co-morbidities rates in specific groups of diabetic patients is critical to comprehensively manage the primary care setting for these patients. Therefore, this study aims to determine the prevalence of depression and its associated factors among elderly people with Type 2 Diabetes Mellitus (DM) in the Klinik Kesihatan Bandar, Sungai Petani, Kedah.

MATERIALS AND METHODS

A cross-sectional study was conducted among elderly patients with Type 2 DM at the Klinik Kesihatan Bandar, Sungai Petani, Kedah. Elderly patients aged 60 years and above were included.

The Elderly Cognitive Assessment Questionnaire (ECAQ) was used to screen patients with cognitive impairment or memory problem.¹² ECAQ was developed and validated in Singapore and it showed a sensitivity of 85.3%, specificity of 91.5% with a positive predictive value of 82.8%. ECAQ is available in three languages; English, Malay and Chinese. The ECAQ

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consists of three sections; namely, memory (three items), orientation (six items) and memory recall (one item). One mark is given for each correct response with a maximum score often. A score of seven or more is considered to be normal. A score of five or six is borderline dementia, while a score of four or lower is considered as probable dementia. Those who scored less than five, with organic brain syndrome and severe mental disorder were excluded from this study.¹²

Elderly patient aged 60 and above who came for their appointment given were screened based on inclusion and exclusion criteria. Dementia was ruled out based on the ECAQ score. Patients with a score of five or less were excluded from the study. Informed consent was obtained for the participation in the study.

Sample size was calculated based on single proportion formula.¹³ The required sample size is 530 subjects for three months duration. Therefore, the total number of patients required for a month is 177. Thus, the total number of patients required per week is 44. Study was carried out for three days per week. Total number of patients required to be interviewed per day is 14. Based on the attendance list, the average number of elderly patients with Type 2 Diabetes Mellitus who come for follow ups at the clinic is about 50 patients per day. The list of eligible patients will be selected using systematic random sampling (1:3) base on the attendance list.

Consented participants were given a patient information sheet, which gives a brief explanation regarding the objectives and methods used in this research and were asked to answer the ECAQ questionnaires. Any questions or inquiry was addressed by the researcher. The remaining information needed was completed by referring to the patients' case notes. Patients who scored five or less in ECAQ were referred to the medical officer for evaluation and treatment. The time take to answer the ECAQ sheet was approximately eight minutes.

The Malay version of Geriatric Depression Scale (M-GDS-14) is based on the Geriatric Depression Scale (GDS) recommended by the Royal College of Physicians, British Geriatric Society and The Royal College of General Practitioners as a suitable scale to screen for depression in the elderly. However, the original GDS has 30-item (GDS-30), the shorter version of GDS with 15-items (GDS-15) scale was validated against the longer GDS-30 scale, and the GDS-15 is recommended to be used in primary care settings.^{14,15}

The GDS 15 was translated to the Malay language and validated. Item-9 of the GDS-15 was omitted due to its non-discriminatory value in clinical diagnosis of depression and poorly correlated with the total corrected item score, making it a 14-item scale with Cronbach's alpha 0.84, test-retest validity 0.84. Several studies that looked into the prevalence of elderly with depression in Malaysia also used the M-GDS-14 self-administered questionnaire.^{16,17} A cut-off points of five and above for clinical significant depression gives a sensitivity of 95.5% and specificity of 84.2%. At the cut-off point at eight and above for major depression in the elderly gives a sensitivity of 100% and specificity of 92.0%.¹⁸

Table 1: Socio demographic and medical characteristic of the respondents (n=511)

Variables	n (%)	mean (SD)
Age		64.5 (7.0)
Duration of diabetes (years)		8.57(5.57)
HbA1c		7.6(1.68)
Gender		
Male	275 (53.8)	
Female	236 (46.2)	
Race		
Malay	322 (63.0)	
Chinese	48 (9.4)	
Indian	141 (27.6)	
Marital status		
Single	11 (2.2)	
Widow/ divorce	107 (20.9)	
Married	393 (76.9)	
Occupation		
Still working	43 (8.4)	
Retired	349 (68.3)	
Never employed	119 (23.3)	
Education		
No formal education	49 (9.6)	
Primary school	177 (34.6)	
Secondary school	202 (39.5)	
Tertiary education	83 (16.2)	
Income (RM)		
<100	119 (23.3)	
101-300	56 (11.0)	
301-500	41 (8.0)	
501-1000	129 (25.2)	
>1001	166 (32.5)	
Living arrangement		
Alone	38 (7.4)	
With spouse	163 (31.9)	
With children	84 (16.4)	
With spouse and children	140 (16.8)	
With spouse, children and in-laws	20 (3.9)	
With spouse, children, in-laws and grandchildren	52 (10.2)	
Others	14 (2.7)	
Diabetic complication		
No	128 (25.0)	
Yes	383 (75.0)	
Co-morbidities		
No	286 (56.0)	
Yes	225 (44.0)	

SD standard deviation

In this present study, those with a score M-GDS-14 of five or higher are categorised as having depression, while those with score of less than five were categorised as non-depress.¹⁸ Patients who were detected with clinically significant depression were referred for further evaluation and treatment as needed. Patients' case notes were used to obtain detailed information of patients' data regarding presence of co-

Table II: Socio-demographic characteristic of depressed and non-depressed subjects (n=511)

Variables	Non depressed n=347 n (%)	Depressed n=164 n (%)
Age(year)	65 (7.0) ^a	64 (7.0) ^a
Duration of diabetes(year)	8.10 (5.7) ^a	9.48 (5.3) ^a
HbA1c(%)	7.43 (1.56) ^a	8.08 (1.79) ^a
Gender		
Male	187 (68.0)	88 (32.0)
Female	160 (67.8)	76 (32.2)
Race		
Malay	214 (66.0)	110 (34.0)
Chinese	42 (87.5)	6 (12.5)
Indian	91 (65.5)	48 (34.5)
Marital status		
Single	4 (36.4)	7 (63.6)
Widow/ divorce	84 (78.5)	23 (21.5)
Married	257 (65.7)	134 (34.3)
Occupation		
Still working	26 (60.5)	17 (39.5)
Retired	247 (71.2)	100 (28.8)
Never employed	72 (60.5)	47 (39.5)
Education		
No formal education	32(68.1)	15(31.9)
Primary school	131(74.0)	46(26.0)
Secondary school	122(60.4)	80(39.6)
Tertiary education	60(72.3)	23(27.7)
Income (RM)		
<100	84(71.8)	33(28.2)
101-300	38(67.9)	18(32.1)
301-500	27(65.9)	14(34.1)
501-1000	81(62.8)	48(37.2)
>1001	115(69.3)	51(30.7)
Living arrangement		
Alone	25(65.8)	13(34.2)
With spouse	113(69.3)	50(30.7)
with children	76(90.5)	8(9.5)
With spouse and children	86(61.4)	54(38.6)
With spouse, children and in-laws	15(68.2)	7(31.8)
With spouse, children, in-laws and grandchildren	22(42.3)	30(57.7)
Others	8(66.7)	4(33.3)
Diabetic complication		
No	111(86.7)	17(13.3)
Yes	236(61.6)	147(38.4)
Co-morbidities		
No	190(66.4)	96(33.6)
Yes	157(69.8)	68(30.2)

^amean(SD)

morbidities/chronic disease and HbA1c level within the last six months. All answers from the patients were kept strictly confidential.

Data entry and analyses were performed by using Statistical Package for the Social Sciences (SPSS) Statistic version 22. The numerical variable was expressed in mean and standard deviation (SD). As for categorical variables, frequency and

percentage were calculated. Variable with p-value less than 0.05 in the Simple Logistic Regression and thought to be important risk factors of depression were included in the Multivariate Logistic Regression. The forward and backward method was used to predict the associated variables for depression. Based on final model, the variables included in the model will be assessed on their interactions. No significant interactions were found. The dependent variable

Table III: Socio-demographic factors associated with depression among the elderly with Type 2 Diabetes Mellitus by Simple and Multivariate Logistic Regression

Variables	Simple logistic regression		Multivariate logistic regression	
	Crude OR (95%CI)	p-value	Adjusted ORa (95%CI)	p-value
Age(year)	0.984 (0.95, 1.02)	0.333		
Duration of diabetes (year)	1.045 (1.01, 1.08)	0.010		
HbA1c (%)	1.261 (1.13, 1.41)	<0.001	1.234 (1.09, 1.39)	0.001
Gender				
Male	1			
Female	1.022 (0.70, 1.48)	0.013		
Marital status				
Single	1			
Widow / divorce	0.156 (0.04, 0.58)	7.676		
Married	0.298 (0.09, 1.04)	3.627		
Education level				
No formal education	1			
Primary school	0.749 (0.37, 1.51)	0.656		
Secondary school	1.399 (0.71, 2.75)	0.950		
Tertiary education	0.818 (0.38, 1.78)	0.256		
Income level (RM)				
<100	1			
101-300	1.206 (0.61, 2.41)	0.282		
301-500	1.320 (0.62, 2.82)	0.511		
501-1000	1.508 (0.88, 2.58)	2.241		
>1001	1.129 (0.67, 1.90)	0.208		
Living arrangement				
Alone	1		1	
With spouse	0.851 (0.40, 1.80)	0.179	0.903 (0.41, 1.97)	0.903
With children	0.202 (0.08, 0.55)	10.003	0.198 (0.07, 0.55)	0.002
With spouse and children	1.208 (0.57, 2.56)	0.242	1.367 (0.62, 3.01)	0.439
Spouse, children & in-laws	0.641 (0.19, 2.16)	0.516	0.471 (0.14, 1.63)	0.234
Spouse, children, in- laws & grandchildren	2.622 (1.10, 6.24)	4.749	2.948 (1.18, 7.37)	0.021
Others	0.962 (0.24, 3.80)	0.003	0.695 (0.17, 2.81)	0.610
Co-morbidities				
No	1			
Yes	0.848 (0.58, 1.24)	0.736		
Diabetic complications				
No	1		1	
Yes	4.102 (2.37, 7.11)	25.246	4.683 (2.63, 8.35)	<0.001

*Forward LR Multiple Logistic Regression model was applied
 Multicollinearity and interaction term were checked and not found
 Hosmer-Lemeshow test, (p=0.110), classification table (overall correctly classified percentage=75.4%) and area under the ROC curve (76.1%) were applied to check the model fitness.

is depression. The independent variables are gender, marital status, level of education, level of income, living arrangement, duration of diabetes, HbA1c, co-morbidities and diabetic complications.

Ethical approval for this study was received from the USM ethic committee (USM/JEPeM/15010026) and the National Medical Research Register (NMRR-15-1243-24003 (IIR)).

RESULTS

Out of 531 elderly persons included in this study, only 511 persons completed the questionnaire. Twenty of them were excluded due incomplete questionnaires, resulting in a response rate of 96.4%.

The mean (Standard Deviation) age of the respondents was 64.5 (SD7.0) years old with the minimum age at 60 years old and the maximum age is 78 years old. Slightly more than half of the respondents were males (53.8%). Majority of respondents were Malays followed by Indians and Chinese.

Most respondents were married. Only 8.4% of the respondents were working, while the overall household income was less than RM1000 (Table I).

The proportion of depression based on the MDGS-14 questionnaire in the elderly with Type 2 DM attending the Klinik Kesihatan Bandar, Sungai Petani, Kedah was 32.1% (n=164).

Table II shows the socio-demographic of depressed and non-depressed subjects. In the depressed group, majority of the subjects were Malay, married, retired and have diabetic complication. Many of them who were staying with their extended family have poor HbA1c and have suffered from diabetes longer compared to the non-depressed group.

The significant association between living arrangements, HbA1c level and diabetic complications were found with depression among the elderly with Type 2 Diabetes Mellitus is shown in Table III.

DISCUSSION

Many of the studies on the prevalence of depression among the elderly with Type 2 Diabetes Mellitus were done at clinic-based study. Thus, base of M-GDS-14, the prevalence of depression among the elderly with Type 2 Diabetes Mellitus in this study is 32.1%. The finding was similar with a cross-sectional study among elderly diabetic patients in Egypt. The prevalence of depression was 32.1% assessed using the Beck Depression Inventory II (BDI-II).¹⁹ Whereas in India, the prevalence of depression among the elderly with diabetic was measured using the GDS was higher at 41%.²⁰

However, in community-based study such as in Hong Kong, the prevalence of depression among diabetic using GDS was shown to be lower if compared with our clinic-based finding. Chou KL and Chi I in 2005 did their study among 2003 non-institutionalised elderly adults, found that 12.2% of them have diabetes. Of those with diabetes, 26% of them reported to have depressive symptoms.²¹ The different possibly due to their study used different population and bigger sample size which is community-based and their participants were relatively healthier and had lesser co-morbidities as compared to our study participants.

In our study, it is found that medical characteristics are closely linked with depression in elderly diabetic patients. The medical characteristics include HbA1c level and diabetic complications. This finding is supported by a study in Japan that concluded elderly patients with more depressive symptoms are more likely to have longer duration of diabetes and higher levels of HbA1c. They also found that any of the symptoms related to diabetic complication were associated with severe depressive symptoms.²² Gross et al., reported that probability of poor glycaemic control steadily increases with severity of depression. The majority of patients with major depression (55.7%) had HbA1c of 8% or more compared to 42.4% in minimal to mild depression, and 31.9% in patient who were not depressed.²³ Richardson et al., in his study among elderly diabetic also concluded significant higher levels of HbA1c levels among depressed compared to non-depressed elderly patients.²⁴

Diabetic patients with depressive symptoms are less likely to adhere to diabetes self-management. High level of depressive symptoms was found to be inversely associated with being physically active and compliant to a healthy diet plan and low adherence to medications including oral hypoglycaemic agents.^{25,26} This, lead to increase in HbA1c level and more complication among the elderly diabetes.

In this study, elderly who lives with their children were significantly less depressed compared to those who live alone. It has been postulated that the elderly living with children has a protective effect from depression as it may provide good social and financially support. This is supported by a study conducted by Imran et al., showed that the presence of a caretaker is associated with a reduced possibility of depression.¹⁶ On the other hand, another significant finding from our study is when an elderly patient who lives in an extended family (e.g., spouse, children, children in-laws and grandchildren) has higher odds of depression compared to those living alone. Our results are similar to the findings in a study conducted in Korea.²⁷ The reason being that the elderly patient is expected to take care of their grandchildren while their children are at work.

This study has a few limitations. This study only explores the socio-demographic, living arrangements and diabetes status, i.e., duration of diabetes, HbA1c, co-morbidities and diabetic complications in general. The functional ability of the elderly and their health-related quality of life were not explored as factors which may contribute to late life depression. Factors related to specific diabetic complications such as visual problem, limited mobility and high dependency on daily living activity on the basis that diabetic foot, stroke and chronic kidney disease which may also contribute to the state of depression were also not studied.

Nonetheless, it has been shown that the proportion of depression among elderly with Type 2 DM is high in our population. Therefore, it is important to increase our knowledge and awareness among health practitioners and doctors about the screening of depression among the elderly who are diabetic. It is important to detect depression early and manage them appropriately either by referring the patients to the family medicine specialist or to the respective discipline. The public should also be educated to create awareness and understanding that depression is very common among our elderly and it is not a normal ageing process.

Further studies are needed to identify other factors that may contribute to depression in elderly diabetic such as functional ability, quality of life and specific problems related to diabetic complications. The current knowledge, awareness and competency of the health practitioners and doctors in detecting and managing depression also should be explored. It is recommended to involve more centres to conduct this type of study and obtain more representative results.

In conclusion, there is high proportion of depression among the elderly with diabetes in Bandar Sungai Petani Health Clinic. Living arrangement, glycaemic control as measured by HbA1c and diabetic complications are associated with depression among the elderly with Type 2 Diabetes Mellitus.

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